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$\bar{N}N$ AND $\bar{N}D$ INTERACTIONS – A COMPILATION

Particle Data Group

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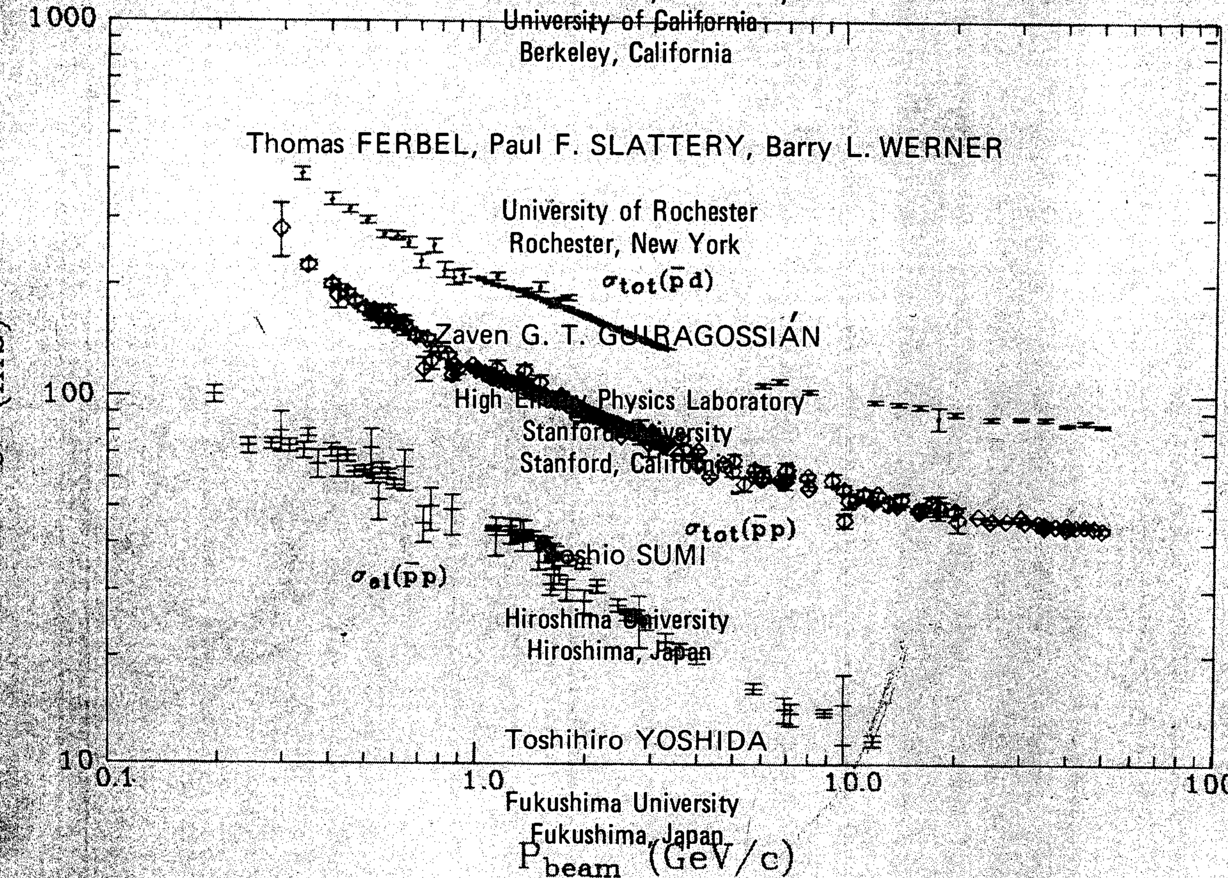

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$\bar{p}p$ Kinematics

P(LAB) (MEV/C)	T(LAB) (MEV)	INV MASS (MEV)	P(CMS) (MEV/C)	4PILAMBARSQ (MB)
0	0	1877	0	
20	0	1877	10	48937.36
40	1	1877	20	12238.51
60	2	1877	30	5442.42
80	3	1878	40	3063.79
100	5	1879	50	1962.81
120	8	1880	60	1364.75
140	10	1882	70	1004.14
160	14	1883	80	770.08
180	17	1885	90	609.60
200	21	1887	99	494.81
220	25	1889	109	409.88
240	30	1892	119	345.27
260	35	1894	129	294.99
280	41	1897	138	255.09
300	47	1900	148	222.90
320	53	1903	158	196.55
340	60	1906	167	174.70
360	67	1910	177	156.39
380	74	1913	186	140.89
400	82	1917	196	127.66
420	90	1921	205	116.26
440	98	1925	214	106.38
460	107	1929	224	97.76
480	116	1933	233	90.19
500	125	1938	242	83.50
520	134	1943	251	77.57
540	144	1947	260	72.28
560	154	1952	269	67.55
580	165	1957	278	63.29
600	175	1962	287	59.45
620	186	1967	296	55.97
640	197	1973	304	52.81
660	209	1978	313	49.93
680	221	1984	322	47.30
700	232	1989	330	44.89
720	244	1995	339	42.67
740	257	2001	347	40.63
760	269	2007	355	38.75
780	282	2013	364	37.00
800	295	2019	372	35.39
820	308	2025	380	33.88
840	321	2031	388	32.49
860	335	2037	396	31.18
880	348	2043	404	29.96
900	362	2049	412	28.82
920	376	2056	420	27.76
940	390	2062	428	26.75
960	404	2069	435	25.81
980	418	2075	443	24.92
1000	433	2082	451	24.09
1020	448	2088	458	23.30
1040	462	2095	466	22.56
1060	477	2102	473	21.85
1080	492	2108	481	21.18
1100	508	2115	488	20.55
1120	523	2122	495	19.95
1140	538	2129	502	19.38
1160	554	2135	510	18.84
1180	569	2142	517	18.32
1200	585	2149	524	17.83
1220	601	2156	531	17.36
1240	617	2163	538	16.91
1260	633	2170	545	16.49
1280	649	2177	552	16.08
1300	665	2184	559	15.69
1320	681	2191	565	15.31
1340	698	2198	572	14.95
1360	714	2205	579	14.61
1380	730	2212	585	14.28
1400	747	2219	592	13.96
1420	764	2226	599	13.66
1440	780	2233	605	13.36
1460	797	2240	612	13.08
1480	814	2247	618	12.81

P(LAB) (MEV/C)	T(LAB) (MEV)	INV MASS (MEV)	P(CMS) (MEV/C)	4PILAMBARSQ (MB)
1500	831	2254	624	12.55
1520	848	2261	631	12.30
1540	865	2268	637	12.06
1560	882	2275	643	11.82
1580	899	2282	650	11.60
1600	917	2289	656	11.38
1620	934	2296	662	11.17
1640	951	2304	668	10.97
1660	969	2311	674	10.77
1680	986	2318	680	10.58
1700	1003	2325	686	10.39
1720	1021	2332	692	10.22
1740	1039	2339	698	10.04
1760	1056	2346	704	9.88
1780	1074	2353	710	9.71
1800	1092	2360	716	9.56
1820	1109	2367	721	9.40
1840	1127	2374	727	9.25
1860	1145	2381	733	9.11
1880	1163	2388	739	8.97
1900	1181	2395	744	8.83
1920	1199	2402	750	8.70
1940	1217	2409	756	8.57
1960	1235	2416	761	8.45
1980	1253	2423	767	8.33
2000	1271	2430	772	8.21
2020	1289	2437	778	8.09
2040	1307	2444	783	7.98
2060	1325	2451	789	7.87
2080	1344	2458	794	7.76
2100	1362	2465	799	7.66
2120	1380	2472	805	7.56
2140	1398	2479	810	7.46
2160	1417	2486	815	7.36
2180	1435	2493	821	7.27
2200	1453	2500	826	7.18
2220	1472	2507	831	7.09
2240	1490	2514	836	7.00
2260	1509	2520	841	6.91
2280	1527	2527	846	6.83
2300	1546	2534	852	6.75
2320	1564	2541	857	6.67
2340	1583	2548	862	6.59
2360	1601	2555	867	6.51
2380	1620	2562	872	6.44
2400	1639	2568	877	6.37
2420	1657	2575	882	6.29
2440	1676	2582	887	6.22
2460	1695	2589	892	6.16
2480	1713	2595	897	6.09
2500	1732	2602	901	6.02
2520	1751	2609	906	5.96
2540	1769	2616	911	5.89
2560	1788	2622	916	5.83
2580	1807	2629	921	5.77
2600	1826	2636	926	5.71
2620	1845	2643	930	5.65
2640	1864	2649	935	5.60
2660	1882	2656	940	5.54
2680	1901	2663	944	5.49
2700	1920	2669	949	5.43
2720	1939	2676	954	5.38
2740	1958	2682	958	5.33
2760	1977	2689	963	5.28
2780	1996	2696	968	5.23
2800	2015	2702	972	5.18
2820	2034	2709	977	5.13
2840	2053	2715	981	5.08
2860	2072	2722	986	5.03
2880	2091	2728	990	4.99
2900	2110	2735	995	4.94
2920	2129	2742	999	4.90
2940	2148	2748	1004	4.86
2960	2167	2755	1008	4.81
2980	2186	2761	1013	4.77

P(LAB) (GEV/C)	T(LAB) (GEV)	INV MASS (GEV)	P(CMS) (GEV/C)	4PILAMBARSQ (MB)
3.0	2.21	2.77	1.02	4.73
3.2	2.40	2.83	1.06	4.35
3.4	2.59	2.89	1.10	4.03
3.6	2.78	2.96	1.14	3.75
3.8	2.98	3.02	1.18	3.50
4.0	3.17	3.08	1.22	3.29
4.2	3.37	3.14	1.26	3.10
4.4	3.56	3.19	1.29	2.93
4.6	3.76	3.25	1.33	2.78
4.8	3.95	3.31	1.36	2.64
5.0	4.15	3.36	1.40	2.51
5.2	4.35	3.42	1.43	2.40
5.4	4.54	3.47	1.46	2.30
5.6	4.74	3.52	1.49	2.20
5.8	4.94	3.58	1.52	2.11
6.0	5.13	3.63	1.55	2.03
6.2	5.33	3.68	1.58	1.96
6.4	5.53	3.73	1.61	1.89
6.6	5.73	3.78	1.64	1.82
6.8	5.93	3.83	1.67	1.76
7.0	6.12	3.87	1.70	1.70
7.2	6.32	3.92	1.72	1.65
7.4	6.52	3.97	1.75	1.60
7.6	6.72	4.02	1.78	1.55
7.8	6.92	4.06	1.80	1.51
8.0	7.12	4.11	1.83	1.47
8.2	7.32	4.15	1.85	1.43
8.4	7.51	4.20	1.88	1.39
8.6	7.71	4.24	1.90	1.35
8.8	7.91	4.29	1.93	1.32
9.0	8.11	4.33	1.95	1.29
9.2	8.31	4.37	1.97	1.26
9.4	8.51	4.41	2.00	1.23
9.6	8.71	4.46	2.02	1.20
9.8	8.91	4.50	2.04	1.17
10.0	9.11	4.54	2.07	1.15
10.5	9.60	4.64	2.12	1.09
11.0	10.10	4.74	2.18	1.03
11.5	10.60	4.84	2.23	.98
12.0	11.10	4.93	2.28	.94
12.5	11.60	5.03	2.33	.90
13.0	12.10	5.12	2.38	.86
13.5	12.59	5.21	2.43	.83
14.0	13.09	5.30	2.48	.80
14.5	13.59	5.39	2.53	.77
15.0	14.09	5.47	2.57	.74
16.0	15.09	5.64	2.66	.69
17.0	16.09	5.81	2.75	.65
18.0	17.09	5.97	2.83	.61
19.0	18.08	6.12	2.91	.58
20.0	19.08	6.27	2.99	.55
22.0	21.08	6.56	3.14	.49
24.0	23.08	6.84	3.29	.45
26.0	25.08	7.11	3.43	.42
28.0	27.08	7.37	3.56	.39
30.0	29.08	7.62	3.69	.36
32.0	31.08	7.86	3.82	.34
34.0	33.07	8.10	3.94	.32
36.0	35.07	8.33	4.06	.30
38.0	37.07	8.55	4.17	.28
40.0	39.07	8.77	4.28	.27
42.0	41.07	8.98	4.39	.25
44.0	43.07	9.18	4.50	.24
46.0	45.07	9.39	4.60	.23
48.0	47.07	9.58	4.70	.22
50.0	49.07	9.78	4.80	.21
55.0	54.07	10.25	5.04	.19
60.0	59.07	10.69	5.26	.18
65.0	64.07	11.12	5.48	.16
70.0	69.07	11.54	5.69	.15
80.0	79.07	12.32	6.09	.13
90.0	89.07	13.06	6.46	.12
100.0	99.07	13.76	6.82	.11
200.0	199.06	19.42	9.66	.05
500.0	499.06	30.66	15.30	.02

$\bar{N}N$ AND $\bar{N}D$ INTERACTIONS – A COMPILATION

Particle Data Group

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ABSTRACT – We compile 181 papers reporting $\bar{p}p$, $\bar{p}n$, $\bar{p}d$, $\bar{n}p$, $\bar{n}n$, and $\bar{n}d$ reactions in flight for beam momenta up to 50 GeV/c. We display, as a function of incident momentum, total and channel cross sections, elastic and two-body inelastic differential cross sections, and polarization in elastic scattering, as well as our fits to the elastic differential cross sections. We also provide indices to the papers, as well as a complete listing of the selected data. The approximate cutoff data for the literature search for this report was September 1, 1971.

*The Berkeley Particle Data Group is jointly supported by the U. S. Atomic Energy Energy Commission, the National Science Foundation, and the office of Standard Reference Data of the National Bureau of Standards.

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Section I.

GENERAL PROCEDURES

Introduction

This is the fifth in a continuing series of reports on cross-section data compiled by the Particle Data Group. (The first three reports were labeled UCRL-20 000, but the fourth and all subsequent reports are labeled LBL-50 through LBL-59.) In this series we collect and display total and channel cross sections, differential cross sections, polarizations, and other data. Each report is devoted to a particular incident channel. The present volume concerns $\bar{N}N$ reactions in flight (the previous four reports dealt with K^+N, YN, NN, and $K^0_L N$ interactions). In the near future we expect to issue the π^+N compilation; other channels will follow eventually. The reports will be updated periodically.

The system from which these reports are derived is a computerized one, having at its nucleus a computer-searchable data tape containing information encoded from various articles. Sometime in the future we hope to be able to answer specific user requests for information from our data tape.

Listed below are the names of the many physicists who are working on, or have recently worked on, these reports:

I. System Development (LBL)

Alan Rittenberg
Arthur Rosenfeld

II. Encoding and Verifying Data, Editing Reports, Fitting Data

James Enstrom (LBL)
Zaven Guiragossián (Stanford)
Victor Henri (LBL)
Thomas Lasinski (LBL)
Thomas Trippe (LBL)
Fumiyo Uchiyama (LBL)

III. Reading and Evaluating Articles, and Analyzing Compiled Data in:

π^-N Interactions

*Alan Thorndike (BNL)
Thomas Trippe (LBL)
Frank Turkot (BNL)

π^+N Interactions

Victor Henri (LBL)
Thomas Lasinski (LBL)
*Henry Lubatti (Univ. of Wash.)
Thomas Trippe (LBL)
Fred Winkelmann (SLAC)
James Wolfson (M. I. T.)

K^-N Interactions—below 2.0 GeV/c

*Claude Bricman (CERN)
Thomas Lasinski (LBL)

K^-N Interactions—above 2.0 GeV/c

J. Badier (Ecole Polytechnique)
*Enzo Flaminio (BNL)
G. Kayas (Ecole Polytechnique)
Thomas Lasinski (LBL)
Brian Musgrave (ANL)

$K^0_L N$ Interactions

James Loos (SLAC)
*Fumiyo Uchiyama (LBL)

K^+N Interactions

Odette Benary (Tel-Aviv)
*Roger Bland (Ecole Polytechnique)
Victor Henri (LBL)
LeRoy Price (U. C. Irvine)
Naomi Schmidt (Brandeis)
Charles Wohl (Oxford)

NN Interactions

Gideon Alexander (Tel-Aviv)
*Odette Benary (Tel-Aviv)
LeRoy Price (U. C. Irvine)

$\bar{N}N$ Interactions

James Enstrom (LBL)
*Tom Ferbel (Rochester)
Zaven Guiragossián (Stanford)
Paul Slattery (Rochester)
Yoshio Sumi (Hiroshima)
Barry Werner (Rochester)
Toshihiro Yoshida (Fukushima)

YN Interactions

Gideon Alexander (Tel-Aviv)
*Odette Benary (Tel-Aviv)
LeRoy Price (U. C. Irvine)

*"Chairman"

If you have any suggestions for improving these reports, please let us know. Our address is:

Particle Data Center
Lawrence Berkeley Laboratory
Berkeley, California 94720

(415) 843-2740, Ext. 6301 or 5885; nights, weekends, and holidays, call 642-0807.

Scope of Compilation Series

1. We collect all experimental high-energy physics results that can be represented by simple tables or graphs, i.e., σ, $d\sigma/d\Omega$, polarizations, etc.

We leave it to Data Summary Tape Libraries to store Dalitz plots or other $\geq$ 2-dimensional displays (although the presence of such data is indicated on our KEYWORDS). In any case our printed compilations should serve as a necessary "table of contents" to a DST Library.

2. The data come primarily from published journals, e.g., Physical Review, Physical Review Letters, Nuclear Physics, Physics Letters, Nuovo Cimento, etc.

We do also compile unpublished theses and conference reports — if the reports give enough information to permit a valid evaluation of the experiment and analysis.

We do not record data that appear in abstract form only, nor do we generally accept preprints unless the article has already been accepted for publication.

3. The compilation is to be complete from no later than January 1968. Before that time we enter data that are particularly important.

Data Handling

In order to make this compilation as accurate and complete as possible, a large number of steps, involving several physicists and a secretary/assistant, are necessary. The list below indicates the most important steps that every article must go through in order to have its information entered onto the DATA TAPE (the magnetic tape that contains all of our data).

a) The "reader," a physicist, finds a relevant article, reads it, marks the data to be encoded, and records on a special form certain additional information.

b) The article is logged in by the secretary/assistant, who also transcribes the bibliographic information, such as title, authors, abstract, etc., onto encoding forms.

c) A physicist, usually different from the reader, transcribes the data selected by the reader onto encoding forms. Additional data may be added at the discretion of this second physicist. Data contained in figures, such as differential cross sections, are converted into tabular form by using a "graph-pen," which is an x-y digitizing plane and electronic pen with automated read-out.

d) The data on encoding forms are key punched onto computer cards and "graph pen" data are also outputted onto computer cards.

e) The resulting deck is entered onto a temporary DATA TAPE by the program DATAPE. Gross errors (such as missing cards or information) are detected immediately by DATAPE. If there are such errors, the deck is corrected and processed.

f) When the data deck has been successfully processed, the temporary DATA TAPE is read by the program SKELM, which makes a listing of all the information stored for each article. This listing is examined carefully by the secretary/assistant and the encoding physicist. Any errors found are corrected and steps e) and f) repeated.

g) When no more errors can be found, the SKELM output is examined by the original reader and compared again with the article. Any further errors are corrected.

h) Finally the encoding physicist makes a last check and marks the article to indicate it has had its final verification.

i) The article is entered onto a permanent DATA TAPE.

All the above is just to get the data onto the DATA TAPE. When preparing a report such as this, many additional tasks are involved. A few typical ones are:

a) Collecting all the data on a particular set of reactions — plotting them, looking at systematic errors, and removing obviously bad data.

b) Ironing out normalization differences between experiments.

c) Worrying about the various ways in which different authors make resonance cuts and subtractions.

d) Deciding what types of curves (if any) should be fit to certain classes of data.

Collaboration with Other Groups

Some physicists in Europe have formed a group called HERA (High Energy Reactions Analysis) to also compile cross-section data. We are trying to keep in close contact with one another in order to minimize duplication of effort both in programming and data collection.

We also cooperate with HERA on report distribution: LBL prints and distributes both HERA and our reports for the Western Hemisphere and Japan, and CERN does the same for the rest of the world.

Other Cross-Section Compilations

We present below (in chronological order) all of the previous large cross-section compilations that we know of. In addition to just listing data, some of them have nice reviews, perform various fits to the data, etc.

- V. S. Barashenkov and V. M. Maltsev, Cross Sections for Elementary Particle Interactions, Fortsch. Physik 9, 549 (1961).
- V. S. Barashenkov and J. Patera, Cross Sections for Antinucleon Production, Fortsch. Physik 11, 469 (1963).
- V. S. Barashenkov and J. Patera, Strange Particle Production, Fortsch. Physik 11, 479 (1963).
- M. N. Focacci and G. Giacomellio Pion Proton Elastic Scattering, CERN 66-18 (1966).
- J. T. Beale, S. D. Ecklund, and R. L. Walker, Pion Photoproduction Data Below 1.5 GeV, CALT-68-108 (1966).
- H. Yukawa, ed., Experimental Data on Hadron Interactions in GeV Region, Supplement of the Progress of Theoretical Physics (Kyoto), Extra Number (1967).
- P. K. Williams, D. M. Levine, J. A. Koschik, References and Some Two-Body Data for High Energy Reactions, University of Michigan, 1967 (unpublished).
- G. Alexander, O. Benary, and U. Maor, Data Compilation of Proton-Proton Interactions Between 1 and 32 GeV/c, Nucl. Phys. B5, 1 (1968).
- G. Alexander, O. Benary, and U. Maor, Data Compilation of Baryon-Baryon Interactions. (II) Proton-Neutron Collisions Between 1 and 27 GeV/c, Nucl. Phys. B7, 281 (1968).
- G. Alexander, O. Benary, U. Karshon, and U. Maor, Data Compilation of Baryon-Baryon Interactions. (III) Hyperon-Proton Collisions, Nucl. Phys. B10, 554 (1969).
- W. Galbraith, Hadron-Nucleon Total Cross Sections at High Energies, Rep. Progr. Phys. 32, 547 (1969).
- † G. Giacomelli, P. Pini, and S. Stagni, A Compilation of Pion-Nucleon Scattering Data, CERN/HERA 69-1 (1969).
- B. Sadoulet, Data Compilation of Antiproton-Proton Reactions into Antihyperon-Hyperon, CERN/HERA 69-2 (1969).
- G. Giacomelli, A Compilation of Total and Total Elastic Cross Sections, CERN/HERA 69-3 (1969).

• Particle Data Group (L. R. Price, N. Barash-Schmidt, O. Benary, R. W. Bland, A. H. Rosenfeld, C. G. Wohl), A Compilation of K^+N Reactions, UCRL-20 000 K^+N (1969).

† • Particle Data Group (D. J. Herndon, A. Barbaro-Galtieri, A. H. Rosenfeld), πN Particle Wave Amplitudes; A Compilation, UCRL-20 030 πN(1970).

• Particle Data Group (O. Benary, N. Barash-Schmidt, L. R. Price, A. H. Rosenfeld, G. Alexander), A Compilation of YN Reactions, UCRL-20 000 YN (1970).

• G. C. Fox and C. Quigg, Compilation of Elastic Scattering Data, UCRL-20 001 (Jan. 1970).

• P. Spillantini and V. Valente, A Collection of Pion Protoproduction Data. I— From the Threshold to 1.5 GeV, CERN/HERA 70-1 (1970).

† • J. D. Hansen, D. R. O. Morrison, N. Tovey, E. Flaminio, Compilation of Cross Sections. I — Proton Induced Reactions, CERN/HERA 70-2 (1970).

† • E. Flaminio, J. D. Hansen, D. R. O. Morrison, N. Tovey, Compilation of Cross Sections. II — Antiproton Induced Reactions, CERN/HERA 70-3 (1970).

† • E. Flaminio, J. D. Hansen, D. R. O. Morrison, N. Tovey, Compilation of Cross Sections. III — K^+ Induced Reactions, CERN/HERA 70-4 (1970).

† • E. Flaminio, J. D. Hansen, D. R. O. Morrison, N. Tovey, Compilation of Cross Sections. IV — π^+ Induced Reactions, CERN/HERA 70-5 (1970).

† • E. Flaminio, J. D. Hansen, D. R. O. Morrison, Compilation of Cross Sections. V — K^- Induced Reactions, CERN/HERA 70-6 (1970).

† • E. Flaminio, J. D. Hansen, D. R. O. Morrison, N. Tovey, Compilation of Cross Sections. VI — π^- Induced Reactions. CERN/HERA 70-7 (1970).

• O. Benary, L. R. Price, G. Alexander, NN and ND Interactions (above 0.5 GeV/c) — A Compilation, UCRL-20 000 NN (August 1970).

• P. Joos, Compilation of Photoproduction Data above 1.2 GeV, DESY/HERA 70-1.

• G. Giacomelli, Total Cross Section Measurements, Progress. in Nuclear Physics 12, part 2, Oxford; Pergomon Press Ltd. (1970).

Acknowledgments

We would like to thank Professor Arthur H. Rosenfeld for his constant interest, support, and advice. We also wish to thank several of our colleagues, without whose aid this report would not have been possible: Dr. Alan Rittenberg helped in organizing the book and in the programming; Marjorie Hutchinson developed and perfected the programs for the plots and data tables; Jane Zoba handled the bibliographic information, typed the text, and proofread the report; Betty Armstrong helped in putting the report together; Professor LeRoy Price did much of the original development of the system; Drs. Thomas Lasinski and Thomas Trippe made several valuable suggestions; and Dr. David Miller of MIT helped read articles in the early phases of this work.

† For the articles marked with a dagger (†) the Particle Data Group can provide BCD tapes of the compiled data.

Section II.

$\bar{N}N$ AND $\bar{N}D$ REACTIONS

Scope of This Compilation

The present compilation presents 5000 points of channel cross section, differential cross section, and polarization data contained in 181 papers dealing with $\bar{p}p$, $\bar{p}n$, $\bar{p}d$, $\bar{n}p$, $\bar{n}n$, or $\bar{n}d$ interactions in flight. We include all papers published before September 1, 1971, and a few selected papers after that date. The articles that we use have been located through a manual search of Nuclear Science Abstracts as well as recent volumes of physics journals. In addition, we have ascertained that we have included all relevant references given in other compilations and original articles. The journals that we have examined in our literature search are:

Australian Journal of Physics
Helvetica Physica Acta
Nuclear Physics
Nukleonika
Nuovo Cimento
Nuovo Cimento Letters
Physical Review
Physical Review Letters
Physics Letters
Reviews of Modern Physics
Soviet Journal of Nuclear Physics

Organization and Treatment of Data

The organization of data is indicated in the Table of Contents. For the cross-section data, each final state has been given a unique reaction number, which is specified in a list given at the beginning of the data presentation. The list proceeds from the simplest to the most complicated categories of final states. Within a given category the final states are listed in order of increasing number of pions in the final state, with single- and double-resonance production coming at the end. Also, within a given category the resonances are listed alphabetically, with pion resonances coming before kaon resonances. Whenever data are given separetly for a reaction and its charge conjugate, we also give the sum [e. g., $\sigma(\bar{p}n\pi^+ + c.c) = \sigma(\bar{p}n\pi^+) + \sigma(\bar{p}n\pi^-)$]. We assume CP invariance in calculating the sum if the charge conjugate reaction is not measured.

The interaction of antiprotons with protons is distinguished by a rich variety of final states. These final states can be categorized according to the following reaction types, as given in the Table of Contents:

1. Total
2. Elastic
3. Topological prongs
4. Production of antileptons and leptons
5. Annihilation into pions
6. Annihilation into kaons (and pions)
7. Charge exchange
8. Pion production without annihilation
9. Production of antihyperons and hyperons
10. Associated production of hyperons and kaons

The presence of many competing reactions and the exothermic nature of the annihilation process make it experimentally rather difficult to obtain large and unbiased samples of bubble chamber data for any one specific channel. This is particularly true for final states contained in categories 6, 9, and 10. Also, the paucity of antiproton flux and of separated antiproton beams at present-day accelerators, especially when compared with the intensities available for γ, $e^{\pm}$, $\pi^{\pm}$, $K^{\pm}$, and proton beams, has until recently tended to deter extensive studies of $\bar{N}N$ interactions through counter and/or spark chamber techniques. It is therefore not surprising that the quality of much of the available $\bar{N}N$ data is relatively poor.

The data contained in this compilation have, to a certain extent, been edited as well as compiled by us. For example, when an experimental group reported somewhat different results from the same experiment in two or more separate publications without specifying which part of the data was being superseded, we chose to present the results that seemed to us to be more final. Our editing has also extended to exclude obviously repeated or superseded data. Furthermore, we have excluded data that we thought to be unreliable or not presented in a clear enough manner. We have chosen to list upper limits to production cross sections for only the simplest final states. In general, cross sections given without errors have not been used. Also, cross sections for the sum of various final states (e. g., $pp \rightarrow \bar{K}K\pi\pi$, independent of charge) have not been compiled. We have decided to show plots of cross section versus beam momentum for reactions with at least five data points.

Following the cross-section data, we give the differential cross sections for antiproton-proton elastic scattering. All of the data have been converted to the invariant square of the momentum transfer. For the elastic cross section data, we have presented the authors' fits to their data, whenever given, along with our fits to all the data. We have assumed a simple exponential form for the differential cross sections, i. e., $d\sigma/dt = d\sigma/dt)_{t=0}\, e^{bt} \equiv a\, e^{-b|t|}$. We have fit the data over various t-ranges from $|t| = 0.0\ (GeV/c)^2$ to $0.4\ (GeV/c).^2$

Next, we present differential cross sections for two-body final states in antiproton-proton inelastic scattering. Again, all of the data have been converted to the invariant square of the momentum transfer between the antiproton and the antiparticle in the final state (this often requires the approximation of a narrow width for a resonance). In addition, we have always normalized the two-body inelastic differential cross sections to the cross section for the given channel. At times this required a certain amount of intelligent guessing, because the papers were not always precise in their content. We have excluded differential cross section spectra that we felt to be of poor statistical quality.

Finally, we give measurements of polarization in antiproton-proton elastic scattering. These data have also been converted to a dependence on the invariant square of the momentum transfer.

Following the tables and figures of data described above, we have a section listing the 181 original sources from which the data are derived. For each article we give the basic bibliographic information, which includes the authors, the title, the abstract, the journal reference, other closely related articles, the beam momentum, the target, the type of detector, the number of events taken, and keywords describing the basic data content of the article. Also we give all the compiled data in the form in which it appeared in the article. Comments pertinent to the methods used by the authors for the extraction of the data, such as special systematic errors, types of fits, and resonance mass cuts, have been provided to aid the reader in the evaluation of the results. We urge the users of the present volume to refer to these comments for clarification of the compiled data. We trust that authors who detect any errors in their displayed results will report the problems to the Particle Data Group. Also we would appreciate receiving any improved but unpublished data that the authors would be willing to send us.

We conclude our report with several indices: an index of references by beam momentum; a keyword index of references; the list of references, alphabetical by first author; the reference list titles; and a list of related reveiw articles. A list of previous compilations is given in Section I.

$\bar{N}N$ and $\bar{N}D$ Total and Channel Cross Sections

Numerical List of All Reactions

Reaction

$\bar{p}p$ total cross section

[1] $\bar{p}p \to$ total

$\bar{p}p$ elastic cross section

[2] $\bar{p}p \to$ elastic

prongs

[3] $\bar{p}p \to 0$ prong

[4] $\bar{p}p \to 2$ prong

[5] $\bar{p}p \to 4$ prong

[6] $\bar{p}p \to 6$ prong

[7] $\bar{p}p \to 8$ prong

production of antileptons and leptons

[8] $\bar{p}p \to e^+e^-$

[9] $\bar{p}p \to \mu^+\mu^-$

annihilation into pions

[10] $\bar{p}p \to \pi^+\pi^-$

[11] $\bar{p}p \to \pi^+\pi^-\pi^0$

[12] $\bar{p}p \to \pi^+\pi^- MM \geqq 2\pi^0$

[13] $\bar{p}p \to 2$ prong pion annihilation

[14] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-$

[15] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0$

[16] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$

[17] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0\pi^0$

[18] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0\pi^0\pi^0$

[19] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0\pi^0\pi^0\pi^0$

[20] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^- MM \geqq 2\pi^0$

[21] $\bar{p}p \to 4$ prong pion annihilation

[22] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$

[23] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$

[24] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0\pi^0$

[25] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0\pi^0\pi^0$

[26] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0\pi^0\pi^0\pi^0$

[27] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^-\pi^-\pi^- MM \geqq 2\pi^0$

[28] $\bar{p}p \to 6$ prong pion annihilation

[29] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-$

[30] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^0$

[31] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^0\pi^0$

[32] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^0\pi^0\pi^0$

[33] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^- MM \geqq 2\pi^0$

[34] $\bar{p}p \to 8$ prong pion annihilation

[35] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^-$

[36] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^-\pi^0$

[37] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^- MM \geqq 2\pi^0$

[38] $\bar{p}p \to 10$ prong pion annihilation

[39] $\bar{p}p \to$ total pion annihilation

[40] $\bar{p}p \to A_2^+\pi^-$ + c.c.
$\hookrightarrow \rho^0\pi^+$

Reaction

[41] $\bar{p}p \to A_2^+\pi^-\pi^0$ + c.c.
$\hookrightarrow \rho^0\pi^+$

[42] $\bar{p}p \to A_2^0\pi^+\pi^-$
$\hookrightarrow \rho^+\pi^-$ + c.c.

[43] $\bar{p}p \to B^+\pi^-$ + c.c.
$\hookrightarrow \omega\pi^+$

[44] $\bar{p}p \to E\pi^0$
$\hookrightarrow \rho^0\pi^+\pi^-$

[45] $\bar{p}p \to \eta\pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-\pi^0$

[46] $\bar{p}p \to \eta\pi^+\pi^+\pi^-\pi^-$
$\hookrightarrow \pi^+\pi^-\pi^0$

[47] $\bar{p}p \to f\pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$

[48] $\bar{p}p \to f\pi^+\pi^-\pi^0$
$\hookrightarrow \pi^+\pi^-$

[49] $\bar{p}p \to f\pi^+\pi^+\pi^-\pi^-$
$\hookrightarrow \pi^+\pi^-$

[50] $\bar{p}p \to \omega\pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-\pi^0$

[51] $\bar{p}p \to \omega\pi^+\pi^+\pi^-\pi^-$
$\hookrightarrow \pi^+\pi^-\pi^0$

[52] $\bar{p}p \to \rho^0\pi^0$
$\hookrightarrow \pi^+\pi^-$

[53] $\bar{p}p \to \rho^0\pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$

[54] $\bar{p}p \to \rho^0\pi^+\pi^-\pi^0$
$\hookrightarrow \pi^+\pi^-$

[55] $\bar{p}p \to \rho^0\pi^+\pi^+\pi^-\pi^-$
$\hookrightarrow \pi^+\pi^-$

[56] $\bar{p}p \to \rho^0\pi^+\pi^+\pi^-\pi^-\pi^0$
$\hookrightarrow \pi^+\pi^-$

[57] $\bar{p}p \to \rho^+\pi^-$ + c.c.
$\hookrightarrow \pi^+\pi^0$

[58] $\bar{p}p \to \rho^+\pi^+\pi^-\pi^-$ + c.c.
$\hookrightarrow \pi^+\pi^0$

[59] $\bar{p}p \to \rho^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + c.c.
$\hookrightarrow \pi^+\pi^0$

[60] $\bar{p}p \to f\rho^0$
$\hookrightarrow \pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$

[61] $\bar{p}p \to \omega\rho^0\pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-\pi^0$

[62] $\bar{p}p \to \rho^0\rho^0$
$\hookrightarrow \pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$

[63] $\bar{p}p \to \rho^0\rho^0\pi^0$
$\hookrightarrow \pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$

[64] $\bar{p}p \to \rho^0\rho^0\pi^+\pi^-\pi^0$
$\hookrightarrow \pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-$

Reaction

annihilation into kaons (and pions)

[65] $\bar{p}p \to K^0\bar{K}^0$

[66] $\bar{p}p \to K^0_S K^0_S$

[67] $\bar{p}p \to K^0_S K^0_S \pi^0$

[68] $\bar{p}p \to K^0_S K^0_S MM \geq 2\pi^0$

[69] $\bar{p}p \to K^0_S K^0_S \pi^+\pi^-$

[70] $\bar{p}p \to K^0_S K^0_S \pi^+\pi^-\pi^0$

[71] $\bar{p}p \to K^0_S K^0_S \pi^+\pi^- MM \geq 2\pi^0$

[72] $\bar{p}p \to K^0_S K^0_S \pi^+\pi^+\pi^-\pi^-$

[73] $\bar{p}p \to K^0_S K^0_S \pi^+\pi^+\pi^-\pi^-\pi^0$

[74] $\bar{p}p \to K^0_S K^0_S \pi^+\pi^+\pi^-\pi^- MM \geq 2\pi^0$

[75] $\bar{p}p \to K^0_S K^0_L$

[76] $\bar{p}p \to K^0_S K^0_L \pi^+\pi^-$

[77] $\bar{p}p \to K^0_S K^0 \pi^+\pi^-$

[78] $\bar{p}p \to K^0_S K^0_L \pi^+\pi^+\pi^-\pi^-$

[79] $\bar{p}p \to K^0_S K^0 \pi^+\pi^+\pi^-\pi^-$

[80] $\bar{p}p \to K^+K^-$

[81] $\bar{p}p \to K^+K^-\pi^+\pi^-$

[82] $\bar{p}p \to K^+K^-\pi^+\pi^-\pi^0$

[83] $\bar{p}p \to K^+K^0_S\pi^-$

[84] $\bar{p}p \to K^-K^0_S\pi^+$

[85] $\bar{p}p \to K^+K^0_S\pi^-$ + c.c.

[86] $\bar{p}p \to K^+K^0_S\pi^-\pi^0$

[87] $\bar{p}p \to K^+K^0_S\pi^-\pi^0$ + c.c.

[88] $\bar{p}p \to K^+K^0_S\pi^- MM \geq 2\pi^0$

[89] $\bar{p}p \to K^+K^0_S\pi^- MM \geq 2\pi^0$ + c.c.

[90] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-$

[91] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-$ + c.c.

[92] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-\pi^0$

[93] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-\pi^0$ + c.c.

[94] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^- MM \geq 2\pi^0$

[95] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^- MM \geq 2\pi^0$ + c.c.

[96] $\bar{p}p \to K^0_S\pi^+\pi^- MM \geq \pi^0 K^0$

[97] $\bar{p}p \to K^0_S\pi^+\pi^+\pi^-\pi^- MM \geq \pi^0 K^0$

[98] $\bar{p}p \to$ total kaon annihilation

[99] $\bar{p}p \to$ total annihilation

[100] $\bar{p}p \to \omega K^0_S K^0_S$
$\hookrightarrow \pi^+\pi^-\pi^0$

[101] $\bar{p}p \to \omega K^0_S K^0_S \pi^+\pi^-$
$\hookrightarrow \pi^+\pi^-\pi^0$

[102] $\bar{p}p \to \omega K^+ K^0_S \pi^-$ + c.c.
$\hookrightarrow \pi^+\pi^-\pi^0$

[103] $\bar{p}p \to \phi\pi^+\pi^-$
$\hookrightarrow K^0_S K^0_L$

[104] $\bar{p}p \to \rho^0 K^0_S K^0_S$
$\hookrightarrow \pi^+\pi^-$

[105] $\bar{p}p \to \rho^0 K^0_S K^0_S \pi^0$ + $\rho^+ K^0_S K^0_S \pi^-$ + c.c.
$\rho^0 \hookrightarrow \pi^+\pi^-$, $\rho^+ \hookrightarrow \pi^+\pi^0$

Reaction

[106] $\bar{p}p \to \rho^+ K^- K^0_S$ + c.c.
$\hookrightarrow \pi^+\pi^0$

[107] $\bar{p}p \to D\pi^0$
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.

[108] $\bar{p}p \to D\pi^0$
$\hookrightarrow \rho^0\pi^+\pi^-$

[109] $\bar{p}p \to D\pi^+\pi^-$
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.

[110] $\bar{p}p \to K^*(890)^0 K^+\pi^-$ + c.c.
$\hookrightarrow K^0_S\pi^0$

[111] $\bar{p}p \to K^*(890)^0 K^0_S$
$\hookrightarrow K^+\pi^-$ + c.c.

[112] $\bar{p}p \to K^*(1420)^0 K^0_S$
$\hookrightarrow K^+\pi^-$ + c.c.

[113] $\bar{p}p \to K^*(890)^+ K^-$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[114] $\bar{p}p \to K^*(1420)^+ K^-$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[115] $\bar{p}p \to K^*(890)^+ K^-\pi^0$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[116] $\bar{p}p \to K^*(890)^+ K^-\pi^+\pi^-$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[117] $\bar{p}p \to K^*(890)^0 K^0_S$
$\hookrightarrow K^0_S\pi^0$

[118] $\bar{p}p \to K^*(890)^0 K^0_S\pi^+\pi^-$
$\hookrightarrow K^0_S\pi^0$

[119] $\bar{p}p \to K^*(890)^0 K^0_S\pi^+\pi^-$
$\hookrightarrow K^+\pi^-$ + c.c.

[120] $\bar{p}p \to K^*(890)^0 K^0_S\pi^+\pi^+\pi^-\pi^-$
$\hookrightarrow K^0_S\pi^0$

[121] $\bar{p}p \to K^*(890)^+ K^0_S\pi^-$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[122] $\bar{p}p \to K^*(890)^+ K^0_S\pi^-\pi^0$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[123] $\bar{p}p \to K^*(890)^+ K^0_S\pi^+\pi^-\pi^-$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[124] $\bar{p}p \to K^*(890)^+ K^0_S\pi^+\pi^-\pi^-\pi^0$ + c.c.
$\hookrightarrow K^0_S\pi^+$

[125] $\bar{p}p \to D\eta$
$\hookrightarrow \pi^+\pi^-\pi^0$
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.

[126] $\bar{p}p \to D\eta$
$\hookrightarrow$ neutrals
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.

[127] $\bar{p}p \to D\omega$
$\hookrightarrow \pi^+\pi^-\pi^0$
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.

[128] $\bar{p}p \to D\omega$
$\hookrightarrow$ neutrals
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.

[129] $\bar{p}p \to D\rho^0$
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.
$\hookrightarrow \pi^+\pi^-$

[130] $\bar{p}p \to D\rho^0$
$\hookrightarrow K^+K^0_S\pi^-$ + c.c.
$\hookrightarrow \pi^+\pi^-$
$\hookrightarrow K^0_S K^0_S\pi^0$

Reaction

charge exchange

[131] $\bar{p}p\to\bar{n}n$

pion production without annihilation

[132] $\bar{p}p\to\bar{n}n\pi^+\pi^-$

[133] $\bar{p}p\to\bar{p}p\pi^0$

[134] $\bar{p}p\to\bar{p}p\pi^+\pi^-$

[135] $\bar{p}p\to\bar{p}p\pi^+\pi^-\pi^0$

[136] $\bar{p}p\to\bar{p}p\pi^+\pi^+\pi^-\pi^-$

[137] $\bar{p}p\to\bar{p}p\pi^+\pi^+\pi^-\pi^-\pi^0$

[138] $\bar{p}p\to\bar{p}n\pi^+$

[139] $\bar{p}p\to\bar{n}p\pi^-$

[140] $\bar{p}p\to\bar{p}n\pi^+$ + c.c.

[141] $\bar{p}p\to\bar{p}n\pi^+\pi^+\pi^-$

[142] $\bar{p}p\to\bar{n}p\pi^+\pi^-\pi^-$

[143] $\bar{p}p\to\bar{p}n\pi^+\pi^+\pi^-$ + c.c.

[144] $\bar{p}p\to\bar{p}n\pi^+\pi^+\pi^+\pi^-\pi^-$ + c.c.

[145] $\bar{p}p\to\bar{p}\bar{p}pp$

[146] $\bar{p}p\to\eta\bar{p}p$
$\quad\hookrightarrow\pi^+\pi^-\pi^0$

[147] $\bar{p}p\to\omega\bar{p}p$
$\quad\hookrightarrow\pi^+\pi^-\pi^0$

[148] $\bar{p}p\to\Delta(1238)^{++}\bar{p}\pi^-$
$\quad\hookrightarrow p\pi^+$

[149] $\bar{p}p\to\bar{\Delta}(1238)^{--}p\pi^+$
$\quad\hookrightarrow\bar{p}\pi^-$

[150] $\bar{p}p\to\Delta(1238)^{++}\bar{p}\pi^-$ + c.c.
$\quad\hookrightarrow p\pi^+$

[151] $\bar{p}p\to\Delta(1238)^{++}\bar{p}\pi^-\pi^0$
$\quad\hookrightarrow p\pi^+$

[152] $\bar{p}p\to\bar{\Delta}(1238)^{--}p\pi^+\pi^0$
$\quad\hookrightarrow\bar{p}\pi^-$

[153] $\bar{p}p\to\Delta(1238)^{++}\bar{p}\pi^-\pi^0$ + c.c.
$\quad\hookrightarrow p\pi^+$

[154] $\bar{p}p\to\Delta(1238)^{++}\bar{p}\pi^+\pi^-\pi^-$ + c.c.
$\quad\hookrightarrow p\pi^+$

[155] $\bar{p}p\to\bar{\Delta}(1238)^{--}\Delta(1238)^{++}$
$\quad\hookrightarrow\bar{p}\pi^-$; $\Delta(1238)^{++}\hookrightarrow p\pi^+$

[156] $\bar{p}p\to\bar{\Delta}(1238)^{--}\Delta(1238)^{++}\pi^0$
$\quad\hookrightarrow\bar{p}\pi^-$; $\Delta(1238)^{++}\hookrightarrow p\pi^+$

production of antihyperons and hyperons

[157] $\bar{p}p\to\bar{\Lambda}\Lambda$

[158] $\bar{p}p\to\bar{\Lambda}\Lambda\pi^0$

[159] $\bar{p}p\to\bar{\Lambda}\Lambda MM\geq 2\pi^0$

[160] $\bar{p}p\to\bar{\Lambda}\Lambda\pi^+\pi^-$

[161] $\bar{p}p\to\bar{\Lambda}\Lambda\pi^+\pi^-\pi^0$

[162] $\bar{p}p\to\bar{\Lambda}\Lambda\pi^+\pi^+\pi^-\pi^-$

Reaction

[163] $\bar{p}p\to\bar{\Lambda}\Sigma^0$

[164] $\bar{p}p\to\bar{\Sigma}^0\Lambda$

[165] $\bar{p}p\to\bar{\Lambda}\Sigma^0$ + c.c.

[166] $\bar{p}p\to\bar{\Sigma}^0\Sigma^0$

[167] $\bar{p}p\to\bar{\Sigma}^-\Sigma^+$

[168] $\bar{p}p\to\bar{\Sigma}^+\Sigma^-$

[169] $\bar{p}p\to\bar{\Sigma}^-\Sigma^+$ + $\bar{\Sigma}^+\Sigma^-$

[170] $\bar{p}p\to\bar{\Lambda}\Sigma^+\pi^-$ + c.c.

[171] $\bar{p}p\to\bar{\Sigma}^0\Sigma^+\pi^-$ + c.c.

[172] $\bar{p}p\to\bar{\Sigma}^-\Sigma^+\pi^0$

[173] $\bar{p}p\to\bar{\Sigma}^-\Sigma^+\pi^0$ + $\bar{\Sigma}^+\Sigma^-\pi^0$

[174] $\bar{p}p\to\bar{\Lambda}\Sigma^-\pi^+$ + c.c.

[175] $\bar{p}p\to\bar{\Sigma}^0\Sigma^-\pi^+$ + c.c.

[176] $\bar{p}p\to\bar{\Sigma}^0\Lambda\pi^+\pi^-$ + c.c.

[177] $\bar{p}p\to\bar{\Lambda}\Sigma^+\pi^-\pi^0$ + c.c.

[178] $\bar{p}p\to\bar{\Lambda}\Sigma^-\pi^+\pi^0$ + c.c.

[179] $\bar{p}p\to\bar{\Lambda}\Sigma^+\pi^-\pi^0$ + $\bar{\Lambda}\Sigma^-\pi^+\pi^0$ + c.c.

[180] $\bar{p}p\to\bar{\Sigma}^-\Sigma^+\pi^+\pi^-$ + $\bar{\Sigma}^+\Sigma^-\pi^+\pi^-$

[181] $\bar{p}p\to\bar{\Sigma}^-\Sigma^+\pi^+\pi^-$ + $\bar{\Sigma}^+\Sigma^+\pi^-\pi^-$ + c.c.

[182] $\bar{p}p\to\bar{\Lambda}\Sigma^+\pi^+\pi^-\pi^-$ + c.c.

[183] $\bar{p}p\to\bar{\Lambda}\Sigma^-\pi^+\pi^+\pi^-$ + c.c.

[184] $\bar{p}p\to\bar{\Xi}^0\Xi^0$

[185] $\bar{p}p\to\bar{\Xi}^+\Xi^-$

[186] $\bar{p}p\to\bar{\Xi}^0\Xi^-\pi^+$ + c.c.

[187] $\bar{p}p\to\Lambda\bar{Y}^*(1385)^0$ + c.c.
$\quad\hookrightarrow\bar{\Lambda}\pi^0$

[188] $\bar{p}p\to\bar{Y}^*(1405)\Lambda$ + c.c.
$\quad\hookrightarrow\bar{\Sigma}^+\pi^-$ + $\bar{\Sigma}^-\pi^+$

[189] $\bar{p}p\to\bar{Y}^*(1520)\Lambda$ + c.c.
$\quad\hookrightarrow$total

[190] $\bar{p}p\to\bar{Y}^*(1520)\Lambda$ + c.c.
$\quad\hookrightarrow\bar{\Sigma}^+\pi^-$ + $\bar{\Sigma}^-\pi^+$

[191] $\bar{p}p\to\bar{Y}^*(1385)^-\Sigma^+$ + c.c.
$\quad\hookrightarrow\bar{\Lambda}\pi^-$

[192] $\bar{p}p\to\bar{Y}^*(1385)^+\Sigma^-$ + c.c.
$\quad\hookrightarrow\bar{\Lambda}\pi^+$

[193] $\bar{p}p\to\Sigma^0\bar{Y}^*(1385)^0$ + c.c.
$\quad\hookrightarrow\bar{\Lambda}\pi^0$

[194] $\bar{p}p\to\bar{Y}^*(1405)\Sigma^0$ + c.c.
$\quad\hookrightarrow\bar{\Sigma}^-\pi^+$ + $\bar{\Sigma}^+\pi^-$

[195] $\bar{p}p\to\bar{Y}^*(1520)\Sigma^0$ + c.c.
$\quad\hookrightarrow\bar{\Sigma}^+\pi^-$ + $\bar{\Sigma}^-\pi^+$

[196] $\bar{p}p\to Y^*(1385)^+\bar{\Lambda}\pi^-$
$\quad\hookrightarrow\Lambda\pi^+$

[197] $\bar{p}p\to\bar{Y}^*(1385)^-\Lambda\pi^+$
$\quad\hookrightarrow\bar{\Lambda}\pi^-$

[198] $\bar{p}p\to\bar{Y}^*(1385)^-Y^*(1385)^+$
$\quad\hookrightarrow\bar{\Lambda}\pi^-$; $Y^*(1385)^+\hookrightarrow\Lambda\pi^+$

[199] $\bar{p}p\to\bar{Y}^*(1385)^+Y^*(1385)^-$
$\quad\hookrightarrow\bar{\Lambda}\pi^+$; $Y^*(1385)^-\hookrightarrow\Lambda\pi^-$

Reaction

associated production of hyperons and kaons

[200] $\bar{p}p \to \Lambda\bar{p}K^+$
[201] $\bar{p}p \to \Lambda\bar{p}K^+$ + c.c.
[202] $\bar{p}p \to \Sigma^0\bar{p}K^+$ + c.c.
[203] $\bar{p}p \to \Lambda\bar{n}K^0$ + c.c.
[204] $\bar{p}p \to \Sigma^+\bar{p}K^0$ + c.c.
[205] $\bar{p}p \to \Lambda\bar{p}K^+\pi^0$ + c.c.
[206] $\bar{p}p \to \Lambda\bar{p}K^0\pi^+$ + c.c.
[207] $\bar{p}p \to \Sigma^0\bar{p}K^0\pi^+$ + c.c.
[208] $\bar{p}p \to \Sigma^+\bar{p}K^0\pi^0$ + c.c.
[209] $\bar{p}p \to \Lambda\bar{n}K^+\pi^-$ + c.c.
[210] $\bar{p}p \to \Sigma^+\bar{n}K^0\pi^-$ + c.c.
[211] $\bar{p}p \to \Lambda\bar{p}K^+\pi^+\pi^-$ + c.c.
[212] $\bar{p}p \to \Lambda\bar{n}K^0\pi^+\pi^-$ + c.c.
[213] $\bar{p}p \to$ total hyperon production

$\bar{p}N(I=0)$ total cross section

[214] $\bar{p}N \to$ total

$\bar{p}n$ total cross section

[215] $\bar{p}n \to$ total

$\bar{p}n$ elastic cross section

[216] $\bar{p}n \to$ elastic

$\bar{p}n \to$ other channels

[217] $\bar{p}n \to \pi^+\pi^-\pi^-$
[218] $\bar{p}n \to \bar{p}p\pi^-$
[219] $\bar{p}n \to \bar{\Delta}(1238)^{--}p$, $\bar{\Delta}(1238)^{--} \to \bar{p}\pi^-$
[220] $\bar{p}n \to \bar{\Delta}(1238)^{--}\Delta(1238)^+$, $\bar{\Delta}(1238)^{--} \to \bar{p}\pi^-$, $\Delta(1238)^+ \to n\pi^+$
[221] $\bar{p}n \to \Delta(1238)^-\bar{\Delta}(1238)^0$, $\Delta(1238)^- \to n\pi^-$, $\bar{\Delta}(1238)^0 \to \bar{p}\pi^+$

$\bar{p}d$ total cross section

[222] $\bar{p}d \to$ total

$\bar{p}d$ elastic cross section

[223] $\bar{p}d \to$ elastic

$\bar{p}d$ prong cross sections

[224] $\bar{p}d \to 0$ prong
[225] $\bar{p}d \to 2$ prong
[226] $\bar{p}d \to 4$ prong
[227] $\bar{p}d \to 6$ prong

Reaction

$\bar{p}d \to$ other channels

[228] $\bar{p}d \to \bar{p}d\pi^+\pi^-$
[229] $\bar{p}d \to \bar{p}d\pi^+\pi^-\pi^0$
[230] $\bar{p}d \to \bar{p}pn\pi^+\pi^-$
[231] $\bar{p}d \to \bar{p}p\pi^-\pi^0(p_s)$
[232] $\bar{p}d \to \bar{p}n\pi^+\pi^-(p_s)$
[233] $\bar{p}d \to \bar{n}p\pi^-\pi^-(p_s)$
[234] $\bar{p}d \to \bar{n}n(n_s)$
[235] $\bar{p}d \to \omega\bar{p}d$, $\omega \to \pi^+\pi^-\pi^0$
[236] $\bar{p}d \to \bar{\Delta}(1238)^{--}d\pi^+$, $\bar{\Delta}(1238)^{--} \to \bar{p}\pi^-$
[237] $\bar{p}d \to \bar{\Delta}(1238)^{--}d\pi^+\pi^0$, $\bar{\Delta}(1238)^{--} \to \bar{p}\pi^-$
[238] $\bar{p}d \to \bar{p}\pi^-d^*(2200)^{++}$, $d^*(2200)^{++} \to d\pi^+$
[239] $\bar{p}d \to \bar{\Delta}(1238)^{--}d^*(2200)^{++}$, $\bar{\Delta}(1238)^{--} \to \bar{p}\pi^-$, $d^*(2200)^{++} \to d\pi^+$
[240] $\bar{p}d \to \bar{\Lambda}dK^-$
[241] $\bar{p}d \to \bar{\Lambda}dK^-\pi^0$
[242] $\bar{p}d \to \bar{\Lambda}pnK^-$

$\bar{n}p$ total and elastic cross sections

[243] $\bar{n}p \to$ total
[244] $\bar{n}p \to$ elastic

$\bar{n}n$ and $\bar{n}d$ total cross sections

[245] $\bar{n}n \to$ total
[246] $\bar{n}d \to$ total

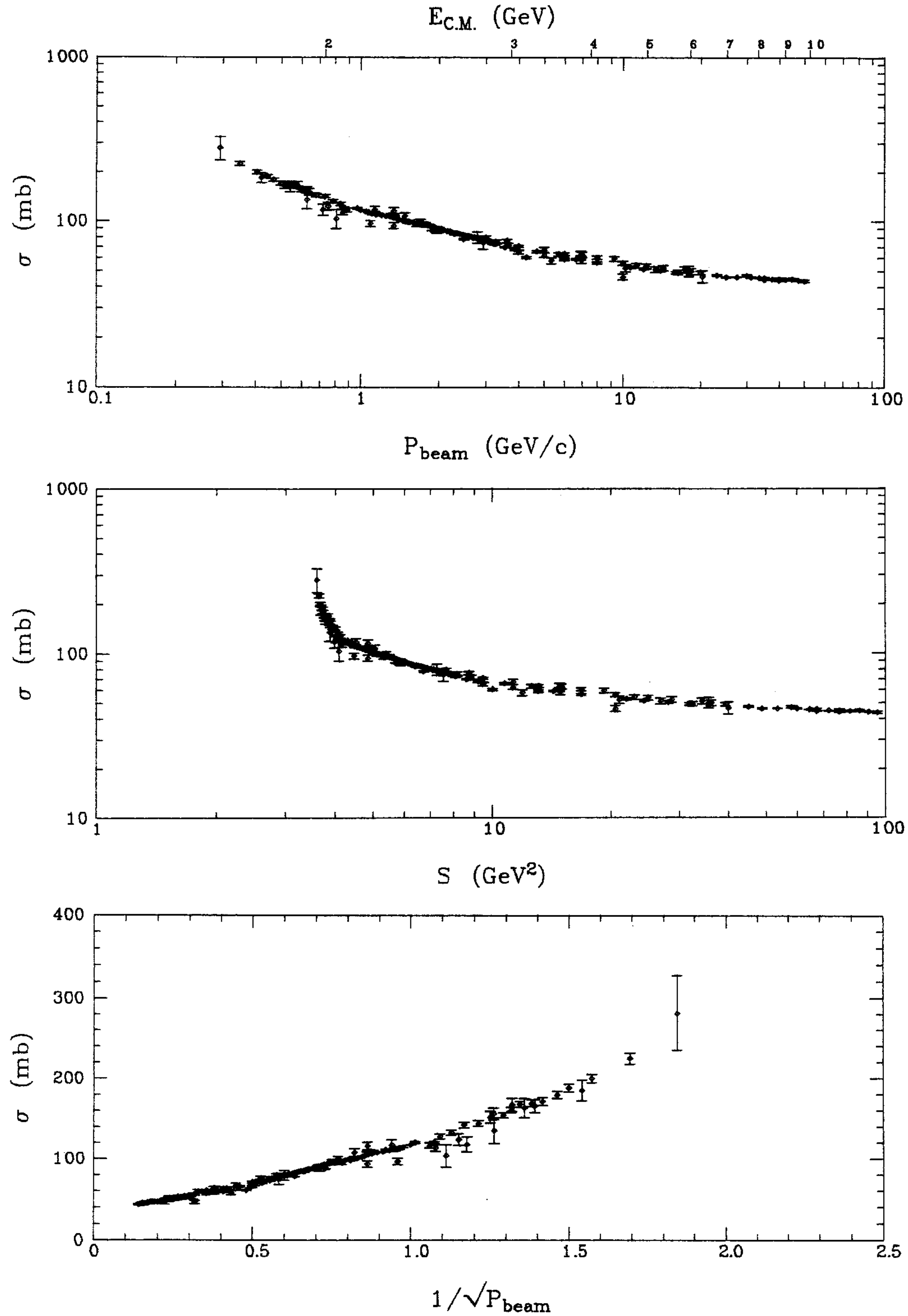
$\bar{p}p$ total cross section

Reaction [1] $\bar{p}p \to$ total

P_{beam} (GeV/c)	ΔP	$E_{C.M.}$ (GeV)	σ (mb)	$\Delta\sigma$	References	Year	Journal	Vol.	Page
0.294	+0.061 −0.076	1.899	281.00	+- 46.00	CORK	62	NC	25	497
0.349	+0.037 −0.040	1.908	224.50	6.60	CONFORTO	68	NC	54A	441
0.405	+0.026 −0.027	1.918	199.70	5.50	CONFORTO	68	NC	54A	441
0.421	+0.047 −0.052	1.921	185.00	13.00	CORK	62	NC	25	497
0.444	+−0.021	1.926	188.00	4.90	CONFORTO	68	NC	54A	441
0.467	0.019	1.931	179.50	4.50	CONFORTO	68	NC	54A	441
0.499	0.015	1.938	171.10	4.50	CONFORTO	68	NC	54A	441
0.517	+0.026 −0.028	1.942	166.00	8.00	COOMBES	58	PR	112	1303
0.525	+−0.013	1.944	169.20	4.10	CONFORTO	68	NC	54A	441
0.541	+0.033 −0.035	1.948	163.00	12.00	CORK	62	NC	25	497
0.553	+−0.013	1.951	167.60	3.50	CONFORTO	68	NC	54A	441
0.575		1.956	167.40	7.80	AMALDI	64	NC	34	825
0.577	0.012	1.956	161.10	3.20	CONFORTO	68	NC	54A	441
0.599	0.011	1.962	154.30	3.00	CONFORTO	68	NC	54A	441
0.627		1.969	135.00	16.00	CORK	57	PR	107	248
0.629		1.970	156.30	7.30	AMALDI	64	NC	34	825
0.639	0.028	1.973	152.00	7.00	COOMBES	58	PR	112	1303
0.681		1.984	144.30	3.70	AMALDI	64	NC	34	825
0.721	0.032	1.995	118.00	9.00	CORK	62	NC	25	497
0.733		1.999	142.10	3.30	AMALDI	64	NC	34	825
0.753	0.027	2.005	124.00	7.00	COOMBES	58	PR	112	1303
0.785		2.014	132.70	3.00	AMALDI	64	NC	34	825
0.808		2.021	104.00	14.00	CORK	57	PR	107	248
0.837		2.030	128.00	2.90	AMALDI	64	NC	34	825
0.858	0.025	2.036	114.00	4.00	COOMBES	58	PR	112	1303
0.867		2.039	120.70	1.30	AMALDI	64	NC	34	825
0.888		2.046	116.80	3.30	AMALDI	64	NC	34	825
0.972		2.073	120.50	0.90	AMALDI	64	NC	34	825
1.000		2.082	117.42	0.21 $	ABRAMS	70	PR	D1	1917
1.050		2.098	114.59	0.17 $	ABRAMS	70	PR	D1	1917
1.074		2.106	113.30	0.90	AMALDI	64	NC	34	825
1.090		2.112	97.00	4.00	CORK	57	PR	107	248
1.100		2.115	111.64	0.16 $	ABRAMS	70	PR	D1	1917
1.110		2.118	112.00	2.40 *	KALBFLEISC	69	PL	29B	259
1.110		2.118	112.60	2.00	KALBFLEISC	71	NP	B30	466
1.135	0.032	2.127	118.00	6.00	ELIOFF	62	PR	128	869
1.150		2.132	110.11	0.12 $	ABRAMS	70	PR	D1	1917
1.178		2.142	111.60	0.60	AMALDI	64	NC	34	825
1.200		2.149	108.96	0.11 $	ABRAMS	70	PR	D1	1917
1.250		2.166	107.75	0.10 $	ABRAMS	70	PR	D1	1917
1.300		2.184	106.47	0.10 $	ABRAMS	70	PR	D1	1917
1.310		2.187	109.60	2.00	KALBFLEISC	71	NP	B30	466
1.330		2.194	107.00	1.50 *	KALBFLEISC	69	PL	29B	259
1.330		2.194	108.40	3.00	KALBFLEISC	71	NP	B30	466
1.343		2.199	94.00	4.00	CORK	57	PR	107	248
1.343	0.040	2.199	116.00	5.00	ELIOFF	62	PR	128	869
1.345		2.200	105.50	0.10 $	ABRAMS	70	PR	D1	1917
1.350		2.201	106.70	2.00	KALBFLEISC	71	NP	B30	466
1.380		2.212	103.30	0.40	AMALDI	64	NC	34	825
1.400		2.219	102.78	0.09 $	ABRAMS	70	PR	D1	1917
1.450		2.236	101.12	0.08 $	ABRAMS	70	PR	D1	1917
1.482	0.044	2.248	108.00	5.00	ELIOFF	62	PR	128	869
1.490		2.251	100.26	0.06 $	ABRAMS	70	PR	D1	1917
1.520		2.261	98.80	1.50 *	KALBFLEISC	69	PL	29B	259
1.520		2.261	99.70	1.50	KALBFLEISC	71	NP	B30	466
1.550		2.272	98.82	0.06 $	ABRAMS	70	PR	D1	1917
1.600		2.289	97.81	0.06 $	ABRAMS	70	PR	D1	1917
1.636	0.048	2.302	96.00	3.00	ELIOFF	62	PR	128	869
1.650		2.307	97.05	0.06 $	ABRAMS	70	PR	D1	1917
1.683		2.319	96.17	0.39	AMALDI	64	NC	34	825
1.696	0.057	2.323	100.00	3.00	ARMENTEROS	60	PR	119	2068
1.700		2.325	96.46	0.06 $	ABRAMS	70	PR	D1	1917
1.750		2.342	95.61	0.06 $	ABRAMS	70	PR	D1	1917
1.773	0.052	2.351	96.00	3.00	ELIOFF	62	PR	128	869
1.806		2.362	94.48	0.06 $	ABRAMS	70	PR	D1	1917
1.850		2.378	93.71	0.06 $	ABRAMS	70	PR	D1	1917
1.875		2.386	93.05	0.06 $	ABRAMS	70	PR	D1	1917
1.884		2.390	87.83	0.24	AMALDI	64	NC	34	825
1.900		2.395	92.52	0.06 $	ABRAMS	70	PR	D1	1917
1.925		2.404	92.07	0.06 $	ABRAMS	70	PR	D1	1917
1.950		2.413	91.38	0.06 $	ABRAMS	70	PR	D1	1917
1.977	0.077	2.422	89.00	4.00	ARMENTEROS	60	PR	119	2068
2.000		2.430	90.23	0.04 $	ABRAMS	70	PR	D1	1917
2.050		2.448	88.84	0.05 $	ABRAMS	70	PR	D1	1917
2.082		2.459	88.48	0.20	AMALDI	64	NC	34	825
2.095		2.463	88.46	0.06 $	ABRAMS	70	PR	D1	1917
2.150		2.482	87.39	0.06 $	ABRAMS	70	PR	D1	1917
2.200		2.500	86.81	0.06 $	ABRAMS	70	PR	D1	1917
2.250		2.517	85.62	0.06 $	ABRAMS	70	PR	D1	1917
2.285		2.529	83.76	0.43	AMALDI	64	NC	34	825
2.300		2.534	85.00	0.05 $	ABRAMS	70	PR	D1	1917
2.350		2.551	84.45	0.05 $	ABRAMS	70	PR	D1	1917
2.400		2.568	83.66	0.06 $	ABRAMS	70	PR	D1	1917
2.450		2.585	83.16	0.06 $	ABRAMS	70	PR	D1	1917
2.485		2.597	78.04	0.52	AMALDI	64	NC	34	825
2.500		2.602	82.32	0.04 $	ABRAMS	70	PR	D1	1917
2.550		2.619	81.64	+− 0.05 $	ABRAMS	70	PR	D1	1917
2.600		2.636	81.12	0.05 $	ABRAMS	70	PR	D1	1917
2.650		2.653	80.61	0.05 $	ABRAMS	70	PR	D1	1917
2.686		2.665	79.33	0.25	AMALDI	64	NC	34	825
2.700		2.669	79.90	0.05 $	ABRAMS	70	PR	D1	1917
2.750		2.686	79.47	0.05 $	ABRAMS	70	PR	D1	1917
2.784	+−0.095	2.697	80.00	6.00	ARMENTEROS	60	PR	119	2068
2.800		2.702	78.91	0.05 $	ABRAMS	70	PR	D1	1917
2.850		2.719	78.21	0.05 $	ABRAMS	70	PR	D1	1917
2.886		2.730	77.82	0.28	AMALDI	64	NC	34	825
2.900		2.735	77.79	0.05 $	ABRAMS	70	PR	D1	1917
2.940		2.748	74.30	6.10	AMALDI	64	NC	34	825
2.950		2.751	77.23	0.05 $	ABRAMS	70	PR	D1	1917
3.000		2.768	79.90	1.70	ESCOUBES	63	PL	5	132
3.000		2.768	76.68	0.05 $	ABRAMS	70	PR	D1	1917
3.050		2.784	76.29	0.05 $	ABRAMS	70	PR	D1	1917
3.068		2.789	75.24	0.70	AMALDI	64	NC	34	825
3.100		2.800	75.66	0.05 $	ABRAMS	70	PR	D1	1917
3.150		2.816	75.16	0.05 $	ABRAMS	70	PR	D1	1917
3.200		2.832	74.66	0.05 $	ABRAMS	70	PR	D1	1917
3.240		2.844	72.90	1.00	AMALDI	64	NC	34	825
3.250		2.848	74.20	0.05 $	ABRAMS	70	PR	D1	1917
3.280	0.066	2.857	75.40	2.00	FERBEL	65	PR	137B	1250
3.300		2.863	73.67	0.05 $	ABRAMS	70	PR	D1	1917
3.540		2.938	69.70	0.50	AMALDI	64	NC	34	825
3.600		2.957	76.30	1.80	ESCOUBES	63	PL	5	132
3.660	0.073	2.975	71.70	2.00	FERBEL	65	PR	137B	1250
3.860		3.036	67.70	0.90	AMALDI	64	NC	34	825
4.000		3.077	65.30	1.50 *	LINDENBAUM	61	PRL	7	185
4.000		3.077	71.00	1.00	CZYZEWSKI	65	PL	15	188
4.015		3.082	66.84	0.32	AMALDI	64	NC	34	825
4.300		3.165	60.60	0.80	AMALDI	64	NC	34	825
4.700		3.279	65.80	0.90	AMALDI	64	NC	34	825
5.000		3.363	67.10	2.50 *	VON DARDEL	60	PRL	5	333
5.000		3.363	62.80	2.00 *	LINDENBAUM	61	PRL	7	185
5.350		3.457	57.90	2.60	AMALDI	64	NC	34	825
5.700	0.057	3.550	63.60	1.40	BOECKMANN	66	NC	42A	954
6.000		3.627	60.70	2.00 *	VON DARDEL	60	PRL	5	333
6.000		3.627	63.40	1.20 *	LINDENBAUM	61	PRL	7	185
6.000	0.105	3.627	59.30	1.10	GALBRAITH	65	PR	138	B913
6.650		3.790	59.30	0.60	DENISOV	71	PL	34B	167
6.900		3.851	60.30	1.50 *	LINDENBAUM	61	PRL	7	185
6.900	0.034	3.851	63.10	2.90	KITAGAKI	68	PRL	21	175
6.940	0.104	3.860	58.70	2.80	FERBEL	68	PR	173	1307
7.000		3.875	63.10	2.20 *	VON DARDEL	60	PRL	5	333
8.000		4.108	60.50	1.50 *	LINDENBAUM	61	PRL	7	185
8.000	0.140	4.108	56.40	0.80	GALBRAITH	65	PR	138	B913
9.300		4.393	59.50	1.80 *	LINDENBAUM	61	PRL	7	185
10.000		4.540	46.30	2.00 *	VON DARDEL	60	PPL	5	333
10.000		4.540	56.00	1.60 *	LINDENBAUM	61	PRL	7	185
10.260		4.593	52.40	2.60 *	VON DARDEL	60	PRL	5	333
10.740		4.689	52.90	1.00 *	VON DARDEL	60	PRL	5	333
11.300		4.800	54.40	1.80 *	LINDENBAUM	61	PRL	7	185
12.000	0.210	4.934	51.70	0.80	GALBRAITH	65	PR	138	B913
12.300		4.991	53.80	1.60 *	LINDENBAUM	61	PRL	7	185
13.300		5.175	51.50	2.20 *	LINDENBAUM	61	PRL	7	185
14.000	0.245	5.300	50.70	0.90	GALBRAITH	65	PR	138	B913
14.300		5.353	52.60	1.80 *	LINDENBAUM	61	PRL	7	185
16.000	0.280	5.642	49.20	0.80	GALBRAITH	65	PR	138	B913
16.300		5.692	49.40	1.60 *	LINDENBAUM	61	PPL	7	185
17.300		5.854	51.50	2.10 *	LINDENBAUM	61	PRL	7	185
18.000	0.315	5.965	50.30	3.60	GALBRAITH	65	PR	138	B913
18.300		6.012	49.90	2.20 *	LINDENBAUM	61	PRL	7	185
20.000	0.200	6.272	49.00	1.10	ALLABY	69	PL	30B	500
20.300		6.316	46.70	3.70 *	LINDENBAUM	61	PRL	7	185
23.000		6.705	47.40	0.30 $	DENISOV	71	PL	36B	528
25.000	0.250	6.979	46.10	0.60	ALLABY	69	PL	30B	500
27.500		7.307	46.30	0.30 $	DENISOV	71	PL	36B	528
30.000	0.300	7.621	47.10	0.60	ALLABY	69	PL	30B	500
31.000		7.743	46.10	0.30 $	DENISOV	71	PL	36B	528
33.500		8.040	45.60	0.30 $	DENISOV	71	PL	36B	528
35.000	0.350	8.214	45.50	0.70	ALLABY	69	PL	30B	500
35.000		8.214	44.60	0.30 $	DENISOV	71	PL	36B	528
37.500		8.494	44.70	0.30 $	DENISOV	71	PL	36B	528
40.000	0.400	8.766	45.00	0.70	ALLABY	69	PL	30B	500
40.000		8.766	44.00	0.30 $	DENISOV	71	PL	36B	528
42.500		9.029	44.50	0.30 $	DENISOV	71	PL	36B	528
45.000	0.450	9.286	44.90	0.70	ALLABY	69	PL	30B	500
47.500		9.535	44.10	0.30 $	DENISOV	71	PL	36B	528
50.000	0.500	9.778	43.60	0.80	ALLABY	69	PL	30B	500

* DATA READ FROM GRAPH
\+ SEE DATA LISTING FOR ADDITIONAL COMMENTS
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS
[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

$\bar{p}p$ total cross section



A Regge pole parametrization of the $\bar{p}p$ elastic scattering amplitudes contains terms with asymptotic energy dependence s^{α} where, at $t = 0$, $\alpha \approx 1$ for Pomeron exchange, $\alpha \approx 1/2$ for vector and tensor meson exchange, and $\alpha \approx 0$ for pion exchange. The energy dependence of Regge cut terms is the same, apart from factors of log s. The asymptotic form of the amplitudes at $t = 0$ is thus approximately $M(s,0) \approx C_P s + C_{VT}\sqrt{s} + C_{\pi}$. Each amplitude contributes a term $\text{Im}\, M(s,0)/q_{c.m.}\sqrt{s} \approx \text{Im}\, M(s,0)/s$ to the total cross section. So the leading energy dependence of σ_{tot} is $C_1 + C_2/\sqrt{s}$ from Pomeron exchange plus vector and tensor meson exchange. Since $s \approx 2\,M_p\,p_{beam}$ at high energy, it is expected that a plot of σ_{tot} versus $1/\sqrt{p_{beam}}$ asymptotically becomes approximately linear. The variable $1/\sqrt{p_{beam}}$ is chosen rather than $1/\sqrt{s}$ because it gives a smoother plot at low energies where σ_{tot} diverges as $1/p_{beam}$ due to the exothermic nature of the $\bar{p}p$ interaction.

p̄p elastic cross section

Reaction [2] p̄p→elastic

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
0.195	+0.023 −0.026	1.886	100.80	±5.30	SPENCER	70	NP	B19	501
0.239	+0.020 −0.021	1.891	72.80	3.40	SPENCER	70	NP	B19	501
0.277	+0.017 −0.018	1.896	73.70	2.70	SPENCER	70	NP	B19	501
0.294	+0.061 −0.076	1.899	80.00	10.00	CORK	62	NC	25	497
0.310	±0.016	1.901	73.00	2.80	SPENCER	70	NP	B19	501
0.341	0.014	1.906	71.00	3.50	SPENCER	70	NP	B19	501
0.349	+0.037 −0.040	1.908	77.60	3.30	CONFORTO	68	NC	54A	441
0.369	±0.013	1.911	65.20	5.60	SPENCER	70	NP	B19	501
0.405	+0.026 −0.027	1.918	71.10	2.80	CONFORTO	68	NC	54A	441
0.421	+0.047 −0.052	1.921	66.00	6.00	CORK	62	NC	25	497
0.444	±0.021	1.926	68.70	2.50	CONFORTO	68	NC	54A	441
0.467	0.019	1.931	62.00	2.20	CONFORTO	68	NC	54A	441
0.499	0.015	1.938	62.60	2.30	CONFORTO	68	NC	54A	441
0.517	+0.026 −0.028	1.942	72.00	+9.00 −11.00	COOMBES	58	PR	112	1303
0.525	±0.013	1.944	59.50	±2.10	CONFORTO	68	NC	54A	441
0.541	+0.033 −0.035	1.948	52.00	6.00	CORK	62	NC	25	497
0.553	±0.013	1.951	63.50	2.20	CONFORTO	68	NC	54A	441
0.577	0.012	1.956	61.30	2.00	CONFORTO	68	NC	54A	441
0.599	0.011	1.962	57.30	1.80	CONFORTO	68	NC	54A	441
0.639	0.028	1.973	64.00	+7.00 −9.00	COOMBES	58	PR	112	1303
0.721	0.032	1.995	45.00	±5.00	CORK	62	NC	25	497
0.753	0.027	2.005	50.00	+6.00 −7.00	COOMBES	58	PR	112	1303
0.858	0.025	2.036	49.00	+6.00 −7.00	COOMBES	58	PR	112	1303
1.110		2.118	43.80	±0.80	KALBFLEISC	71	NP	B30	466
1.135	0.032	2.127	42.00	5.00	ELIOFF	62	PR	128	869
1.230	0.020	2.160	43.30	1.30	BACON	71	NP	B32	66
1.240		2.163	43.20	3.50	COOPER	70	NP	B16	155
1.300	0.020	2.184	41.50	1.20	BACON	71	NP	B32	66
1.320		2.191	43.30	3.00	COOPER	70	NP	B16	155
1.330		2.194	41.30	0.40	KALBFLEISC	71	NP	B30	466
1.343	0.040	2.199	42.00	4.00	ELIOFF	62	PR	128	869
1.360	0.020	2.205	42.20	1.20	BACON	71	NP	B32	66
1.430	0.020	2.229	41.80	1.20	BACON	71	NP	B32	66
1.482	0.044	2.248	38.00	4.00	ELIOFF	62	PR	128	869
1.510		2.258	39.40	1.30	PARKER	71	NP	B32	29
1.520		2.261	39.30	0.80	KALBFLEISC	71	NP	B30	466
1.540		2.268	38.50	3.00	COOPER	70	NP	B16	155
1.610		2.293	31.10	2.00	LYNCH	63	PR	131	1276
1.620		2.296	37.20	3.00	COOPER	70	NP	B16	155
1.636	0.048	2.302	33.00	3.00	ELIOFF	62	PR	128	869
1.650		2.307	38.10	1.20	PARKER	71	NP	B32	29
1.696	0.057	2.323	33.00	2.00	ARMENTEROS	60	PR	119	2068
1.773	0.052	2.351	30.00	2.00	ELIOFF	62	PR	128	869
1.800		2.360	36.10	1.20	PARKER	71	NP	B32	29
1.950		2.413	35.40	1.20	PARKER	71	NP	B32	29
1.977	0.077	2.422	28.00	2.00	ARMENTEROS	60	PR	119	2068
2.150		2.482	30.80	1.20	PARKER	71	NP	B32	29
2.450		2.585	27.40	1.10	PARKER	71	NP	B32	29
2.600		2.636	25.90	1.00	PARKER	71	NP	B32	29
2.690	0.050	2.666	25.60	0.60	DOMINGO	67	PL	24B	642
2.750		2.686	25.60	1.00	PARKER	71	NP	B32	29
2.784	0.095	2.697	25.00	4.00	ARMENTEROS	60	PR	119	2068
2.900		2.735	24.50	1.00	PARKER	71	NP	B32	29
3.280	0.066	2.857	21.90	1.10	FERBEL	65	PR	137B	1250
3.600		2.957	20.90	0.80	DEHNE	64	PR	136	B843
4.000		3.077	19.75	0.73	CZYZEWSKI	65	PL	15	188
5.700	0.057	3.550	16.30	0.60	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	14.20	1.20	FERBEL	68	PR	173	1307
7.200		3.922	13.79	1.00 $	FOLEY	63	PRL	11	503
8.900		4.307	13.89	0.35 $	FOLEY	63	PRL	11	503
10.000		4.540	14.60	3.30 $	FOLEY	63	PRL	11	503
12.000		4.934	11.59	0.41 $	FOLEY	63	PRL	11	503

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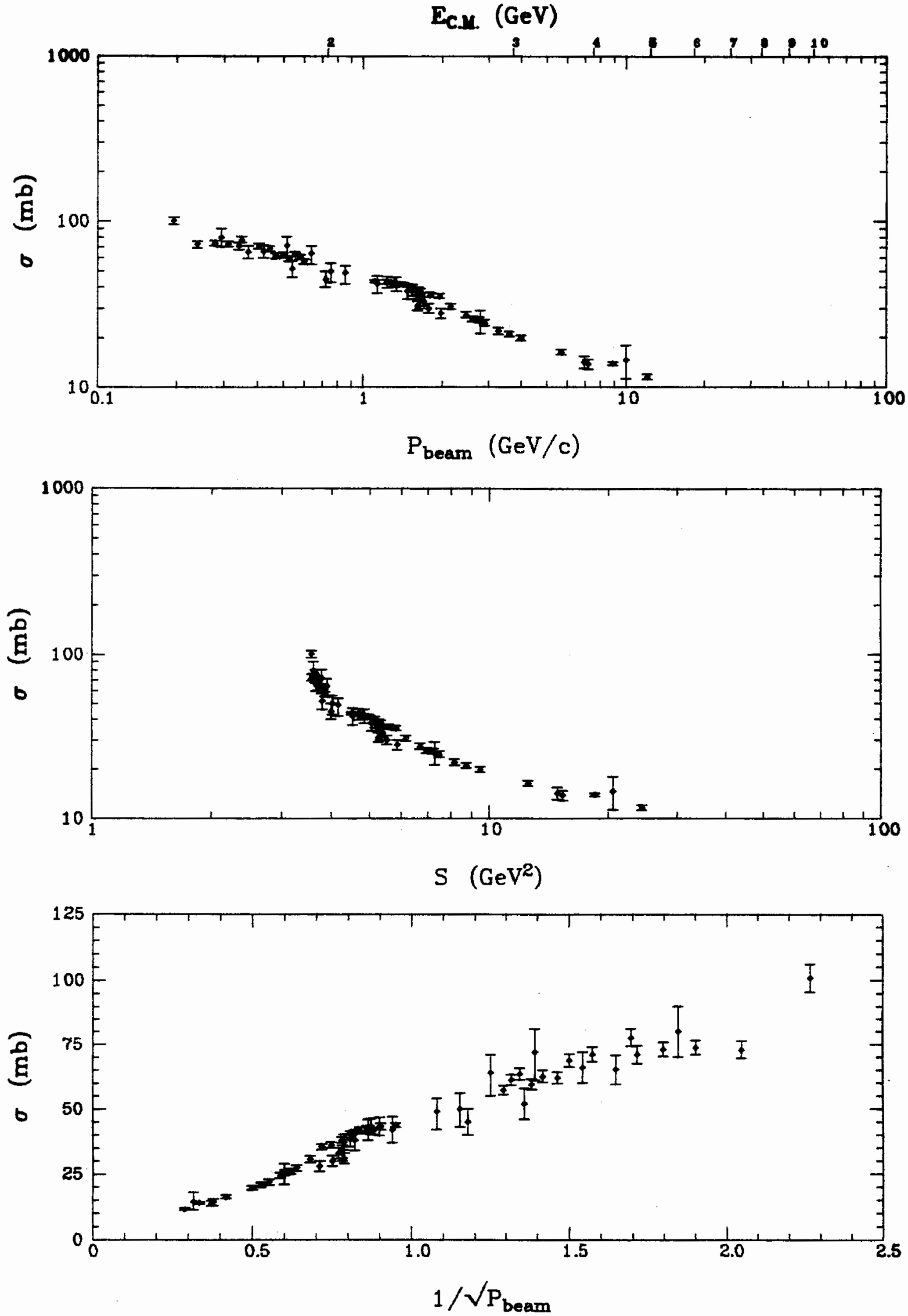
$\bar{p}p$ elastic cross section



Following the Regge pole theory previously discussed for the total cross section, the contribution of each amplitude to the integrated elastic cross section is

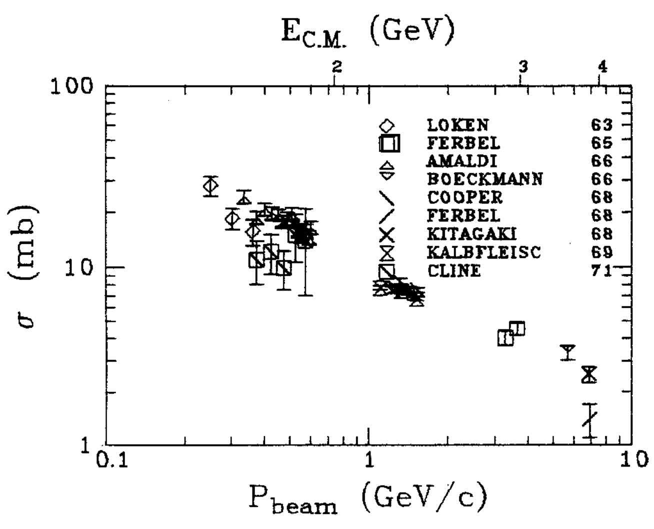
$$\frac{\int dt\,|M(s,t)|^2}{64\pi q^2_{c.m.}\, s} \approx (\text{const.})\ \frac{|M(s,0)|^2}{s^2}\,,$$

where factors of log s coming from the integration have been ignored. Thus the leading energy dependence of σ_{el} is $C_3 + C_4/\sqrt{s}$ from Pomeron exchange plus interference between Pomeron and meson exchange. Again, since $s \approx 2M_p\, p_{beam}$ at high energy, it is expected that a plot of σ_{el} versus $1/\sqrt{p_{beam}}$ asymptotically becomes approximately linear.

prongs

Reaction [3] $\bar{p}p \to 0$ prong

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References		
0.249	+0.028 -0.031	1.893	27.80	+-3.40		LOKEN	63	PL 3 334
0.302	+0.024 -0.025	1.900	18.50	2.40		LOKEN	63	PL 3 334
0.334	+0.030 -0.033	1.905	24.40	1.90		AMALDI	66	NC 46A 171
0.362	+0.033 -0.036	1.910	15.60	2.50		LOKEN	63	PL 3 334
0.372	+0.023 -0.024	1.912	18.70	1.60		AMALDI	66	NC 46A 171
0.375	+-0.025	1.912	11.00	3.00	*$	CLINE	71	PRL 27 71
0.403	0.019	1.917	20.80	1.70		AMALDI	66	NC 46A 171
0.425	0.025	1.922	12.10	3.00	*$	CLINE	71	PRL 27 71
0.429	0.017	1.923	19.80	1.60		AMALDI	66	NC 46A 171
0.452	0.015	1.927	19.50	1.20		AMALDI	66	NC 46A 171
0.472	0.014	1.932	17.80	1.20		AMALDI	66	NC 46A 171
0.475	0.025	1.932	9.90	2.40	*$	CLINE	71	PRL 27 71
0.491	0.012	1.936	18.40	1.50		AMALDI	66	NC 46A 171
0.508	0.012	1.940	19.60	1.50		AMALDI	66	NC 46A 171
0.524	0.011	1.943	18.00	1.40		AMALDI	66	NC 46A 171
0.525	0.025	1.944	15.00	4.40	*$	CLINE	71	PRL 27 71
0.539	0.010	1.947	15.90	1.10		AMALDI	66	NC 46A 171
0.553	0.010	1.951	14.90	1.40		AMALDI	66	NC 46A 171
0.567	0.009	1.954	15.70	1.40		AMALDI	66	NC 46A 171
0.575	0.025	1.956	14.00	7.00	*$	CLINE	71	PRL 27 71
0.580	0.009	1.957	15.70	1.40		AMALDI	66	NC 46A 171
0.592	0.008	1.960	14.50	1.30		AMALDI	66	NC 46A 171
0.604	0.008	1.963	16.40	1.30		AMALDI	66	NC 46A 171
1.110		2.118	7.69	0.21	*	KALBFLEISC	69	PL 29B 259
1.230		2.160	7.51	0.32	*	COOPER	68	PRL 20 1059
1.270		2.173	7.65	0.37	*	COOPER	68	PRL 20 1059
1.320		2.191	8.32	0.34	*	COOPER	68	PRL 20 1059
1.330		2.194	7.41	0.13	*	KALBFLEISC	69	PL 29B 259
1.370		2.208	7.41	0.31	*	COOPER	68	PRL 20 1059
1.430		2.229	7.48	0.38	*	COOPER	68	PRL 20 1059
1.490		2.251	7.16	0.53	*	COOPER	68	PRL 20 1059
1.520		2.261	6.70	0.18	*	KALBFLEISC	69	PL 29B 259
1.540		2.268	7.53	0.25	*	COOPER	68	PRL 20 1059
3.280	0.066	2.857	4.00	0.40		FERBEL	65	PR 137B1250
3.660	0.073	2.975	4.50	0.40		FERBEL	65	PR 137B1250
5.700	0.057	3.550	3.30	0.30	†	BOECKMANN	66	NC 42A 954
6.900	0.034	3.851	2.50	0.25		KITAGAKI	68	PRL 21 175
6.940	0.104	3.860	1.40	0.30		FERBEL	68	PR 173 1307



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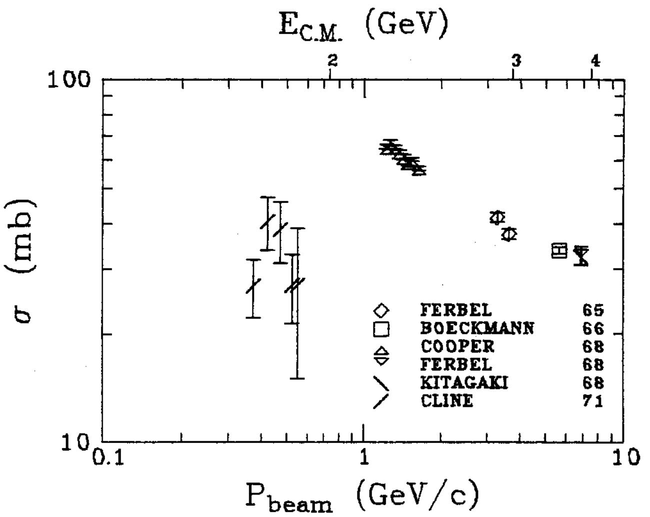
Reaction [4] $\bar{p}p \to 2$ prong

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References		
0.375	+-0.025	1.912	26.90	+- 4.90	*$	CLINE	71	PRL 27 71
0.425	0.025	1.922	40.60	6.70	*$	CLINE	71	PRL 27 71
0.475	0.025	1.932	38.50	7.40	*$	CLINE	71	PRL 27 71
0.525	0.025	1.944	27.10	5.80	*$	CLINE	71	PRL 27 71
0.550	0.050	1.950	27.00	12.00	*$	CLINE	71	PRL 27 71
1.230		2.160	65.10	1.00	*	COOPER	68	PRL 20 1059
1.270		2.173	66.70	1.30	*	COOPER	68	PRL 20 1059
1.320		2.191	64.90	0.80	*	COOPER	68	PRL 20 1059
1.370		2.208	63.00	1.00	*	COOPER	68	PRL 20 1059
1.430		2.229	60.90	1.10	*	COOPER	68	PRL 20 1059
1.490		2.251	59.00	1.40	*	COOPER	68	PRL 20 1059
1.540		2.268	59.80	0.70	*	COOPER	68	PRL 20 1059
1.630		2.300	56.80	0.90	*	COOPER	68	PRL 20 1059
3.280	0.066	2.857	41.50	1.30		FERBEL	65	PR 137B1250
3.660	0.073	2.975	37.30	1.30		FERBEL	65	PR 137B1250
5.700	0.057	3.550	33.70	0.80	†	BOECKMANN	66	NC 42A 954
6.900	0.034	3.851	32.30	1.60		KITAGAKI	68	PRL 21 175
6.940	0.104	3.860	32.60	2.00		FERBEL	68	PR 173 1307



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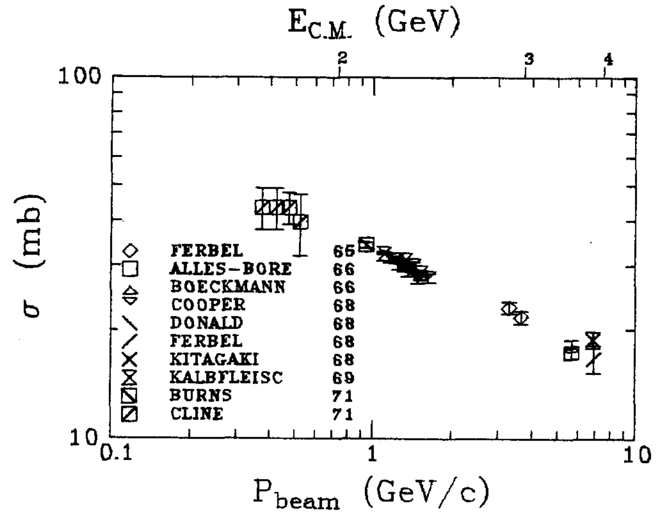
prongs

Reaction [5] $\bar{p}p \rightarrow 4$ prong

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References		
0.375+-	0.025	1.912	43.40	+- 5.80	*$	CLINE	71	PRL 27 71
0.425—	0.025	1.922	43.40	5.80	*$	CLINE	71	PRL 27 71
0.475	0.025	1.932	43.50	4.50	*$	CLINE	71	PRL 27 71
0.525	0.025	1.944	39.50	7.70	*$	CLINE	71	PRL 27 71
0.943		2.063	34.20	0.70		BURNS	71	NP B27 109
1.110		2.118	32.40	0.30	*	KALBFLEISC	69	PL 29B 259
1.176	0.050	2.141	31.60	1.00		DONALD	68	NP B6 174
1.230		2.160	31.10	0.70	*	COOPER	68	PRL 20 1059
1.270		2.173	30.00	0.80	*	COOPER	68	PRL 20 1059
1.320		2.191	29.40	0.50	*	COOPER	68	PRL 20 1059
1.330		2.194	31.00	0.20	*	KALBFLEISC	69	PL 29B 259
1.370		2.208	28.80	0.70	*	COOPER	68	PRL 20 1059
1.430		2.229	30.00	0.80	*	COOPER	68	PRL 20 1059
1.490		2.251	27.60	0.90	*	COOPER	68	PRL 20 1059
1.520		2.261	28.70	0.30	*	KALBFLEISC	69	PL 29B 259
1.540		2.268	27.90	0.50	*	COOPER	68	PRL 20 1059
1.630		2.300	27.70	0.80	*	COOPER	68	PRL 20 1059
3.280	0.066	2.857	22.90	0.90		FERBEL	65	PR 137B1250
3.660	0.073	2.975	21.60	0.90		FERBEL	65	PR 137B1250
5.700		3.550	17.30	0.70		ALLES-BORE	66	NC 46A 438
5.700	0.057	3.550	18.20	0.50	†	BOECKMANN	66	NC 42A 954
6.900	0.034	3.851	18.70	1.00		KITAGAKI	68	PRL 21 175
6.940	0.104	3.860	16.60	1.50		FERBEL	68	PR 173 1307



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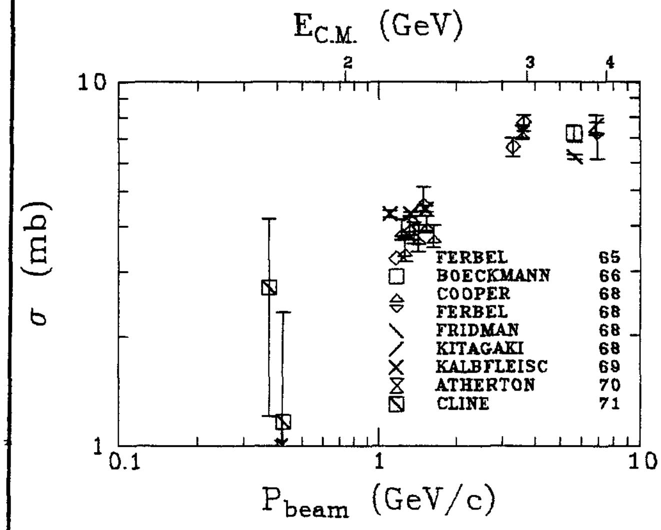
Reaction [6] $\bar{p}p \rightarrow 6$ prong

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References		
0.375	0.025	1.912	2.70	1.50	*$	CLINE	71	PRL 27 71
0.425	0.025	1.922	1.16	1.16	*$	CLINE	71	PRL 27 71
1.110		2.118	4.31	0.10	*	KALBFLEISC	69	PL 29B 259
1.230		2.160	3.91	0.25	*	COOPER	68	PRL 20 1059
1.270		2.173	3.45	0.27	*	COOPER	68	PRL 20 1059
1.320		2.191	4.02	0.23	*	COOPER	68	PRL 20 1059
1.330		2.194	4.31	0.05	*	KALBFLEISC	69	PL 29B 259
1.370		2.208	3.83	0.27	*	COOPER	68	PRL 20 1059
1.430		2.229	3.71	0.32	*	COOPER	68	PRL 20 1059
1.490		2.251	4.77	0.37	*	COOPER	68	PRL 20 1059
1.520		2.261	4.45	0.09	*	KALBFLEISC	69	PL 29B 259
1.540		2.268	4.04	0.22	*	COOPER	68	PRL 20 1059
1.630		2.300	3.76	0.27	*	COOPER	68	PRL 20 1059
3.280	0.066	2.857	6.60	0.40		FERBEL	65	PR 137B1250
3.590	0.054	2.954	7.26	0.27		ATHERTON	70	NP B18 221
3.660	0.073	2.975	7.70	0.40		FERBEL	65	PR 137B1250
5.700	0.057	3.550	7.20	0.40	†	BOECKMANN	66	NC 42A 954
5.700		3.550	6.21	0.10		FRIDMAN	68	PR 167 1268
6.900	0.034	3.851	7.60	0.50		KITAGAKI	68	PRL 21 175
6.940	0.104	3.860	6.90	0.80		FERBEL	68	PR 173 1307



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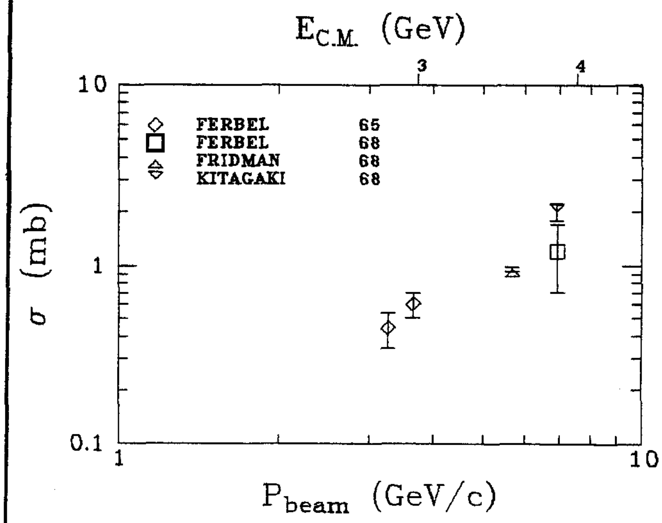
Reaction [7] $\bar{p}p \rightarrow 8$ prong

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References		
3.280+-	0.066	2.857	0.44	+- 0.10	FERBEL	65	PR 137B1250
3.660	0.073	2.975	0.60	0.10	FERBEL	65	PR 137B1250
5.700		3.550	0.96	0.03	FRIDMAN	68	PR 176 1595
6.900	0.034	3.851	2.00	0.22	KITAGAKI	68	PRL 21 175
6.940	0.104	3.860	1.20	0.50	FERBEL	68	PR 173 1307



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production of antileptons and leptons

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [8] $\bar{p}p \rightarrow e^+e^-$

2.500	2.602	<0.0000016	† CONVERSI 65 NC 40A 690

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Reaction [9] $\bar{p}p \rightarrow \mu^+\mu^-$

2.500	2.602	<0.0000008	† CONVERSI 65 NC 40A 690

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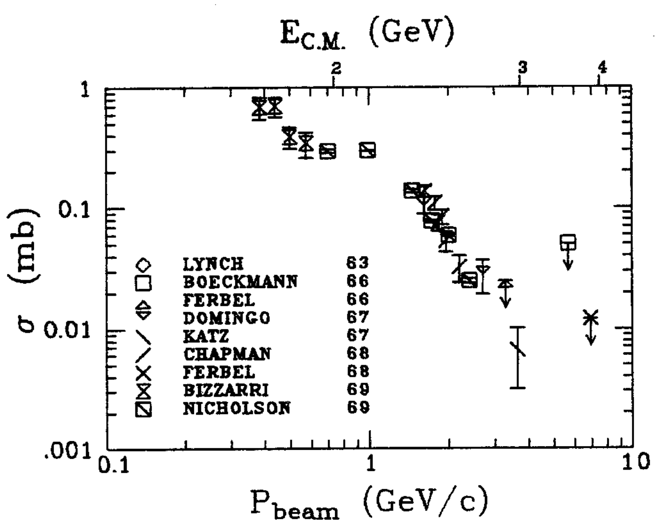
annihilation into pions

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [10] $\bar{p}p \to \pi^+\pi^-$

0.384	+0.031 −0.033	1.914	0.6800	+−0.1400	*	BIZZARRI	69	NCL	1	749
0.440	±0.024 −0.025	1.925	0.7000	0.1300	*	BIZZARRI	69	NCL	1	749
0.502	+0.036 −0.038	1.938	0.3900	0.0800	*	BIZZARRI	69	NCL	1	749
0.579	+−0.024	1.957	0.3400	0.0800	*	BIZZARRI	69	NCL	1	749
0.700	0.007	1.989	0.2940	0.0110	*	NICHOLSON	69	PRL	23	603
0.990	0.010	2.078	0.2960	0.0050	*	NICHOLSON	69	PRL	23	603
1.450	0.015	2.236	0.1370	0.0040	*	NICHOLSON	69	PRL	23	603
1.610		2.293	0.1190	0.0300		LYNCH	63	PR	131	1287
1.620		2.296	0.1370	0.0160	$	CHAPMAN	68	PRL	21	1718
1.720	0.017	2.332	0.0772	0.0020	*	NICHOLSON	69	PRL	23	603
1.770		2.349	0.1090	0.0140	$	CHAPMAN	68	PRL	21	1718
1.830		2.371	0.0760	0.0120	$	CHAPMAN	68	PRL	21	1718
1.890		2.392	0.0840	0.0110	$	CHAPMAN	68	PRL	21	1718
1.950		2.413	0.0530	0.0100	$	CHAPMAN	68	PRL	21	1718
1.990	0.020	2.427	0.0593	0.0016	*	NICHOLSON	69	PRL	23	603
2.200		2.500	0.0320	0.0080	$	CHAPMAN	68	PRL	21	1718
2.400	0.024	2.568	0.0248	0.0014	*	NICHOLSON	69	PRL	23	603
2.700		2.669	0.0280	0.0090		DOMINGO	67	PL	25B	486
3.280	0.020	2.857	<0.0250			FERBEL	66	PR	143	1096
3.660	0.080	2.975	0.0066	0.0035		KATZ	67	PRL	19	265
5.700	0.057	3.550	<0.0500			BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	<0.0120			FERBEL	68	PR	173	1307



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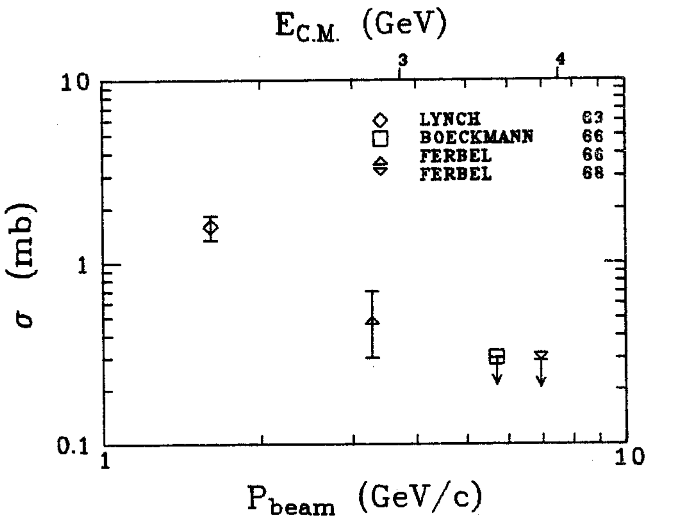
P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [11] $\bar{p}p \to \pi^+\pi^-\pi^0$

1.610		2.293	1.5800	+− 0.2500	LYNCH	63	PR	131	1276
3.280	+−0.020	2.857	0.5000	0.2000	FERBEL	66	PR	143	1096
5.700	− 0.057	3.550	<0.3000		BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	<0.2900		FERBEL	68	PR	173	1307



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Reaction [12] $\bar{p}p \to \pi^+\pi^- MM \geq 2\pi^0$

1.610		2.293	14.1000	3.0000	XUONG	62	PR	128	1849
3.280	0.020	2.857	6.7000	2.2000	FERBEL	66	PR	143	1096
5.700	0.057	3.550	4.5000	1.2000	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	10.0000	1.0000	FERBEL	68	PR	173	1307

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Reaction [13] $\bar{p}p \to 2$ prong pion annihilation

3.280	0.020	2.857	[7.2000	2.2000]	FERBEL	66	PR	143	1096
5.700	0.057	3.550	[4.5000	1.0000]	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	[10.0000	1.0000]	FERBEL	68	PR	173	1307

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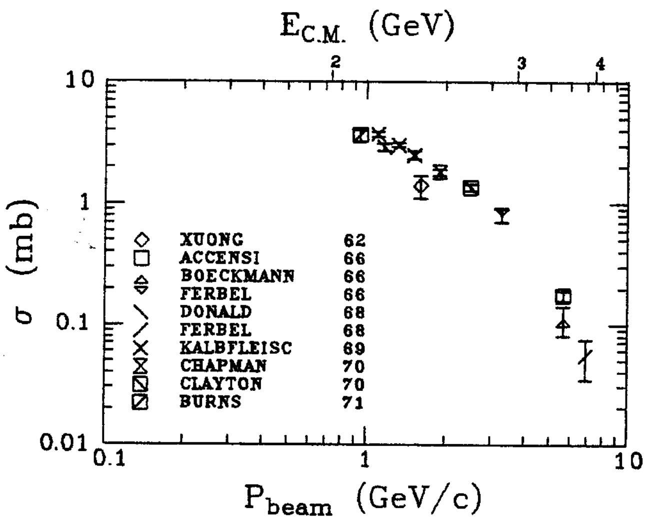
annihilation into pions

Reaction [14] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
0.943		2.063	3.6000 +-	0.4000		BURNS	71	NP	B27	109
1.110		2.118	3.6700	0.2100	*	KALBFLEISC	69	PL	29B	259
1.176+-	0.050	2.141	2.9000	0.2000		DONALD	68	NP	B6	174
1.330		2.194	3.0000	0.1200	*	KALBFLEISC	69	PL	29B	259
1.520		2.261	2.4900	0.1900	*	KALBFLEISC	69	PL	29B	259
1.610		2.293	1.4000	0.3000		XUONG	62	PR	128	1849
1.900	0.300	2.395	1.8000	0.1000		CHAPMAN	70	NP	B24	445
2.500		2.602	1.3500	0.1000		CLAYTON	70	NP	B22	85
3.280	0.020	2.857	0.8000	0.1000		FERBEL	66	PR	143	1096
5.700		3.550	0.1730	0.0160		ACCENSI	66	PL	20	557
5.700	0.057	3.550	0.1100	0.0300		BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	0.0540	0.0200		FERBEL	68	PR	173	1307



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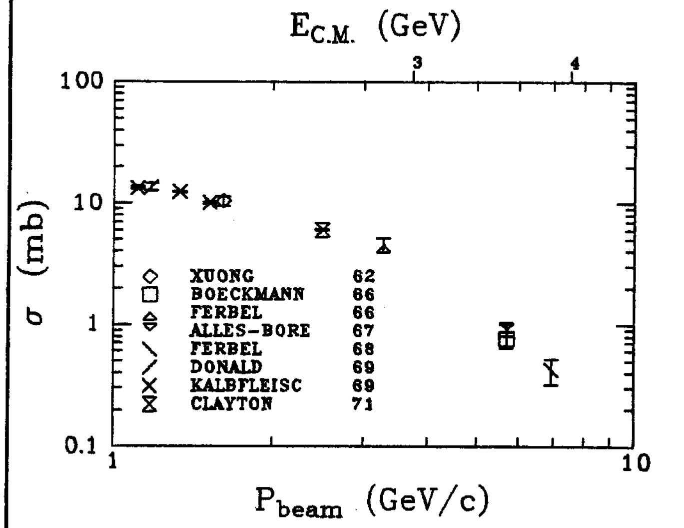
Reaction [15] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
1.110		2.118	13.3000	0.3700	*	KALBFLEISC	69	PL	29B	259
1.176	0.050	2.141	13.6000	1.0000		DONALD	69	NP	B11	551
1.330		2.194	12.4000	0.2200	*	KALBFLEISC	69	PL	29B	259
1.520		2.261	10.0000	0.2800	*	KALBFLEISC	69	PL	29B	259
1.610		2.293	10.4000	1.0000		XUONG	62	PR	128	1849
2.500		2.602	6.0000	0.1000		CLAYTON	71	NP	B30	605
3.280	0.020	2.857	4.5000	0.6000		FERBEL	66	PR	143	1096
5.700	0.057	3.550	0.7500	0.1100		BOECKMANN	66	NC	42A	954
5.700		3.550	0.9000	0.1000		ALLES-BORE	67	NC	50A	776
6.940	0.104	3.860	0.4200	0.1000		FERBEL	68	PR	173	1307



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Reaction [16] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$

1.176+-	0.050	2.141	8.9000 +-	1.5000	†	DONALD	69	NP	B11	551
2.500		2.602	7.8000	0.1000	†	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	[5.5000	0.7000]	†	FERBEL	66	PR	143	1096

****

Reaction [17] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0\pi^0$

1.176	0.050	2.141	5.4000	1.4000	†	DONALD	69	NP	B11	551
2.500		2.602	5.0000	0.1000	†	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	[3.4000	0.6000]	†	FERBEL	66	PR	143	1096

****

Reaction [18] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0\pi^0\pi^0$

2.500		2.602	1.4000	0.1000	†	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	[2.3000	0.6000]	†	FERBEL	66	PR	143	1096

****

Reaction [19] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^-\pi^0\pi^0\pi^0\pi^0\pi^0$

2.500		2.602	0.3000	0.1500	†	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	[0.8000	0.4000]	†	FERBEL	66	PR	143	1096

****

Reaction [20] $\bar{p}p \to \pi^+\pi^+\pi^-\pi^- MM \geq 2\pi^0$

1.110		2.118	15.7000	0.2800	*	KALBFLEISC	69	PL	29B	259
1.176	0.050	2.141	14.3000	1.0000		DONALD	69	NP	B11	551
1.330		2.194	15.5000	0.2200	*	KALBFLEISC	69	PL	29B	259
1.520		2.261	16.3000	0.2900	*	KALBFLEISC	69	PL	29B	259
1.610		2.293	12.0000	1.5000		XUONG	62	PR	128	1849
3.280	0.020	2.857	12.0000	1.2000		FERBEL	66	PR	143	1096
5.700	0.057	3.550	8.3000	1.4000		BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	10.5000	1.5000		FERBEL	68	PR	173	1307

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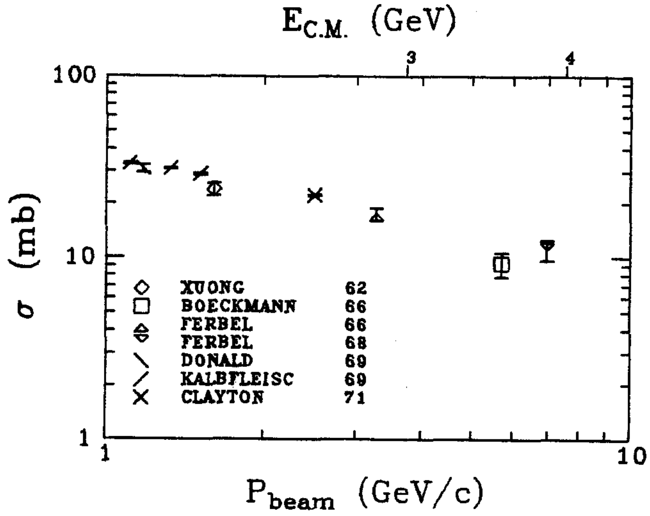
annihilation into pions

Reaction [21] $\bar{p}p \rightarrow 4$ prong pion annihilation

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.110		2.118	[32.7000	+-0.5000]	KALBFLEISC	69	PL	29B	259
1.176	+-0.050	2.141	[30.8000	1.5000]	DONALD	69	NP	B11	551
1.330		2.194	[30.9000	0.3000]	KALBFLEISC	69	PL	29B	259
1.520		2.261	[28.8000	0.5000]	KALBFLEISC	69	PL	29B	259
1.610		2.293	[23.8000	1.8000]	XUONG	62	PR	128	1849
2.500		2.602	[21.9000	0.3000]	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	[17.3000	1.4000]	FERBEL	66	PR	143	1096
5.700	0.057	3.550	[9.2000	1.4000]	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	[11.0000	1.5000]	FERBEL	68	PR	173	1307



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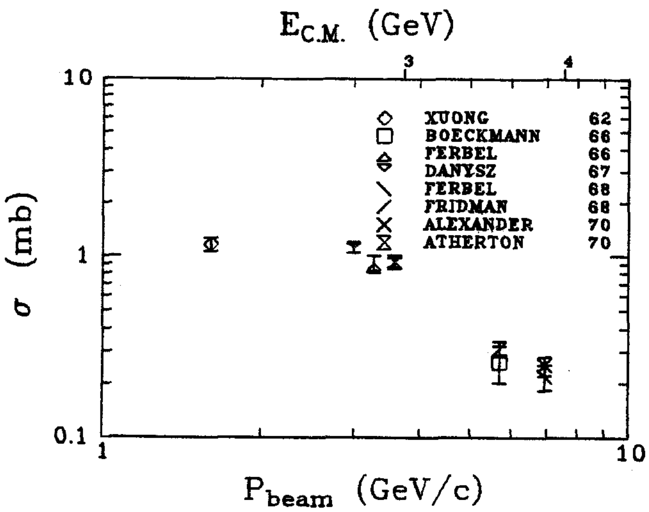
Reaction [22] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.610		2.293	1.1600	0.1000	XUONG	62	PR	128	1849
3.000	0.015	2.768	1.1000	0.0700	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.9000	0.1000	FERBEL	66	PR	143	1096
3.590	0.054	2.954	0.9200	0.0600	ATHERTON	70	NP	B18	221
5.700	0.057	3.550	0.2600	0.0600	BOECKMANN	66	NC	42A	954
5.700		3.550	0.3100	0.0300	FRIDMAN	68	PR	167	1268
6.940	0.104	3.860	0.2160	0.0350	FERBEL	68	PR	173	1307
6.940		3.860	0.2500	0.0300	ALEXANDER	70	NP	B23	557



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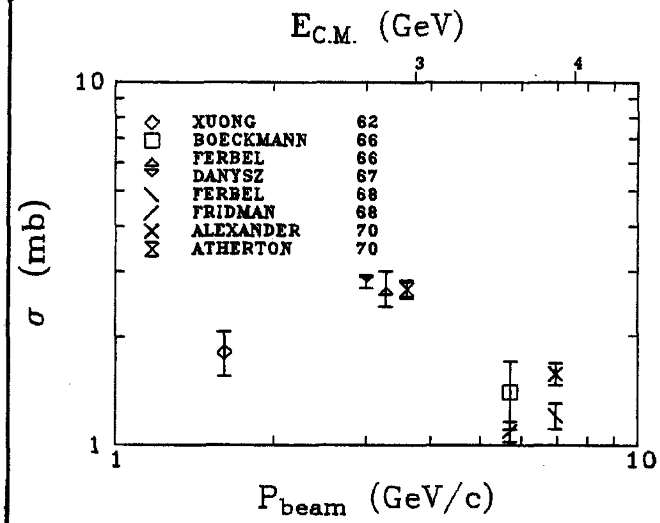
Reaction [23] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.610		2.293	1.8000	+-0.2500	XUONG	62	PR	128	1849
3.000	+-0.015	2.768	2.8000	0.1000	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	2.7000	0.3000	FERBEL	66	PR	143	1096
3.590	0.054	2.954	2.6800	0.1600	ATHERTON	70	NP	B18	221
5.700	0.057	3.550	1.4000	0.3000	BOECKMANN	66	NC	42A	954
5.700		3.550	1.0900	0.0700	FRIDMAN	68	PR	167	1268
6.940	0.104	3.860	1.2000	0.1000	FERBEL	68	PR	173	1307
6.940		3.860	1.5700	0.1100	ALEXANDER	70	NP	B23	557



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Reaction [24] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0\pi^0$

1.610		2.293	1.0500	0.2500	XUONG	62	PR	128	1849
3.000	0.015	2.768	2.6000	0.1000 †	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	[1.4000	0.3000]†	FERBEL	66	PR	143	1096

****

Reaction [25] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0\pi^0\pi^0$

3.000	0.015	2.768	0.5200	0.0600 †	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	[0.8000	0.2000]†	FERBEL	66	PR	143	1096

****

Reaction [26] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0\pi^0\pi^0\pi^0$

3.280	0.020	2.857	[0.2000	0.1000]†	FERBEL	66	PR	143	1096

****

Reaction [27] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^- MM \geq 2\pi^0$

3.280	0.020	2.857	2.4000	0.5000	FERBEL	66	PR	143	1096
5.700	0.057	3.550	4.9000	0.4000	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	3.9000	0.5000	FERBEL	68	PR	173	1307
6.940		3.860	3.6500	0.2400	ALEXANDER	70	NP	B23	557

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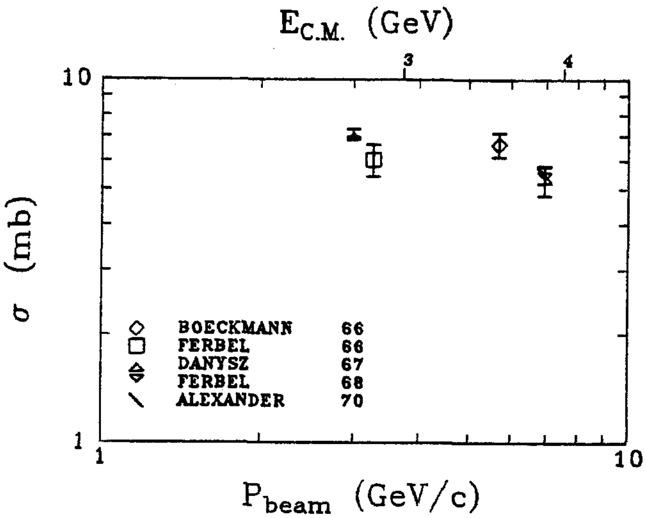
Reaction [28] $\bar{p}p \rightarrow 6$ prong pion annihilation

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
3.000+-	0.015	2.768	7.1000 +-	0.2000	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	[6.0000	0.6000]	FERBEL	66	PR	143	1096
5.700	0.057	3.550	[6.6000	0.5000]	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	[5.3000	0.5000]	FERBEL	68	PR	173	1307
6.940		3.860	5.4700	0.2700	ALEXANDER	70	NP	B23	557



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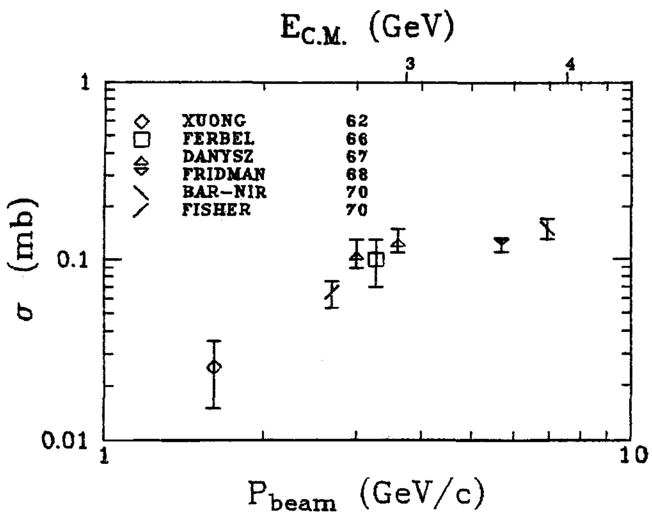
Reaction [29] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.610		2.293	0.0250	0.0100	XUONG	62	PR	128	1849
2.700	0.070	2.669	0.0650	0.0110	FISHER	70	NP	B16	450
3.000	0.015	2.768	0.1100	0.0200	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.1000	0.0300	FERBEL	66	PR	143	1096
3.600	0.018	2.957	0.1300	0.0200	DANYSZ	67	NC	51A	801
5.700		3.550	0.1200	0.0100	FRIDMAN	68	PR	176	1595
6.940	0.069	3.860	0.1500	0.0200	BAR-NIR	70	NP	B20	45



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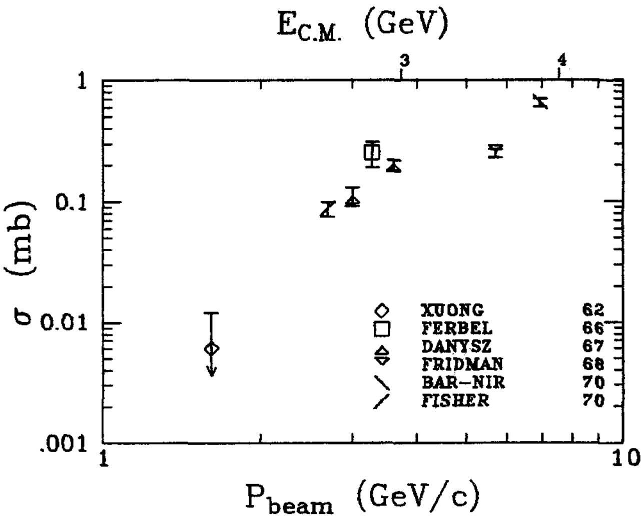
Reaction [30] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.610		2.293	0.0060 +-	0.0060	XUONG	62	PR	128	1849
2.700+-	0.070	2.669	0.0870	0.0120	FISHER	70	NP	B16	450
3.000	0.015	2.768	0.1100	0.0200	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.2500	0.0600	FERBEL	66	PR	143	1096
3.600	0.018	2.957	0.2000	0.0200	DANYSZ	67	NC	51A	801
5.700		3.550	0.2500	0.0200	FRIDMAN	68	PR	176	1595
6.940	0.069	3.860	0.6500	0.0500	BAR-NIR	70	NP	B20	45



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Reaction [31] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^0\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
3.000	0.015	2.768	0.1000	0.0200 †	DANYSZ	67	NC	51A	801
3.600	0.018	2.957	0.1300	0.0300 †	DANYSZ	67	NC	51A	801

****

Reaction [32] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^0\pi^0\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
3.600	0.018	2.957	0.0200	0.0300 †	DANYSZ	67	NC	51A	801

****

Reaction [33] $\bar{p}p \rightarrow \pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^- MM \geqq 2\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
2.700	0.070	2.669	0.0170	0.0060	FISHER	70	NP	B16	450
3.280	0.020	2.857	0.1000		FERBEL	66	PR	143	1096
6.940	0.069	3.860	0.9600	0.0700	BAR-NIR	70	NP	B20	45

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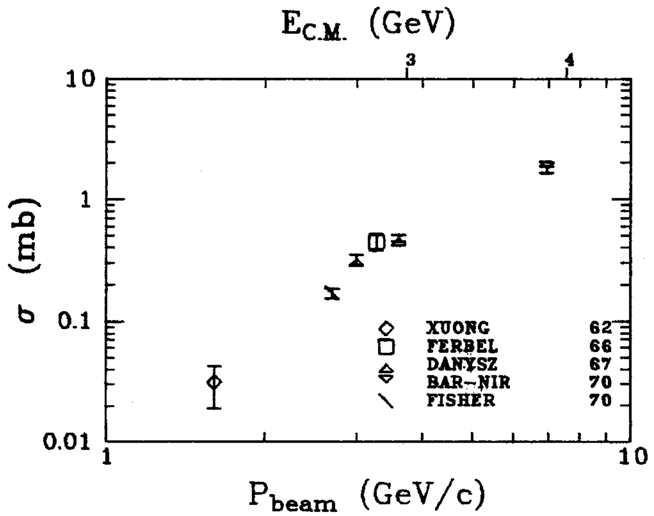
annihilation into pions

Columns: P_{beam} (GeV/c), $E_{C.M.}$ (GeV), σ (mb), References

Reaction [34] $\bar{p}p \to 8$ prong pion annihilation

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
1.610		2.293	[0.0310	+-0.0120]	XUONG	62	PR	128	1849
2.700	+-0.070	2.669	[0.1690	0.0170]	FISHER	70	NP	B16	450
3.000	0.015	2.768	0.3200	0.0300	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	[0.4500	0.0700]	FERBEL	66	PR	143	1096
3.600	0.018	2.957	0.4800	0.0300	DANYSZ	67	NC	51A	801
6.940	0.069	3.860	1.7700	0.1000	BAR-NIR	70	NP	B20	45



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Reaction [35] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^-$

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
2.700	0.070	2.669	<0.0040		FISHER	70	NP	B16	450
6.940	0.069	3.860	0.0130	0.0070 -0.0040	BAR-NIR	70	NP	B20	45

****

Reaction [36] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^-\pi^0$

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
2.700	0.070	2.669	0.0017	0.0017	FISHER	70	NP	B16	450
6.940	0.069	3.860	0.0600	0.0130	BAR-NIR	70	NP	B20	45

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Reaction [37] $\bar{p}p \to \pi^+\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^- MM \geq 2\pi^0$

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
6.940	0.069	3.860	0.0680	0.0140	BAR-NIR	70	NP	B20	45

****

Reaction [38] $\bar{p}p \to 10$ prong pion annihilation

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
3.000	0.015	2.768	0.0060	0.0040	DANYSZ	67	NC	51A	801
3.600	0.018	2.957	0.0130	0.0050	DANYSZ	67	NC	51A	801
6.940	0.069	3.860	0.1400	0.0200	BAR-NIR	70	NP	B20	45

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Reaction [39] $\bar{p}p \to$ total pion annihilation

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
3.280	+-0.066	2.857	30.9000	+-3.0000	FERBEL	65	PR	137B	1250
6.940	0.104	3.860	25.0000	5.0000	FERBEL	68	PR	173	1307

****

Reaction [40] $\bar{p}p \to A_2^+\pi^-$ + c.c. ($A_2^+ \to \rho^0\pi^+$)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
0.943		2.063	[0.4000	0.2000]†	BURNS	71	NP	B27	109
1.176	0.050	2.141	[0.6100	0.1500]†	DONALD	68	NP	B6	174

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Reaction [41] $\bar{p}p \to A_2^+\pi^-\pi^0$ + c.c. ($A_2^+ \to \rho^0\pi^+$)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
1.176	0.050	2.141	<0.2200	†	DONALD	69	NP	B11	551

****

Reaction [42] $\bar{p}p \to A_2^0\pi^+\pi^-$ ($A_2^0 \to \rho^+\pi^-$ + c.c.)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
1.176	0.050	2.141	<0.2500	†	DONALD	69	NP	B11	551

****

Reaction [43] $\bar{p}p \to B^+\pi^-$ + c.c. ($B^+ \to \omega\pi^+$)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
1.176	0.050	2.141	<0.1260	†	DONALD	69	NP	B11	551

****

Reaction [44] $\bar{p}p \to E\pi^0$ ($E \to \rho^0\pi^+\pi^-$)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
1.176	0.050	2.141	<0.1100	†	DONALD	69	NP	B11	551

****

Reaction [45] $\bar{p}p \to \eta\pi^+\pi^-$ ($\eta \to \pi^+\pi^-\pi^0$)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
1.176	0.050	2.141	[0.1500	0.0300]†	DONALD	69	NP	B11	551
3.280	0.020	2.857	<0.0300	†	FERBEL	66	PR	143	1096
5.700		3.550	0.0040	0.0020 †	ALLES-BORE	67	NC	50A	776

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Reaction [46] $\bar{p}p \to \eta\pi^+\pi^+\pi^-\pi^-$ ($\eta \to \pi^+\pi^-\pi^0$)

P_{beam}	ΔP	$E_{C.M.}$	σ	$\Delta\sigma$	Reference	Year	Journal	Vol.	Page
3.280	0.020	2.857	<0.2000	†	FERBEL	66	PR	143	1096
3.590	0.054	2.954	[0.0320	0.0050]†	ATHERTON	70	NP	B18	221

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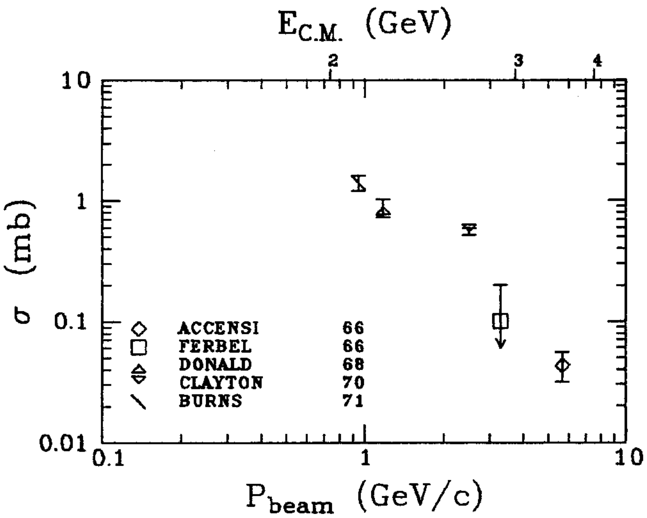
annihilation into pions

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				

Reaction [47] $\bar{p}p \to f\pi^+\pi^-$, $f \to \pi^+\pi^-$

0.943		2.063	[1.4000	+-0.2000] †	BURNS	71	NP	B27	109
1.176+-0.050		2.141	[0.8700	0.1500] †	DONALD	68	NP	B6	174
2.500		2.602	0.5500	0.0400 †	CLAYTON	70	NP	B22	85
3.280	0.020	2.857	0.1000	0.1000 †	FERBEL	66	PR	143	1096
5.700		3.550	0.0430	0.0120 †	ACCENSI	66	PL	20	557



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Reaction [48] $\bar{p}p \to f\pi^+\pi^-\pi^0$, $f \to \pi^+\pi^-$

1.176	0.050	2.141	[0.9500	0.0900] †	DONALD	69	NP	B11	551
2.500		2.602	[1.0000	0.3000] †	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	0.6000	0.3000 †	FERBEL	66	PR	143	1096
5.700		3.550	0.0800	0.0400 †	ALLES-BORE	67	NC	50A	776

****

Reaction [49] $\bar{p}p \to f\pi^+\pi^+\pi^-\pi^-$, $f \to \pi^+\pi^-$

3.280	0.020	2.857	0.2000	0.1000 †	FERBEL	66	PR	143	1096
3.590	0.054	2.954	[0.1660	0.0280] †	ATHERTON	70	NP	B18	221

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Reaction [50] $\bar{p}p \to \omega\pi^+\pi^-$, $\omega \to \pi^+\pi^-\pi^0$

1.110		2.118	2.3300	0.2500 *	KALBFLEISC	69	PL	29B	259
1.176	0.050	2.141	[3.9000	0.3000] †	DONALD	69	NP	B11	551
1.330		2.194	2.3100	0.1200 *	KALBFLEISC	69	PL	29B	259
1.520		2.261	1.8800	0.2300 *	KALBFLEISC	69	PL	29B	259
2.500		2.602	[1.1000	0.2000] †	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	0.4000	0.1000 †	FERBEL	66	PR	143	1096
5.700	0.057	3.550	0.0620	0.0020 †	BOECKMANN	66	NC	42A	954
5.700		3.550	0.0840	0.0260 †	ALLES-BORE	67	NC	50A	776
6.940	0.104	3.860	<0.0400		FERBEL	68	PR	173	1307

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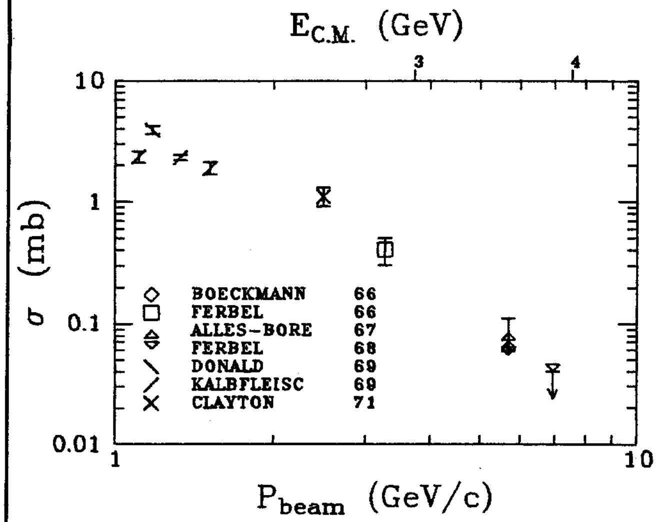

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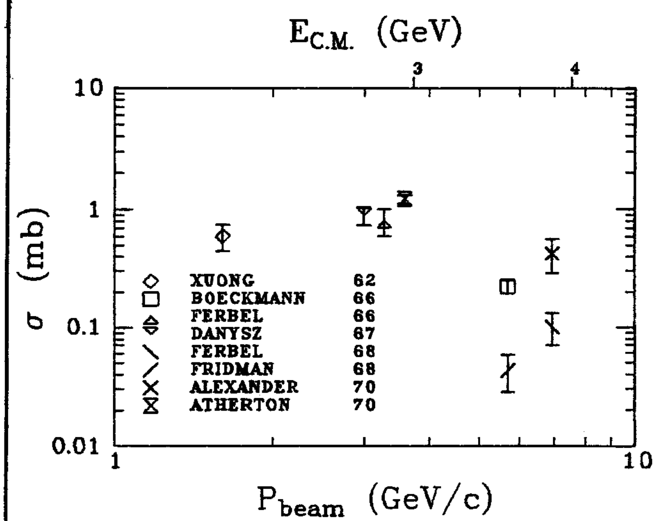
Reaction [51] $\bar{p}p \to \omega\pi^+\pi^+\pi^-\pi^-$, $\omega \to \pi^+\pi^-\pi^0$

1.610		2.293	0.6000	+-0.1500 †	XUONG	62	PR	128	1849
3.000+-0.015		2.768	0.8900	0.1500 †	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.8000	0.2000 †	FERBEL	66	PR	143	1096
3.590	0.054	2.954	[1.2100	0.1000] †	ATHERTON	70	NP	B18	221
5.700	0.057	3.550	0.2200	0.0300 †	BOECKMANN	66	NC	42A	954
5.700		3.550	0.0430	0.0150	FRIDMAN	68	PR	167	1268
6.940	0.104	3.860	0.1000	0.0300	FERBEL	68	PR	173	1307
6.940		3.860	[0.4240	0.1410] †	ALEXANDER	70	NP	B23	557



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Reaction [52] $\bar{p}p \to \rho^0\pi^0$, $\rho^0 \to \pi^+\pi^-$

3.280	0.020	2.857	<0.0500	†	FERBEL	66	PR	143	1096
6.940	0.104	3.860	<0.0250		FERBEL	68	PR	173	1307

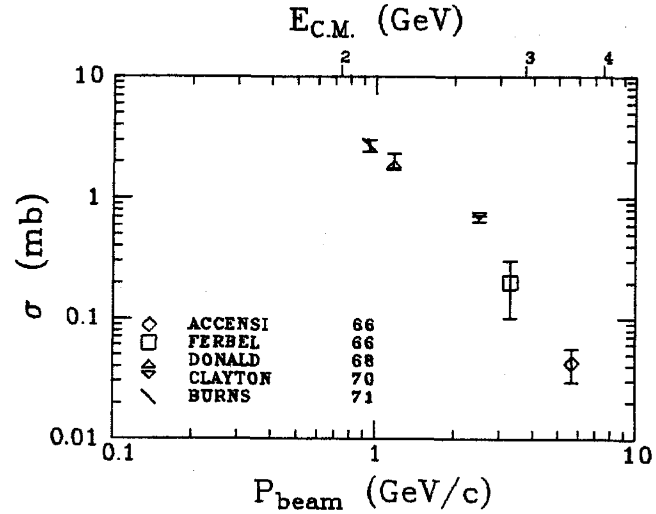
****

annihilation into pions

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [53] $\bar{p}p \rightarrow \rho^0\pi^+\pi^-$, $\rho^0 \rightarrow \pi^+\pi^-$

0.943		2.063	[2.7000	+- 0.3000]	†	BURNS	71	NP	B27	109
1.176	+-0.050	2.141	[2.0000	0.3000]	†	DONALD	68	NP	B6	174
2.500		2.602	0.6700	0.0400	†	CLAYTON	70	NP	B22	85
3.280	0.020	2.857	0.2000	0.1000	†	FERBEL	66	PR	143	1096
5.700		3.550	0.0420	0.0130	†	ACCENSI	66	PL	20	557



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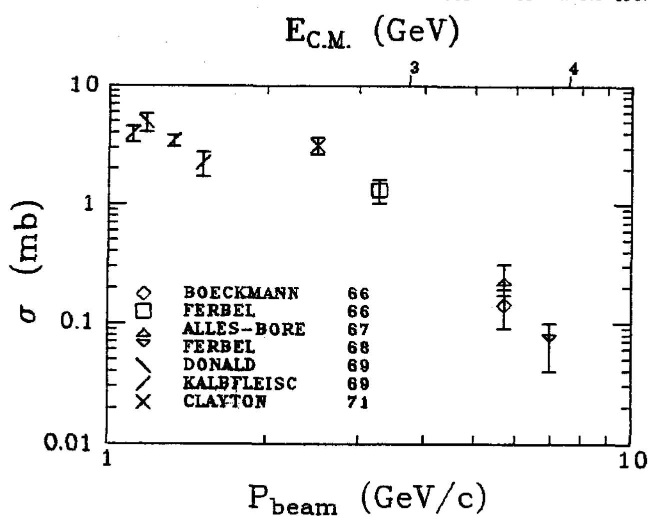
Reaction [54] $\bar{p}p \rightarrow \rho^0\pi^+\pi^-\pi^0$, $\rho^0 \rightarrow \pi^+\pi^-$

1.110		2.118	3.9100	0.5900	*	KALBFLEISC	69	PL	29B	259
1.176	0.050	2.141	[4.9000	0.9000]	†	DONALD	69	NP	B11	551
1.330		2.194	3.4100	0.3600	*	KALBFLEISC	69	PL	29B	259
1.520		2.261	2.2100	0.5300	*	KALBFLEISC	69	PL	29B	259
2.500		2.602	[3.1000	0.5000]	†	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	1.3000	0.3000	†	FERBEL	66	PR	143	1096
5.700	0.057	3.550	0.1400	0.0500	†	BOECKMANN	66	NC	42A	954
5.700		3.550	0.2400	0.0700	†	ALLES-BORE	67	NC	50A	776
6.940	0.104	3.860	0.0700	0.0300		FERBEL	68	PR	173	1307



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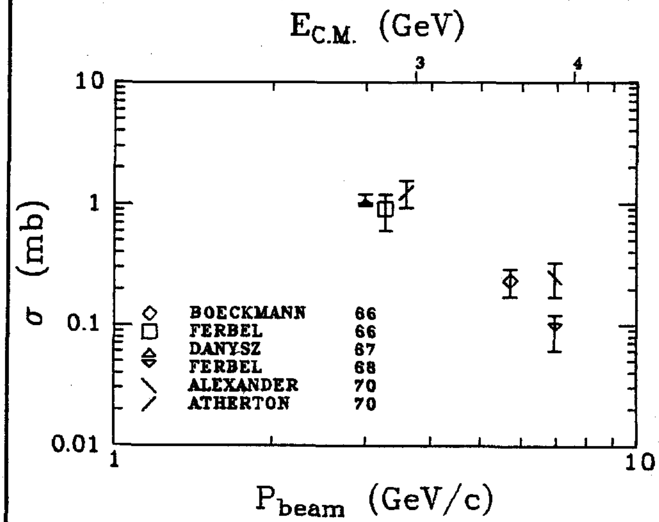
P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [55] $\bar{p}p \rightarrow \rho^0\pi^+\pi^+\pi^-\pi^-$, $\rho^0 \rightarrow \pi^+\pi^-$

3.000	+-0.015	2.768	1.1000	+- 0.1000	†	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.9000	0.3000	†	FERBEL	66	PR	143	1096
3.590	0.054	2.954	[1.2400	0.3200]	†	ATHERTON	70	NP	B18	221
5.700	0.057	3.550	0.2300	0.0600	†	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	0.0900	0.0300		FERBEL	68	PR	173	1307
6.940		3.860	[0.2500	0.0800]	†	ALEXANDER	70	NP	B23	557



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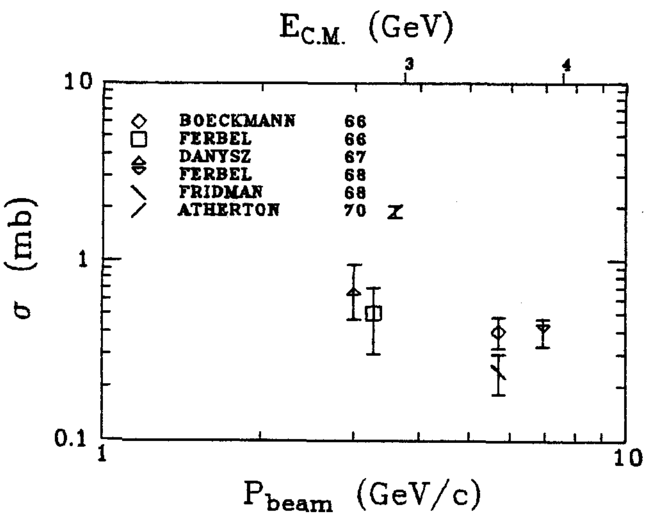
Reaction [56] $\bar{p}p \rightarrow \rho^0\pi^+\pi^+\pi^-\pi^-\pi^0$, $\rho^0 \rightarrow \pi^+\pi^-$

3.000	0.015	2.768	0.7000	0.2400	†	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.5000	0.2000	†	FERBEL	66	PR	143	1096
3.590	0.054	2.954	[1.8800	0.1500]	†	ATHERTON	70	NP	B18	221
5.700	0.057	3.550	0.4000	0.0800	†	BOECKMANN	66	NC	42A	954
5.700		3.550	0.2400	0.0600		FRIDMAN	68	PR	167	1268
6.940	0.104	3.860	0.4000	0.0700		FERBEL	68	PR	173	1307



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annihilation into pions

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				

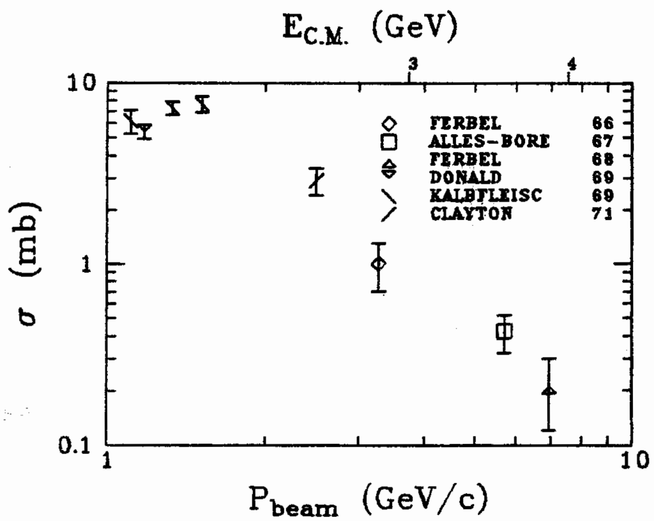
Reaction [57] $\bar{p}p \to \rho^+\pi^-$ + c.c. ($\rho^+ \to \pi^+\pi^0$)

3.280	+-0.020	2.857	<0.0500	†	FERBEL	66	PR	143	1096

****

Reaction [58] $\bar{p}p \to \rho^+\pi^+\pi^-\pi^-$ + c.c. ($\rho^+ \to \pi^+\pi^0$)

1.110		2.118	6.1500	+-0.9100 *	KALBFLEISC	69	PL	29B	259
1.176	0.050	2.141	[5.4000	0.5000]†	DONALD	69	NP	B11	551
1.330		2.194	7.2800	0.5700 *	KALBFLEISC	69	PL	29B	259
1.520		2.261	7.6100	0.8000 *	KALBFLEISC	69	PL	29B	259
2.500		2.602	[2.9000	0.5000]†	CLAYTON	71	NP	B30	605
3.280	0.020	2.857	1.0000	0.3000 †	FERBEL	66	PR	143	1096
5.700		3.550	0.4200	0.1000 †	ALLES-BORE	67	NC	50A	776
6.940	0.104	3.860	0.2100	0.0900	FERBEL	68	PR	173	1307



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P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				

Reaction [59] $\bar{p}p \to \rho^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + c.c. ($\rho^+ \to \pi^+\pi^0$)

3.000	+-0.015	2.768	0.2000	+-0.0500 †	DANYSZ	67	NC	51A	801
3.280	0.020	2.857	0.2000	0.2000 †	FERBEL	66	PR	143	1096
3.590	0.054	2.954	[0.6700	0.0800]†	ATHERTON	70	NP	B18	221
6.940	0.104	3.860	0.1000	0.0300	FERBEL	68	PR	173	1307

****

Reaction [60] $\bar{p}p \to f\rho^0$ ($f \to \pi^+\pi^-$, $\rho^0 \to \pi^+\pi^-$)

0.943		2.063	[1.1000	0.2000]†	BURNS	71	NP	B27	109
5.700		3.550	<0.0220	†	ACCENSI	66	PL	20	557

****

Reaction [61] $\bar{p}p \to \omega\rho^0\pi^+\pi^-$ ($\rho^0 \to \pi^+\pi^-$, $\omega \to \pi^+\pi^-\pi^0$)

3.590	0.054	2.954	[0.5400	0.1100]†	ATHERTON	70	NP	B18	221

****

Reaction [62] $\bar{p}p \to \rho^0\rho^0$ ($\rho^0 \to \pi^+\pi^-$, $\rho^0 \to \pi^+\pi^-$)

0.943		2.063	[0.4000	0.2000]†	BURNS	71	NP	B27	109
5.700		3.550	<0.0100	†	ACCENSI	66	PL	20	557

****

Reaction [63] $\bar{p}p \to \rho^0\rho^0\pi^0$ ($\rho^0 \to \pi^+\pi^-$, $\rho^0 \to \pi^+\pi^-$)

1.330	0.020	2.194	0.5000	0.1000	KALBFLEISC	69	PL	29B	259

****

Reaction [64] $\bar{p}p \to \rho^0\rho^0\pi^+\pi^-\pi^0$ ($\rho^0 \to \pi^+\pi^-$, $\rho^0 \to \pi^+\pi^-$)

5.700		3.550	0.0200	0.0100	FRIDMAN	68	PR	167	1268

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annihilation into kaons (and pions)

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				

Reaction [65] $\bar{p}p \rightarrow K^0\bar{K}^0$

1.880		2.388	0.0055	+-0.0020 $	CHAPMAN	68	PRL	21	1718
2.700		2.669	<0.0100		DOMINGO	67	PL	25B	486
3.660+-0.073		2.975	<0.0020		BALTAY	66	PR	142	932
6.935—0.069		3.859	<0.0200		YEH	67	PR	158	1275

****

Reaction [66] $\bar{p}p \rightarrow K^0_S K^0_S$

1.180	0.010	2.142	0.0059	0.0023	BARLOW	67	NC	50A	701
2.500		2.602	0.0120	0.0050	BADIER	70	NP	B22	512

****

Reaction [67] $\bar{p}p \rightarrow K^0_S K^0_S \pi^0$

1.180	0.010	2.142	0.0590	0.0070	BARLOW	67	NC	50A	701
2.500		2.602	0.0110	0.0020	BADIER	70	NP	B22	512
5.700	0.057	3.550	0.0020	0.0020	ATHERTON	70	NP	B16	416

****

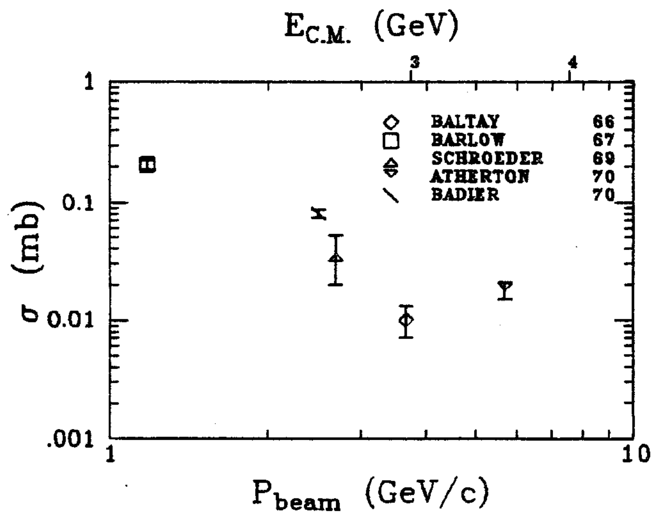
Reaction [68] $\bar{p}p \rightarrow K^0_S K^0_S MM \geq 2\pi^0$

2.500		2.602	0.0450	0.0010	BADIER	70	NP	B22	512
5.700	0.057	3.550	0.0320	0.0040	ATHERTON	70	NP	B16	416

****

Reaction [69] $\bar{p}p \rightarrow K^0_S K^0_S \pi^+\pi^-$

1.180	0.010	2.142	0.2080	0.0200	BARLOW	67	NC	50A	701
2.500		2.602	0.0810	0.0070	BADIER	70	NP	B22	512
2.700	0.070	2.669	0.0360	0.0160	SCHROEDER	69	PR	188	2081
3.660	0.073	2.975	0.0100	0.0030	BALTAY	66	PR	142	932
5.700	0.057	3.550	0.0180	0.0030	ATHERTON	70	NP	B16	416



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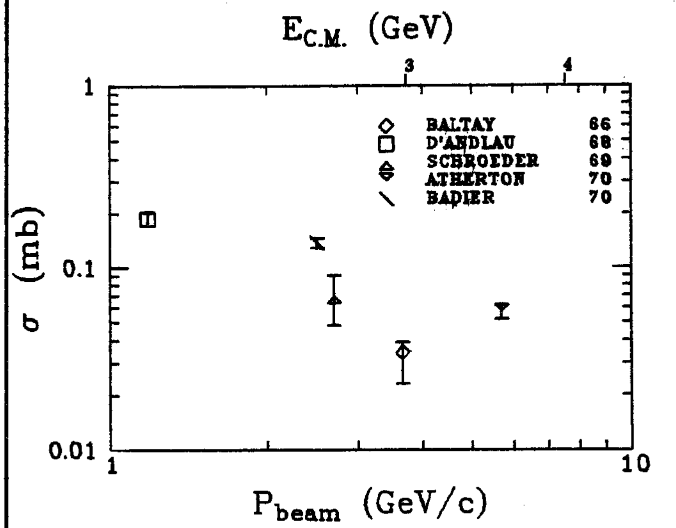
Reaction [70] $\bar{p}p \rightarrow K^0_S K^0_S \pi^+\pi^-\pi^0$

1.180+-0.010		2.142	0.1860	+-0.0170	D'ANDLAU	68	NP	B5	693
2.500		2.602	0.1360	0.0090	BADIER	70	NP	B22	512
2.700	0.070	2.669	0.0690	0.0210	SCHROEDER	69	PR	188	2081
3.660	0.073	2.975	0.0340	+0.0050 -0.0110	BALTAY	66	PR	142	932
5.700	0.057	3.550	0.0570	+-0.0050	ATHERTON	70	NP	B16	416



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Reaction [71] $\bar{p}p \rightarrow K^0_S K^0_S \pi^+\pi^- MM \geq 2\pi^0$

2.500		2.602	0.0570	0.0060	BADIER	70	NP	B22	512
5.700	0.057	3.550	0.1250	0.0100	ATHERTON	70	NP	B16	416

****

Reaction [72] $\bar{p}p \rightarrow K^0_S K^0_S \pi^+\pi^+\pi^-\pi^-$

2.500		2.602	0.0130	0.0020	BADIER	70	NP	B22	512
3.660	0.073	2.975	0.0110	0.0030	BALTAY	66	PR	142	932
5.700	0.057	3.550	0.0250	0.0040	ATHERTON	70	NP	B16	416

****

Reaction [73] $\bar{p}p \rightarrow K^0_S K^0_S \pi^+\pi^+\pi^-\pi^-\pi^0$

2.500		2.602	0.0100	0.0020	BADIER	70	NP	B22	512
5.700	0.057	3.550	0.0760	0.0070	ATHERTON	70	NP	B16	416

****

Reaction [74] $\bar{p}p \rightarrow K^0_S K^0_S \pi^+\pi^+\pi^-\pi^- MM \geq 2\pi^0$

2.500		2.602	<0.0010		BADIER	70	NP	B22	512
5.700	0.057	3.550	0.0400	0.0050	ATHERTON	70	NP	B16	416

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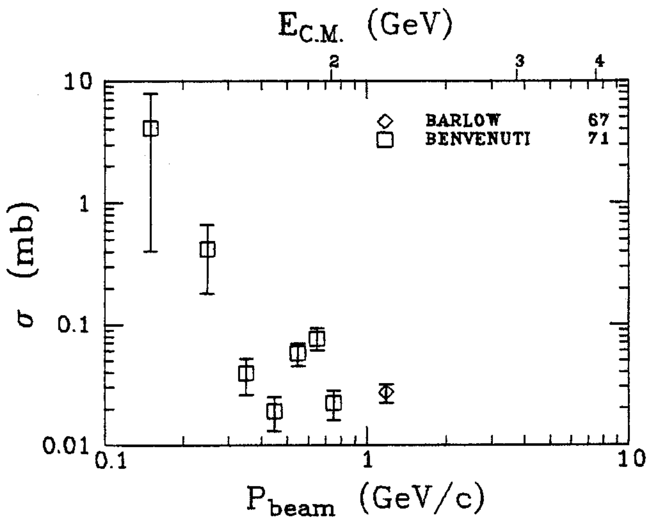
annihilation into kaons (and pions)

Reaction [75] $\bar{p}p \rightarrow K^0_S K^0_L$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
0.150	+-0.050	1.882	4.1000	+-3.7000	*	BENVENUTI	71	PRL	27	283
0.250	0.050	1.893	0.4200	0.2400	*	BENVENUTI	71	PRL	27	283
0.350	0.050	1.908	0.0390	0.0130	*	BENVENUTI	71	PRL	27	283
0.450	0.050	1.927	0.0190	0.0060	*	BENVENUTI	71	PRL	27	283
0.550	0.050	1.950	0.0570	0.0120	*	BENVENUTI	71	PRL	27	283
0.650	0.050	1.975	0.0760	0.0160	*	BENVENUTI	71	PRL	27	283
0.750	0.050	2.004	0.0220	0.0060	*	BENVENUTI	71	PRL	27	283
1.180	0.010	2.142	0.0270	0.0050		BARLOW	67	NC	50A	701



Reaction [76] $\bar{p}p \rightarrow K^0_S K^0_L \pi^+\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
2.500		2.602	0.2040	0.0130		BADIER	70	NP	B22	512
5.700	0.057	3.550	0.0250	0.0050	$	ATHERTON	70	NP	B16	416

Reaction [77] $\bar{p}p \rightarrow K^0_S K^0 \pi^+\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
2.700	0.070	2.669	0.2000	+0.0450 -0.0300		SCHROEDER	69	PR	188	2081
3.660	0.073	2.975	0.0610	+0.0630 -0.0430	†	BALTAY	66	PR	142	932

Reaction [78] $\bar{p}p \rightarrow K^0_S K^0_L \pi^+\pi^+\pi^-\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
2.500		2.602	0.0290	+- 0.0040		BADIER	70	NP	B22	512
5.700	0.057	3.550	0.0680	0.0060	$	ATHERTON	70	NP	B16	416

Reaction [79] $\bar{p}p \rightarrow K^0_S K^0 \pi^+\pi^+\pi^-\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
2.700	0.070	2.669	0.0700	+0.0240 -0.0160		SCHROEDER	69	PR	188	2081
3.660	0.073	2.975	0.0750	+0.1100 -0.0640	†	BALTAY	66	PR	142	932

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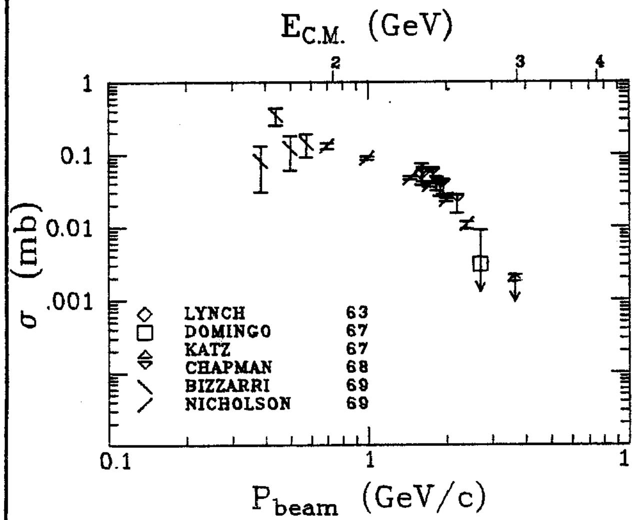
Reaction [80] $\bar{p}p \rightarrow K^+K^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
0.384	+0.031 -0.033	1.914	0.0800	+- 0.0500	*	BIZZARRI	69	NCL	1	749
0.440	+0.024 -0.025	1.925	0.3400	0.0900	*	BIZZARRI	69	NCL	1	749
0.502	+0.036 -0.038	1.938	0.1200	0.0600	*	BIZZARRI	69	NCL	1	749
0.579	+-0.024	1.957	0.1400	0.0500	*	BIZZARRI	69	NCL	1	749
0.700	0.007	1.989	0.1290	0.0140	*	NICHOLSON	69	PRL	23	603
0.990	0.010	2.078	0.0870	0.0046	*	NICHOLSON	69	PRL	23	603
1.450	0.015	2.236	0.0456	0.0025	*	NICHOLSON	69	PRL	23	603
1.610		2.293	0.0550	0.0180		LYNCH	63	PR	131	1287
1.620		2.296	0.0510	0.0100	$	CHAPMAN	68	PRL	21	1718
1.720	0.017	2.332	0.0368	0.0021	*	NICHOLSON	69	PRL	23	603
1.770		2.349	0.0510	0.0100	$	CHAPMAN	68	PRL	21	1718
1.830		2.371	0.0390	0.0080	$	CHAPMAN	68	PRL	21	1718
1.890		2.392	0.0340	0.0080	$	CHAPMAN	68	PRL	21	1718
1.950		2.413	0.0350	0.0080	$	CHAPMAN	68	PRL	21	1718
1.990	0.020	2.427	0.0231	0.0016	*	NICHOLSON	69	PRL	23	603
2.200		2.500	0.0210	0.0060	$	CHAPMAN	68	PRL	21	1718
2.400	0.024	2.568	0.0105	0.0012	*	NICHOLSON	69	PRL	23	603
2.700		2.669	0.0030	+0.0060 -0.0030		DOMINGO	67	PL	25B	486
3.660	0.080	2.975	<0.0022			KATZ	67	PRL	19	265



Reaction [81] $\bar{p}p \rightarrow K^+K^-\pi^+\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
1.200		2.149	0.2600	+-0.0400		FRODESEN	69	NP	B10	307

Reaction [82] $\bar{p}p \rightarrow K^+K^-\pi^+\pi^-\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
1.200		2.149	0.2900	+0.0400 -0.0600		FRODESEN	69	NP	B10	307

Reaction [83] $\bar{p}p \rightarrow K^+K^0_S\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
1.180	0.010	2.142	0.1280	+-0.0100		BARLOW	67	NC	50A	701
2.500		2.602	0.0370	0.0030		BADIER	70	NP	B22	512

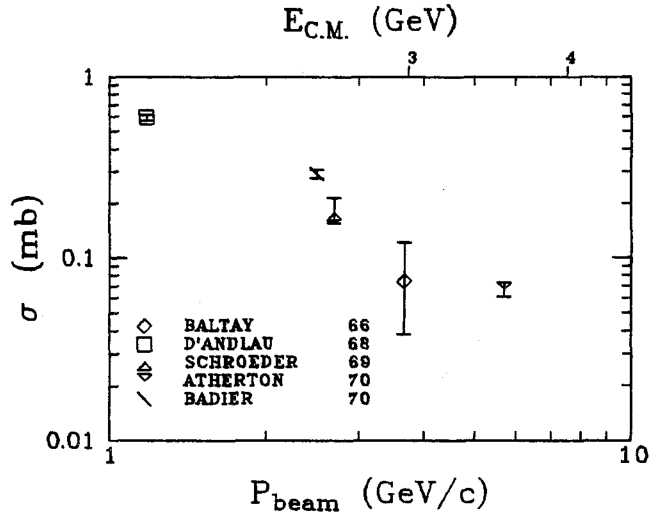
Reaction [84] $\bar{p}p \rightarrow K^-K^0_S\pi^+$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
1.180	0.010	2.142	0.1240	0.0100		BARLOW	67	NC	50A	701

annihilation into kaons (and pions)

Reaction [85] $\bar{p}p \rightarrow K^+K^0_S\pi^-$ + c.c.

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
1.180+-0.010	2.142	[0.2520 +-0.0140]	BARLOW 67 NC 50A 701
2.500	2.602	[0.0740 0.0060]	BADIER 70 NP B22 512
2.700 0.070	2.669	0.0320 0.0130	SCHROEDER 69 PR 188 2081
3.660 0.073	2.975	0.0110 0.0060	BALTAY 66 PR 142 932
5.700 0.057	3.550	0.0050 0.0010	ATHERTON 70 NP B16 416



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Reaction [86] $\bar{p}p \rightarrow K^+K^0_S\pi^-\pi^0$

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
2.500	2.602	0.1440 0.0080	BADIER 70 NP B22 512

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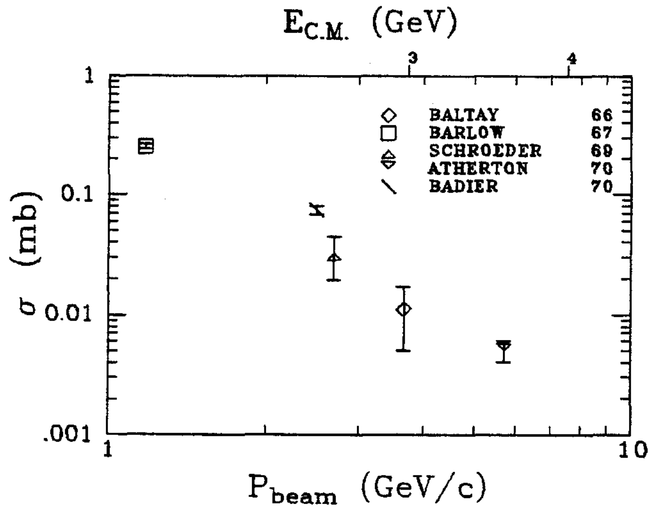
Reaction [87] $\bar{p}p \rightarrow K^+K^0_S\pi^-\pi^0$ + c.c.

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
1.180 0.010	2.142	0.5940 0.0240	D'ANDLAU 68 NP B5 693
2.500	2.602	[0.2880 0.0160]	BADIER 70 NP B22 512
2.700 0.070	2.669	0.1750 +0.0400 −0.0200	SCHROEDER 69 PR 188 2081
3.660 0.073	2.975	0.0740 +0.0480 −0.0360	BALTAY 66 PR 142 932
5.700 0.057	3.550	0.0670 +−0.0060 $	ATHERTON 70 NP B16 416



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* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS
[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

Reaction [88] $\bar{p}p \rightarrow K^+K^0_S\pi^-MM \geq 2\pi^0$

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
2.500	2.602	0.0840+- 0.0050	BADIER 70 NP B22 512

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Reaction [89] $\bar{p}p \rightarrow K^+K^0_S\pi^-MM \geq 2\pi^0$ + c.c.

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
1.180+-0.010	2.142	0.0750 0.0090	D'ANDLAU 68 NP B5 693
2.500	2.602	[0.1680 0.0100]	BADIER 70 NP B22 512
5.700 0.057	3.550	0.2500 0.0200 $	ATHERTON 70 NP B16 416

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Reaction [90] $\bar{p}p \rightarrow K^+K^0_S\pi^+\pi^-\pi^-$

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
2.500	2.602	0.1050 0.0100	BADIER 70 NP B22 512

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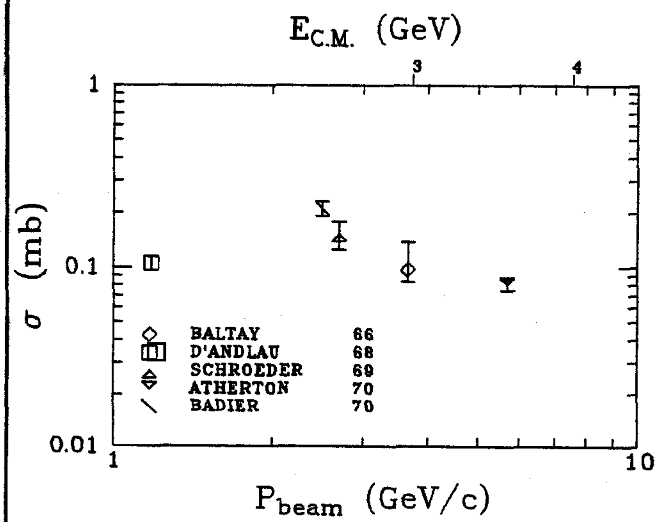
Reaction [91] $\bar{p}p \rightarrow K^+K^0_S\pi^+\pi^-\pi^-$ + c.c.

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
1.180 0.010	2.142	0.1050 0.0100	D'ANDLAU 68 NP B5 693
2.500	2.602	[0.2100 0.0200]	BADIER 70 NP B22 512
2.700 0.070	2.669	0.1510 0.0260	SCHROEDER 69 PR 188 2081
3.660 0.073	2.975	0.0970 +0.0410 −0.0140	BALTAY 66 PR 142 932
5.700 0.057	3.550	0.0800 +− 0.0060 $	ATHERTON 70 NP B16 416



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Reaction [92] $\bar{p}p \rightarrow K^+K^0_S\pi^+\pi^-\pi^-\pi^0$

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
2.500	2.602	0.1050 0.0070	BADIER 70 NP B22 512

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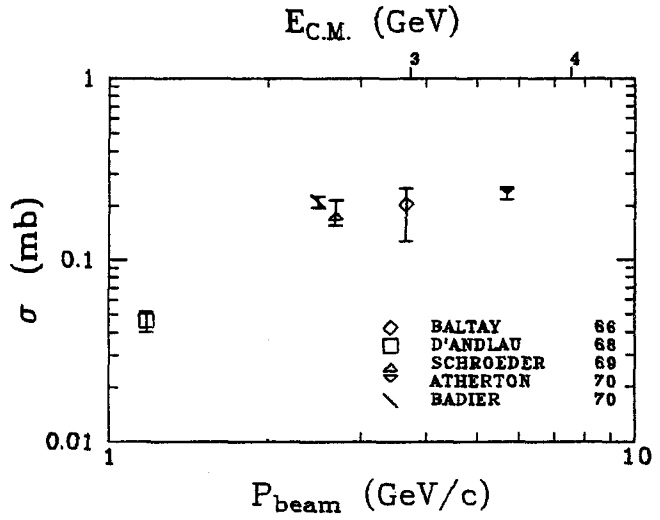
annihilation into kaons (and pions)

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [93] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-\pi^0$ + c.c.

1.180+-0.010	2.142	0.0460 +-0.0060	D'ANDLAU	68 NP B5 693
2.500	2.602	[0.2100 0.0140]	BADIER	70 NP B22 512
2.700 0.070	2.669	0.1820 +0.0320 -0.0270	SCHROEDER	69 PR 188 2081
3.660 0.073	2.975	0.2010 +0.0470 -0.0750	BALTAY	66 PR 142 932
5.700 0.057	3.550	0.2300 +-0.0150 $	ATHERTON	70 NP B16 416



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Reaction [94] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-MM \geq 2\pi^0$

2.500	2.602	0.0210 0.0030	BADIER	70 NP B22 512

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Reaction [95] $\bar{p}p \to K^+K^0_S\pi^+\pi^-\pi^-MM \geq 2\pi^0$ + c.c.

2.500	2.602	[0.0420 0.0060]	BADIER	70 NP B22 512
5.700 0.057	3.550	0.2500 0.0200 $	ATHERTON	70 NP B16 416

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Reaction [96] $\bar{p}p \to K^0_S\pi^+\pi^-MM \geq \pi^0K^0$

1.180 0.010	2.142	0.1980 0.0150	D'ANDLAU	68 NP B5 693
2.500	2.602	0.2240 0.0160	BADIER	70 NP B22 512
5.700 0.057	3.550	0.1400 0.0080 $	ATHERTON	70 NP B16 416

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Reaction [97] $\bar{p}p \to K^0_S\pi^+\pi^+\pi^-\pi^-MM \geq \pi^0K^0$

2.500	2.602	0.0260 0.0030	BADIER	70 NP B22 512
5.700 0.057	3.550	0.1200 0.0200 $	ATHERTON	70 NP B16 416

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† SEE DATA LISTING FOR ADDITIONAL COMMENTS
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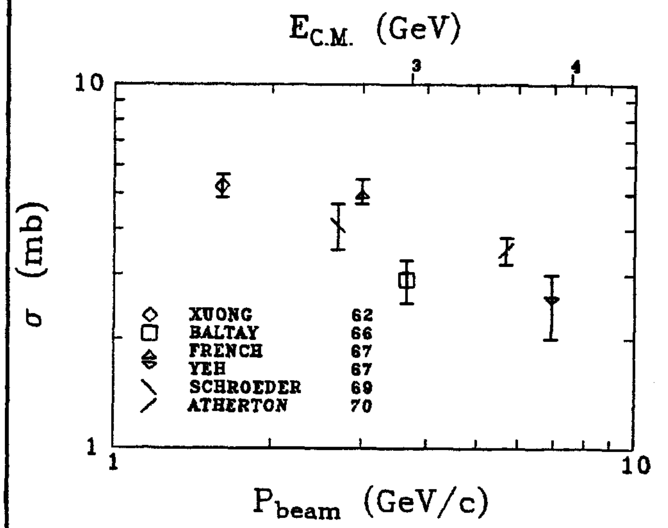
P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [98] $\bar{p}p \to$ total kaon annihilation

1.610	2.293	[5.2600 +- 0.4000]	XUONG	62 PR 128 1849
2.700+-0.070	2.669	4.1000 0.6000 †	SCHROEDER	69 PR 188 2081
3.000	2.768	5.1000 0.4000 †	FRENCH	67 NC 52A 438
3.660 0.073	2.975	2.9000 0.4000	BALTAY	66 PR 142 932
5.700 0.057	3.550	3.5000 0.3000	ATHERTON	70 NP B16 416
6.935 0.069	3.859	2.5000 0.5000 †	YEH	67 PR 158 1275



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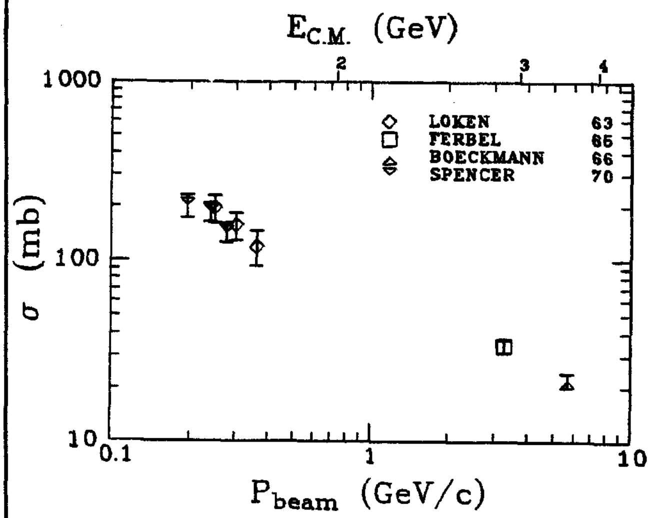
Reaction [99] $\bar{p}p \to$ total annihilation

0.195 +0.023 -0.026	1.886	200.0000 30.0000	SPENCER	70 NP B19 501
0.239 +0.020 -0.021	1.891	184.0000 22.0000	SPENCER	70 NP B19 501
0.249 +0.028 -0.031	1.893	192.0000 34.0000	LOKEN	63 PL 3 334
0.277 +0.017 -0.018	1.896	142.0000 18.0000	SPENCER	70 NP B19 501
0.302 +0.024 -0.025	1.900	155.0000 27.0000	LOKEN	63 PL 3 334
0.362 +0.033 -0.036	1.910	118.0000 26.0000	LOKEN	63 PL 3 334
3.280+-0.066	2.857	[33.8000 3.0000]	FERBEL	65 PR 137B1250
5.700 0.057	3.550	22.0000 2.0000 †	BOECKMANN	66 NC 42A 954



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annihilation into kaons (and pions)

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				

Reaction [100] $\bar{p}p \to \omega K^0_S K^0_S$, $\omega \hookrightarrow \pi^+\pi^-\pi^0$

1.180 +-	0.010	2.142	0.0820 +-	0.0050 †	D'ANDLAU	68	NP	B5	693
5.700	0.057	3.550	[0.0023	0.0012]†	ATHERTON	70	NP	B16	416

Reaction [101] $\bar{p}p \to \omega K^0_S K^0_S \pi^+\pi^-$, $\omega \hookrightarrow \pi^+\pi^-\pi^0$

5.700	0.057	3.550	[0.0170	0.0030]†	ATHERTON	70	NP	B16	416

Reaction [102] $\bar{p}p \to \omega K^+ K^0_S \pi^-$ + c.c., $\omega \hookrightarrow \pi^+\pi^-\pi^0$

1.180	0.010	2.142	0.0087	0.0030 †	D'ANDLAU	68	NP	B5	693
2.700	0.070	2.669	[0.0550	0.0180]	SCHROEDER	69	PR	188	2081

Reaction [103] $\bar{p}p \to \phi \pi^+\pi^-$, $\phi \hookrightarrow K^0_S K^0_L$

1.180	0.010	2.142	0.0120	0.0030 †	BARLOW	67	NC	50A	701

Reaction [104] $\bar{p}p \to \rho^0 K^0_S K^0_S$, $\rho^0 \hookrightarrow \pi^+\pi^-$

1.180	0.010	2.142	0.0520	0.0150 †	BARLOW	67	NC	50A	701

Reaction [105]

$\bar{p}p \to \rho^0 K^0_S K^0_S \pi^0$ + $\rho^+ K^0_S K^0_S \pi^-$ + c.c., $\rho^0 \hookrightarrow \pi^+\pi^-$, $\rho^+ \hookrightarrow \pi^+\pi^0$

1.180	0.010	2.142	0.0260	0.0090 †	D'ANDLAU	68	NP	B5	693

Reaction [106] $\bar{p}p \to \rho^+ K^- K^0_S$ + c.c., $\rho^+ \hookrightarrow \pi^+\pi^0$

1.180	0.010	2.142	0.1190	0.0220 †	BARLOW	67	NC	50A	701

Reaction [107] $\bar{p}p \to D\pi^0$, $D \hookrightarrow K^+ K^0_S \pi^-$ + c.c.

1.180		2.142	0.0070	0.0020 †	BARLOW	67	NC	50A	701
1.180	0.010	2.142	0.0112	0.0030 †	D'ANDLAU	68	NP	B5	693

Reaction [108] $\bar{p}p \to D\pi^0$, $D \hookrightarrow \rho^0 \pi^+\pi^-$

1.176+-0.050	2.141	<0.0440	†	DONALD	69	NP	B11	551

Reaction [109] $\bar{p}p \to D\pi^+\pi^-$, $D \hookrightarrow K^+ K^0_S \pi^-$ + c.c.

1.180	0.010	2.142	0.0032 +-	0.0020 †	D'ANDLAU	68	NP	B5	693

Reaction [110]

$\bar{p}p \to K^*(890)^0 K^+ \pi^-$ + c.c., $K^*(890)^0 \hookrightarrow K^0_S \pi^0$

1.180	0.010	2.142	0.1130	0.0180 †	BARLOW	67	NC	50A	701

Reaction [111] $\bar{p}p \to K^*(890)^0 K^0_S$, $K^*(890)^0 \hookrightarrow K^+\pi^-$ + c.c.

1.180	0.010	2.142	0.0350	0.0060 †	BARLOW	67	NC	50A	701

Reaction [112] $\bar{p}p \to K^*(1420)^0 K^0_S$, $K^*(1420)^0 \hookrightarrow K^+\pi^-$ + c.c.

1.180	0.010	2.142	[0.0100	0.0060]†	BARLOW	67	NC	50A	701

Reaction [113]

$\bar{p}p \to K^*(890)^+ K^-$ + c.c., $K^*(890)^+ \hookrightarrow K^0_S \pi^+$

1.180	0.010	2.142	0.0700	0.0070 †	BARLOW	67	NC	50A	701
5.700	0.057	3.550	[0.0015	0.0005]†	ATHERTON	70	NP	B16	416.

Reaction [114]

$\bar{p}p \to K^*(1420)^+ K^-$ + c.c., $K^*(1420)^+ \hookrightarrow K^0_S \pi^+$

1.180	0.010	2.142	[0.0100	0.0060]†	BARLOW	67	NC	50A	701

Reaction [115]

$\bar{p}p \to K^*(890)^+ K^- \pi^0$ + c.c., $K^*(890)^+ \hookrightarrow K^0_S \pi^+$

1.180	0.010	2.142	0.2200	0.0220 †	BARLOW	67	NC	50A	701

Reaction [116]

$\bar{p}p \to K^*(890)^+ K^- \pi^+\pi^-$ + c.c., $K^*(890)^+ \hookrightarrow K^0_S \pi^+$

5.700	0.057	3.550	[0.0450	0.0060]†	ATHERTON	70	NP	B16	416

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* DATA READ FROM GRAPH
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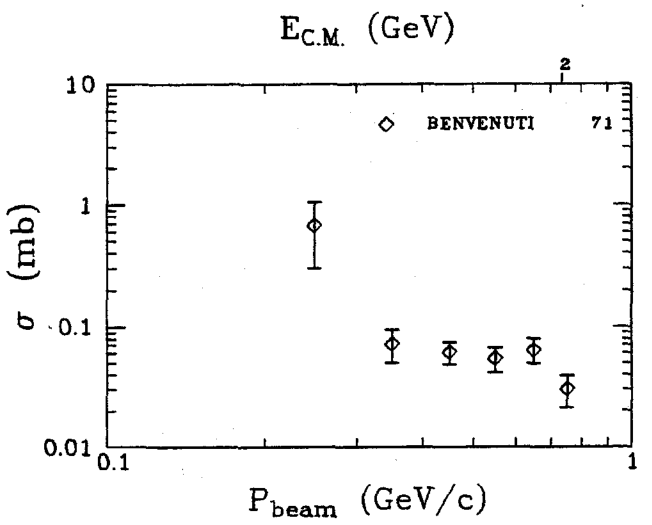
annihilation into kaons (and pions)

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [117] $\bar{p}p \to K^*(890)K^0_S$

$\hookrightarrow K^0_S\pi^0$

0.250+-0.050	1.893	0.6800 +- 0.3800	*†	BENVENUTI	71	PRL	27	283
0.350 0.050	1.908	0.0720 0.0220	*†	BENVENUTI	71	PRL	27	283
0.450 0.050	1.927	0.0610 0.0130	*†	BENVENUTI	71	PRL	27	283
0.550 0.050	1.950	0.0540 0.0130	*†	BENVENUTI	71	PRL	27	283
0.650 0.050	1.975	0.0640 0.0150	*†	BENVENUTI	71	PRL	27	283
0.750 0.050	2.004	0.0300 0.0090	*†	BENVENUTI	71	PRL	27	283



Reaction [118] $\bar{p}p \to K^*(890)^0K^0_S\pi^+\pi^-$

$\hookrightarrow K^0_S\pi^0$

5.700 0.057	3.550	[0.0140 0.0040]†	ATHERTON	70	NP	B16	416

Reaction [119] $\bar{p}p \to K^*(890)^0K^0_S\pi^+\pi^-$

$\hookrightarrow K^+\pi^-$ + c.c.

5.700 0.057	3.550	[0.0160 0.0040]†	ATHERTON	70	NP	B16	416

Reaction [120] $\bar{p}p \to K^*(890)^0K^0_S\pi^+\pi^+\pi^-\pi^-$

$\hookrightarrow K^0_S\pi^0$

5.700 0.057	3.550	[0.0210 0.0080]†	ATHERTON	70	NP	B16	416

Reaction [121] $\bar{p}p \to K^*(890)^+K^0_S\pi^-$ + c.c.

$\hookrightarrow K^0_S\pi^+$

1.180 0.010	2.142	0.1180 0.0180 †	BARLOW	67	NC	50A	701
5.700 0.057	3.550	[0.0027 0.0020]†	ATHERTON	70	NP	B16	416

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[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [122] $\bar{p}p \to K^*(890)^+K^0_S\pi^-\pi^0$ + c.c.

$\hookrightarrow K^0_S\pi^+$

5.700+-0.057	3.550	[0.0260 +- 0.0050]†	ATHERTON	70	NP	B16	416

Reaction [123] $\bar{p}p \to K^*(890)^+K^0_S\pi^+\pi^-\pi^-$ + c.c.

$\hookrightarrow K^0_S\pi^+$

5.700 0.057	3.550	[0.0270 0.0050]†	ATHERTON	70	NP	B16	416

Reaction [124] $\bar{p}p \to K^*(890)^+K^0_S\pi^+\pi^-\pi^-\pi^0$ + c.c.

$\hookrightarrow K^0_S\pi^+$

5.700 0.057	3.550	[0.0470 0.0100]†	ATHERTON	70	NP	B16	416

Reaction [125] $\bar{p}p \to D\eta$

$\eta \hookrightarrow \pi^+\pi^-\pi^0$
$D \hookrightarrow K^+K^0_S\pi^-$ + c.c.

1.180 0.010	2.142	0.0005 0.0005 †	D'ANDLAU	68	NP	B5	693

Reaction [126] $\bar{p}p \to D\eta$

$\eta \hookrightarrow$ neutrals
$D \hookrightarrow K^+K^0_S\pi^-$ + c.c.

1.180 0.010	2.142	0.0026 0.0011 †	D'ANDLAU	68	NP	B5	693

Reaction [127] $\bar{p}p \to D\omega$

$\omega \hookrightarrow \pi^+\pi^-\pi^0$
$D \hookrightarrow K^+K^0_S\pi^-$ + c.c.

1.180 0.010	2.142	0.0210 0.0030 †	D'ANDLAU	68	NP	B5	693

Reaction [128] $\bar{p}p \to D\omega$

$\omega \hookrightarrow$ neutrals
$D \hookrightarrow K^+K^0_S\pi^-$ + c.c.

1.180 0.010	2.142	0.0017 0.0008 †	D'ANDLAU	68	NP	B5	693

Reaction [129] $\bar{p}p \to D\rho^0$

$\rho^0 \hookrightarrow \pi^+\pi^-$
$D \hookrightarrow K^+K^0_S\pi^-$ + c.c.

1.180 0.010	2.142	0.0032 0.0015 †	D'ANDLAU	68	NP	B5	693

Reaction [130] $\bar{p}p \to D\rho^0$

$\rho^0 \hookrightarrow \pi^+\pi^-$
$D \hookrightarrow K^0_SK^0_S\pi^0$

1.180 0.010	2.142	0.0040 0.0020 †	D'ANDLAU	68	NP	B5	693

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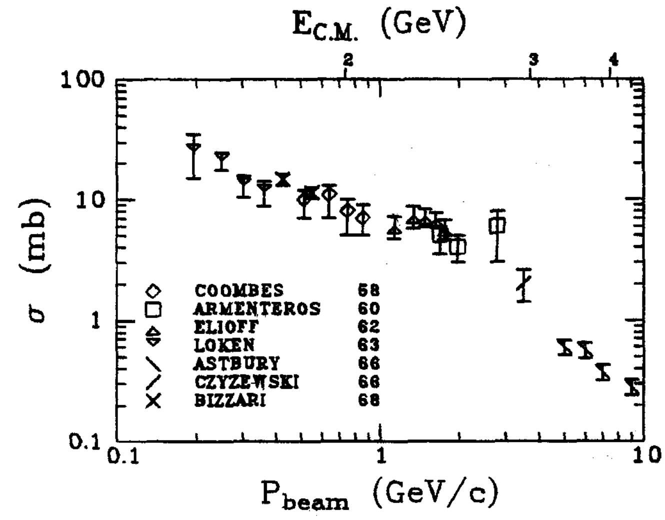
charge exchange

Reaction [131] $\bar{p}p \rightarrow \bar{n}n$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
0.195	+0.023 −0.026	1.886	25.0000	+−10.0000	LOKEN	63	PL	3	334
0.249	+0.028 −0.031	1.893	21.1000	3.6000	LOKEN	63	PL	3	334
0.302	+0.024 −0.025	1.900	13.1000	2.6000	LOKEN	63	PL	3	334
0.362	+0.033 −0.036	1.910	11.5000	2.7000	LOKEN	63	PL	3	334
0.428	+0.051 −0.118	1.922	14.7000	1.6000	BIZZARI	68	NC	54A	456
0.517	+0.026 −0.028	1.942	10.0000	+2.0000 −3.0000	COOMBES	58	PR	112	1303
0.549	+0.059 −0.071	1.950	11.4000	+−1.2000	BIZZARI	68	NC	54A	456
0.639	+−0.028	1.973	11.0000	+2.0000 −4.0000	COOMBES	58	PR	112	1303
0.753	0.027	2.005	8.0000	+2.0000 −3.0000	COOMBES	58	PR	112	1303
0.858	0.025	2.036	7.0000	+− 2.0000	COOMBES	58	PR	112	1303
1.135	0.032	2.127	6.0000	1.3000	ELIOFF	62	PR	128	869
1.343	0.040	2.199	7.2000	1.5000	ELIOFF	62	PR	128	869
1.482	0.044	2.248	7.1000	1.2000	ELIOFF	62	PR	128	869
1.636	0.048	2.302	6.8000	1.0000	ELIOFF	62	PR	128	869
1.696	0.057	2.323	5.0000	+1.0000 −1.5000	ARMENTEROS	60	PR	119	2068
1.773	0.052	2.351	5.7000	+−1.1000	ELIOFF	62	PR	128	869
1.977	0.077	2.422	4.0000	1.0000	ARMENTEROS	60	PR	119	2068
2.784	0.095	2.697	6.0000	+2.0000 −3.0000	ARMENTEROS	60	PR	119	2068
3.500		2.926	2.0000	+−0.6000	CZYZEWSKI	66	PL	20	554
5.000		3.363	0.5980	0.0860	ASTBURY	66	PL	23	160
6.000		3.627	0.5630	0.0820	ASTBURY	66	PL	23	160
7.000		3.875	0.3730	0.0540	ASTBURY	66	PL	23	160
9.000		4.329	0.2840	0.0410	ASTBURY	66	PL	23	160



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* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS
() CALCULATED BY US FROM DATA IN THIS ARTICLE

pion production without annihilation

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References		

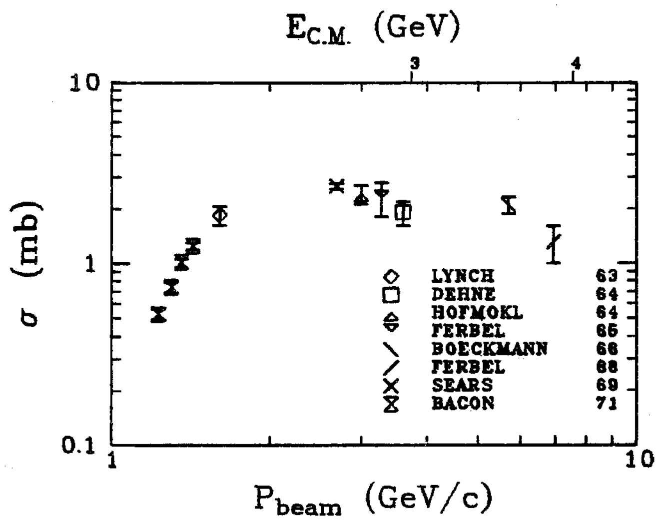
Reaction [132] $\bar{p}p \to \bar{n}n\pi^+\pi^-$

3.500		2.926	2.0000	±0.7000	CZYZEWSKI	66	PL 20 554

****

Reaction [133] $\bar{p}p \to \bar{p}p\pi^0$

1.230	+-0.020	2.160	0.5260	0.0350	BACON	71	NP B32 66
1.300	0.020	2.184	0.7390	0.0460	BACON	71	NP B32 66
1.360	0.020	2.205	1.0110	0.0540	BACON	71	NP B32 66
1.430	0.020	2.229	1.2470	0.0600	BACON	71	NP B32 66
1.610		2.293	1.8500	0.2200	LYNCH	63	PR 131 1276
2.700		2.669	2.6700	0.0900	SEARS	69	PL 29B 700
3.000	0.045	2.768	2.4100	0.2900	HOFMOKL	64	NUKE 9 121
3.280	0.066	2.857	2.3000	0.5000	FERBEL	65	PR 137B1250
3.600		2.957	1.9000	0.3000	DEHNE	64	PR 136 B843
5.700	0.057	3.550	2.1000	0.2300	BOECKMANN	66	NC 42A 954
6.940	0.104	3.860	1.3000	0.3000	FERBEL	68	PR 173 1307



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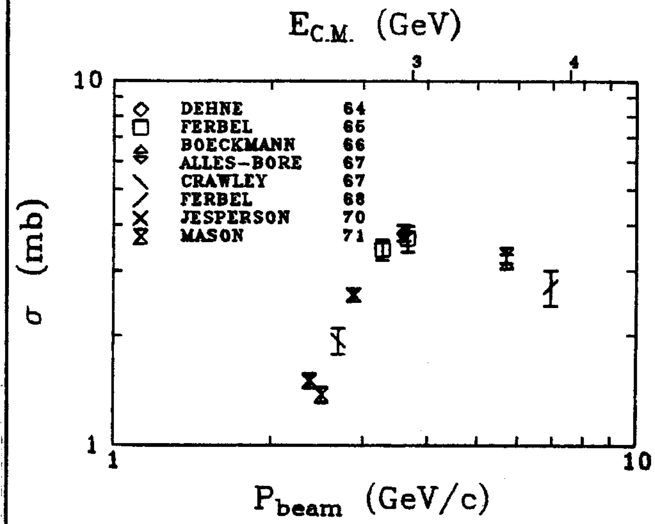
Reaction [134] $\bar{p}p \to \bar{p}p\pi^+\pi^-$

2.375	0.075	2.560	1.5000	0.0700	JESPERSON	70	PR D 1 2483
2.500		2.602	1.3700	0.0700	MASON	71	NP B30 617
2.700		2.669	1.9300	0.1600	CRAWLEY	67	PR 154 1264
2.885	0.080	2.730	2.5700	0.1000	JESPERSON	70	PR D 1 2483
3.280	0.066	2.857	3.4300	0.2300	FERBEL	65	PR 137B1250
3.600		2.957	3.8000	0.2000	DEHNE	64	PR 136 B843
3.660	0.073	2.975	3.6700	0.3000	FERBEL	65	PR 137B1250
5.700	0.057	3.550	3.1800	0.1600	BOECKMANN	66	NC 42A 954
5.700		3.550	[3.3110	0.1600]	ALLES-BORE	67	NC 47A 232
6.940	0.104	3.860	2.7000	0.3000	FERBEL	68	PR 173 1307



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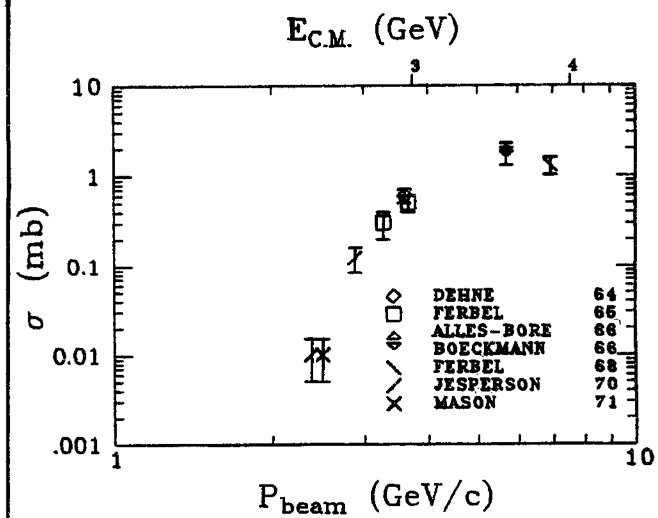
Reaction [135] $\bar{p}p \to \bar{p}p\pi^+\pi^-\pi^0$

2.375	+-0.075	2.560	0.0100	+-0.0050	JESPERSON	70	PR D 1 2483
2.500		2.602	0.0100	0.0050	MASON	71	NP B30 617
2.885	0.080	2.730	0.1240	0.0400	JESPERSON	70	PR D 1 2483
3.280	0.066	2.857	0.3000	0.1000	FERBEL	65	PR 137B1250
3.600		2.957	0.6000	0.1000	DEHNE	64	PR 136 B843
3.660	0.073	2.975	0.5000	0.1000	FERBEL	65	PR 137B1250
5.700		3.550	2.1600	0.1400	ALLES-BORE	66	NC 46A 438
5.700	0.057	3.550	1.5500	0.2500	BOECKMANN	66	NC 42A 954
6.940	0.104	3.860	1.3000	0.3000	FERBEL	68	PR 173 1307



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Reaction [136] $\bar{p}p \to \bar{p}p\pi^+\pi^+\pi^-\pi^-$

3.280	0.066	2.857	>0.0100		FERBEL	65	PR 137B1250
5.700	0.057	3.550	0.1300	0.0300	BOECKMANN	66	NC 42A 954
5.700		3.550	0.1800	0.0500	BRAUN	71	NC 4A 703
6.940	0.104	3.860	0.2600	0.0400	FERBEL	68	PR 173 1307

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[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

pion production without annihilation

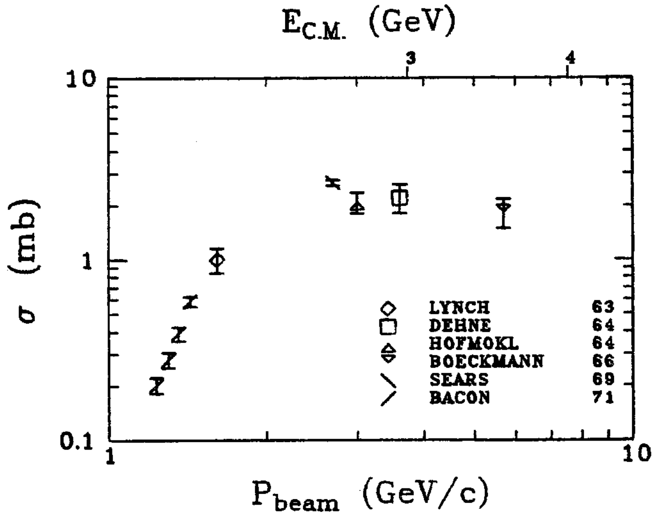
Reaction [137] $\bar{p}p \rightarrow \bar{p}p\pi^+\pi^+\pi^-\pi^-\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
6.940+-	0.104	3.860	0.1400 +-	0.0300	FERBEL	68	PR	173	1307

****

Reaction [138] $\bar{p}p \rightarrow \bar{p}n\pi^+$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.230	0.020	2.160	0.2000	0.0210	BACON	71	NP	B32	66
1.300	0.020	2.184	0.2790	0.0280	BACON	71	NP	B32	66
1.360	0.020	2.205	0.3880	0.0330	BACON	71	NP	B32	66
1.430	0.020	2.229	0.5860	0.0390	BACON	71	NP	B32	66
1.610		2.293	1.0000	0.1600	LYNCH	63	PR	131	1276
2.700		2.669	2.6500	0.0900	SEARS	69	PL	29B	700
3.000	0.045	2.768	2.0700	0.2700	HOFMOKL	64	NUKE	9	121
3.600		2.957	2.2000	0.4000	DEHNE	64	PR	136	B843
5.700	0.057	3.550	1.8200	0.3400	BOECKMANN	66	NC	42A	954



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Reaction [139] $\bar{p}p \rightarrow \bar{n}p\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.230	0.020	2.160	0.2070	0.0220	BACON	71	NP	B32	66
1.300	0.020	2.184	0.3550	0.0320	BACON	71	NP	B32	66
1.360	0.020	2.205	0.4590	0.0360	BACON	71	NP	B32	66
1.430	0.020	2.229	0.6460	0.0420	BACON	71	NP	B32	66
1.610		2.293	1.1900	0.1600	LYNCH	63	PR	131	1276
2.700		2.669	2.7200	0.0900	SEARS	69	PL	29B	700
3.000	0.045	2.768	1.9600	0.2600	HOFMOKL	64	NUKE	9	121
3.600		2.957	2.6000	0.4000	DEHNE	64	PR	136	B843
5.700	0.057	3.550	1.7700	0.3700	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	1.1000	0.3000	FERBEL	68	PR	173	1307

* DATA READ FROM GRAPH
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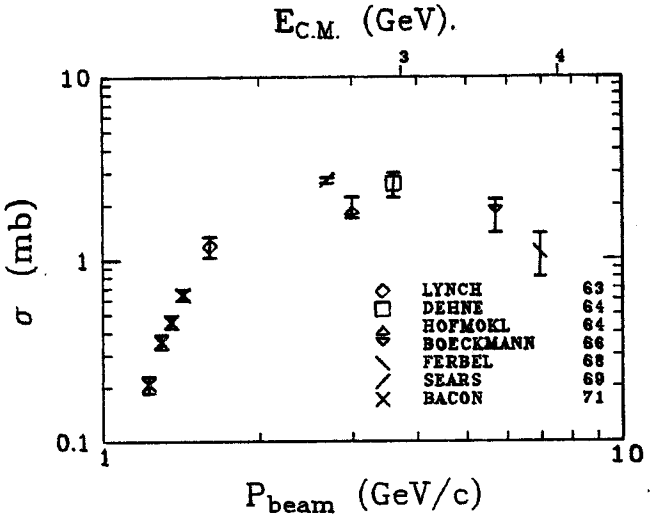

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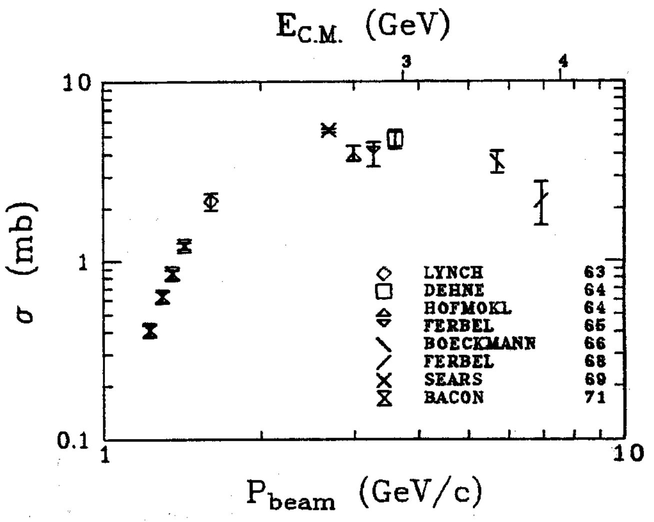
Reaction [140] $\bar{p}p \rightarrow \bar{p}n\pi^+$ + c.c.

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.230+-	0.020	2.160	[0.4070 +-	0.0310]	BACON	71	NP	B32	66
1.300	0.020	2.184	[0.6340	0.0430]	BACON	71	NP	B32	66
1.360	0.020	2.205	[0.8470	0.0490]	BACON	71	NP	B32	66
1.430	0.020	2.229	[1.2320	0.0580]	BACON	71	NP	B32	66
1.610		2.293	[2.1900	0.2300]	LYNCH	63	PR	131	1276
2.700		2.669	[5.3700	0.1300]	SEARS	69	PL	29B	700
3.000	0.045	2.768	[4.0300	0.3800]	HOFMOKL	64	NUKE	9	121
3.280	0.066	2.857	4.0000	0.6000	FERBEL	65	PR	137B	1250
3.600		2.957	[4.8000	0.6000]	DEHNE	64	PR	136	B843
5.700	0.057	3.550	[3.5900	0.5100]	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	[2.2000	0.6000]	FERBEL	68	PR	173	1307



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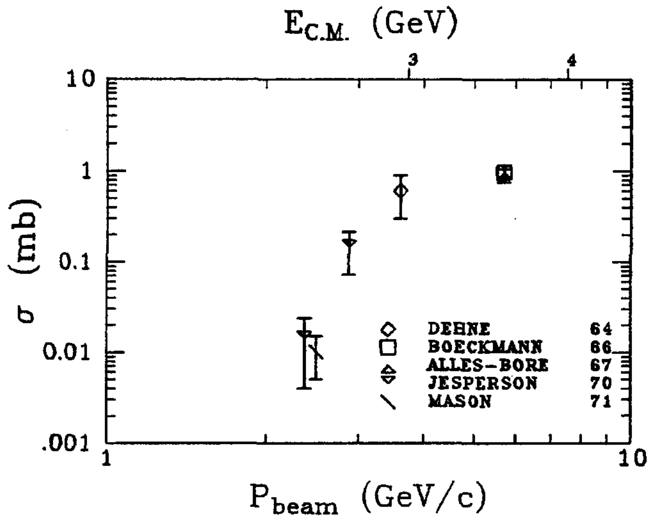
pion production without annihilation

Reaction [141] $\bar{p}p \rightarrow \bar{p}n\pi^+\pi^+\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References
2.375+-0.075		2.560	0.0140	+-0.0100	JESPERSON 70 PR D 1 2483
2.500		2.602	0.0100	0.0050	MASON 71 NP B30 617
2.885	0.080	2.730	0.1430	0.0700	JESPERSON 70 PR D 1 2483
3.600		2.957	0.6000	0.3000	DEHNE 64 PR 136 B843
5.700	0.057	3.550	0.9500	0.2100	BOECKMANN 66 NC 42A 954
5.700		3.550	[0.9590	0.1000]	ALLES-BORE 67 NC 47A 232



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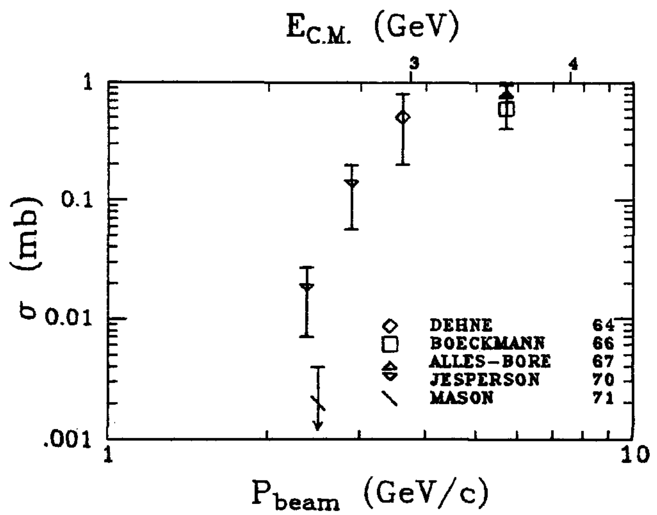
Reaction [142] $\bar{p}p \rightarrow \bar{n}p\pi^+\pi^-\pi^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References
2.375	0.075	2.560	0.0170	0.0100	JESPERSON 70 PR D 1 2483
2.500		2.602	0.0020	0.0020	MASON 71 NP B30 617
2.885	0.080	2.730	0.1270	0.0700	JESPERSON 70 PR D 1 2483
3.600		2.957	0.5000	0.3000	DEHNE 64 PR 136 B843
5.700	0.057	3.550	0.6000	+0.4000 -0.2000	BOECKMANN 66 NC 42A 954
5.700		3.550	[0.8630	+-0.0900]	ALLES-BORE 67 NC 47A 232



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* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS
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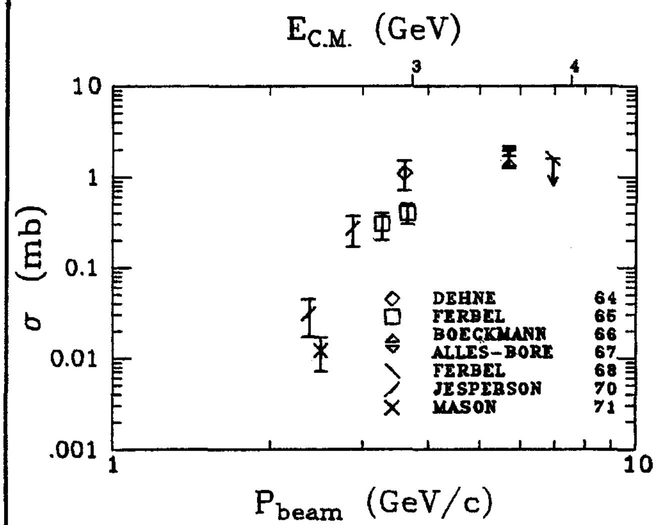
[] CALCULATED BY US FROM DATA IN THIS ARTICLE

Reaction [143] $\bar{p}p \rightarrow \bar{p}n\pi^+\pi^+\pi^-$ + c.c.

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References
2.375+-0.075		2.560	[0.0310	+-0.0140]	JESPERSON 70 PR D 1 2483
2.500		2.602	[0.0120	0.0050]	MASON 71 NP B30 617
2.885	0.080	2.730	[0.2700	0.1000]	JESPERSON 70 PR D 1 2483
3.280	0.066	2.857	0.3000	0.1000	FERBEL 65 PR 137B1250
3.600		2.957	[1.1000	0.4000]	DEHNE 64 PR 136 B843
3.660	0.073	2.975	0.4000	0.1000	FERBEL 65 PR 137B1250
5.700	0.057	3.550	[1.5500	+0.5000 -0.5000]	BOECKMANN 66 NC 42A 954
5.700		3.550	[1.8200	+-0.1400]	ALLES-BORE 67 NC 47A 232
6.940	0.104	3.860	<1.6000		FERBEL 68 PR 173 1307



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Reaction [144] $\bar{p}p \rightarrow \bar{p}n\pi^+\pi^+\pi^+\pi^-\pi^-$ + c.c.

6.940	0.104	3.860	<2.0000		FERBEL 68 PR 173 1307

****

Reaction [145] $\bar{p}p \rightarrow \bar{p}\bar{p}pp$

6.940	0.104	3.860	<0.0150		FERBEL 68 PR 173 1307

****

Reaction [146] $\bar{p}p \rightarrow \eta\bar{p}p$, $\eta \rightarrow \pi^+\pi^-\pi^0$

5.700		3.550	0.0430	0.0080 †	ALLES-BORE 66 NC 46A 438

****

Reaction [147] $\bar{p}p \rightarrow \omega\bar{p}p$, $\omega \rightarrow \pi^+\pi^-\pi^0$

3.600		2.957	0.0600	0.0200	DEHNE 64 PR 136 B843
5.700		3.550	0.2330	0.0360 †	ALLES-BORE 66 NC 46A 438
5.700	0.057	3.550	<0.0400	†	BOECKMANN 66 NC 42A 954

****

pion production without annihilation

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [148] $\bar{p}p \rightarrow \Delta(1238)^{++}\bar{p}\pi^-$, $\Delta(1238)^{++} \rightarrow p\pi^+$

5.700	+-0.057	3.550	0.7400	+-0.1500	†	BOECKMANN	66	NC	42A	954
5.700		3.550	0.3300	0.0700	†	ALLES-BORE	67	NC	48A	360

****

Reaction [149] $\bar{p}p \rightarrow \bar{\Delta}(1238)^{--}p\pi^+$, $\bar{\Delta}(1238)^{--} \rightarrow \bar{p}\pi^-$

5.700	0.057	3.550	0.7400	0.1500	†	BOECKMANN	66	NC	42A	954
5.700		3.550	0.3300	0.0700	†	ALLES-BORE	67	NC	48A	360

****

Reaction [150] $\bar{p}p \rightarrow \Delta(1238)^{++}\bar{p}\pi^-$ + c.c., $\Delta(1238)^{++} \rightarrow p\pi^+$

5.700	0.057	3.550	[1.4800	0.3000]	†	BOECKMANN	66	NC	42A	954
5.700		3.550	[0.6600	0.1400]	†	ALLES-BORE	67	NC	48A	360
6.940	0.104	3.860	0.5400	0.3000		FERBEL	68	PR	173	1307

****

Reaction [151] $\bar{p}p \rightarrow \Delta(1238)^{++}\bar{p}\pi^-\pi^0$, $\Delta(1238)^{++} \rightarrow p\pi^+$

5.700		3.550	0.1450	0.0800	†	ALLES-BORE	66	NC	46A	438
5.700	0.057	3.550	0.3000	0.0600	†	BOECKMANN	66	NC	42A	954

****

Reaction [152] $\bar{p}p \rightarrow \bar{\Delta}(1238)^{--}p\pi^+\pi^0$, $\bar{\Delta}(1238)^{--} \rightarrow \bar{p}\pi^-$

5.700		3.550	0.1450	0.0800	†	ALLES-BORE	66	NC	46A	438
5.700	0.057	3.550	0.3000	0.0600	†	BOECKMANN	66	NC	42A	954

****

Reaction [153] $\bar{p}p \rightarrow \Delta(1238)^{++}\bar{p}\pi^-\pi^0$ + c.c., $\Delta(1238)^{++} \rightarrow p\pi^+$

5.700		3.550	[0.2900	0.1600]	†	ALLES-BORE	66	NC	46A	438
5.700	0.057	3.550	[0.6000	0.1200]	†	BOECKMANN	66	NC	42A	954
6.940	0.104	3.860	0.4400	0.2000		FERBEL	68	PR	173	1307

****

Reaction [154] $\bar{p}p \rightarrow \Delta(1238)^{++}\bar{p}\pi^+\pi^-\pi^-$ + c.c., $\Delta(1238)^{++} \rightarrow p\pi^+$

6.940	0.104	3.860	0.2100	0.0600		FERBEL	68	PR	173	1307

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* DATA READ FROM GRAPH
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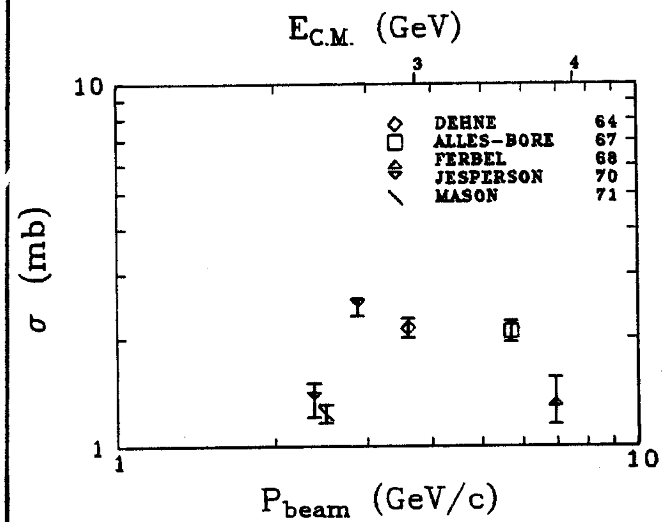
[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [155] $\bar{p}p \rightarrow \bar{\Delta}(1238)^{--}\Delta(1238)^{++}$, $\bar{\Delta}(1238)^{--} \rightarrow \bar{p}\pi^-$, $\Delta(1238)^{++} \rightarrow p\pi^+$

2.375	+-0.075	2.560	[1.3500	+-0.1500]	†	JESPERSON	70	PR	D 1	2483
2.500		2.602	[1.2300	0.0700]		MASON	71	NP	B30	617
2.885	0.080	2.730	[2.4400	0.1300]	†	JESPERSON	70	PR	D 1	2483
3.600		2.957	2.1300	0.1300	†	DEHNE	64	PR	136	B843
5.700		3.550	2.0800	0.1400	†	ALLES-BORE	67	NC	48A	360
6.940	0.104	3.860	1.3500	0.2000		FERBEL	68	PR	173	1307



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Reaction [156] $\bar{p}p \rightarrow \bar{\Delta}(1238)^{--}\Delta(1238)^{++}\pi^0$, $\bar{\Delta}(1238)^{--} \rightarrow \bar{p}\pi^-$, $\Delta(1238)^{++} \rightarrow p\pi^+$

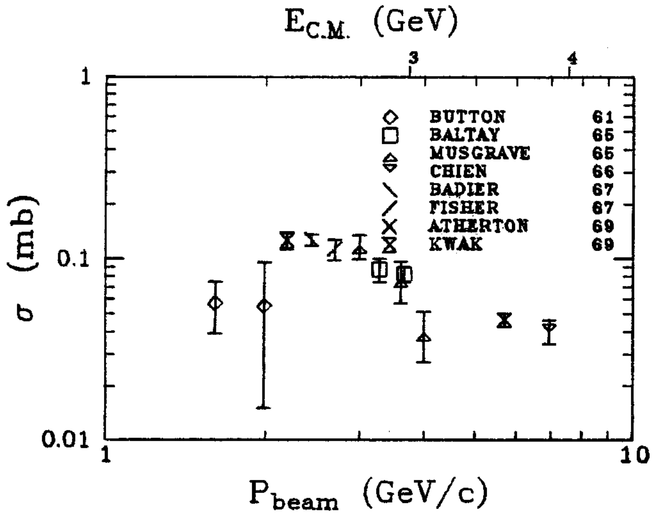
5.700		3.550	0.5800	0.0950	†	ALLES-BORE	66	NC	46A	438

****

production of antihyperons and hyperons

Reaction [157] $\bar{p}p \to \bar{\Lambda}\Lambda$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
1.610+-	0.020	2.293	0.0570 +-	0.0180	BUTTON	61	PR	121	1788
1.990	0.030	2.427	0.0550	0.0400	BUTTON	61	PR	121	1788
2.190		2.496	0.1263	0.0126	KWAK	69	PR	186	1392
2.434	0.030	2.580	0.1270	0.0090	BADIER	67	PL	25B	152
2.700	0.070	2.669	0.1130	0.0150	FISHER	67	PR	161	1335
3.000	0.015	2.768	0.1170	0.0180	MUSGRAVE	65	NC	35	735
3.280	0.049	2.857	0.0870	0.0130	BALTAY	65	PR	140B	1027
3.600	0.018	2.957	0.0770	0.0200	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0820	0.0080	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0390	0.0120	MUSGRAVE	65	NC	35	735
5.700	0.057	3.550	0.0460	0.0040	ATHERTON	69	PL	30B	494
6.935	0.139	3.859	0.0400	0.0060	CHIEN	66	PR	152	1171



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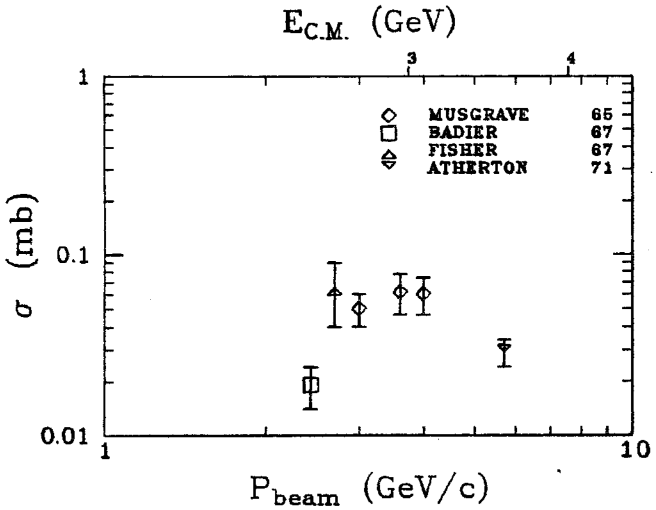
Reaction [158] $\bar{p}p \to \bar{\Lambda}\Lambda\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
2.434	0.030	2.580	0.0190	0.0050	BADIER	67	PL	25B	152
2.700	0.070	2.669	0.0650	0.0250	FISHER	67	PR	161	1335
3.000	0.015	2.768	0.0500	0.0100	MUSGRAVE	65	NC	35	735
3.600	0.018	2.957	0.0620	0.0160	MUSGRAVE	65	NC	35	735
4.000	0.020	3.077	0.0600	0.0140	MUSGRAVE	65	NC	35	735
5.700	0.060	3.550	0.0290	0.0050	ATHERTON	71	NP	B29	477



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[] CALCULATED BY US FROM DATA IN THIS ARTICLE

Reaction [159] $\bar{p}p \to \bar{\Lambda}\Lambda MM \geq 2\pi^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
3.000+-	0.015	2.768	0.0170 +-	0.0070	MUSGRAVE	65	NC	35	735
3.600	0.018	2.957	0.0160	0.0090	MUSGRAVE	65	NC	35	735
4.000	0.020	3.077	0.0300	0.0110	MUSGRAVE	65	NC	35	735

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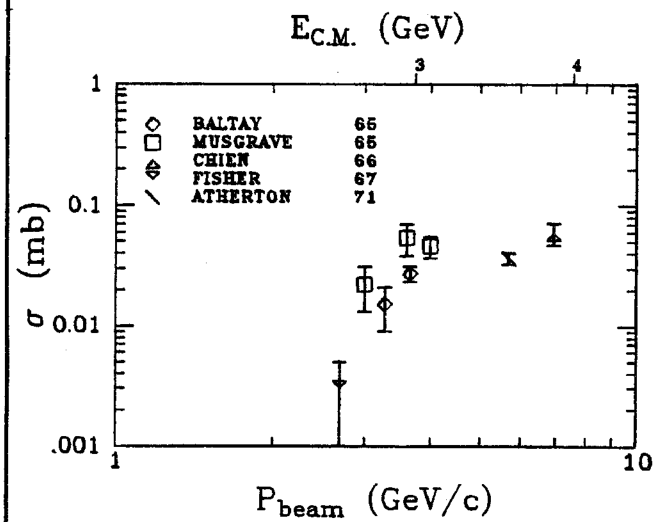
Reaction [160] $\bar{p}p \to \bar{\Lambda}\Lambda\pi^+\pi^-$

2.700	0.070	2.669	0.0030	0.0020	FISHER	67	PR	161	1335
3.000	0.015	2.768	0.0220	0.0090	MUSGRAVE	65	NC	35	735
3.280	0.049	2.857	0.0150	0.0060	BALTAY	65	PR	140B	1027
3.600	0.018	2.957	0.0540	0.0160	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0270	0.0040	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0460	0.0090	MUSGRAVE	65	NC	35	735
5.700	0.060	3.550	0.0360	0.0040	ATHERTON	71	NP	B29	477
6.935	0.139	3.859	0.0590	0.0120	CHIEN	66	PR	152	1171



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Reaction [161] $\bar{p}p \to \bar{\Lambda}\Lambda\pi^+\pi^-\pi^0$

3.280	0.049	2.857	<0.0050		BALTAY	65	PR	140B	1027
3.660	0.055	2.975	0.0030	0.0010	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0015	0.0015	MUSGRAVE	65	NC	35	735

****

Reaction [162] $\bar{p}p \to \bar{\Lambda}\Lambda\pi^+\pi^+\pi^-\pi^-$

6.935	0.139	3.859	0.0080	0.0040	CHIEN	66	PR	152	1171

****

Reaction [163] $\bar{p}p \to \bar{\Lambda}\Sigma^0$

2.434	0.030	2.580	0.0310	0.0050	BADIER	67	PL	25B	152

****

Reaction [164] $\bar{p}p \to \bar{\Sigma}^0\Lambda$

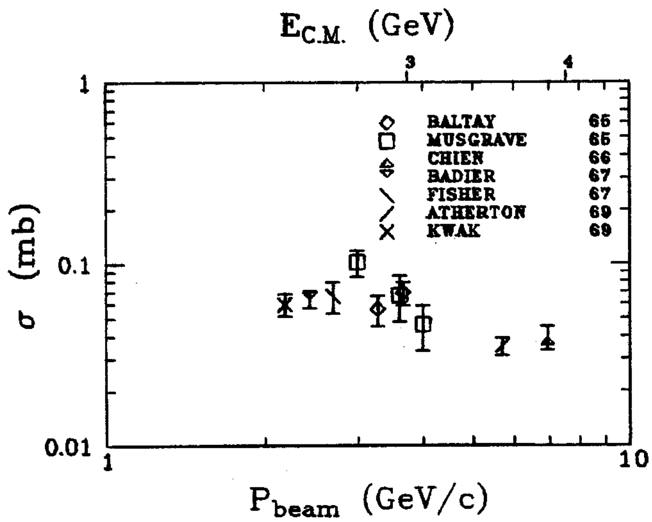
2.434	0.030	2.580	0.0330	0.0050	BADIER	67	PL	25B	152

****

production of antihyperons and hyperons

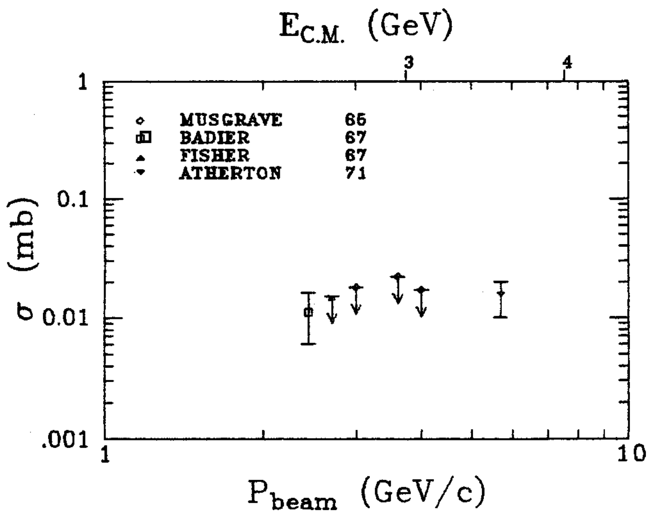
Reaction [165] $\bar{p}p \rightarrow \bar{\Lambda}\Sigma^0$ + c.c.

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
2.190		2.496	0.0598	+-0.0084	KWAK	69	PR	186	1392
2.434	+-0.030	2.580	[0.0640	0.0070]	BADIER	67	PL	25B	152
2.700	0.070	2.669	0.0660	0.0130	FISHER	67	PR	161	1335
3.000	0.015	2.768	0.1020	0.0170	MUSGRAVE	65	NC	35	735
3.280	0.049	2.857	0.0560	0.0110	BALTAY	65	PR	140B	1027
3.600	0.018	2.957	0.0670	0.0190	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0690	0.0100	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0460	0.0130	MUSGRAVE	65	NC	35	735
5.700	0.057	3.550	0.0350	0.0040	ATHERTON	69	PL	30B	494
6.935	0.139	3.859	0.0390	0.0060	CHIEN	66	PR	152	1171



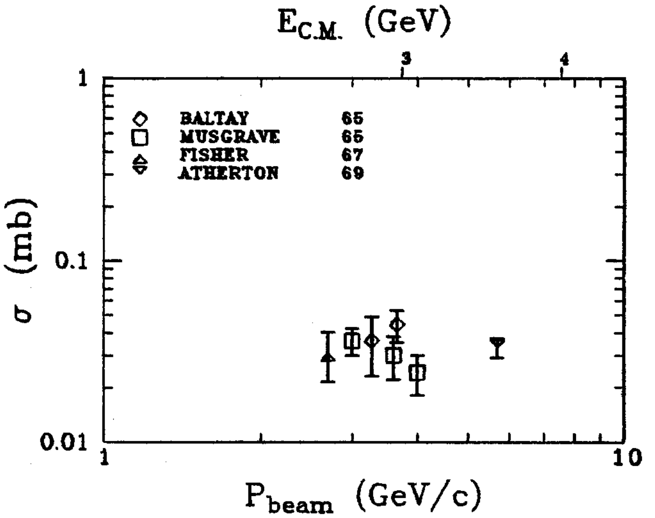
Reaction [166] $\bar{p}p \rightarrow \bar{\Sigma}^0\Sigma^0$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
2.434	0.030	2.580	0.0110	0.0050	BADIER	67	PL	25B	152
2.700	0.070	2.669	<0.0150		FISHER	67	PR	161	1335
3.000	0.015	2.768	<0.0180		MUSGRAVE	65	NC	35	735
3.600	0.018	2.957	<0.0220		MUSGRAVE	65	NC	35	735
4.000	0.020	3.077	<0.0170		MUSGRAVE	65	NC	35	735
5.700	0.060	3.550	0.0150	0.0050	ATHERTON	71	NP	B29	477



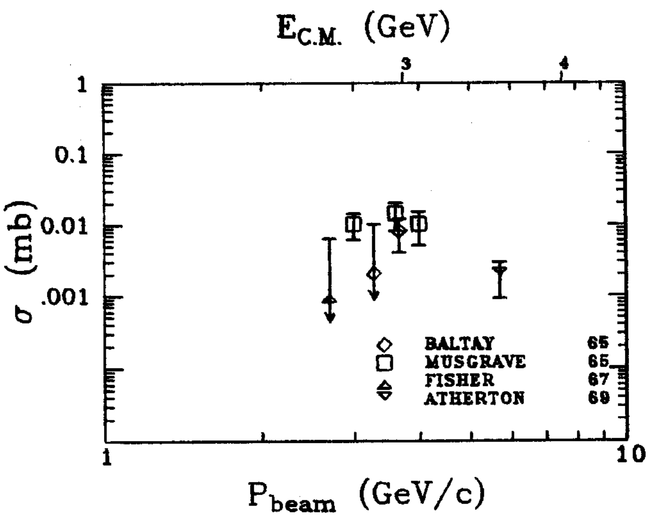
Reaction [167] $\bar{p}p \rightarrow \bar{\Sigma}^-\Sigma^+$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
2.700	±-0.070	2.669	0.0307	+-0.0094	FISHER	67	PR	161	1335
3.000	0.015	2.768	0.0360	0.0060	MUSGRAVE	65	NC	35	735
3.280	0.049	2.857	0.0360	0.0130	BALTAY	65	PR	140B	1027
3.600	0.018	2.957	0.0300	0.0080	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0440	0.0090	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0240	0.0060	MUSGRAVE	65	NC	35	735
5.700	0.057	3.550	0.0330	0.0040	ATHERTON	69	PL	30B	494



Reaction [168] $\bar{p}p \rightarrow \bar{\Sigma}^+\Sigma^-$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				
2.700	0.070	2.669	0.0010	0.0054	FISHER	67	PR	161	1335
3.000	0.015	2.768	0.0100	0.0040	MUSGRAVE	65	NC	35	735
3.280	0.049	2.857	0.0020	+0.0080 -0.0020	BALTAY	65	PR	140B	1027
3.600	0.018	2.957	0.0140	+-0.0060	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0080	0.0040	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0100	0.0050	MUSGRAVE	65	NC	35	735
5.700	0.057	3.550	[0.0019	0.0010]	ATHERTON	69	PL	30B	494



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* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS
[] CALCULATED BY US FROM DATA IN THIS ARTICLE

production of antihyperons and hyperons

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

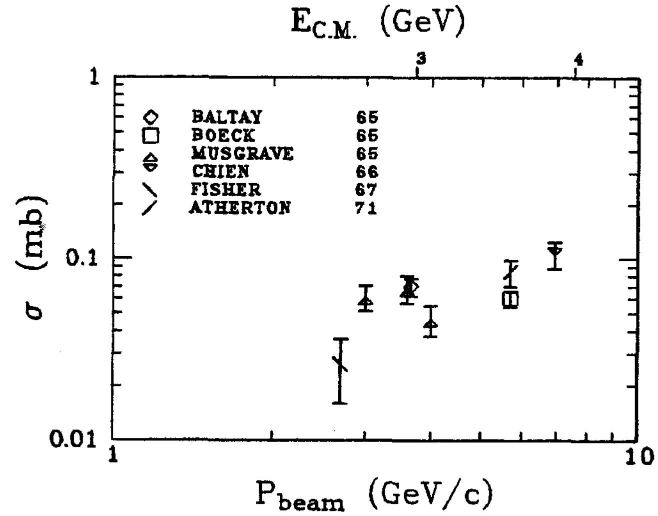
Reaction [169] $\bar{p}p \rightarrow \bar{\Sigma}^-\Sigma^+ + \bar{\Sigma}^+\Sigma^-$

6.935+-0.139	3.859	0.0190+-0.0090	CHIEN	66	PR 152 1171

****

Reaction [170] $\bar{p}p \rightarrow \bar{\Lambda}\Sigma^+\pi^-$ + c.c.

2.700	0.070	2.669	0.0259	0.0101	FISHER	67	PR 161 1335
3.000	0.015	2.768	0.0610	0.0100	MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0680	0.0120	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0700	0.0080	BALTAY	65	PR 140B1027
4.000	0.020	3.077	0.0460	0.0090	MUSGRAVE	65	NC 35 735
5.700		3.550	0.0600	0.0060	BOECK	65	PL 17 166
5.700	0.060	3.550	0.0840	0.0140	ATHERTON	71	NP B29 477
6.935	0.139	3.859	0.1050	0.0180	CHIEN	66	PR 152 1171



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Reaction [171] $\bar{p}p \rightarrow \bar{\Sigma}^0\Sigma^+\pi^-$ + c.c.

2.700	0.070	2.669	0.0029	0.0029	FISHER	67	PR 161 1335
3.000	0.015	2.768	0.0080	0.0040	MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0130	0.0050	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0110	0.0030	BALTAY	65	PR 140B1027
4.000	0.020	3.077	0.0240	0.0070	MUSGRAVE	65	NC 35 735
5.700		3.550	0.0185	0.0030	BOECK	65	PL 17 166
6.935	0.139	3.859	0.0050	0.0050	CHIEN	66	PR 152 1171

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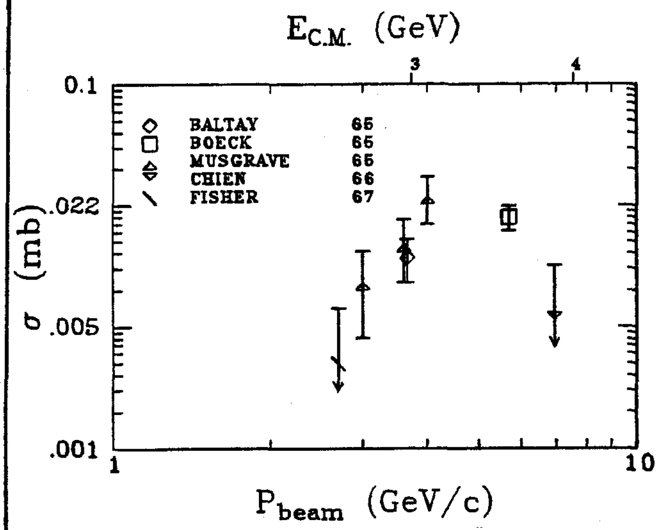
P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References



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Reaction [172] $\bar{p}p \rightarrow \bar{\Sigma}^-\Sigma^+\pi^0$

2.700+-0.070		2.669	<0.0036		FISHER	67	PR 161 1335
3.000	0.015	2.768	0.0036 +-0.0015		MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0046	0.0020	MUSGRAVE	65	NC 35 735
4.000	0.020	3.077	0.0080	0.0030	MUSGRAVE	65	NC 35 735

****

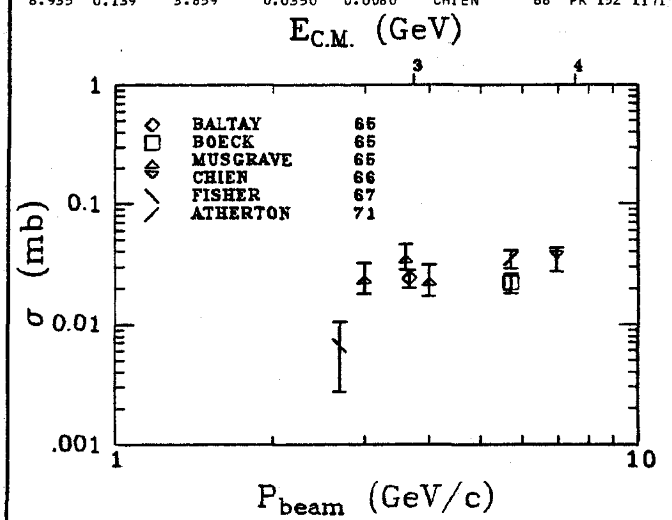
Reaction [173] $\bar{p}p \rightarrow \bar{\Sigma}^-\Sigma^+\pi^0 + \bar{\Sigma}^+\Sigma^-\pi^0$

3.280	0.049	2.857	0.0070	0.0050	BALTAY	65	PR 140B1027
3.660	0.055	2.975	0.0120	0.0030	BALTAY	65	PR 140B1027

****

Reaction [174] $\bar{p}p \rightarrow \bar{\Lambda}\Sigma^-\pi^+$ + c.c.

2.700	0.070	2.669	0.0066	0.0039	FISHER	67	PR 161 1335
3.000	0.015	2.768	0.0250	0.0070	MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0370	0.0090	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0240	0.0040	BALTAY	65	PR 140B1027
4.000	0.020	3.077	0.0240	0.0070	MUSGRAVE	65	NC 35 735
5.700		3.550	0.0220	0.0040	BOECK	65	PL 17 166
5.700	0.060	3.550	0.0350	0.0060	ATHERTON	71	NP B29 477
6.935	0.139	3.859	0.0350	0.0080	CHIEN	66	PR 152 1171



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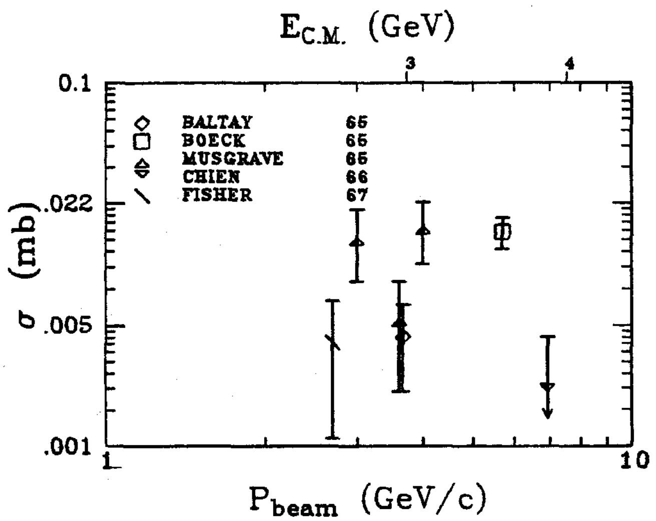
production of antihyperons and hyperons

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References		

Reaction [175] $\bar{p}p \rightarrow \bar{\Sigma}^0 \Sigma^- \pi^+$ + c.c.

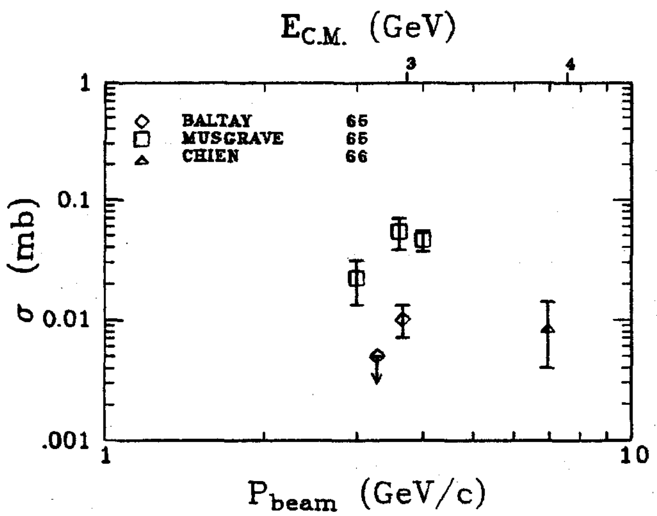
2.700	+-0.070	2.669	0.0037	+-0.0026	FISHER	67	PR 161 1335
3.000	0.015	2.768	0.0140	0.0060	MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0050	0.0030	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0040	0.0020	BALTAY	65	PR 140B1027
4.000	0.020	3.077	0.0160	0.0060	MUSGRAVE	65	NC 35 735
5.700		3.550	0.0150	0.0030	BOECK	65	PL 17 166
6.935	0.139	3.859	0.0020	0.0020	CHIEN	66	PR 152 1171



****

Reaction [176] $\bar{p}p \rightarrow \bar{\Sigma}^0 \Lambda \pi^+ \pi^-$ + c.c.

3.000	0.015	2.768	0.0220	0.0090	MUSGRAVE	65	NC 35 735
3.280	0.049	2.857	<0.0050		BALTAY	65	PR 140B1027
3.600	0.018	2.957	0.0540	0.0160	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0100	0.0030	BALTAY	65	PR 140B1027
4.000	0.020	3.077	0.0460	0.0090	MUSGRAVE	65	NC 35 735
6.935	0.139	3.859	0.0090	0.0050	CHIEN	66	PR 152 1171



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* DATA READ FROM GRAPH
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[] CALCULATED BY US FROM DATA IN THIS ARTICLE

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References		

Reaction [177] $\bar{p}p \rightarrow \bar{\Lambda} \Sigma^+ \pi^- \pi^0$ + c.c.

3.000	+-0.015	2.768	0.0020	+-0.0020	MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0200	0.0120	MUSGRAVE	65	NC 35 735
4.000	0.020	3.077	0.0110	0.0040	MUSGRAVE	65	NC 35 735
5.700		3.550	0.0480	0.0060	BOECK	65	PL 17 166

****

Reaction [178] $\bar{p}p \rightarrow \bar{\Lambda} \Sigma^- \pi^+ \pi^0$ + c.c.

3.000	0.015	2.768	0.0020	0.0020	MUSGRAVE	65	NC 35 735
3.600	0.018	2.957	0.0200	0.0120	MUSGRAVE	65	NC 35 735
4.000	0.020	3.077	0.0110	0.0040	MUSGRAVE	65	NC 35 735
5.700		3.550	0.0270	0.0040	BOECK	65	PL 17 166

****

Reaction [179] $\bar{p}p \rightarrow \bar{\Lambda} \Sigma^+ \pi^- \pi^0$ + $\bar{\Lambda} \Sigma^- \pi^+ \pi^0$ + c.c.

3.280	0.049	2.857	0.0060	0.0060	BALTAY	65	PR 140B1027
3.660	0.055	2.975	0.0190	0.0030	BALTAY	65	PR 140B1027

****

Reaction [180] $\bar{p}p \rightarrow \bar{\Sigma}^- \Sigma^+ \pi^+ \pi^-$ + $\bar{\Sigma}^+ \Sigma^- \pi^+ \pi^-$

6.935	0.139	3.859	0.0120	0.0050	CHIEN	66	PR 152 1171

****

Reaction [181] $\bar{p}p \rightarrow \bar{\Sigma}^- \Sigma^+ \pi^+ \pi^-$ + $\bar{\Sigma}^+ \Sigma^+ \pi^- \pi^-$ + c.c.

5.700		3.550	0.0150	0.0030	BOECK	65	PL 17 166

****

Reaction [182] $\bar{p}p \rightarrow \bar{\Lambda} \Sigma^+ \pi^+ \pi^- \pi^-$ + c.c.

6.935	0.139	3.859	0.0240	0.0080	CHIEN	66	PR 152 1171

****

Reaction [183] $\bar{p}p \rightarrow \bar{\Lambda} \Sigma^- \pi^+ \pi^+ \pi^-$ + c.c.

6.935	0.139	3.859	0.0120	0.0040	CHIEN	66	PR 152 1171

****

Reaction [184] $\bar{p}p \rightarrow \bar{\Xi}^0 \Xi^0$

2.700	0.070	2.669	<0.0028		FISHER	67	PR 161 1335

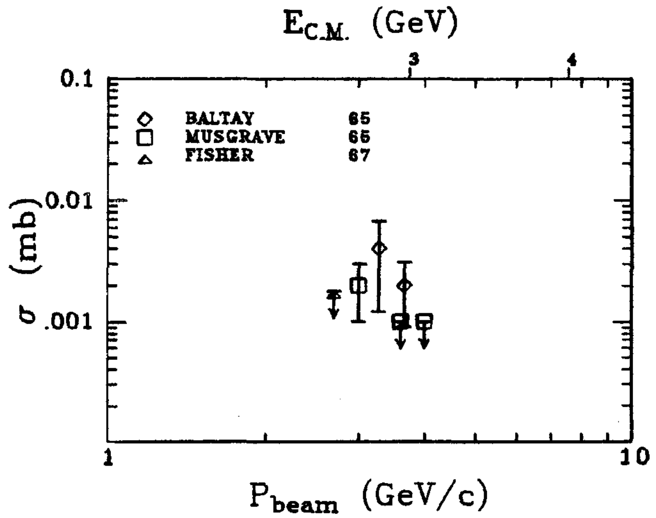
****

production of antihyperons and hyperons

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References		

Reaction [185] $\bar{p}p \to \bar{\Xi}^+ \Xi^-$

2.700+-	0.070	2.669	<0.0018			FISHER	67	PR 161 1335
3.000	0.015	2.768	0.0020	+-0.0010		MUSGRAVE	65	NC 35 735
3.280	0.049	2.857	0.0040	0.0028		BALTAY	65	PR 140B1027
3.600	0.018	2.957	<0.0010			MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0020	0.0011		BALTAY	65	PR 140B1027
4.000	0.020	3.077	<0.0010			MUSGRAVE	65	NC 35 735



****

Reaction [186] $\bar{p}p \to \bar{\Xi}^0 \Xi^- \pi^+$ + c.c.

3.280	0.049	2.857	<0.0050			BALTAY	65	PR 140B1027
3.660	0.055	2.975	0.0030	0.0017		BALTAY	65	PR 140B1027

****

Reaction [187] $\bar{p}p \to \Lambda \bar{Y}^*(1385)^0$ + c.c.

$\bar{Y}^*(1385)^0 \to \bar{\Lambda}\pi^0$

3.000	0.015	2.768	0.0200	0.0060	†	MUSGRAVE	65	NC 35 735
5.700	0.060	3.550	0.0320	0.0070	†	ATHERTON	71	NP B29 477

****

Reaction [188] $\bar{p}p \to \bar{Y}^*(1405)\Lambda$ + c.c.

$\bar{Y}^*(1405) \to \bar{\Sigma}^+\pi^-$ + $\bar{\Sigma}^-\pi^+$

3.000	0.015	2.768	0.0240	0.0080	†	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0280	0.0100	†	BALTAY	65	PR 140B1027

****

Reaction [189] $\bar{p}p \to \bar{Y}^*(1520)\Lambda$ + c.c.

$\bar{Y}^*(1520) \to$ total

3.660	0.055	2.975	0.0370	0.0180	†	BALTAY	65	PR 140B1027

****

Reaction [190] $\bar{p}p \to \bar{Y}^*(1520)\Lambda$ + c.c.

$\bar{Y}^*(1520) \to \bar{\Sigma}^+\pi^-$ + $\bar{\Sigma}^-\pi^+$

3.000	0.015	2.768	0.0400	0.0100	†	MUSGRAVE	65	NC 35 735

****

Reaction [191] $\bar{p}p \to \bar{Y}^*(1385)^- \Sigma^+$ + c.c.

$\bar{Y}^*(1385)^- \to \bar{\Lambda}\pi^-$

3.000+-	0.015	2.768	0.0210	+-0.0040	†	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0360	0.0110	†	BALTAY	65	PR 140B1027
5.700	0.060	3.550	0.0460	0.0090	†	ATHERTON	71	NP B29 477

****

Reaction [192] $\bar{p}p \to \bar{Y}^*(1385)^+ \Sigma^-$ + c.c.

$\bar{Y}^*(1385)^+ \to \bar{\Lambda}\pi^+$

3.000	0.015	2.768	0.0020	0.0020	†	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	<0.0090		†	BALTAY	65	PR 140B1027
5.700	0.060	3.550	<0.0036		†	ATHERTON	71	NP B29 477

****

Reaction [193] $\bar{p}p \to \Sigma^0 \bar{Y}^*(1385)^0$ + c.c.

$\bar{Y}^*(1385)^0 \to \bar{\Lambda}\pi^0$

3.000	0.015	2.768	<0.0050		†	MUSGRAVE	65	NC 35 735

****

Reaction [194] $\bar{p}p \to \bar{Y}^*(1405)\Sigma^0$ + c.c.

$\bar{Y}^*(1405) \to \bar{\Sigma}^-\pi^+$ + $\bar{\Sigma}^+\pi^-$

3.000	0.015	2.768	0.0090	0.0030	†	MUSGRAVE	65	NC 35 735

****

Reaction [195] $\bar{p}p \to \bar{Y}^*(1520)\Sigma^0$ + c.c.

$\bar{Y}^*(1520) \to \bar{\Sigma}^+\pi^-$ + $\bar{\Sigma}^-\pi^+$

3.000	0.015	2.768	0.0065	0.0025	†	MUSGRAVE	65	NC 35 735

****

Reaction [196] $\bar{p}p \to Y^*(1385)^+ \bar{\Lambda}\pi^-$

$Y^*(1385)^+ \to \Lambda\pi^+$

5.700	0.060	3.550	[0.0047	0.0024]	†	ATHERTON	71	NP B29 477

****

Reaction [197] $\bar{p}p \to \bar{Y}^*(1385)^- \Lambda\pi^+$

$\bar{Y}^*(1385)^- \to \bar{\Lambda}\pi^-$

5.700	0.060	3.550	[0.0054	0.0021]	†	ATHERTON	71	NP B29 477

****

Reaction [198] $\bar{p}p \to \bar{Y}^*(1385)^- Y^*(1385)^+$

$Y^*(1385)^+ \to \Lambda\pi^+$; $\bar{Y}^*(1385)^- \to \bar{\Lambda}\pi^-$

3.000	0.015	2.768	0.0080	0.0030	†	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0050	0.0020	†	BALTAY	65	PR 140B1027
5.700	0.060	3.550	[0.0119	0.0025]	†	ATHERTON	71	NP B29 477

****

Reaction [199] $\bar{p}p \to \bar{Y}^*(1385)^+ Y^*(1385)^-$

$Y^*(1385)^- \to \Lambda\pi^-$; $\bar{Y}^*(1385)^+ \to \bar{\Lambda}\pi^+$

3.000	0.015	2.768	0.0050	0.0020	†	MUSGRAVE	65	NC 35 735
3.660	0.055	2.975	0.0080	0.0030	†	BALTAY	65	PR 140B1027
5.700	0.060	3.550	<0.0045		†	ATHERTON	71	NP B29 477

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* DATA READ FROM GRAPH
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associated production of hyperons and kaons

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References				

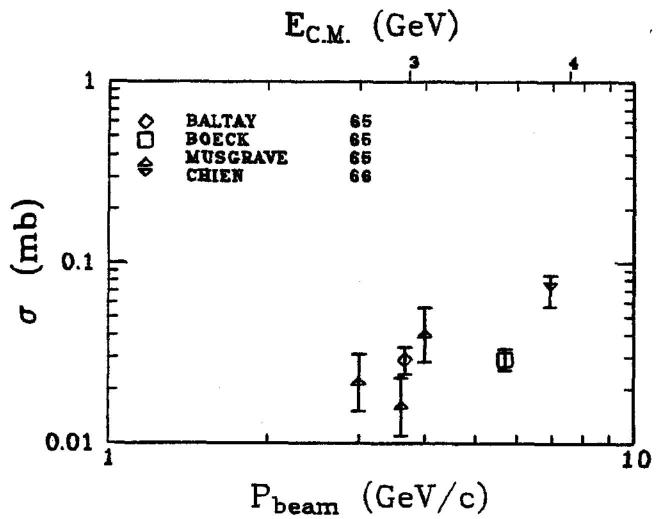
Reaction [200] $\bar{p}p \rightarrow \Lambda\bar{p}K^+$

2.700+-0.070		2.669	0.0023 +- 0.0023		FISHER	67	PR	161	1335

****

Reaction [201] $\bar{p}p \rightarrow \Lambda\bar{p}K^+$ + c.c.

3.000	0.015	2.768	0.0230	0.0080	MUSGRAVE	65	NC	35	735
3.600	0.018	2.957	0.0170	0.0060	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0290	0.0050	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0420	0.0140	MUSGRAVE	65	NC	35	735
5.700		3.550	0.0290	0.0040	BOECK	65	PL	17	166
6.935	0.139	3.859	0.0710	0.0140	CHIEN	66	PR	152	1171



****

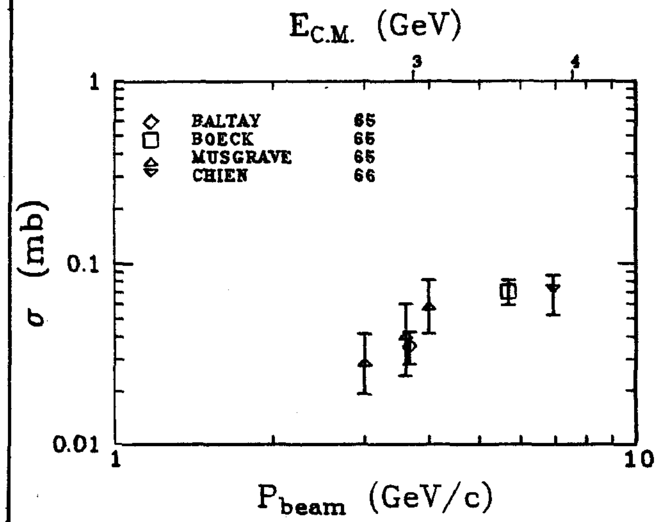
Reaction [202] $\bar{p}p \rightarrow \Sigma^0\bar{p}K^+$ + c.c.

3.660	0.055	2.975	0.0130	0.0040	BALTAY	65	PR	140B	1027
5.700		3.550	0.0150	0.0030	BOECK	65	PL	17	166
6.935	0.139	3.859	0.0510	0.0130	CHIEN	66	PR	152	1171

****

Reaction [203] $\bar{p}p \rightarrow \Lambda\bar{n}K^0$ + c.c.

3.000+-0.015		2.768	0.0300	+-0.0110	MUSGRAVE	65	NC	35	735
3.600	0.018	2.957	0.0420	0.0180	MUSGRAVE	65	NC	35	735
3.660	0.055	2.975	0.0350	0.0070	BALTAY	65	PR	140B	1027
4.000	0.020	3.077	0.0610	0.0200	MUSGRAVE	65	NC	35	735
5.700		3.550	0.0700	0.0110	BOECK	65	PL	17	166
6.935	0.139	3.859	0.0690	0.0170	CHIEN	66	PR	152	1171



****

Reaction [204] $\bar{p}p \rightarrow \Sigma^+\bar{p}K^0$ + c.c.

3.660	0.055	2.975	0.0140	0.0040	BALTAY	65	PR	140B	1027
5.700		3.550	0.0200	0.0050	BOECK	65	PL	17	166
6.935	0.139	3.859	0.0150	0.0080	CHIEN	66	PR	152	1171

****

Reaction [205] $\bar{p}p \rightarrow \Lambda\bar{p}K^+\pi^0$ + c.c.

5.700		3.550	0.0300	0.0030	BOECK	65	PL	17	166

****

Reaction [206] $\bar{p}p \rightarrow \Lambda\bar{p}K^0\pi^+$ + c.c.

5.700		3.550	0.0390	0.0040	BOECK	65	PL	17	166
6.935	0.139	3.859	0.0460	0.0140	CHIEN	66	PR	152	1171

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associated production of hyperons and kaons

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [207] $\bar{p}p \to \Sigma^0 \bar{p} K^0 \pi^+$ + c.c.

5.700	3.550	0.0080	+-0.0040	BOECK	65	PL	17	166
6.935+-0.139	3.859	0.0070	0.0050	CHIEN	66	PR	152	1171

****

Reaction [208] $\bar{p}p \to \Sigma^+ \bar{p} K^0 \pi^0$ + c.c.

5.700	3.550	0.0190	0.0040	BOECK	65	PL	17	166

****

Reaction [209] $\bar{p}p \to \Lambda \bar{n} K^+ \pi^-$ + c.c.

5.700	3.550	0.0180	0.0030	BOECK	65	PL	17	166

****

Reaction [210] $\bar{p}p \to \Sigma^+ \bar{n} K^0 \pi^-$ + c.c.

5.700	3.550	0.0250	0.0050	BOECK	65	PL	17	166

****

Reaction [211] $\bar{p}p \to \Lambda \bar{p} K^+ \pi^+ \pi^-$ + c.c.

6.935	0.139	3.859	0.0080	0.0030	CHIEN	66	PR	152	1171

****

Reaction [212] $\bar{p}p \to \Lambda \bar{n} K^0 \pi^+ \pi^-$ + c.c.

6.935	0.139	3.859	0.0060	0.0030	CHIEN	66	PR	152	1171

****

Reaction [213]

$\bar{p}p \to$ total hyperon production

3.280	0.049	2.857	0.4380	0.0520	BALTAY	65	PR	140B	1027
3.660	0.055	2.975	0.7200	0.0300	BALTAY	65	PR	140B	1027
6.935	0.139	3.859	1.3100	0.1050	CHIEN	66	PR	152	1171

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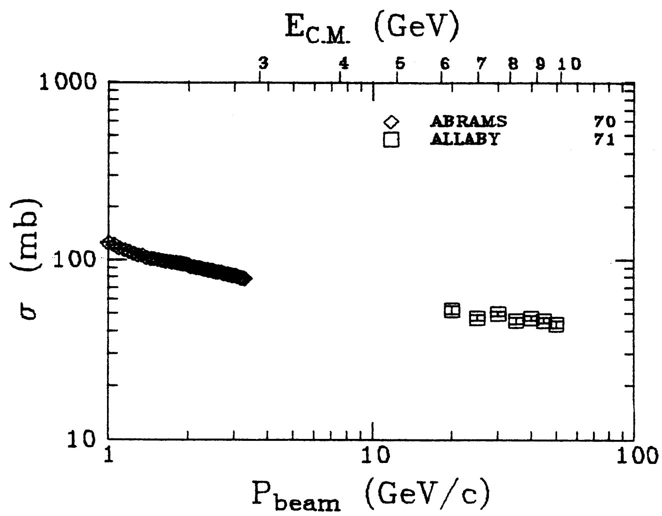
$\bar{p}N(I=0)$ total cross section

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)		References		

Reaction [214] $\bar{p}N(I-0) \rightarrow$ total

1.000		2.083	124.6700	+- 0.6600	+$ ABRAMS	70	PR D1 1917
1.050		2.100	121.4000	0.5500	+$ ABRAMS	70	PR D1 1917
1.100		2.117	115.8700	0.5200	+$ ABRAMS	70	PR D1 1917
1.150		2.134	113.4500	0.3900	+$ ABRAMS	70	PR D1 1917
1.200		2.151	111.1900	0.3500	+$ ABRAMS	70	PR D1 1917
1.250		2.168	108.3100	0.3300	+$ ABRAMS	70	PR D1 1917
1.300		2.185	106.4500	0.3200	+$ ABRAMS	70	PR D1 1917
1.345		2.201	105.5600	0.3200	+$ ABRAMS	70	PR D1 1917
1.400		2.220	102.7100	0.3000	+$ ABRAMS	70	PR D1 1917
1.450		2.238	101.5900	0.2600	+$ ABRAMS	70	PR D1 1917
1.490		2.252	101.6000	0.2000	+$ ABRAMS	70	PR D1 1917
1.550		2.273	100.1600	0.2000	+$ ABRAMS	70	PR D1 1917
1.600		2.291	98.9000	0.2000	+$ ABRAMS	70	PR D1 1917
1.650		2.309	98.2600	0.2000	+$ ABRAMS	70	PR D1 1917
1.700		2.326	97.7600	0.2000	+$ ABRAMS	70	PR D1 1917
1.750		2.344	96.6900	0.2000	+$ ABRAMS	70	PR D1 1917
1.806		2.364	96.1500	0.1900	+$ ABRAMS	70	PR D1 1917
1.850		2.379	95.7600	0.2000	+$ ABRAMS	70	PR D1 1917
1.875		2.388	95.0700	0.1900	+$ ABRAMS	70	PR D1 1917
1.900		2.397	94.7600	0.1900	+$ ABRAMS	70	PR D1 1917
1.925		2.406	94.6800	0.1900	+$ ABRAMS	70	PR D1 1917
1.950		2.414	94.0200	0.1900	+$ ABRAMS	70	PR D1 1917
2.000		2.432	93.0000	0.1300	+$ ABRAMS	70	PR D1 1917
2.050		2.449	91.4000	0.1700	+$ ABRAMS	70	PR D1 1917
2.095		2.465	91.0000	0.1900	+$ ABRAMS	70	PR D1 1917
2.150		2.484	90.3200	0.1900	+$ ABRAMS	70	PR D1 1917
2.200		2.501	90.1600	0.1900	+$ ABRAMS	70	PR D1 1917
2.250		2.519	88.7500	0.1900	+$ ABRAMS	70	PR D1 1917
2.300		2.536	88.4900	0.1700	+$ ABRAMS	70	PR D1 1917
2.350		2.553	87.9400	0.1700	+$ ABRAMS	70	PR D1 1917
2.400		2.570	87.4900	0.1900	+$ ABRAMS	70	PR D1 1917
2.450		2.587	87.3100	0.1900	+$ ABRAMS	70	PR D1 1917
2.500		2.604	86.2000	0.1300	+$ ABRAMS	70	PR D1 1917
2.550		2.621	85.4300	0.1700	+$ ABRAMS	70	PR D1 1917
2.600		2.638	85.1700	0.1700	+$ ABRAMS	70	PR D1 1917
2.650		2.654	84.7500	0.1600	+$ ABRAMS	70	PR D1 1917
2.700		2.671	83.7800	0.1600	+$ ABRAMS	70	PR D1 1917
2.750		2.688	83.4600	0.1700	+$ ABRAMS	70	PR D1 1917
2.800		2.704	83.1600	0.1600	+$ ABRAMS	70	PR D1 1917
2.850		2.721	82.3300	0.1600	+$ ABRAMS	70	PR D1 1917
2.900		2.737	82.1000	0.1600	+$ ABRAMS	70	PR D1 1917
2.950		2.753	81.4200	0.1600	+$ ABRAMS	70	PR D1 1917
3.000		2.769	80.8900	0.1600	+$ ABRAMS	70	PR D1 1917
3.050		2.786	80.8800	0.1600	+$ ABRAMS	70	PR D1 1917
3.100		2.802	80.1100	0.1600	+$ ABRAMS	70	PR D1 1917
3.150		2.818	79.4200	0.1600	+$ ABRAMS	70	PR D1 1917
3.200		2.834	78.9600	0.1600	+$ ABRAMS	70	PR D1 1917
3.250		2.849	78.5200	0.1600	+$ ABRAMS	70	PR D1 1917
3.300		2.865	77.7000	0.1600	+$ ABRAMS	70	PR D1 1917
20.000	+-0.200	6.276	52.0000	2.8000	+$ ALLABY	71	SJNP 12 295
25.000	0.250	6.984	47.0000	1.7000	+$ ALLABY	71	SJNP 12 295
30.000	0.300	7.627	49.3000	1.7000	+$ ALLABY	71	SJNP 12 295
35.000	0.350	8.219	45.2000	1.9000	+$ ALLABY	71	SJNP 12 295
40.000	0.400	8.772	46.8000	1.8000	+$ ALLABY	71	SJNP 12 295
45.000	0.450	9.292	45.3000	1.8000	+$ ALLABY	71	SJNP 12 295
50.000	0.500	9.784	43.0000	2.0000	+$ ALLABY	71	SJNP 12 295



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$\bar{p}n$ total cross section

Reaction [215] $\bar{p}n \rightarrow total$

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
1.000		2.083	110.1700	+- 0.3000	+$	ABRAMS	70	PR	D1	1917
1.050		2.099	107.7800	0.2600	+$	ABRAMS	70	PR	D1	1917
1.100		2.116	107.4100	0.2500	+$	ABRAMS	70	PR	D1	1917
1.135+-0.032		2.128	119.0000	8.0000	+	ELIOFF	62	PR	128	869
1.150		2.133	106.6600	0.1900	+$	ABRAMS	70	PR	D1	1917
1.200		2.150	106.7300	0.1700	+$	ABRAMS	70	PR	D1	1917
1.250		2.167	107.1900	0.1600	+$	ABRAMS	70	PR	D1	1917
1.300		2.185	106.4900	0.1600	+$	ABRAMS	70	PR	D1	1917
1.344	0.040	2.200	96.0000	7.0000	+	ELIOFF	62	PR	128	869
1.345		2.200	105.4400	0.1600	+$	ABRAMS	70	PR	D1	1917
1.400		2.220	102.8500	0.1500	+$	ABRAMS	70	PR	D1	1917
1.450		2.237	100.6500	0.1300	+$	ABRAMS	70	PR	D1	1917
1.483	0.044	2.249	112.0000	8.0000	+	ELIOFF	62	PR	128	869
1.490		2.251	98.9200	0.1100	+$	ABRAMS	70	PR	D1	1917
1.550		2.273	97.4800	0.1000	+$	ABRAMS	70	PR	D1	1917
1.600		2.290	96.7200	0.1000	+$	ABRAMS	70	PR	D1	1917
1.637	0.048	2.303	102.0000	6.0000	+	ELIOFF	62	PR	128	869
1.650		2.308	95.8400	0.1000	+$	ABRAMS	70	PR	D1	1917
1.700		2.325	95.1600	0.1000	+$	ABRAMS	70	PR	D1	1917
1.750		2.343	94.5300	0.1000	+$	ABRAMS	70	PR	D1	1917
1.774	0.052	2.352	109.0000	4.0000	+	ELIOFF	62	PR	128	869
1.806		2.363	92.8100	0.0900	+$	ABRAMS	70	PR	D1	1917
1.850		2.378	91.6600	0.1100	+$	ABRAMS	70	PR	D1	1917
1.875		2.387	91.0300	0.0900	+$	ABRAMS	70	PR	D1	1917
1.900		2.396	90.2800	0.0900	+$	ABRAMS	70	PR	D1	1917
1.925		2.405	89.4600	0.0900	+$	ABRAMS	70	PR	D1	1917
1.950		2.413	88.7400	0.0900	+$	ABRAMS	70	PR	D1	1917
2.000		2.431	87.4600	0.0700	+$	ABRAMS	70	PR	D1	1917
2.050		2.448	86.2800	0.0900	+$	ABRAMS	70	PR	D1	1917
2.095		2.464	85.9200	0.0900	+$	ABRAMS	70	PR	D1	1917
2.150		2.483	84.4600	0.0900	+$	ABRAMS	70	PR	D1	1917
2.200		2.500	83.4600	0.0900	+$	ABRAMS	70	PR	D1	1917
2.250		2.518	82.4900	0.0900	+$	ABRAMS	70	PR	D1	1917
2.300		2.535	81.5100	0.0900	+$	ABRAMS	70	PR	D1	1917
2.350		2.552	80.9600	0.0900	+$	ABRAMS	70	PR	D1	1917
2.400		2.569	79.8300	0.0900	+$	ABRAMS	70	PR	D1	1917
2.450		2.586	79.0100	0.0900	+$	ABRAMS	70	PR	D1	1917
2.500		2.603	78.4400	0.0600	+$	ABRAMS	70	PR	D1	1917
2.550		2.620	77.8500	0.0900	+$	ABRAMS	70	PR	D1	1917
2.600		2.636	77.0700	0.0900	+$	ABRAMS	70	PR	D1	1917
2.650		2.653	76.4700	0.0800	+$	ABRAMS	70	PR	D1	1917
2.700		2.670	76.0200	0.0800	+$	ABRAMS	70	PR	D1	1917
2.750		2.686	75.4800	0.0900	+$	ABRAMS	70	PR	D1	1917
2.800		2.703	74.6600	0.0800	+$	ABRAMS	70	PR	D1	1917
2.850		2.719	74.0900	0.0800	+$	ABRAMS	70	PR	D1	1917
2.900		2.736	73.4800	0.0800	+$	ABRAMS	70	PR	D1	1917
2.950		2.752	73.0400	0.0800	+$	ABRAMS	70	PR	D1	1917
3.000		2.768	72.4700	0.0800	+$	ABRAMS	70	PR	D1	1917
3.050		2.784	71.7000	0.0800	+$	ABRAMS	70	PR	D1	1917
3.100		2.800	71.2100	0.0800	+$	ABRAMS	70	PR	D1	1917
3.150		2.816	70.9000	0.0800	+$	ABRAMS	70	PR	D1	1917
3.200		2.832	70.3600	0.0800	+$	ABRAMS	70	PR	D1	1917
3.250		2.848	69.8800	0.0800	+$	ABRAMS	70	PR	D1	1917
3.300		2.864	69.6400	0.0800	+$	ABRAMS	70	PR	D1	1917
3.500	0.100	2.926	68.3000	3.1000	+	REYNOLDS	70	PR	D 2	1767
6.000	0.105	3.628	59.5000	4.0000	+†	GALBRAITH	65	PR	138	B913
6.650		3.790	58.8000	2.4000	+	DENISOV	71	PL	34B	167
8.000	0.140	4.108	57.3000	3.9000	+†	GALBRAITH	65	PR	138	B913
12.000	0.210	4.935	53.8000	3.7000	+†	GALBRAITH	65	PR	138	B913
14.000	0.245	5.300	53.4000	3.7000	+†	GALBRAITH	65	PR	138	B913
16.000	0.280	5.643	52.7000	3.7000	+†	GALBRAITH	65	PR	138	B913
18.000	0.315	5.965	44.4000	9.0000	+†	GALBRAITH	65	PR	138	B913
20.000	0.200	6.272	46.0000	1.7000	+$	ALLABY	69	PL	30B	500
25.000	0.250	6.979	45.3000	1.1000	+$	ALLABY	69	PL	30B	500
30.000	0.300	7.621	44.9000	1.1000	+$	ALLABY	69	PL	30B	500
35.000	0.350	8.214	45.9000	1.2000	+$	ALLABY	69	PL	30B	500
40.000	0.400	8.766	43.2000	1.1000	+$	ALLABY	69	PL	30B	500
45.000	0.450	9.286	44.6000	1.1000	+$	ALLABY	69	PL	30B	500
50.000	0.500	9.778	44.1000	1.2000	+$	ALLABY	69	PL	30B	500

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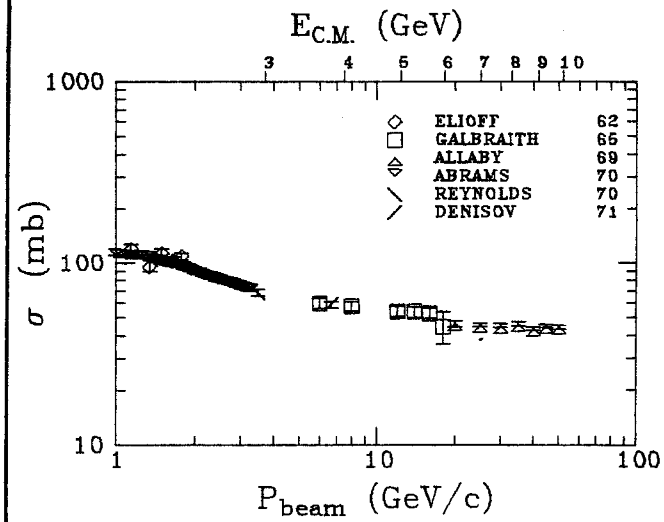

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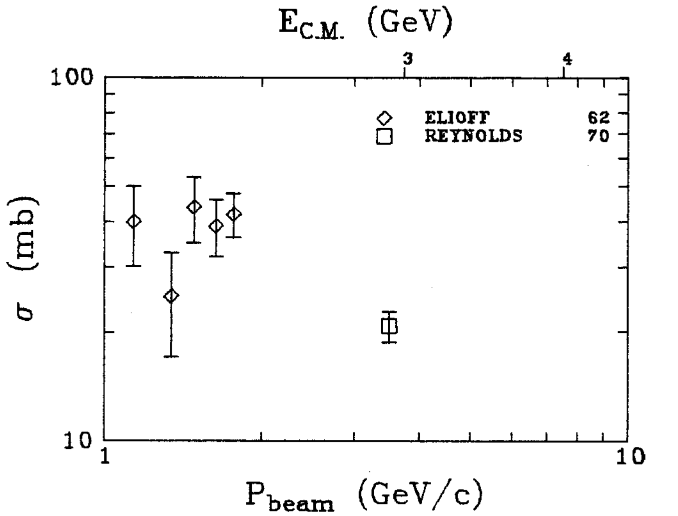
$\bar{p}n$ elastic cross section

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [216] $\bar{p}n \rightarrow$ elastic

1.135	+-0.032	2.128	40.0000	+-10.0000	+	ELIOFF	62	PR	128	869
1.344	0.040	2.200	25.0000	8.0000	+	ELIOFF	62	PR	128	869
1.483	0.044	2.249	44.0000	9.0000	+	ELIOFF	62	PR	128	869
1.637	0.048	2.303	39.0000	7.0000	+	ELIOFF	62	PR	128	869
1.774	0.052	2.352	42.0000	6.0000	+	ELIOFF	62	PR	128	869
3.500	0.100	2.926	20.6000	2.0000	+	REYNOLDS	70	PR	D 2	1767



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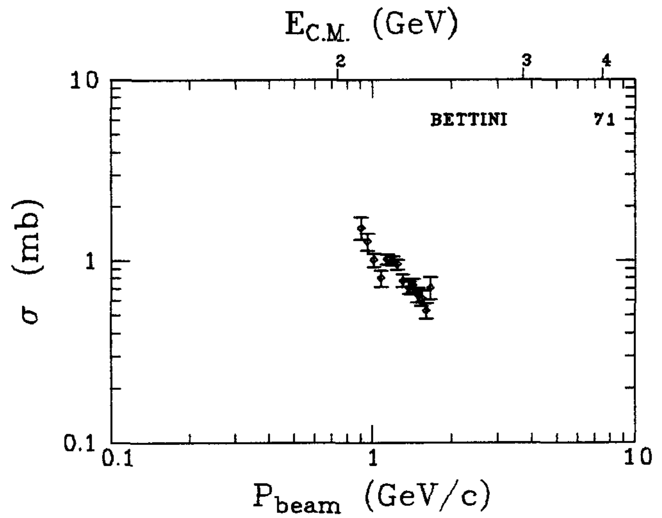
$\bar{p}n \to$ other channels

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References

Reaction [217] $\bar{p}n \to \pi^+\pi^-\pi^-$

0.910	2.054	1.5200	+- 0.2200	*+$BETTINI	71	NC	1	A	333
0.960	2.070	1.2800	0.1400	*+$BETTINI	71	NC	1	A	333
1.020	2.089	1.0100	0.0900	*+$BETTINI	71	NC	1	A	333
1.080	2.109	0.8000	0.0800	*+$BETTINI	71	NC	1	A	333
1.140	2.130	1.0200	0.0700	*+$BETTINI	71	NC	1	A	333
1.200	2.150	1.0000	0.0600	*+$BETTINI	71	NC	1	A	333
1.250	2.167	0.9500	0.0600	*+$BETTINI	71	NC	1	A	333
1.310	2.188	0.7800	0.0600	*+$BETTINI	71	NC	1	A	333
1.380	2.213	0.7100	0.0600	*+$BETTINI	71	NC	1	A	333
1.430	2.230	0.7300	0.0600	*+$BETTINI	71	NC	1	A	333
1.490	2.251	0.6500	0.0600	*+$BETTINI	71	NC	1	A	333
1.550	2.273	0.6200	0.0600	*+$BETTINI	71	NC	1	A	333
1.610	2.294	0.5300	0.0500	*+$BETTINI	71	NC	1	A	333
1.660	2.311	0.7100	0.1000	*+$BETTINI	71	NC	1	A	333



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Reaction [218] $\bar{p}n \to \bar{p}p\pi^-$

5.550+-0.054	3.511	1.6800	0.1100 †	BRAUN	70	PR	D 2	488

****

Reaction [219] $\bar{p}n \to \bar{\Delta}(1238)^{--}p$

└→ $\bar{p}\pi^-$

1.960	0.025	2.417	5.1000	0.5000 †	BACON	65	PR	139B1420
5.550	0.054	3.511	[0.8600	0.0700]†	BRAUN	70	PR	D 2 488

****

Reaction [220] $\bar{p}n \to \bar{\Delta}(1238)^{--}\Delta(1238)^+$

└→ $n\pi^+$

└→ $\bar{p}\pi^-$

2.790	0.035	2.700	0.7800	0.0800 †	BACON	70	PR	D 2 463

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Reaction [221] $\bar{p}n \to \Delta(1238)^-\bar{\Delta}(1238)^0$

└→ $\bar{p}\pi^+$

└→ $n\pi^-$

2.790	0.035	2.700	0.7800	0.0800 †	BACON	70	PR	D 2 463

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$\bar{p}d$ total cross section

Reaction [222] $\bar{p}d \rightarrow$ total

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				
0.050		2.814	2067.0000+-90.0000		↑	BURROWS	70	AUJP	23	819
0.335		2.852	390.0000	15.0000	↑	BURROWS	70	AUJP	23	819
0.404+-0.015		2.868	334.0000	12.0000	↑	BURROWS	70	AUJP	23	819
0.450	0.015	2.881	316.0000	7.0000	↑	BURROWS	70	AUJP	23	819
0.504	0.015	2.897	295.0000	7.0000	↑	BURROWS	70	AUJP	23	819
0.560	0.015	2.914	271.0000	6.0000	↑	BURROWS	70	AUJP	23	819
0.605	0.015	2.930	269.0000	7.0000	↑	BURROWS	70	AUJP	23	819
0.650	0.015	2.946	258.0000	8.0000	↑	BURROWS	70	AUJP	23	819
0.705	0.015	2.966	230.0000	10.0000	↑	BURROWS	70	AUJP	23	819
0.762	0.015	2.988	253.0000	10.0000	↑	BURROWS	70	AUJP	23	819
0.813	0.015	3.009	218.0000	11.0000	↑	BURROWS	70	AUJP	23	819
0.866	0.015	3.031	208.0000	10.0000	↑	BURROWS	70	AUJP	23	819
0.920	0.015	3.054	210.0000	9.0000	↑	BURROWS	70	AUJP	23	819
1.000		3.088	208.1800	0.2100	$	ABRAMS	70	PR	D1	1917
1.050		3.111	203.3700	0.2000	$	ABRAMS	70	PR	D1	1917
1.100		3.133	199.8400	0.1900	$	ABRAMS	70	PR	D1	1917
1.135	0.032	3.149	210.0000	5.0000		ELIOFF	62	PR	128	869
1.150		3.156	197.1400	0.1500	$	ABRAMS	70	PR	D1	1917
1.200		3.179	195.2100	0.1300	$	ABRAMS	70	PR	D1	1917
1.250		3.203	193.7700	0.1300	$	ABRAMS	70	PR	D1	1917
1.300		3.226	191.7100	0.1200	$	ABRAMS	70	PR	D1	1917
1.343	0.040	3.247	189.0000	5.0000		ELIOFF	62	PR	128	869
1.345		3.248	190.1700	0.1200	$	ABRAMS	70	PR	D1	1917
1.400		3.274	186.1900	0.1200	$	ABRAMS	70	PR	D1	1917
1.450		3.297	183.5100	0.1000	$	ABRAMS	70	PR	D1	1917
1.482	0.044	3.313	196.0000	6.0000		ELIOFF	62	PR	128	869
1.490		3.317	181.4700	0.0900	$	ABRAMS	70	PR	D1	1917
1.550		3.345	178.8000	0.0800	$	ABRAMS	70	PR	D1	1917
1.600		3.369	176.9700	0.0800	$	ABRAMS	70	PR	D1	1917
1.636	0.048	3.387	178.0000	5.0000		ELIOFF	62	PR	128	869
1.650		3.393	175.1600	0.0800	$	ABRAMS	70	PR	D1	1917
1.700		3.417	173.7500	0.0800	$	ABRAMS	70	PR	D1	1917
1.750		3.441	172.3300	0.0800	$	ABRAMS	70	PR	D1	1917
1.773	0.052	3.453	184.0000	3.0000		ELIOFF	62	PR	128	869
1.806		3.468	169.8800	0.0700	$	ABRAMS	70	PR	D1	1917
1.850		3.489	168.4900	0.0900	$	ABRAMS	70	PR	D1	1917
1.875		3.501	167.5500	0.0700	$	ABRAMS	70	PR	D1	1917
1.900		3.513	166.5900	0.0700	$	ABRAMS	70	PR	D1	1917
1.925		3.525	165.6900	0.0700	$	ABRAMS	70	PR	D1	1917
1.950		3.537	164.5900	0.0700	$	ABRAMS	70	PR	D1	1917
2.000		3.561	162.6900	0.0600	$	ABRAMS	70	PR	D1	1917
2.050		3.585	160.4600	0.0700	$	ABRAMS	70	PR	D1	1917
2.095		3.606	159.9900	0.0700	$	ABRAMS	70	PR	D1	1917
2.150		3.632	157.7600	0.0700	$	ABRAMS	70	PR	D1	1917
2.200		3.656	156.4500	0.0700	$	ABRAMS	70	PR	D1	1917
2.250		3.679	154.5300	0.0700	$	ABRAMS	70	PR	D1	1917
2.300		3.703	153.1300	0.0700	$	ABRAMS	70	PR	D1	1917
2.350		3.726	152.2400	0.0700	$	ABRAMS	70	PR	D1	1917
2.400		3.750	150.5600	0.0700	$	ABRAMS	70	PR	D1	1917
2.450		3.773	149.4600	0.0700	$	ABRAMS	70	PR	D1	1917
2.500		3.796	148.2100	0.0500	$	ABRAMS	70	PR	D1	1917
2.550		3.819	147.0900	0.0700	$	ABRAMS	70	PR	D1	1917
2.600		3.842	145.9300	0.0700	$	ABRAMS	70	PR	D1	1917
2.650		3.865	145.0100	0.0600	$	ABRAMS	70	PR	D1	1917
2.700		3.888	143.9900	0.0600	$	ABRAMS	70	PR	D1	1917
2.750		3.911	143.1200	0.0700	$	ABRAMS	70	PR	D1	1917
2.800		3.933	141.9000	0.0600	$	ABRAMS	70	PR	D1	1917
2.850		3.956	140.8700	0.0600	$	ABRAMS	70	PR	D1	1917
2.900		3.978	140.0300	0.0600	$	ABRAMS	70	PR	D1	1917
2.950		4.001	139.1900	0.0600	$	ABRAMS	70	PR	D1	1917
3.000		4.023	138.2500	0.0600	$	ABRAMS	70	PR	D1	1917
3.050		4.045	137.3000	0.0600	$	ABRAMS	70	PR	D1	1917
3.100		4.067	136.3700	0.0600	$	ABRAMS	70	PR	D1	1917
3.150		4.089	135.7000	0.0600	$	ABRAMS	70	PR	D1	1917
3.200		4.111	134.8400	0.0600	$	ABRAMS	70	PR	D1	1917
3.250		4.133	134.0500	0.0600	$	ABRAMS	70	PR	D1	1917
3.300		4.155	133.2300	0.0600	$	ABRAMS	70	PR	D1	1917
6.000	0.105	5.213	106.9000	1.3000		GALBRAITH	65	PR	138	B913
6.650		5.439	109.7000	1.3000		DENISOV	71	PL	34B	167
8.000	0.140	5.882	102.7000	1.3000		GALBRAITH	65	PR	138	B913
12.000	0.210	7.038	96.1000	1.3000		GALBRAITH	65	PR	138	B913
14.000	0.245	7.551	95.0000	1.4000		GALBRAITH	65	PR	138	B913
16.000	0.280	8.031	93.2000	1.6000		GALBRAITH	65	PR	138	B913
18.000	0.315	8.485	87.2000	6.1000		GALBRAITH	65	PR	138	B913
20.000	0.200	8.915	89.5000	1.3000		ALLABY	69	PL	30B	500
25.000	0.250	9.910	86.5000	0.9000		ALLABY	69	PL	30B	500
30.000	0.300	10.815	87.0000	0.9000		ALLABY	69	PL	30B	500
35.000	0.350	11.649	86.4000	1.0000		ALLABY	69	PL	30B	500
40.000	0.400	12.428	83.5000	0.9000		ALLABY	69	PL	30B	500
45.000	0.450	13.160	84.8000	0.9000		ALLABY	69	PL	30B	500
50.000	0.500	13.854	83.1000	0.9000		ALLABY	69	PL	30B	500

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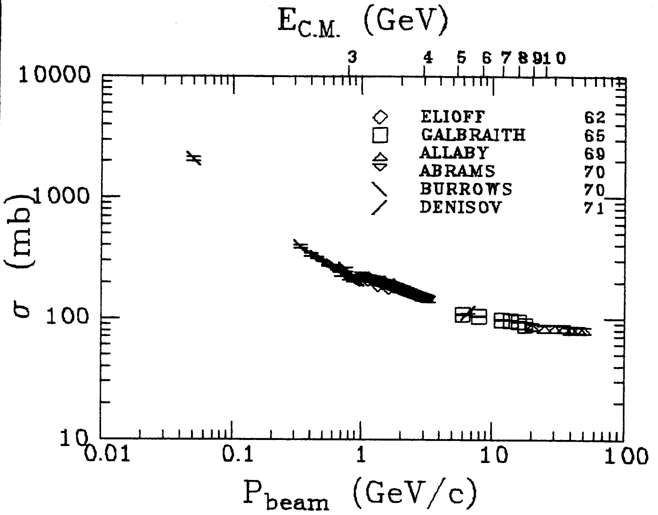

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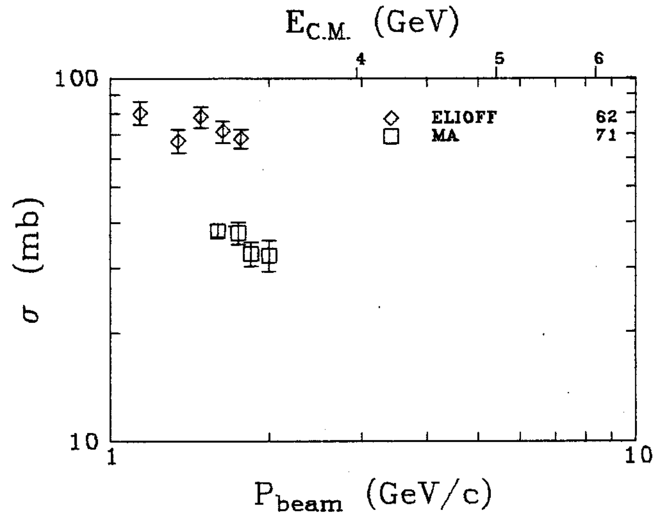
$\bar{p}d$ elastic cross section

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)			References			

Reaction [223] $\bar{p}d \to$ elastic

1.135+-0.032	3.149	80.0000	+-6.0000	†	ELIOFF	62	PR	128	869
1.343	0.040	3.247	67.0000	5.0000	†	ELIOFF	62	PR	128	869
1.482	0.044	3.313	78.0000	5.0000	†	ELIOFF	62	PR	128	869
1.600		3.369	37.9000	1.6000	†	MA	71	PRL	27	344
1.636	0.048	3.387	71.0000	5.0000	†	ELIOFF	62	PR	128	869
1.750		3.441	37.3000	2.7000	†	MA	71	PRL	27	344
1.773	0.052	3.453	68.0000	4.0000	†	ELIOFF	62	PR	128	869
1.850		3.489	32.7000	2.5000	†	MA	71	PRL	27	344
2.000		3.561	32.4000	3.2000	†	MA	71	PRL	27	344



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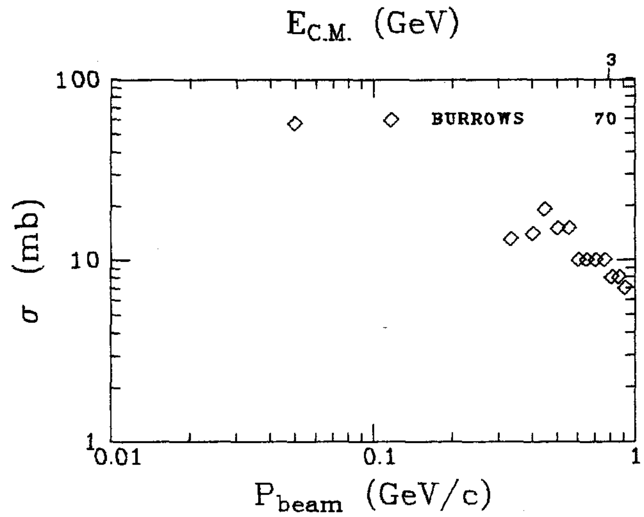
p̄d prong cross sections

Reaction [224] p̄d→0 prong

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
0.050	2.814	57.0000	† BURROWS 70 AUJP 23 819
0.335	2.852	13.0000	† BURROWS 70 AUJP 23 819
0.404+-0.025	2.868	14.0000	† BURROWS 70 AUJP 23 819
0.450 0.025	2.881	19.0000	† BURROWS 70 AUJP 23 819
0.504 0.025	2.897	15.0000	† BURROWS 70 AUJP 23 819
0.560 0.025	2.914	15.0000	† BURROWS 70 AUJP 23 819
0.605 0.025	2.930	10.0000	† BURROWS 70 AUJP 23 819
0.650 0.025	2.946	10.0000	† BURROWS 70 AUJP 23 819
0.705 0.025	2.966	10.0000	† BURROWS 70 AUJP 23 819
0.762 0.025	2.988	10.0000	† BURROWS 70 AUJP 23 819
0.813 0.025	3.009	8.0000	† BURROWS 70 AUJP 23 819
0.866 0.025	3.031	8.0000	† BURROWS 70 AUJP 23 819
0.920 0.025	3.054	7.0000	† BURROWS 70 AUJP 23 819



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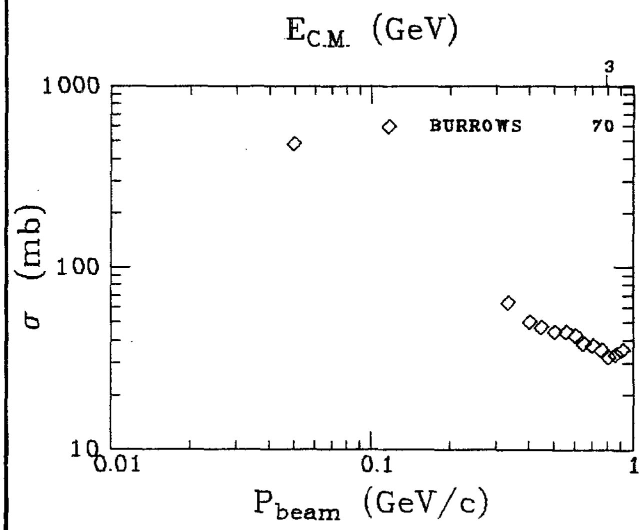
[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

Reaction [225] p̄d→2 prong

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
0.050	2.814	478.0000	† BURROWS 70 AUJP 23 819
0.335	2.852	64.0000	† BURROWS 70 AUJP 23 819
0.404+-0.025	2.868	50.0000	† BURROWS 70 AUJP 23 819
0.450 0.025	2.881	47.0000	† BURROWS 70 AUJP 23 819
0.504 0.025	2.897	44.0000	† BURROWS 70 AUJP 23 819
0.560 0.025	2.914	44.0000	† BURROWS 70 AUJP 23 819
0.605 0.025	2.930	42.0000	† BURROWS 70 AUJP 23 819
0.650 0.025	2.946	38.0000	† BURROWS 70 AUJP 23 819
0.705 0.025	2.966	37.0000	† BURROWS 70 AUJP 23 819
0.762 0.025	2.988	35.0000	† BURROWS 70 AUJP 23 819
0.813 0.025	3.009	32.0000	† BURROWS 70 AUJP 23 819
0.866 0.025	3.031	33.0000	† BURROWS 70 AUJP 23 819
0.920 0.025	3.054	35.0000	† BURROWS 70 AUJP 23 819



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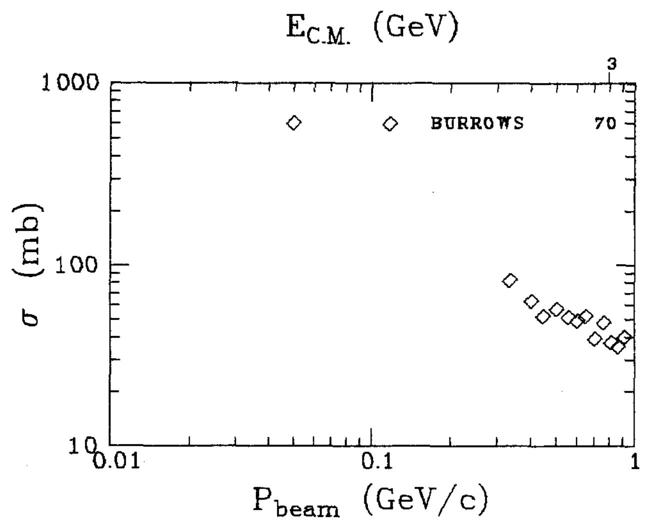
$\bar{p}d$ prong cross sections

Reaction [226] $\bar{p}d \rightarrow 4$ prong

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
0.050	2.814	600.0000	† BURROWS 70 AUJP 23 819
0.335	2.852	82.0000	† BURROWS 70 AUJP 23 819
0.404+-0.025	2.868	63.0000	† BURROWS 70 AUJP 23 819
0.450 0.025	2.881	52.0000	† BURROWS 70 AUJP 23 819
0.504 0.025	2.897	57.0000	† BURROWS 70 AUJP 23 819
0.560 0.025	2.914	51.0000	† BURROWS 70 AUJP 23 819
0.605 0.025	2.930	49.0000	† BURROWS 70 AUJP 23 819
0.650 0.025	2.946	52.0000	† BURROWS 70 AUJP 23 819
0.705 0.025	2.966	39.0000	† BURROWS 70 AUJP 23 819
0.762 0.025	2.988	48.0000	† BURROWS 70 AUJP 23 819
0.813 0.025	3.009	37.0000	† BURROWS 70 AUJP 23 819
0.866 0.025	3.031	35.0000	† BURROWS 70 AUJP 23 819
0.920 0.025	3.054	40.0000	† BURROWS 70 AUJP 23 819



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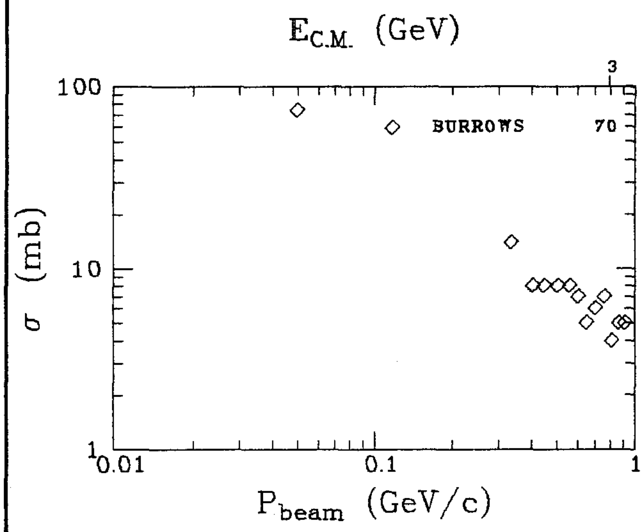
Reaction [227] $\bar{p}d \rightarrow 6$ prong

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)	References
0.050	2.814	74.0000	† BURROWS 70 AUJP 23 819
0.335	2.852	14.0000	† BURROWS 70 AUJP 23 819
0.404+-0.025	2.868	8.0000	† BURROWS 70 AUJP 23 819
0.450 0.025	2.881	8.0000	† BURROWS 70 AUJP 23 819
0.504 0.025	2.897	8.0000	† BURROWS 70 AUJP 23 819
0.560 0.025	2.914	8.0000	† BURROWS 70 AUJP 23 819
0.605 0.025	2.930	7.0000	† BURROWS 70 AUJP 23 819
0.650 0.025	2.946	5.0000	† BURROWS 70 AUJP 23 819
0.705 0.025	2.966	6.0000	† BURROWS 70 AUJP 23 819
0.762 0.025	2.988	7.0000	† BURROWS 70 AUJP 23 819
0.813 0.025	3.009	4.0000	† BURROWS 70 AUJP 23 819
0.866 0.025	3.031	5.0000	† BURROWS 70 AUJP 23 819
0.920 0.025	3.054	5.0000	† BURROWS 70 AUJP 23 819



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$\bar{p}d \rightarrow$ other channels

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)		References				

Reaction [228] $\bar{p}d \rightarrow \bar{p}d\pi^+\pi^-$

5.550	5.050	0.2200	+-0.0200 †	BRAUN	70	PR	D2	1212
7.000	5.557	0.2600	0.0250 †	ANTICH	71	NP	B29	327

****

Reaction [229] $\bar{p}d \rightarrow \bar{p}d\pi^+\pi^-\pi^0$

7.000	5.557	0.1800	0.0320 †	ANTICH	71	NP	B29	327

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Reaction [230] $\bar{p}d \rightarrow \bar{p}pn\pi^+\pi^-$

7.000	5.557	1.1200	0.0900 †	ANTICH	71	NP	B29	327

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Reaction [231] $\bar{p}d \rightarrow \bar{p}p\pi^-\pi^0(p_s)$

2.790+-0.035	3.929	0.9000	0.1000 †	BACON	70	PR	D 2	463

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Reaction [232] $\bar{p}d \rightarrow \bar{p}n\pi^+\pi^-(p_s)$

2.790	0.035	3.929	1.5000	0.2000 †	BACON	70	PR	D 2	463

****

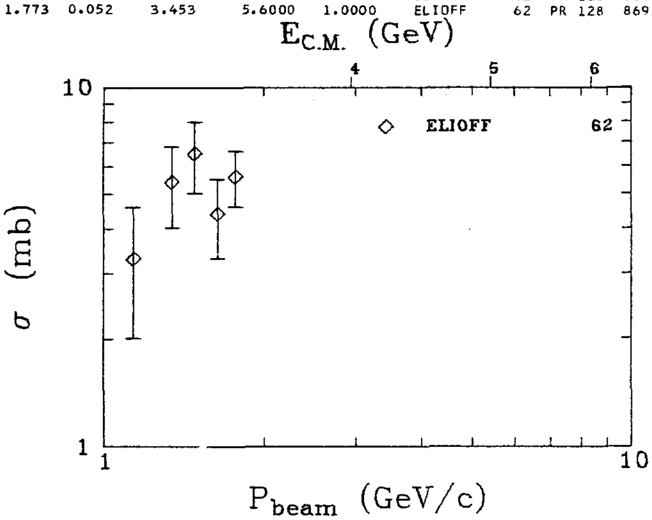
Reaction [233] $\bar{p}d \rightarrow \bar{n}p\pi^-\pi^-(p_s)$

2.790	0.035	3.929	0.3000	0.0400 †	BACON	70	PR	D 2	463

****

Reaction [234] $\bar{p}d \rightarrow \bar{n}n(n_s)$

1.135	0.032	3.149	3.3000	1.3000	ELIOFF	62	PR 128	869
1.343	0.040	3.247	5.4000	1.4000	ELIOFF	62	PR 128	869
1.482	0.044	3.313	6.5000	1.5000	ELIOFF	62	PR 128	869
1.636	0.048	3.387	4.4000	1.1000	ELIOFF	62	PR 128	869
1.773	0.052	3.453	5.6000	1.0000	ELIOFF	62	PR 128	869



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P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)		References				

Reaction [235] $\bar{p}d \rightarrow \omega\bar{p}d$, $\omega \rightarrow \pi^+\pi^-\pi^0$

7.000	5.557	0.0060	+0.0100 -0.0020 †	ANTICH	71	NP	B29	327

****

Reaction [236] $\bar{p}d \rightarrow \bar{\Delta}(1238)^{--}d\pi^+$, $\bar{\Delta} \rightarrow \bar{p}\pi^-$

7.000	5.557	0.1850	+-0.0200 †	ANTICH	71	NP	B29	327

****

Reaction [237] $\bar{p}d \rightarrow \bar{\Delta}(1238)^{--}d\pi^+\pi^0$, $\bar{\Delta} \rightarrow \bar{p}\pi^-$

7.000	5.557	0.1100	0.0240 †	ANTICH	71	NP	B29	327

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Reaction [238] $\bar{p}d \rightarrow \bar{p}\pi^- d^*(2200)^{++}$, $d^* \rightarrow d\pi^+$

7.000	5.557	0.0550	0.0100 †	ANTICH	71	NP	B29	327

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Reaction [239] $\bar{p}d \rightarrow \bar{\Delta}(1238)^{--} d^*(2200)^{++}$, $d^* \rightarrow d\pi^+$, $\bar{\Delta} \rightarrow \bar{p}\pi^-$

7.000	5.557	0.0450	0.0100 †	ANTICH	71	NP	B29	327

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Reaction [240] $\bar{p}d \rightarrow \bar{\Lambda}dK^-$

7.000	5.557	0.0030	0.0020 †	ANTICH	71	NP	B29	327

****

Reaction [241] $\bar{p}d \rightarrow \bar{\Lambda}dK^-\pi^0$

7.000	5.557	0.0020	0.0020 †	ANTICH	71	NP	B29	327

****

Reaction [242] $\bar{p}d \rightarrow \bar{\Lambda}pnK^-$

7.000	5.557	0.0130	0.0040 †	ANTICH	71	NP	B29	327

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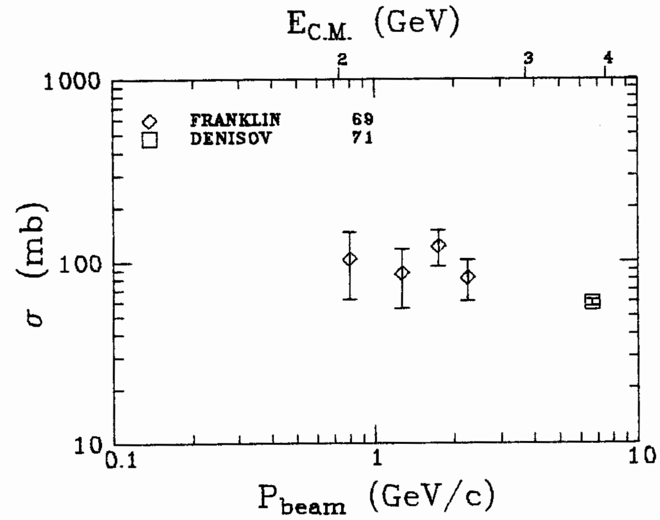
$\bar{n}p$ total and elastic cross sections

P_{beam} (GeV/c)		$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [243] $\bar{n}p \rightarrow$ total

0.800	+0.200 −0.300	2.020	104.0000	+−42.0000		FRANKLIN	69	PR	184	1413
1.270	+0.230 −0.270	2.174	86.0000	31.0000		FRANKLIN	69	PR	184	1413
1.750	+−0.250	2.343	121.0000	28.0000		FRANKLIN	69	PR	184	1413
2.250	0.250	2.518	81.0000	21.0000		FRANKLIN	69	PR	184	1413
6.650		3.790	59.0000	3.0000	+	DENISOV	71	PL	34B	167



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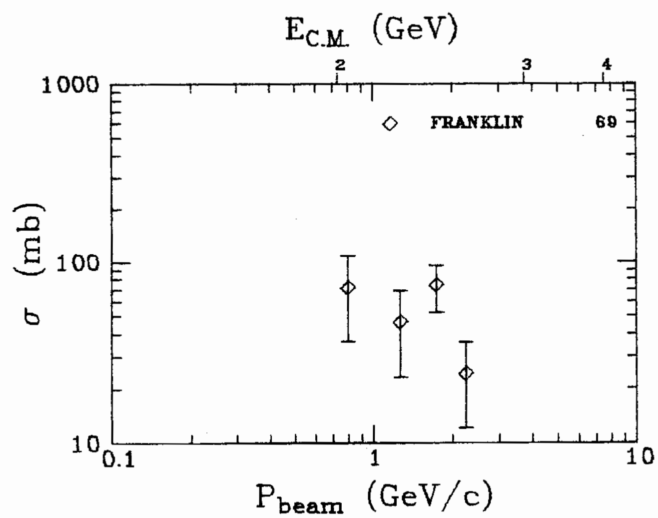
Reaction [244] $\bar{n}p \rightarrow$ elastic

0.800	+0.200 −0.300	2.020	72.0000	36.0000	FRANKLIN	69	PR	184	1413
1.270	+0.230 −0.270	2.174	46.0000	23.0000	FRANKLIN	69	PR	184	1413
1.750	+−0.250	2.343	74.0000	22.0000	FRANKLIN	69	PR	184	1413
2.250	0.250	2.518	24.0000	12.0000	FRANKLIN	69	PR	184	1413



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[ ] CALCULATED BY US FROM DATA IN THIS ARTICLE

$\bar{n}n$ and $\bar{n}d$ total cross sections

P_{beam} (GeV/c)	$E_{C.M.}$ (GeV)	σ (mb)			References				

Reaction [245] $\bar{n}n \rightarrow$ total

6.650	3.793	69.0000	+−10.0000	+	DENISOV	71	PL	34B	167

****

Reaction [246] $\bar{n}d \rightarrow$ total

6.650	5.439	118.0000	8.0000	+	DENISOV	71	PL	34B	167

****

$\bar{p}p$ Elastic Differential Cross Sections

$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= .195 + .023 , - .026

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.003	5658.68	+-1205.40
0.005	4922.04	1037.98
0.007	4989.01	971.02
0.008	4051.48	870.57
0.010	2209.90	435.28
0.012	4553.73	636.18
0.014	3716.65	569.22
0.016	3984.51	569.22
0.018	4018.00	569.22
0.020	1808.10	401.80
0.022	2611.70	468.77
0.023	2410.80	401.80
0.025	2109.45	401.80
0.027	1138.43	301.35
0.029	535.73	200.90
0.031	1171.92	301.35
0.033	569.22	200.90
0.035	803.60	234.38
0.037	770.12	234.38

SPENCER 70.....NP B19 501 HBC

BEAM MOMENTUM= .239 + .020 , - .021

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.002	3080.46	669.67
0.004	2388.47	334.83
0.007	2075.96	290.19
0.010	2075.96	290.19
0.013	2321.51	290.19
0.015	2075.96	290.19
0.018	1428.62	223.22
0.021	1875.06	267.87
0.024	1428.62	223.22
0.027	1450.94	223.22
0.030	1205.40	200.90
0.032	915.21	178.58
0.035	758.95	156.26
0.038	647.34	156.26
0.041	468.77	133.93
0.044	401.80	111.61
0.046	468.77	133.93
0.049	334.83	111.61
0.052	267.87	89.29
0.055	625.02	133.93

SPENCER 70.....NP B19 501 HBC

BEAM MOMENTUM= .277 + .017 , - .018

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.003	3013.50	485.51
0.006	2461.02	267.87
0.009	2042.48	217.64
0.013	1942.03	217.64
0.017	1523.49	184.16
0.021	1607.20	200.90
0.024	1406.30	184.16
0.028	1339.33	167.42
0.032	904.05	150.67
0.036	803.60	133.93
0.039	552.47	117.19
0.043	535.73	117.19
0.047	468.77	100.45
0.051	318.09	83.71
0.054	418.54	100.45
0.058	184.16	66.97
0.062	184.16	66.97
0.066	251.12	66.97
0.069	117.19	50.22
0.073	251.12	66.97

SPENCER 70.....NP B19 501 HBC

BEAM MOMENTUM= .294 + .061 , - .076

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.000	0.004	3020.94	+-670.49	*
0.004	0.008	2336.39	589.65	*
0.008	0.013	2142.93	564.71	*
0.013	0.017	1979.23	542.71	*
0.017	0.021	1205.40	423.53	*
0.021	0.025	1577.44	484.51	*
0.025	0.030	1324.45	443.96	*
0.030	0.034	357.16	230.54	*
0.034	0.038	1681.61	500.25	*
0.038	0.042	550.61	286.25	*
0.042	0.046	446.44	257.75	*
0.046	0.051	654.78	312.16	*
0.051	0.055	357.16	230.54	*
0.055	0.059	59.53	94.12	*
0.059	0.063	193.46	169.67	*
0.063	0.068	357.16	230.54	*
0.068	0.072	0.		*
0.072	0.076	0.		*
0.076	0.080	74.41	105.23	*
0.080	0.084	0.		*

* DATA READ FROM GRAPH

CORK 62.....NC 25 497 HBC

BEAM MOMENTUM= .31 + .016 , - .016

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.004	1781.31	334.83
0.007	1861.67	200.90
0.012	1888.46	200.90
0.016	1633.98	174.11
0.021	1607.20	174.11
0.026	1245.58	160.72
0.030	1044.68	133.93
0.035	803.60	120.54
0.040	589.31	107.15
0.045	522.34	93.75
0.049	428.59	93.75
0.054	241.08	66.97
0.059	321.44	80.36
0.063	294.65	66.97
0.068	281.26	66.97
0.073	120.54	40.18
0.077	160.72	53.57
0.082	120.54	40.18
0.087	107.15	40.18
0.091	214.29	66.97

SPENCER 70.....NP B19 501 HBC

BEAM MOMENTUM= .341 + .014 , - .015

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.005	2009.00	401.80
0.008	1596.04	212.06
0.014	1584.88	200.90
0.020	1785.78	212.06
0.025	1082.63	156.26
0.031	926.37	145.09
0.037	546.89	111.61
0.042	770.12	133.93
0.048	446.44	100.45
0.053	245.54	78.13
0.059	267.87	78.13
0.065	223.22	66.97
0.070	178.58	66.97
0.076	111.61	44.64
0.082	234.38	66.97
0.087	66.97	33.48
0.093	122.77	55.81
0.099	44.64	33.48
0.104	234.38	66.97
0.110	234.38	66.97

SPENCER 70.....NP B19 501 HBC

BEAM MOMENTUM= .349 + .037 , - .040

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.002	1922.49	+- 299.05
0.004	1933.17	192.25
0.007	1815.68	181.57
0.010	1570.03	170.89
0.013	1708.88	181.57
0.016	1676.83	181.57
0.019	1634.11	181.57
0.022	1452.54	170.89
0.025	1185.53	149.53
0.028	1046.69	138.85
0.031	897.16	128.17
0.034	1185.53	149.53
0.037	758.31	117.49
0.040	822.40	128.17
0.043	822.40	128.17
0.046	651.51	106.80
0.049	384.50	85.44
0.051	651.51	106.80
0.054	437.90	96.12
0.057	480.62	96.12
0.060	288.37	74.76
0.063	224.29	64.08
0.066	480.62	96.12
0.069	341.78	85.44
0.072	170.89	53.40
0.075	170.89	53.40
0.078	149.53	53.40
0.081	117.49	42.72
0.084	96.12	42.72
0.087	117.49	42.72
0.090	21.36	21.36
0.093	96.12	42.72
0.096	117.49	42.72
0.099	74.76	42.72
0.101	21.36	21.36
0.104	74.76	42.72
0.107	0.	
0.110	21.36	21.36
0.113	0.	
0.116	42.72	32.04

CONFORTO 68.....NC 54A 441 HBC

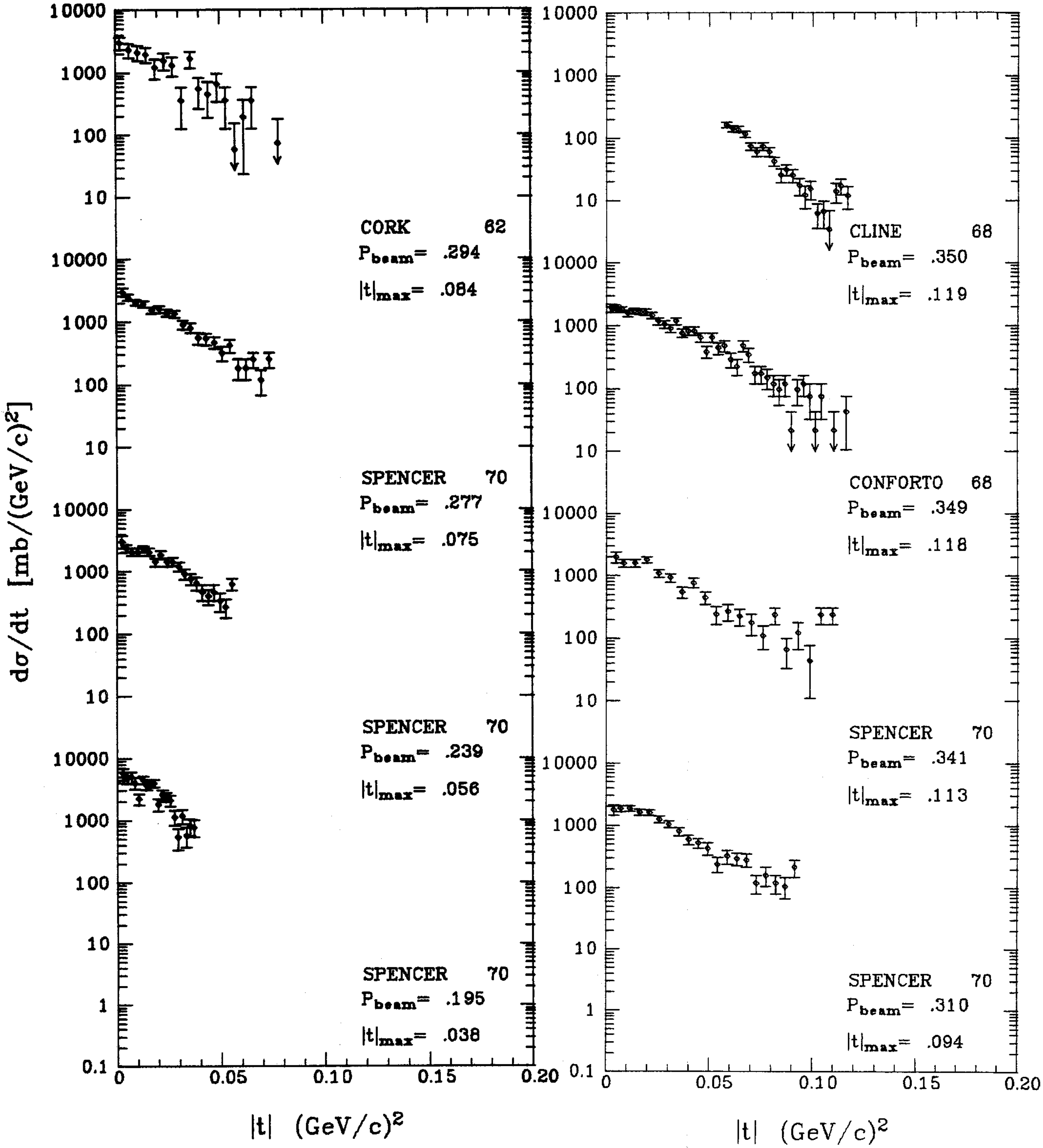
BEAM MOMENTUM= .35 +- .05

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.058	163.19	15.16	*$
0.061	142.41	15.16	*$
0.064	137.53	15.59	*$
0.067	116.11	12.51	*$
0.070	73.59	10.60	*$
0.073	60.55	10.50	*$
0.076	74.12	10.29	*$
0.079	60.76	10.07	*$
0.081	41.99	6.89	*$
0.085	25.77	6.47	*$
0.087	31.17	6.26	*$
0.090	25.34	5.94	*$
0.094	17.28	5.30	*$
0.096	12.19	4.88	*$
0.099	15.16	5.09	*$
0.102	6.15	2.65	*$
0.105	6.57	3.08	*$
0.108	3.39	3.39	*$
0.111	14.00	4.98	*$
0.114	16.97	4.77	*$
0.117	11.77	4.67	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

CLINE 68.....PRL 21 1268 HBC

$\bar{p}p$ elastic $d\sigma/dt$



p̄p elastic dσ/dt

BEAM MOMENTUM= .369 + .013 , - .014

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.005	2018.56	+- 640.97
0.010	1683.73	344.40
0.016	1291.50	287.00
0.023	1301.07	287.00
0.030	420.93	162.63
0.036	593.13	191.33
0.043	411.37	153.07
0.049	746.20	210.47
0.056	229.60	114.80
0.062	287.00	124.37
0.069	277.43	124.37
0.076	277.43	124.37
0.082	57.40	57.40
0.089	57.40	57.40
0.095	0.	
0.102	57.40	57.40
0.108	105.23	76.53
0.115	57.40	57.40
0.122	210.47	105.23
0.128	162.63	95.67

?ENCER 70.....NP B19 501 HBC

BEAM MOMENTUM= .405 + .026 , - .027

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.003	2004.99	248.62
0.006	1644.09	144.36
0.010	1636.07	144.36
0.014	1475.67	136.34
0.018	1427.55	136.34
0.022	1010.51	112.28
0.025	938.33	104.26
0.029	874.17	104.26
0.033	777.94	96.24
0.037	922.29	104.26
0.041	689.72	96.24
0.045	553.38	80.20
0.049	705.76	96.24
0.053	336.84	64.16
0.057	433.08	72.18
0.061	336.84	64.16
0.065	384.96	72.18
0.069	409.02	72.18
0.072	232.58	56.14
0.076	144.36	40.10
0.080	120.30	40.10
0.084	280.70	56.14
0.088	136.34	40.10
0.092	112.28	40.10
0.096	88.22	32.08
0.100	72.18	32.08
0.104	64.16	24.06
0.108	64.16	24.06
0.112	48.12	24.06
0.116	16.04	16.04
0.119	16.04	16.04
0.123	0.	
0.127	16.04	16.04
0.131	16.04	16.04
0.135	24.06	16.04
0.139	24.06	16.04
0.143	16.04	16.04
0.147	16.04	16.04
0.151	0.	
0.155	16.04	16.04

CONFORTO 68.....NC 54A 441 HBC

BEAM MOMENTUM= .421 + .047 , - .052

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.000	0.008	1235.16	303.16	*
0.008	0.017	1473.26	331.09	*
0.017	0.025	930.09	263.07	*
0.025	0.034	878.01	255.60	*
0.034	0.042	632.46	216.93	*
0.042	0.051	550.61	202.41	*
0.051	0.059	550.61	202.41	*
0.059	0.068	275.31	143.13	*
0.068	0.076	319.95	154.29	*
0.076	0.084	245.54	135.17	*
0.084	0.093	111.61	91.13	*
0.093	0.101	148.81	105.23	*
0.101	0.110	59.53	66.55	*
0.110	0.118	0.		*
0.118	0.127	29.76	47.06	*
0.127	0.135	0.		*
0.135	0.144	0.		*
0.144	0.152	29.76	47.06	*
0.152	0.160	29.76	47.06	*
0.160	0.169	66.97	70.59	*

DATA READ FROM GRAPH

CORK 62.....NC 25 497 HBC

BEAM MOMENTUM= .444 + .021 , - .022

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.004	1536.61	+-187.88
0.007	1248.07	107.36
0.012	1462.80	114.07
0.016	1355.44	114.07
0.021	1013.22	93.94
0.026	892.44	93.94
0.030	771.66	87.23
0.035	925.99	93.94
0.040	731.40	80.52
0.044	717.98	80.52
0.049	583.78	73.81
0.054	429.45	60.39
0.059	409.31	60.39
0.063	402.60	60.39
0.068	268.40	46.97
0.073	335.50	53.68
0.077	120.78	33.55
0.082	241.56	46.97
0.087	140.91	33.55
0.091	127.49	33.55
0.096	127.49	33.55
0.101	80.52	26.84
0.105	93.94	26.84
0.110	80.52	26.84
0.115	67.10	26.84
0.119	46.97	20.13
0.124	67.10	26.84
0.129	26.84	13.42
0.133	26.84	13.42
0.138	40.26	20.13
0.143	0.	
0.147	20.13	13.42
0.152	0.	
0.157	20.13	13.42
0.162	20.13	13.42
0.166	40.26	20.13
0.171	6.71	6.71
0.176	6.71	6.71
0.180	20.13	13.42
0.185	53.68	20.13

CONFORTO 68.....NC 54A 441 HBC

BEAM MOMENTUM= .45 +- .05

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.095	44.11	3.21	*$
0.099	35.73	3.14	*$
0.105	36.71	3.08	*$
0.109	30.89	3.27	*$
0.114	17.60	2.42	*$
0.119	17.60	2.42	*$
0.123	15.12	1.51	*$
0.128	10.08	1.64	*$
0.133	9.10	1.44	*$
0.138	5.04	1.57	*$
0.142	7.46	1.64	*$
0.147	8.51	1.44	*$
0.152	9.23	1.51	*$
0.157	7.66	1.37	*$
0.162	11.52	1.51	*$
0.167	14.14	1.57	*$
0.171	10.80	1.64	*$
0.176	14.14	1.57	*$
0.181	18.39	2.42	*$
0.186	10.80	1.64	*$
0.191	15.84	1.64	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

CLINE 68.....PRL 21 1268 HBC

BEAM MOMENTUM= .467 + .019 , - .019

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.004	1521.97	+-164.37
0.008	1248.01	97.41
0.013	1156.70	91.32
0.018	943.62	85.23
0.023	858.39	79.14
0.028	645.31	66.97
0.034	852.30	79.14
0.039	541.82	60.88
0.044	487.03	60.88
0.049	529.64	60.88
0.054	413.98	54.79
0.059	395.71	54.79
0.065	359.18	48.70
0.070	298.31	48.70
0.075	273.95	42.62
0.080	231.34	42.62
0.085	206.99	36.53
0.090	182.64	36.53
0.095	127.85	30.44
0.101	91.32	24.35
0.106	109.58	30.44
0.111	85.23	24.35
0.116	42.62	18.26
0.121	42.62	18.26
0.126	48.70	18.26
0.132	36.53	18.26
0.137	12.18	12.18
0.142	12.18	12.18
0.147	12.18	12.18
0.152	6.09	6.09
0.157	6.09	6.09
0.163	6.09	6.09
0.168	6.09	6.09
0.173	0.	
0.178	6.09	6.09
0.183	30.44	12.18
0.188	30.44	12.18
0.194	12.18	12.18
0.199	6.09	6.09
0.204	30.44	12.18

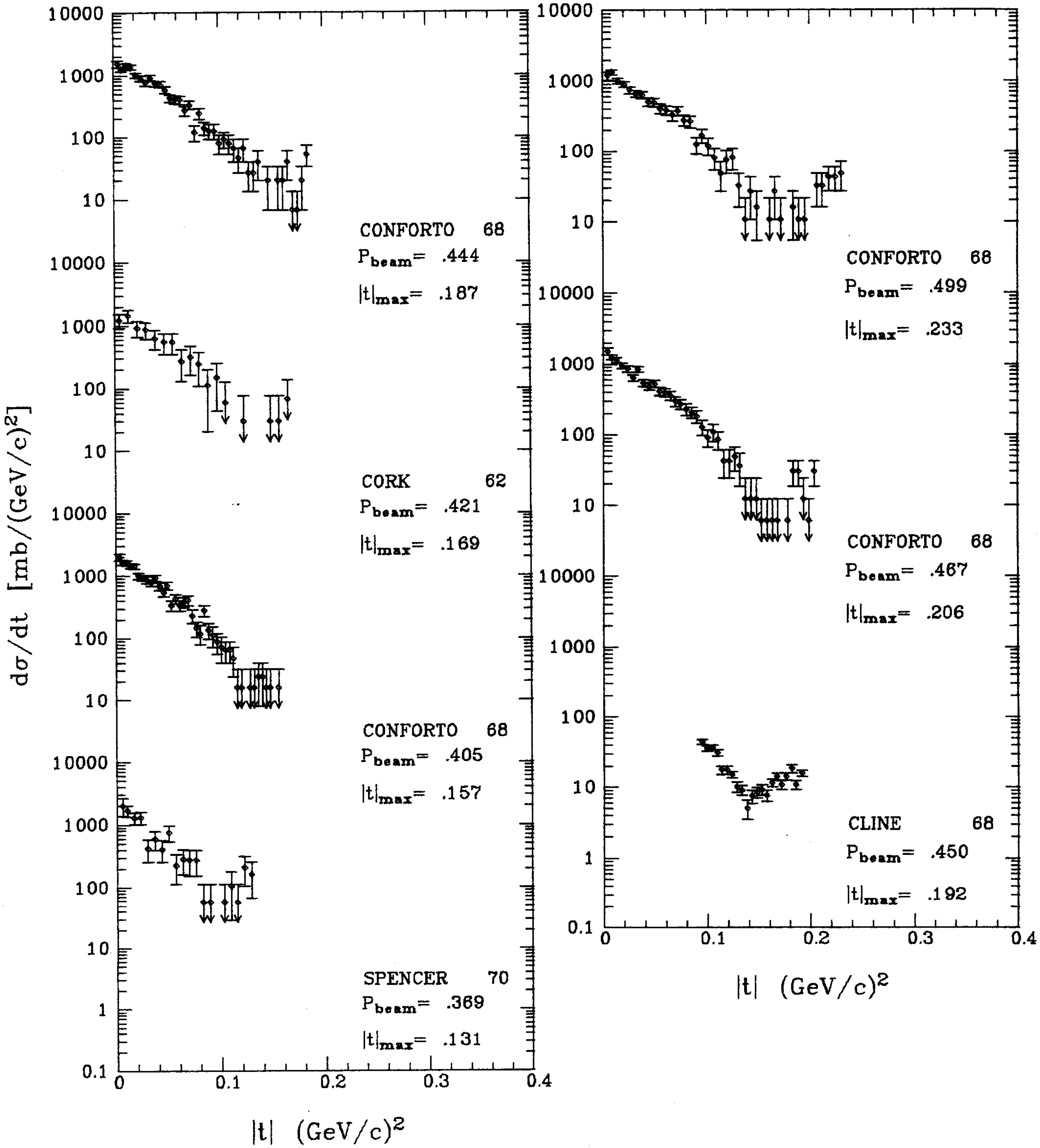
CONFORTO 68.....NC 54A 441 HBC

BEAM MOMENTUM= .499 + .015 , - .015

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.005	1196.02	156.24
0.009	1336.10	107.75
0.015	1012.85	91.59
0.020	899.71	86.20
0.026	743.47	80.81
0.032	662.66	75.42
0.038	630.34	70.04
0.044	506.42	64.65
0.050	490.26	64.65
0.055	404.06	59.26
0.061	382.51	53.87
0.067	323.25	53.87
0.073	371.74	53.87
0.079	274.76	48.49
0.085	263.99	48.49
0.090	123.91	32.32
0.096	167.01	37.71
0.102	118.52	32.32
0.108	80.81	26.94
0.114	48.49	21.55
0.120	75.42	26.94
0.125	80.81	26.94
0.131	32.32	16.16
0.137	10.77	10.77
0.143	26.94	16.16
0.149	16.16	10.77
0.155	0.	
0.160	10.77	10.77
0.166	26.94	16.16
0.172	10.77	10.77
0.178	0.	
0.184	16.16	10.77
0.190	10.77	10.77
0.195	10.77	10.77
0.201	0.	
0.207	32.32	16.16
0.213	32.32	16.16
0.219	43.10	16.16
0.225	43.10	16.16
0.230	48.49	21.55

CONFORTO 68.....NC 54A 441 HBC

$\bar{p}p$ elastic $d\sigma/dt$



p̄p elastic dσ/dt

BEAM MOMENTUM= .525 + .013 , - .013

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.005	1145.48	+- 141.96
0.010	1057.37	83.22
0.016	1091.63	88.11
0.022	778.34	73.43
0.029	704.91	68.53
0.035	651.06	68.53
0.042	548.26	63.64
0.048	416.09	53.85
0.055	430.78	53.85
0.061	293.71	44.06
0.067	327.98	48.95
0.074	342.67	48.95
0.080	225.18	39.16
0.087	117.49	29.37
0.093	176.23	34.27
0.099	122.38	29.37
0.106	97.90	24.48
0.112	73.43	24.48
0.119	117.49	29.37
0.125	68.53	19.58
0.132	63.64	19.58
0.138	34.27	14.69
0.144	34.27	14.69
0.151	0.	
0.157	19.58	9.79
0.164	4.90	4.90
0.170	4.90	4.90
0.176	19.58	9.79
0.183	14.69	9.79
0.189	0.	
0.196	4.90	4.90
0.202	0.	
0.209	4.90	4.90
0.215	0.	
0.221	29.37	14.69
0.228	34.27	14.69
0.234	14.69	9.79
0.241	29.37	14.69
0.247	39.16	14.69
0.253	34.27	14.69

CONFORTO 68.....NC 54A 441 HBC

BEAM MOMENTUM= .541 + .033 , - .035

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.000	0.014	886.73	202.37	*
0.014	0.027	771.27	188.73	*
0.027	0.041	674.28	176.47	*
0.041	0.054	429.51	140.84	*
0.054	0.068	0.		*
0.068	0.082	230.92	103.27	*
0.082	0.095	96.99	66.93	*
0.095	0.109	115.46	73.02	*
0.109	0.122	41.57	43.81	*
0.122	0.136	55.42	50.59	*
0.136	0.150	23.09	32.66	*
0.150	0.163	23.09	32.66	*
0.163	0.177	0.		*
0.177	0.190	0.		*
0.190	0.204	0.		*
0.204	0.218	0.		*
0.218	0.231	0.		*
0.231	0.245	13.86	25.30	*
0.245	0.258	13.86	25.30	*
0.258	0.272	32.33	38.64	*

* DATA READ FROM GRAPH

CORK 62.....NC 25 497 HBC

BEAM MOMENTUM= .55 +- .05

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.137	25.74	+- 2.20	*$
0.144	21.30	2.11	*$
0.150	16.73	1.61	*$
0.157	10.14	1.03	*$
0.165	8.97	0.99	*$
0.171	8.97	0.99	*$
0.177	6.68	1.08	*$
0.185	4.40	1.08	*$
0.192	6.19	1.17	*$
0.200	5.02	1.08	*$
0.206	6.68	1.08	*$
0.213	7.80	1.08	*$
0.220	9.06	1.08	*$
0.227	6.68	1.08	*$
0.234	15.16	1.70	*$
0.240	19.10	1.61	*$
0.247	21.35	2.20	*$
0.255	23.50	2.15	*$
0.261	24.13	2.15	*$
0.268	18.97	2.20	*$
0.275	15.70	2.11	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

CLINE 68.....PRL 21 1268 HBC

BEAM MOMENTUM= .553 + .013 , - .013

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.006	1602.05	190.83
0.011	927.50	93.19
0.018	1113.89	97.63
0.025	909.75	88.76
0.032	803.24	84.32
0.039	661.23	75.44
0.046	483.72	66.57
0.053	390.53	57.69
0.060	381.65	57.69
0.067	363.90	57.69
0.074	221.89	44.38
0.081	204.14	44.38
0.088	168.64	39.94
0.096	150.89	35.50
0.103	142.01	35.50
0.110	97.63	31.06
0.117	79.88	26.63
0.124	53.25	22.19
0.131	17.75	13.31
0.138	26.63	13.31
0.145	8.88	8.88
0.152	8.88	8.88
0.159	0.	
0.166	35.50	17.75
0.173	8.88	8.88
0.181	0.	
0.188	8.88	8.88
0.195	0.	
0.202	0.	
0.209	0.	
0.216	0.	
0.223	8.88	8.88
0.230	8.88	8.88
0.237	8.88	8.88
0.244	17.75	13.31
0.251	8.88	8.88
0.258	17.75	13.31
0.265	26.63	13.31
0.273	44.38	17.75
0.280	8.88	8.88

CONFORTO 68.....NC 54A 441 HBC

BEAM MOMENTUM= .577 + .012 , - .012

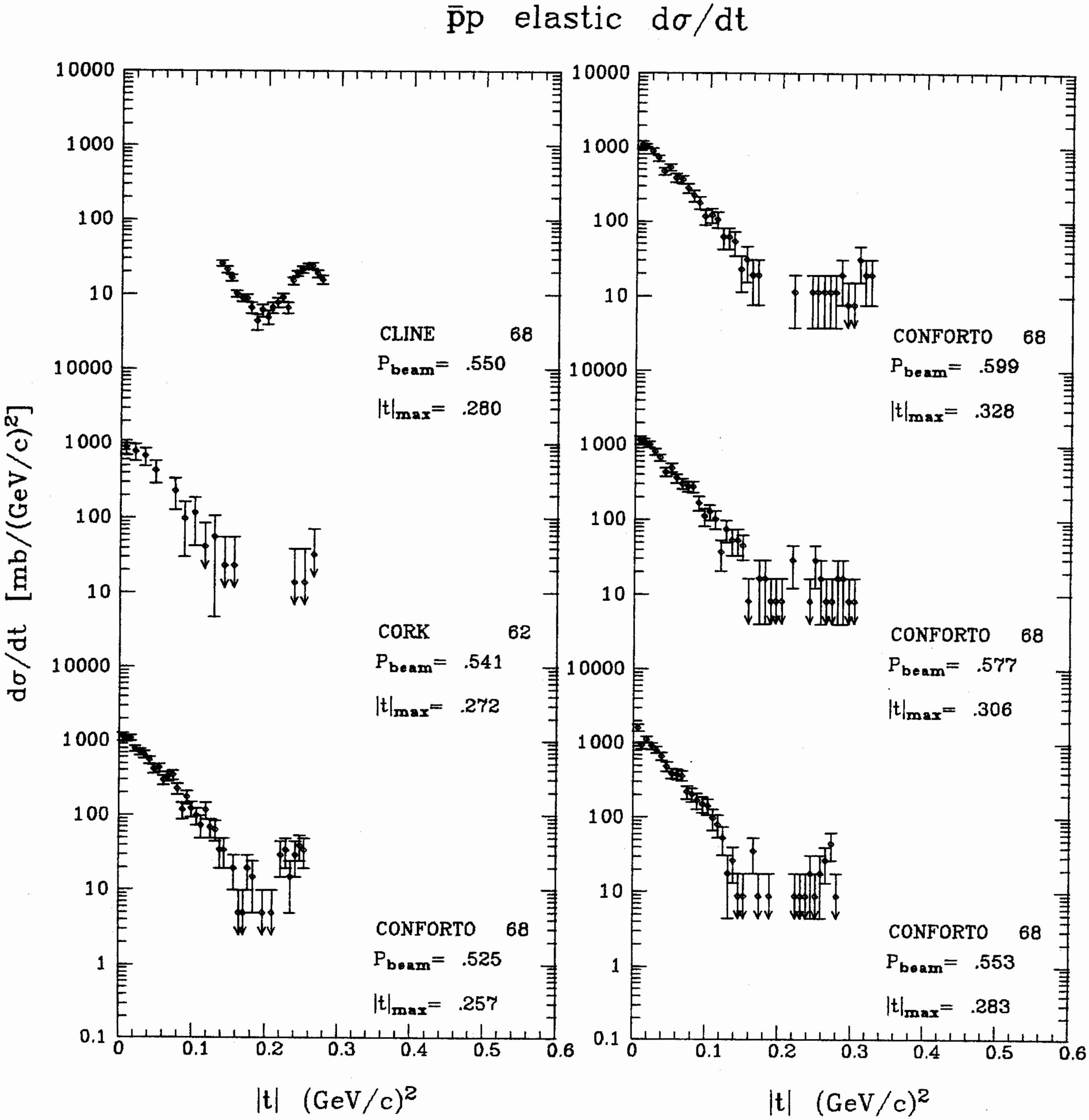
-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.006	1160.54	+- 147.63
0.011	1131.83	90.22
0.019	1017.01	86.12
0.027	803.76	77.92
0.034	672.54	69.71
0.042	434.69	57.41
0.050	496.20	61.51
0.057	356.77	49.21
0.065	303.46	49.21
0.073	278.86	45.11
0.080	274.76	45.11
0.088	168.1[illegible]	36.91
0.096	110.[illegible]	28.71
0.103	127.13	28.71
0.111	102.52	28.71
0.119	36.91	16.40
0.126	73.81	24.60
0.134	53.31	20.50
0.142	53.31	20.50
0.149	45.11	16.40
0.157	8.20	8.20
0.165	0.	
0.172	16.40	12.30
0.180	16.40	12.30
0.188	8.20	8.20
0.195	8.20	8.20
0.203	8.20	8.20
0.211	0.	
0.218	28.71	16.40
0.226	0.	
0.234	0.	
0.241	8.20	8.20
0.249	28.71	16.40
0.257	16.40	12.30
0.264	8.20	8.20
0.272	8.20	8.20
0.280	16.40	12.30
0.287	16.40	12.30
0.295	8.20	8.20
0.303	8.20	8.20

CONFORTO 68.....NC 54A 441 HBC

BEAM MOMENTUM= .599 + .011 , - .011

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.007	1071.47	126.28
0.012	1033.20	80.36
0.021	880.13	72.71
0.029	711.76	65.05
0.037	470.68	53.57
0.045	535.73	57.40
0.053	386.49	49.75
0.062	363.53	45.92
0.070	279.35	42.09
0.078	221.95	38.27
0.086	179.85	34.44
0.094	114.80	26.79
0.103	122.45	26.79
0.111	107.15	26.79
0.119	61.23	19.13
0.127	61.23	19.13
0.135	53.57	19.13
0.144	22.96	11.48
0.152	30.61	15.31
0.160	19.13	11.48
0.168	19.13	11.48
0.177	0.	
0.185	0.	
0.193	0.	
0.201	0.	
0.209	0.	
0.218	11.48	7.65
0.226	0.	
0.234	0.	
0.242	11.48	7.65
0.250	11.48	7.65
0.259	11.48	7.65
0.267	11.48	7.65
0.275	11.48	7.65
0.283	19.13	11.48
0.291	7.65	7.65
0.300	7.65	7.65
0.308	30.61	15.31
0.316	19.13	11.48
0.324	19.13	11.48

CONFORTO 68.....NC 54A 441 HBC


p̄p elastic dσ/dt
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²
CLINE 68
P_beam= .550
|t|_max= .280
CORK 62
P_beam= .541
|t|_max= .272
CONFORTO 68
P_beam= .525
|t|_max= .257
CONFORTO 68
P_beam= .599
|t|_max= .328
CONFORTO 68
P_beam= .577
|t|_max= .306
CONFORTO 68
P_beam= .553
|t|_max= .283
10000
1000
100
10
1
0.1
0
0.1
0.2
0.3
0.4
0.5
0.6

$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= .65 +- .05

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.186	9.856	+-1.648	*$
0.195	11.109	1.648	*$
0.205	5.703	1.220	*$
0.215	3.197	0.857	*$
0.224	4.813	1.286	*$
0.233	4.054	0.824	*$
0.243	4.054	0.824	*$
0.252	4.879	1.220	*$
0.262	6.955	1.220	*$
0.271	11.141	1.648	*$
0.281	12.724	1.648	*$
0.291	7.812	1.253	*$
0.301	9.856	1.648	*$
0.310	11.141	1.648	*$
0.319	10.680	1.747	*$
0.329	12.724	1.648	*$
0.339	16.547	1.648	*$
0.348	18.987	2.044	*$
0.358	13.976	1.648	*$
0.367	13.119	1.615	*$
0.377	7.351	1.187	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

CLINE 68.....PRL 21 1268 HBC

BEAM MOMENTUM= .721 + .032 , - .033

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.000	0.023	519.333	119.143	*
0.023	0.046	431.866	108.648	*
0.046	0.069	382.666	102.272	*
0.069	0.092	188.600	71.799	*
0.092	0.115	95.667	51.136	*
0.115	0.138	109.333	54.667	*
0.138	0.161	13.667	19.328	*
0.161	0.184	13.667	19.328	*
0.184	0.207	13.667	19.328	*
0.207	0.230	0.		*
0.230	0.253	24.600	25.931	*
0.253	0.276	0.		*
0.276	0.299	13.667	19.328	*
0.299	0.322	0.		*
0.322	0.345	13.667	19.328	*
0.345	0.368	0.		*
0.368	0.391	0.		*
0.391	0.414	13.667	19.328	*
0.414	0.437	13.667	19.328	*
0.437	0.460	0.		*

* DATA READ FROM GRAPH

CORK 62.....NC 25 497 HBC

BEAM MOMENTUM= 1.

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.197	18.500	0.925	$
0.229	12.900	0.645	$
0.264	7.500	0.375	$
0.302	4.900	0.245	$
0.338	4.270	0.213	$
0.338	3.730	0.186	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 1.11

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.010	0.020	543.000	+-23.302	*
0.020	0.030	494.000	22.226	*
0.030	0.040	409.000	20.224	*
0.040	0.050	309.000	17.578	*
0.050	0.060	281.000	16.763	*
0.060	0.070	281.000	16.763	*
0.070	0.080	212.000	14.560	*
0.080	0.090	202.000	14.213	*
0.090	0.100	121.000	11.000	*
0.100	0.110	115.000	10.724	*
0.110	0.120	87.000	9.327	*
0.120	0.130	91.000	9.539	*
0.130	0.140	87.000	9.327	*
0.140	0.150	69.000	8.307	*
0.150	0.160	57.000	7.550	*
0.160	0.170	47.000	6.856	*
0.170	0.180	49.000	7.000	*
0.180	0.190	24.000	4.899	*
0.190	0.200	31.000	5.568	*
0.200	0.210	26.000	5.099	*
0.210	0.220	12.000	3.464	*
0.220	0.230	10.000	3.162	*
0.230	0.240	7.000	2.646	*
0.240	0.250	10.000	3.162	*
0.250	0.260	7.000	2.646	*
0.260	0.270	3.000	1.732	*
0.270	0.280	6.000	2.449	*
0.280	0.290	2.000	1.414	*
0.290	0.300	2.000	1.414	*
0.300	0.310	0.		*
0.310	0.320	0.		*
0.320	0.330	8.000	2.828	*
0.330	0.340	0.		*
0.340	0.350	2.000	1.414	*
0.350	0.360	3.000	1.732	*
0.360	0.370	2.000	1.414	*
0.370	0.380	3.000	1.732	*
0.380	0.390	3.000	1.732	*
0.390	0.400	2.000	1.414	*
0.400	0.410	2.000	1.414	*
0.410	0.420	3.000	1.732	*
0.420	0.430	3.000	1.732	*
0.430	0.440	6.000	2.449	*
0.440	0.450	1.000	1.000	*
0.450	0.460	2.000	1.414	*
0.460	0.470	5.000	2.236	*
0.470	0.480	2.000	1.414	*
0.480	0.490	3.000	1.732	*
0.490	0.500	1.000	1.000	*
0.500	0.510	0.		*
0.510	0.520	1.000	1.000	*
0.520	0.530	5.000	2.236	*
0.530	0.540	3.000	1.732	*
0.540	0.550	3.000	1.732	*
0.550	0.560	1.000	1.000	*
0.560	0.570	3.000	1.732	*
0.570	0.580	8.000	2.828	*
0.580	0.590	3.000	1.732	*
0.590	0.600	0.		*
0.600	0.610	1.000	1.000	*
0.610	0.620	1.000	1.000	*
0.620	0.630	1.000	1.000	*
0.630	0.640	2.000	1.414	*
0.640	0.650	2.000	1.414	*
0.650	0.660	2.000	1.414	*
0.660	0.670	1.000	1.000	*
0.670	0.680	2.000	1.414	*
0.680	0.690	2.000	1.414	*
0.690	0.700	1.000	1.000	*

* DATA READ FROM GRAPH

KALBFLEISC 71.....NP B30 466 HBC

BEAM MOMENTUM= 1.125

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.186	21.250	+-1.063	$
0.215	14.730	0.736	$
0.244	9.470	0.474	$
0.283	6.440	0.322	$
0.321	3.740	0.187	$
0.364	3.770	0.188	$
0.412	5.080	0.254	$
0.476	5.530	0.276	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

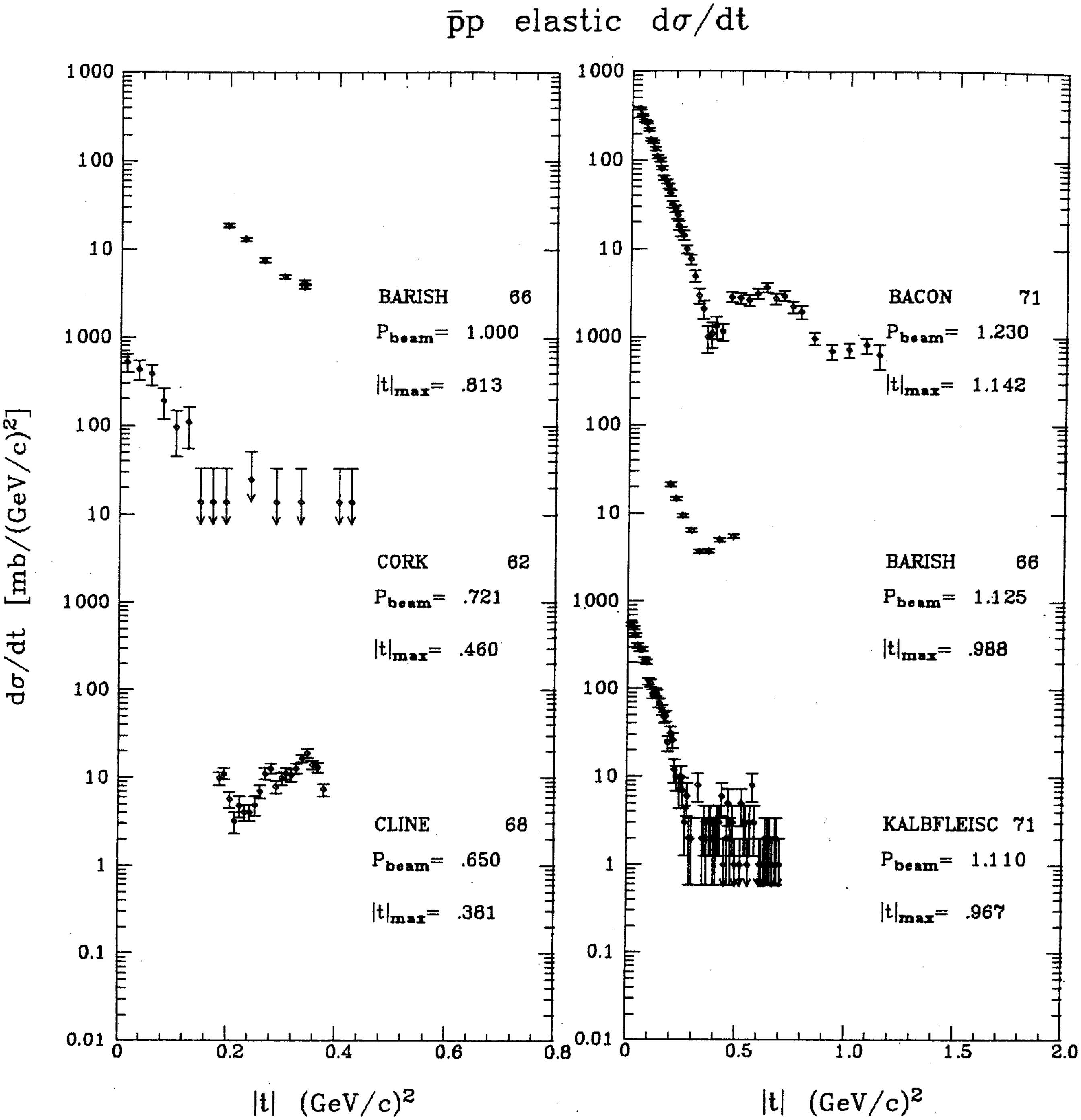
BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 1.23 +- .02

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.030	0.040	379.000	11.000	$
0.040	0.050	319.400	9.200	$
0.050	0.060	275.200	8.200	$
0.060	0.070	265.100	7.600	$
0.070	0.080	221.600	7.200	$
0.080	0.090	171.400	6.300	$
0.090	0.100	161.100	6.100	$
0.100	0.110	134.300	5.700	$
0.110	0.120	109.500	4.900	$
0.120	0.130	100.600	4.700	$
0.130	0.140	81.400	4.200	$
0.140	0.150	62.900	3.700	$
0.150	0.160	57.400	3.600	$
0.160	0.170	51.300	3.400	$
0.170	0.180	42.500	3.100	$
0.180	0.190	31.700	2.600	$
0.190	0.200	28.300	2.500	$
0.200	0.210	24.000	2.300	$
0.210	0.220	18.500	2.000	$
0.220	0.230	15.600	1.900	$
0.230	0.240	14.300	1.800	$
0.240	0.260	9.900	1.000	$
0.260	0.280	7.590	0.910	$
0.280	0.300	4.950	0.740	$
0.300	0.320	2.970	0.570	$
0.320	0.340	2.090	0.480	$
0.340	0.360	0.990	0.330	$
0.360	0.380	1.100	0.350	$
0.380	0.400	1.320	0.380	$
0.400	0.440	1.160	0.250	$
0.440	0.480	2.860	0.400	$
0.480	0.520	2.800	0.390	$
0.520	0.560	2.640	0.380	$
0.560	0.600	3.140	0.420	$
0.600	0.640	3.690	0.450	$
0.640	0.680	2.750	0.390	$
0.680	0.720	2.970	0.400	$
0.720	0.760	2.200	0.350	$
0.760	0.800	1.930	0.330	$
0.800	0.880	0.960	0.160	$
0.880	0.960	0.693	0.140	$
0.960	1.040	0.720	0.140	$
1.040	1.120	0.820	0.160	$
1.120	1.160	0.630	0.200	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BACON 71.....NP B32 66 HBC


p̄p elastic dσ/dt
dσ/dt [mb/(GeV/c)²]
BARISH 66
Pbeam= 1.000
|t|max= .813
CORK 62
Pbeam= .721
|t|max= .460
CLINE 68
Pbeam= .650
|t|max= .381
BACON 71
Pbeam= 1.230
|t|max= 1.142
BARISH 66
Pbeam= 1.125
|t|max= .988
KALBFLEISC 71
Pbeam= 1.110
|t|max= .967
|t| (GeV/c)²
|t| (GeV/c)²

$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= 1.25

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.197	21.100	+- 1.055	$
0.220	16.600	0.830	$
0.245	10.600	0.530	$
0.270	6.740	0.337	$
0.307	4.230	0.211	$
0.340	2.600	0.130	$
0.388	2.710	0.135	$
0.448	3.430	0.171	$
0.508	4.180	0.209	$
0.588	5.000	0.250	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 1.3 +- .02

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.030	0.040	355.000	11.000	$
0.040	0.050	308.200	9.800	$
0.050	0.060	270.800	8.900	$
0.060	0.070	219.000	7.800	$
0.070	0.080	202.800	7.500	$
0.080	0.090	170.100	6.800	$
0.090	0.100	137.500	6.100	$
0.100	0.110	117.200	5.600	$
0.110	0.120	103.500	5.200	$
0.120	0.130	84.300	4.700	$
0.130	0.140	69.900	4.300	$
0.140	0.150	61.900	4.000	$
0.150	0.160	50.600	3.600	$
0.160	0.170	45.900	3.500	$
0.170	0.180	38.100	3.200	$
0.180	0.190	34.700	3.000	$
0.190	0.200	25.500	2.500	$
0.200	0.210	22.200	2.400	$
0.210	0.220	19.800	2.300	$
0.220	0.230	14.900	2.000	$
0.230	0.240	12.000	1.800	$
0.240	0.260	9.700	1.100	$
0.260	0.280	5.220	0.830	$
0.280	0.300	5.480	0.850	$
0.300	0.320	2.610	0.580	$
0.320	0.340	1.960	0.510	$
0.340	0.360	1.830	0.490	$
0.360	0.380	2.220	0.540	$
0.380	0.400	1.440	0.430	$
0.400	0.440	2.870	0.430	$
0.440	0.480	1.700	0.330	$
0.480	0.520	1.960	0.360	$
0.520	0.560	2.480	0.400	$
0.560	0.600	2.350	0.390	$
0.600	0.640	3.520	0.480	$
0.640	0.680	3.070	0.450	$
0.680	0.720	2.150	0.370	$
0.720	0.760	1.890	0.350	$
0.760	0.800	1.830	0.350	$
0.800	0.880	0.950	0.180	$
0.880	0.960	0.880	0.170	$
0.960	1.040	0.520	0.130	$
1.040	1.120	0.290	0.100	$
1.120	1.160	0.650	0.150	$
1.200	1.260	0.380	0.130	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BACON 71.....NP B32 66 HBC

BEAM MOMENTUM= 1.33

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.020	0.030	461.580	+- 13.923	*
0.030	0.040	364.980	12.381	*
0.040	0.050	332.220	11.812	*
0.050	0.060	262.500	10.500	*
0.060	0.070	238.980	10.019	*
0.070	0.080	228.060	9.787	*
0.080	0.090	180.180	8.699	*
0.090	0.100	142.380	7.733	*
0.100	0.110	107.520	6.720	*
0.110	0.120	112.560	6.876	*
0.120	0.130	93.240	6.258	*
0.130	0.140	73.920	5.572	*
0.140	0.150	67.200	5.313	*
0.150	0.160	61.320	5.075	*
0.160	0.170	39.900	4.094	*
0.170	0.180	44.100	4.304	*
0.180	0.190	26.460	3.334	*
0.190	0.200	20.580	2.940	*
0.200	0.210	18.060	2.754	*
0.210	0.220	20.580	2.940	*
0.220	0.230	15.540	2.555	*
0.230	0.240	10.920	2.142	*
0.240	0.250	9.240	1.970	*
0.250	0.260	7.560	1.782	*
0.260	0.270	11.760	2.222	*
0.270	0.280	3.780	1.260	*
0.280	0.290	4.200	1.328	*
0.290	0.300	5.460	1.514	*
0.300	0.310	2.520	1.029	*
0.310	0.320	0.840	0.594	*
0.320	0.330	1.260	0.727	*
0.330	0.340	0.840	0.594	*
0.340	0.350	2.520	1.029	*
0.350	0.360	0.840	0.594	*
0.360	0.370	1.680	0.840	*
0.370	0.380	0.840	0.594	*
0.380	0.390	0.420	0.420	*
0.390	0.400	1.680	0.840	*
0.400	0.410	3.360	1.188	*
0.410	0.420	0.		*
0.420	0.430	0.420	0.420	*
0.430	0.440	1.260	0.727	*
0.440	0.450	1.680	0.840	*
0.450	0.460	1.680	0.840	*
0.460	0.470	1.260	0.727	*
0.470	0.480	2.520	1.029	*
0.480	0.490	2.940	1.111	*
0.490	0.500	1.260	0.727	*
0.500	0.510	0.840	0.594	*
0.510	0.520	1.680	0.840	*
0.520	0.530	1.680	0.840	*
0.530	0.540	3.360	1.188	*
0.540	0.550	1.260	0.727	*
0.550	0.560	0.840	0.594	*
0.560	0.570	2.940	1.111	*
0.570	0.580	0.840	0.594	*
0.580	0.590	2.940	1.111	*
0.590	0.600	5.460	1.514	*
0.600	0.610	1.680	0.840	*
0.610	0.620	1.680	0.840	*
0.620	0.630	2.940	1.111	*
0.630	0.640	2.520	1.029	*
0.640	0.650	4.200	1.328	*
0.650	0.660	2.940	1.111	*
0.660	0.670	2.520	1.029	*
0.670	0.680	1.260	0.727	*
0.680	0.690	1.260	0.727	*
0.690	0.700	2.520	1.029	*

* DATA READ FROM GRAPH

KALBFLEISC 71.....NP B30 466 HBC

BEAM MOMENTUM= 1.36 +- .02

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.030	0.040	364.000	+-12.000	$
0.040	0.050	298.000	10.000	$
0.050	0.060	277.000	9.100	$
0.060	0.070	222.400	8.000	$
0.070	0.080	214.100	7.800	$
0.080	0.090	164.700	6.800	$
0.090	0.100	152.400	6.500	$
0.100	0.110	122.600	5.900	$
0.110	0.120	103.100	5.300	$
0.120	0.130	94.200	5.100	$
0.130	0.140	79.600	4.700	$
0.140	0.150	68.700	4.300	$
0.150	0.160	64.500	4.100	$
0.160	0.170	44.400	3.400	$
0.170	0.180	42.200	3.300	$
0.180	0.190	35.900	3.100	$
0.190	0.200	28.800	2.800	$
0.200	0.210	19.000	2.200	$
0.210	0.220	17.200	2.100	$
0.220	0.230	20.100	2.300	$
0.230	0.240	14.000	1.900	$
0.240	0.260	9.800	1.100	$
0.260	0.280	5.150	0.820	$
0.280	0.300	4.620	0.780	$
0.300	0.320	4.360	0.760	$
0.320	0.340	2.110	0.530	$
0.340	0.360	1.580	0.460	$
0.360	0.380	0.920	0.350	$
0.380	0.400	1.980	0.510	$
0.400	0.440	2.380	0.400	$
0.440	0.480	2.180	0.380	$
0.480	0.520	3.100	0.450	$
0.520	0.560	3.230	0.460	$
0.560	0.600	2.440	0.400	$
0.600	0.640	3.040	0.450	$
0.640	0.680	2.840	0.430	$
0.680	0.720	2.180	0.380	$
0.720	0.760	3.500	0.480	$
0.760	0.800	2.180	0.380	$
0.800	0.880	1.120	0.190	$
0.880	0.960	0.990	0.180	$
0.960	1.040	0.590	0.140	$
1.040	1.120	0.300	0.100	$
1.120	1.160	0.370	0.110	$
1.200	1.260	0.890	0.180	$
1.280	1.330	0.810	0.220	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BACON 71.....NP B32 66 HBC

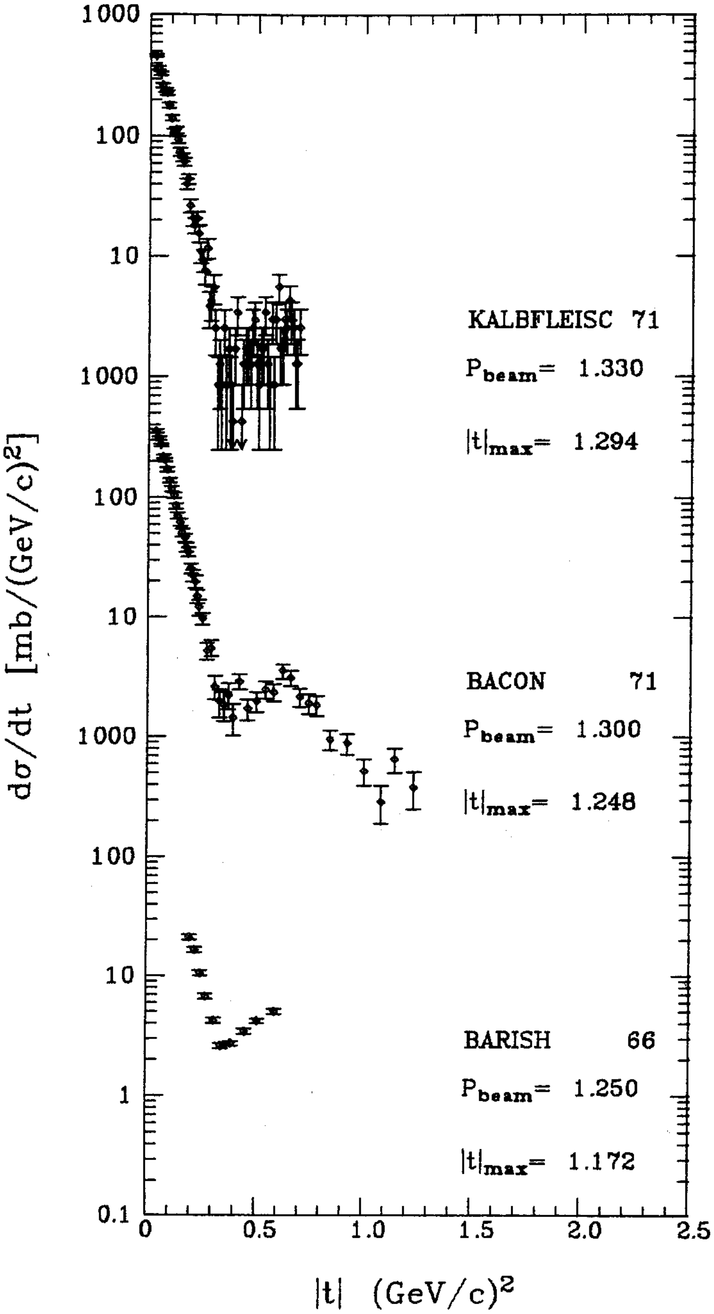
BEAM MOMENTUM= 1.375

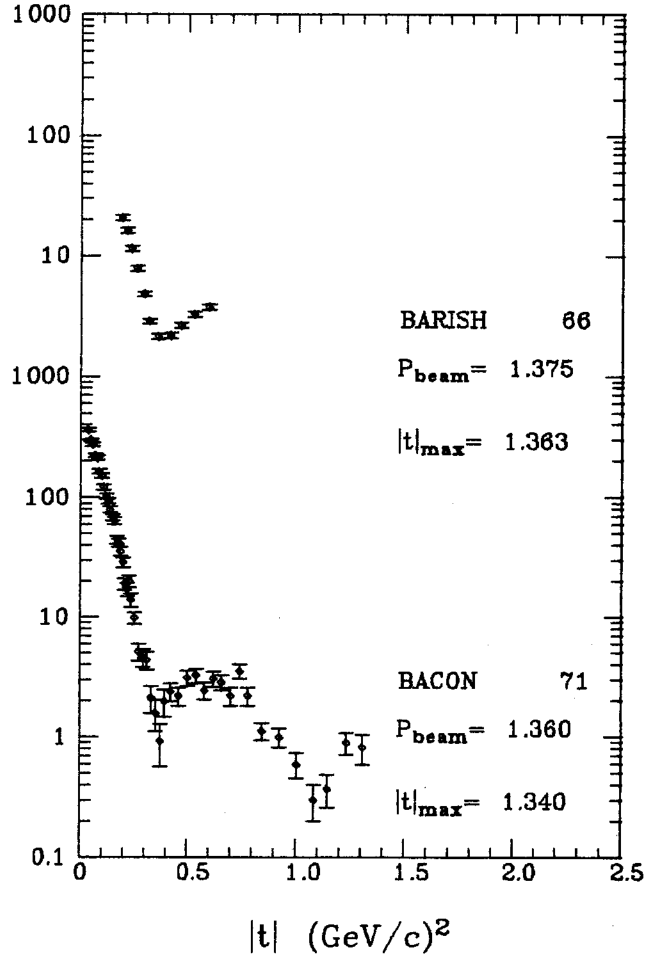
-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.188	20.500	1.025	$
0.214	16.100	0.805	$
0.234	11.450	0.572	$
0.260	7.780	0.389	$
0.292	4.770	0.239	$
0.318	2.840	0.142	$
0.359	2.130	0.106	$
0.416	2.180	0.109	$
0.468	2.620	0.131	$
0.528	3.240	0.162	$
0.596	3.720	0.186	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

$\bar{p}p$ elastic $d\sigma/dt$





p̄p elastic dσ/dt

BEAM MOMENTUM= 1.43 +- .02

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.030	0.040	368.000	+-11.000 $
0.040	0.050	302.900	9.400 $
0.050	0.060	262.800	8.500 $
0.060	0.070	221.100	7.700 $
0.070	0.080	188.000	7.000 $
0.080	0.090	172.600	6.700 $
0.090	0.100	137.800	6.000 $
0.100	0.110	126.100	5.900 $
0.110	0.120	118.600	5.500 $
0.120	0.130	90.200	4.700 $
0.130	0.140	76.800	4.300 $
0.140	0.150	61.300	3.900 $
0.150	0.160	53.500	3.600 $
0.160	0.170	52.000	3.600 $
0.170	0.180	38.400	3.100 $
0.180	0.190	35.400	2.900 $
0.190	0.200	27.200	2.600 $
0.200	0.210	27.500	2.600 $
0.210	0.220	17.300	2.000 $
0.220	0.230	18.000	2.100 $
0.230	0.240	14.100	1.900 $
0.240	0.260	10.200	1.100 $
0.260	0.280	8.010	0.990 $
0.280	0.300	4.620	0.750 $
0.300	0.320	3.160	0.620 $
0.320	0.340	2.190	0.520 $
0.340	0.360	1.580	0.440 $
0.360	0.380	0.970	0.340 $
0.380	0.400	1.340	0.400 $
0.400	0.440	1.400	0.290 $
0.440	0.480	1.820	0.330 $
0.480	0.520	3.220	0.440 $
0.520	0.560	2.430	0.380 $
0.560	0.600	3.460	0.460 $
0.600	0.640	2.610	0.400 $
0.640	0.680	2.860	0.420 $
0.680	0.720	2.680	0.400 $
0.720	0.760	1.880	0.340 $
0.760	0.800	1.400	0.290 $
0.800	0.880	1.150	0.190 $
0.880	0.960	0.940	0.170 $
0.960	1.040	0.940	0.170 $
1.040	1.120	0.330	0.100 $
1.120	1.160	0.760	0.150 $
1.200	1.260	0.370	0.110 $
1.280	1.330	0.480	0.130 $
1.360	1.440	0.460	0.130 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BACON 71.....NP B32 66 HBC

BEAM MOMENTUM= 1.43 +- .19

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.254	10.304	0.668 *
0.326	3.946	0.486 *
0.398	1.960	0.347 *
0.471	1.570	0.295 *
0.543	2.966	0.399 *
0.616	3.062	0.434 *
0.688	2.403	0.399 *
0.761	1.553	0.304 *
0.833	1.882	0.347 *
0.906	1.232	0.295 *
0.978	0.911	0.226 *
1.050	0.775	0.217 *
1.123	0.512	0.150 *
1.195	0.447	0.169 *
1.268	0.108	0.108 *
1.340	0.579	0.188 *
1.413	1.023	0.252 *

* DATA READ FROM GRAPH

COOPER 70.....NP B16 155 HBC

BEAM MOMENTUM= 1.44 +- .21

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.160	0.180	63.000	+-13.000 *†
0.180	0.200	39.000	5.000 *†
0.200	0.240	23.000	2.000 *†
0.240	0.280	14.000	2.000 *†
0.280	0.320	7.200	1.200 *†
0.320	0.360	4.200	0.900 *†
0.360	0.400	2.200	0.500 *†
0.400	0.440	1.800	0.500 *†
0.440	0.480	2.800	0.600 *†
0.480	0.580	3.400	0.400 *†
0.580	0.640	3.000	0.400 *†
0.640	0.800	2.300	0.300 *†
0.800	1.000	0.630	0.130 *†
1.000	1.500	0.540	0.190 *†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

BERRYHILL 68.....PRL 21 770 DBC

BEAM MOMENTUM= 1.5

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.200	17.500	0.875 $
0.218	12.000	0.600 $
0.248	8.550	0.428 $
0.280	5.430	0.271 $
0.312	3.760	0.188 $
0.344	2.160	0.108 $
0.392	1.560	0.078 $
0.430	1.490	0.074 $
0.490	2.020	0.101 $
0.556	2.410	0.120 $
0.624	2.620	0.131 $
0.716	2.920	0.146 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 1.51

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.032	249.678	5.584
0.032	0.063	275.204	6.382
0.063	0.095	172.302	4.786
0.095	0.126	104.498	3.988
0.126	0.158	64.613	3.191
0.158	0.189	34.939	2.154
0.189	0.221	23.692	1.835
0.221	0.252	13.082	1.356
0.252	0.284	7.738	1.037
0.284	0.315	3.271	0.638
0.315	0.347	1.356	0.399
0.347	0.378	0.957	0.399
0.378	0.410	1.516	0.479
0.410	0.441	1.516	0.479
0.441	0.473	2.234	0.558
0.473	0.504	2.313	0.558
0.504	0.536	2.234	0.558
0.536	0.567	2.074	0.558
0.567	0.599	2.792	0.638
0.599	0.630	3.191	0.638
0.630	0.662	3.031	0.638
0.662	0.693	2.074	0.558
0.693	0.725	2.792	0.638
0.725	0.756	2.074	0.558
0.756	0.788	1.516	0.479
0.788	0.851	0.957	0.239
0.851	0.914	1.037	0.239
0.914	0.977	0.638	0.239
0.977	1.040	0.718	0.239
1.040	1.103	0.957	0.239
1.103	1.229	0.479	0.160
1.229	1.355	0.479	0.160
1.355	1.481	0.399	0.080
1.481	1.575	0.718	0.160

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 1.52

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.020	0.030	387.900	+-18.684 *
0.030	0.040	336.600	17.405 *
0.040	0.050	279.000	15.846 *
0.050	0.060	231.300	14.428 *
0.060	0.070	210.600	13.767 *
0.070	0.080	174.600	12.536 *
0.080	0.090	120.600	10.418 *
0.090	0.100	137.700	11.132 *
0.100	0.110	90.900	9.045 *
0.110	0.120	90.900	9.045 *
0.120	0.130	82.800	8.632 *
0.130	0.140	72.000	8.050 *
0.140	0.150	78.300	8.395 *
0.150	0.160	54.000	6.971 *
0.160	0.170	32.400	5.400 *
0.170	0.180	46.800	6.490 *
0.180	0.190	27.900	5.011 *
0.190	0.200	27.000	4.930 *
0.200	0.210	21.600	4.409 *
0.210	0.220	27.900	5.011 *
0.220	0.230	17.100	3.923 *
0.230	0.240	16.200	3.818 *
0.240	0.250	9.900	2.985 *
0.250	0.260	5.400	2.205 *
0.260	0.270	2.700	1.559 *
0.270	0.280	5.400	2.205 *
0.280	0.290	3.600	1.800 *
0.290	0.300	2.700	1.559 *
0.300	0.310	7.200	2.546 *
0.310	0.320	0.900	0.900 *
0.320	0.330	0.900	0.900 *
0.330	0.340	0.900	0.900 *
0.340	0.350	0.900	0.900 *
0.350	0.360	0.	*
0.360	0.370	2.700	1.559 *
0.370	0.380	0.900	0.900 *
0.380	0.390	0.900	0.900 *
0.390	0.400	0.	*
0.400	0.410	0.	*
0.410	0.420	0.	*
0.420	0.430	0.900	0.900 *
0.430	0.440	0.	*
0.440	0.450	0.900	0.900 *
0.450	0.460	2.700	1.559 *
0.460	0.470	2.700	1.559 *
0.470	0.480	0.900	0.900 *
0.480	0.490	3.600	1.800 *
0.490	0.500	3.600	1.800 *
0.500	0.510	0.	*
0.510	0.520	2.700	1.559 *
0.520	0.530	2.700	1.559 *
0.530	0.540	0.	*
0.540	0.550	0.900	0.900 *
0.550	0.560	0.900	0.900 *
0.560	0.570	0.900	0.900 *
0.570	0.580	3.600	1.800 *
0.580	0.590	0.900	0.900 *
0.590	0.600	0.900	0.900 *
0.600	0.610	0.	*
0.610	0.620	0.900	0.900 *
0.620	0.630	3.600	1.800 *
0.630	0.640	3.600	1.800 *
0.640	0.650	0.900	0.900 *
0.650	0.660	0.	*
0.660	0.670	0.900	0.900 *
0.670	0.680	0.900	0.900 *
0.680	0.690	2.700	1.559 *
0.690	0.700	2.700	1.559 *

* DATA READ FROM GRAPH

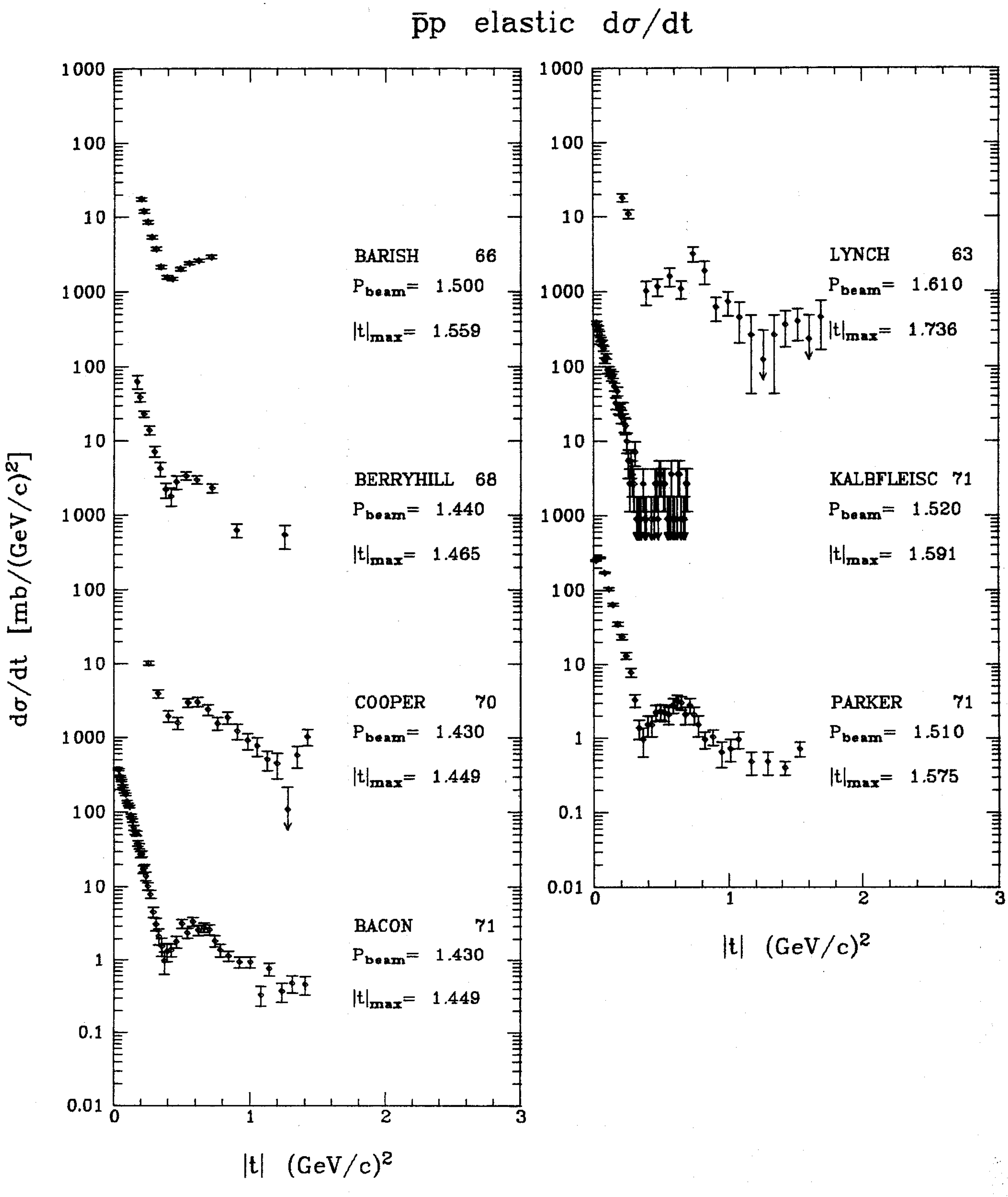
KALBFLEISC 71.....NP B30 466 HBC

BEAM MOMENTUM= 1.61

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.217	18.095	2.171 *
0.260	10.857	1.448 *
0.391	1.013	0.362 *
0.477	1.158	0.290 *
0.564	1.592	0.434 *
0.651	1.086	0.290 *
0.738	3.185	0.724 *
0.825	1.882	0.651 *
0.911	0.615	0.217 *
0.998	0.724	0.253 *
1.085	0.456	0.253 *
1.172	0.261	0.217 *
1.259	0.123	0.181 *
1.345	0.261	0.217 *
1.432	0.362	0.181 *
1.519	0.398	0.181 *
1.606	0.232	0.253 *
1.693	0.456	0.290 *

* DATA READ FROM GRAPH

LYNCH 63.....PR 131 1276 HBC


p̄p elastic dσ/dt
dσ/dt [mb/(GeV/c)²]
BARISH 66
Pbeam= 1.500
|t|max= 1.559
BERRYHILL 68
Pbeam= 1.440
|t|max= 1.465
COOPER 70
Pbeam= 1.430
|t|max= 1.449
BACON 71
Pbeam= 1.430
|t|max= 1.449
LYNCH 63
Pbeam= 1.610
|t|max= 1.736
KALBFLEISC 71
Pbeam= 1.520
|t|max= 1.591
PARKER 71
Pbeam= 1.510
|t|max= 1.575
|t| (GeV/c)²
|t| (GeV/c)²

$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= 1.62

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.026	348.517	+- 17.211	*
0.044	277.523	19.362	*
0.061	223.739	12.908	*
0.079	183.581	12.191	*
0.096	145.574	12.191	*
0.114	103.981	7.171	*
0.131	73.863	6.454	*
0.149	59.234	5.378	*
0.166	54.787	4.446	*
0.184	33.919	4.303	*
0.202	24.956	4.088	*
0.219	26.390	4.231	*
0.237	13.338	2.868	*
0.254	10.613	2.582	*
0.307	3.915	0.653	*
0.394	1.126	0.330	*
0.482	1.391	0.402	*
0.570	0.753	0.337	*
0.657	1.606	0.394	*
0.745	1.771	0.394	*
0.832	0.961	0.323	*

* DATA READ FROM GRAPH

COOPER 70.....NP B16 155 HBC

BEAM MOMENTUM= 1.62 +- .016

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.526	0.613	2.276	0.237	*$
0.613	0.701	2.251	0.236	*$
0.701	0.789	2.053	0.225	*$
0.789	0.876	1.361	0.183	*$
0.876	0.964	0.915	0.150	*$
0.964	1.051	0.371	0.096	*$
1.051	1.139	0.272	0.082	*$
1.139	1.227	0.544	0.116	*$
1.227	1.314	0.272	0.082	*$
1.314	1.402	0.346	0.093	*$
1.402	1.489	0.396	0.099	*$
1.489	1.577	0.371	0.096	*$
1.577	1.665	0.594	0.121	*$
1.665	1.739	0.619	0.124	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

LYS 68.....PRL 21 1116 HBC

BEAM MOMENTUM= 1.65

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.036	246.279	4.884
0.036	0.072	233.721	4.884
0.072	0.108	154.186	4.186
0.108	0.144	85.116	2.791
0.144	0.180	48.140	2.093
0.180	0.216	22.744	1.535
0.216	0.252	16.395	1.326
0.252	0.288	8.791	0.977
0.288	0.324	2.721	0.558
0.324	0.360	2.023	0.488
0.360	0.396	1.395	0.419
0.396	0.432	1.605	0.419
0.432	0.468	1.744	0.419
0.468	0.504	1.814	0.419
0.504	0.540	1.744	0.419
0.540	0.576	2.163	0.488
0.576	0.612	2.791	0.558
0.612	0.648	2.233	0.488
0.648	0.684	3.209	0.558
0.684	0.720	1.744	0.419
0.720	0.756	1.744	0.419
0.756	0.793	1.326	0.349
0.793	0.829	1.186	0.349
0.829	0.865	0.837	0.279
0.865	0.901	0.977	0.349
0.901	0.973	0.628	0.209
0.973	1.045	0.558	0.209
1.045	1.189	0.349	0.070
1.189	1.261	0.488	0.140
1.261	1.405	0.349	0.070
1.405	1.549	0.488	0.140
1.549	1.693	0.349	0.070
1.693	1.801	0.349	0.140

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 1.73

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.097	370.666	+- 182.081	$
0.106	182.081	45.520	$
0.145	72.833	5.202	$
0.174	50.072	3.902	$
0.242	14.957	1.301	$
0.386	0.910	0.455	$
0.425	2.016	0.325	$
0.483	2.926	0.390	$
0.570	2.341	0.325	$
0.589	3.056	0.390	$
0.705	3.707	0.390	$
0.734	2.146	0.325	$
0.831	2.211	0.325	$
0.899	1.496	0.260	$
0.966	1.496	0.260	$
1.063	1.105	0.195	$
1.111	1.236	0.260	$
1.227	0.325	0.130	$
1.256	0.390	0.130	$
1.372	0.390	0.260	$
1.401	0.455	0.195	$
1.517	0.325	0.260	$
1.546	0.390	0.195	$
1.672	0.390	0.195	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 1.75

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.194	20.600	1.030	$
0.204	13.400	0.670	$
0.239	10.500	0.525	$
0.274	8.320	0.416	$
0.298	6.330	0.316	$
0.325	3.900	0.195	$
0.364	2.370	0.119	$
0.392	1.860	0.093	$
0.450	1.350	0.067	$
0.492	1.350	0.067	$
0.554	1.750	0.087	$
0.604	1.940	0.097	$
0.688	2.090	0.104	$
0.788	2.090	0.104	$
0.872	1.930	0.096	$
0.972	1.900	0.095	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 1.77 +- .018

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.600	0.700	2.113	0.200	*$
0.700	0.799	2.396	0.213	*$
0.799	0.899	1.490	0.168	*$
0.899	0.999	1.132	0.146	*$
0.999	1.099	0.641	0.110	*$
1.099	1.199	0.415	0.088	*$
1.199	1.299	0.283	0.073	*$
1.299	1.399	0.453	0.092	*$
1.399	1.499	0.245	0.068	*$
1.499	1.599	0.283	0.073	*$
1.599	1.699	0.245	0.068	*$
1.699	1.799	0.264	0.071	*$
1.799	1.899	0.207	0.063	*$
1.899	1.984	0.717	0.116	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

LYS 68.....PRL 21 1116 HBC

BEAM MOMENTUM= 1.8

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.041	237.413	+- 4.908
0.041	0.082	206.740	4.908
0.082	0.123	113.492	2.454
0.123	0.164	59.507	2.454
0.164	0.205	30.060	1.840
0.205	0.246	15.828	1.288
0.246	0.287	6.135	0.798
0.287	0.328	3.374	0.613
0.328	0.369	1.718	0.429
0.369	0.410	1.472	0.368
0.410	0.451	2.024	0.491
0.451	0.492	2.086	0.491
0.492	0.533	2.024	0.491
0.533	0.574	2.331	0.491
0.574	0.615	1.166	0.368
0.615	0.655	1.902	0.429
0.655	0.696	2.208	0.491
0.696	0.737	1.779	0.429
0.737	0.778	2.024	0.491
0.778	0.819	1.718	0.429
0.819	0.860	2.086	0.491
0.860	0.901	0.859	0.245
0.901	0.942	1.350	0.368
0.942	1.024	0.736	0.184
1.024	0.942	0.736	0.184
1.106	1.270	0.307	0.061
1.270	1.434	0.245	0.061
1.434	1.598	0.184	0.061
1.598	1.762	0.429	0.123
1.762	1.926	0.491	0.123
1.926	2.048	0.245	0.123

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 1.83 +- .018

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.630	0.734	1.904	0.185	*$
0.734	0.839	1.689	0.174	*$
0.839	0.944	1.294	0.152	*$
0.944	1.049	0.988	0.133	*$
1.049	1.154	0.467	0.092	*$
1.154	1.259	0.467	0.092	*$
1.259	1.364	0.323	0.076	*$
1.364	1.469	0.377	0.082	*$
1.469	1.574	0.234	0.065	*$
1.574	1.679	0.252	0.067	*$
1.679	1.784	0.252	0.067	*$
1.784	1.889	0.234	0.065	*$
1.889	1.993	0.216	0.062	*$
1.993	2.083	0.539	0.098	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

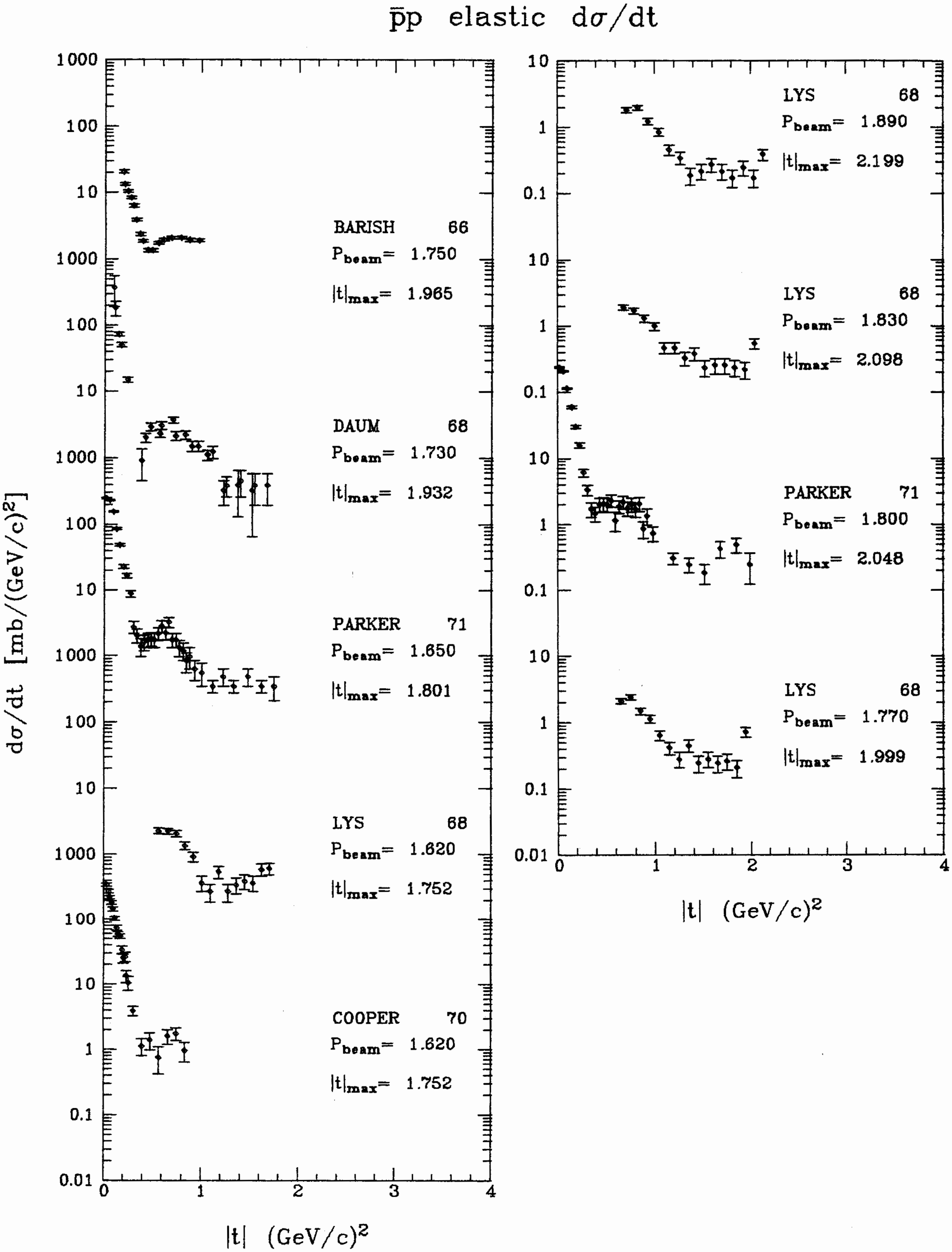
LYS 68.....PRL 21 1116 HBC

BEAM MOMENTUM= 1.89 +- .019

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.660	0.770	1.843	0.162	*$
0.770	0.880	1.986	0.168	*$
0.880	0.990	1.229	0.132	*$
0.990	1.099	0.843	0.110	*$
1.099	1.209	0.457	0.081	*$
1.209	1.319	0.343	0.070	*$
1.319	1.429	0.186	0.052	*$
1.429	1.539	0.214	0.055	*$
1.539	1.649	0.271	0.062	*$
1.649	1.759	0.214	0.055	*$
1.759	1.869	0.171	0.049	*$
1.869	1.979	0.243	0.059	*$
1.979	2.089	0.171	0.049	*$
2.089	2.182	0.386	0.074	*$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

LYS 68.....PRL 21 1116 HBC



p̄p elastic dσ/dt
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²
BARISH 66
Pbeam= 1.750
|t|max= 1.965
DAUM 68
Pbeam= 1.730
|t|max= 1.932
PARKER 71
Pbeam= 1.650
|t|max= 1.801
LYS 68
Pbeam= 1.620
|t|max= 1.752
COOPER 70
Pbeam= 1.620
|t|max= 1.752
LYS 68
Pbeam= 1.890
|t|max= 2.199
LYS 68
Pbeam= 1.830
|t|max= 2.098
PARKER 71
Pbeam= 1.800
|t|max= 2.048
LYS 68
Pbeam= 1.770
|t|max= 1.999

$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= 1.95 +- .019

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.690	0.805	1.828	+- 0.169 *$
0.805	0.920	1.484	0.152 *$
0.920	1.035	1.031	0.127 *$
1.035	1.150	0.688	0.104 *$
1.150	1.265	0.453	0.084 *$
1.265	1.380	0.328	0.072 *$
1.380	1.495	0.281	0.066 *$
1.495	1.610	0.250	0.063 *$
1.610	1.725	0.188	0.054 *$
1.725	1.840	0.266	0.064 *$
1.840	1.955	0.172	0.052 *$
1.955	2.070	0.188	0.054 *$
2.070	2.185	0.188	0.054 *$
2.185	2.283	0.188	0.054 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

LYS 68.....PRL 21 1116 HBC

BEAM MOMENTUM= 1.95

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.046	230.010	4.917
0.046	0.092	179.746	4.371
0.092	0.138	94.517	3.278
0.138	0.184	47.532	2.185
0.184	0.230	20.542	1.530
0.230	0.276	11.419	1.147
0.276	0.322	3.715	0.656
0.322	0.368	1.475	0.382
0.368	0.414	1.858	0.492
0.414	0.460	1.475	0.382
0.460	0.506	1.366	0.382
0.506	0.552	1.858	0.437
0.552	0.598	1.475	0.382
0.598	0.644	1.858	0.437
0.644	0.690	2.295	0.492
0.690	0.736	2.295	0.492
0.736	0.782	2.185	0.492
0.782	0.828	1.475	0.382
0.828	0.874	1.475	0.382
0.874	0.920	1.475	0.382
0.920	0.966	1.366	0.382
0.966	1.058	0.382	0.164
1.058	1.150	0.710	0.219
1.150	1.334	0.328	0.109
1.334	1.610	0.328	0.055
1.610	1.794	0.273	0.109
1.794	2.300	0.219	0.055

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 2.

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.214	13.300	0.665 $
0.224	9.660	0.483 $
0.251	9.820	0.491 $
0.275	5.940	0.297 $
0.302	4.380	0.219 $
0.380	2.970	0.148 $
0.410	1.430	0.071 $
0.460	1.210	0.060 $
0.494	1.090	0.055 $
0.544	1.380	0.069 $
0.600	1.670	0.083 $
0.648	1.800	0.090 $
0.724	1.980	0.099 $
0.800	1.850	0.092 $
0.920	1.510	0.075 $
1.044	1.270	0.063 $
1.168	1.150	0.057 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 2.13

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.130	81.947	+- 16.871 $
0.130	83.875	12.533 $
0.222	37.599	2.892 $
0.378	4.049	0.434 $
0.469	2.699	0.386 $
0.574	2.410	0.289 $
0.587	2.892	0.337 $
0.730	2.699	0.289 $
0.795	2.410	0.241 $
0.886	1.832	0.241 $
1.017	1.446	0.193 $
1.043	1.012	0.193 $
1.225	0.916	0.145 $
1.238	0.771	0.145 $
1.421	0.530	0.145 $
1.460	0.434	0.145 $
1.629	0.386	0.096 $
1.668	0.482	0.145 $
1.838	0.434	0.096 $
1.864	0.337	0.145 $
2.033	0.530	0.145 $
2.046	0.386	0.193 $
2.203	0.289	0.193 $
2.216	0.193	0.145 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 2.15

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.053	161.285	4.282
0.053	0.106	137.021	4.282
0.106	0.158	60.422	2.855
0.158	0.211	28.546	1.903
0.211	0.264	10.943	1.142
0.264	0.317	5.043	0.809
0.317	0.370	2.569	0.571
0.370	0.475	0.571	0.190
0.475	0.528	1.237	0.381
0.528	0.581	1.475	0.428
0.581	0.634	1.951	0.476
0.634	0.687	1.332	0.381
0.687	0.740	1.855	0.476
0.740	0.792	2.331	0.523
0.792	0.845	1.332	0.381
0.845	0.898	1.618	0.428
0.898	1.004	0.856	0.238
1.004	1.109	0.714	0.190
1.109	1.215	0.809	0.238
1.215	1.426	0.381	0.095
1.426	1.638	0.285	0.095
1.638	1.849	0.285	0.095
1.849	2.060	0.285	0.095
2.060	2.483	0.238	0.048
2.483	2.641	0.333	0.095

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 2.2 +- .022

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.818	0.955	1.476	0.139 *$
0.955	1.091	0.896	0.109 *$
1.091	1.227	0.580	0.087 *$
1.227	1.364	0.448	0.077 *$
1.364	1.500	0.395	0.072 *$
1.500	1.636	0.316	0.065 *$
1.636	1.773	0.224	0.054 *$
1.773	1.909	0.316	0.065 *$
1.909	2.046	0.211	0.053 *$
2.046	2.182	0.237	0.056 *$
2.182	2.318	0.132	0.042 *$
2.318	2.455	0.158	0.046 *$
2.455	2.591	0.066	0.029 *$
2.591	2.707	0.132	0.042 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

LYS 68.....PRL 21 1116 HBC

BEAM MOMENTUM= 2.25

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.280	4.720	+- 0.236 $
0.297	3.490	0.174 $
0.312	2.760	0.138 $
0.330	1.620	0.081 $
0.362	1.240	0.062 $
0.410	1.040	0.052 $
0.468	0.820	0.041 $
0.502	0.860	0.043 $
0.566	0.970	0.048 $
0.600	1.220	0.061 $
0.668	1.470	0.073 $
0.730	1.460	0.073 $
0.830	1.460	0.073 $
0.916	1.330	0.066 $
1.040	1.150	0.057 $
1.160	0.830	0.041 $
1.300	0.700	0.035 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 2.37

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.151	83.983	18.293 $
0.166	57.790	8.315 $
0.317	8.315	0.832 $
0.453	3.077	0.416 $
0.514	2.869	0.416 $
0.680	3.118	0.374 $
0.937	2.744	0.333 $
0.982	1.912	0.333 $
1.164	0.998	0.249 $
1.194	1.663	0.249 $
1.375	0.707	0.208 $
1.466	0.499	0.166 $
1.602	0.333	0.166 $
1.723	0.540	0.166 $
1.844	0.624	0.166 $
1.965	0.624	0.166 $
2.388	0.	0.208 $
2.569	0.042	0.291 $

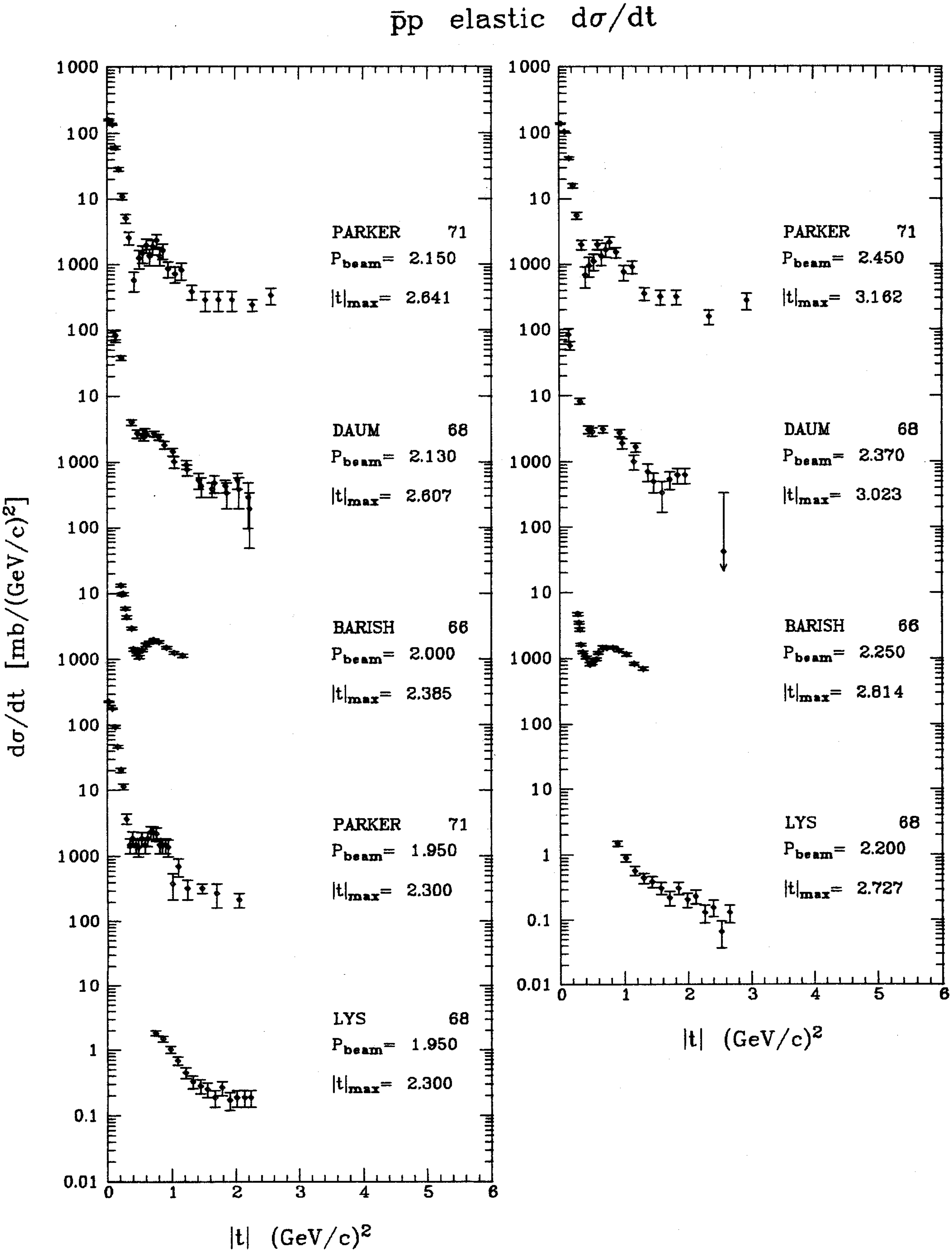
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 2.45

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.063	138.681	3.576
0.063	0.126	104.508	3.179
0.126	0.190	41.724	1.987
0.190	0.253	15.736	1.232
0.253	0.316	5.523	0.715
0.316	0.379	1.987	0.318
0.379	0.443	0.676	0.238
0.443	0.506	0.954	0.318
0.506	0.569	1.113	0.318
0.569	0.632	1.987	0.318
0.632	0.696	1.311	0.358
0.696	0.759	1.669	0.397
0.759	0.822	2.146	0.437
0.822	0.949	1.510	0.278
0.949	1.075	0.755	0.199
1.075	1.202	0.914	0.199
1.202	1.455	0.358	0.079
1.455	1.708	0.318	0.079
1.708	1.961	0.318	0.079
1.961	2.720	0.159	0.040
2.720	3.162	0.278	0.079

PARKER 71.....NP B32 29 HBC


p̄p elastic dσ/dt
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²
PARKER 71
Pbeam= 2.150
|t|max= 2.641
DAUM 68
Pbeam= 2.130
|t|max= 2.607
BARISH 66
Pbeam= 2.000
|t|max= 2.385
PARKER 71
Pbeam= 1.950
|t|max= 2.300
LYS 68
Pbeam= 1.950
|t|max= 2.300
PARKER 71
Pbeam= 2.450
|t|max= 3.162
DAUM 68
Pbeam= 2.370
|t|max= 3.023
BARISH 66
Pbeam= 2.250
|t|max= 2.814
LYS 68
Pbeam= 2.200
|t|max= 2.727

$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= 2.5

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.245	6.310	+-0.315	$
0.260	6.690	0.334	$
0.276	4.780	0.239	$
0.292	5.530	0.276	$
0.310	2.870	0.143	$
0.342	2.130	0.106	$
0.378	1.600	0.080	$
0.395	1.430	0.071	$
0.424	0.742	0.037	$
0.466	0.593	0.030	$
0.492	0.619	0.031	$
0.552	0.920	0.046	$
0.600	0.866	0.043	$
0.672	1.140	0.057	$
0.720	1.110	0.055	$
0.792	1.350	0.067	$
0.892	1.230	0.061	$
1.000	1.070	0.053	$
1.110	0.935	0.047	$
1.250	0.707	0.035	$
1.390	0.550	0.027	$
1.550	0.476	0.024	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERROR

BARISH 66.....PRL 17 720 CNTR

BEAM MOMENTUM= 2.6

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.069	130.569	3.301
0.069	0.137	88.391	2.567
0.137	0.206	34.843	1.834
0.206	0.274	12.323	0.990
0.274	0.343	4.255	0.587
0.343	0.411	1.137	0.293
0.411	0.480	0.550	0.220
0.480	0.548	1.137	0.293
0.548	0.617	1.687	0.367
0.617	0.685	1.064	0.293
0.685	0.754	1.284	0.330
0.754	0.822	1.540	0.367
0.822	0.959	1.210	0.220
0.959	1.096	0.770	0.183
1.096	1.233	0.844	0.183
1.233	1.370	0.403	0.110
1.370	1.576	0.220	0.073
1.576	1.987	0.110	0.037
1.987	2.398	0.110	0.037
2.398	2.947	0.110	0.037
2.947	3.221	0.183	0.073
3.221	3.426	0.257	0.073

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 2.69 +- .05

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.018	0.036	225.362	8.412
0.036	0.054	182.253	7.360
0.054	0.072	133.886	5.958
0.072	0.090	115.660	5.608
0.090	0.108	90.075	4.907
0.108	0.125	62.737	3.855
0.125	0.143	56.779	3.855
0.143	0.161	47.666	3.505
0.161	0.179	34.733	2.804
0.179	0.215	23.693	1.647
0.215	0.251	12.863	1.192
0.251	0.287	7.290	0.911
0.287	0.323	4.276	0.666
0.323	0.359	2.138	0.491
0.359	0.448	1.087	0.210
0.448	0.538	0.596	0.175
0.538	0.627	0.946	0.210
0.627	0.717	1.332	0.245
0.717	0.807	1.122	0.175
0.807	0.896	1.192	0.210
0.896	0.986	1.227	0.210
0.986	1.076	0.596	0.140
1.076	1.434	0.396	0.056
1.434	1.793	0.242	0.046
1.793	2.151	0.102	0.032
2.151	2.510	0.084	0.028
2.510	2.868	0.077	0.025
2.868	3.227	0.032	0.018
3.227	3.585	0.011	0.011

DOMINGO 67.....PL 24B 642 HBC

BEAM MOMENTUM= 2.75

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.074	130.026	+-3.404
0.074	0.148	80.330	2.723
0.148	0.222	27.231	1.702
0.222	0.295	10.007	0.987
0.295	0.369	2.621	0.511
0.369	0.517	0.545	0.511
0.517	0.591	1.396	0.374
0.591	0.665	1.293	0.374
0.665	0.738	2.212	0.477
0.738	0.812	2.110	0.477
0.812	0.886	0.919	0.306
0.886	0.960	0.817	0.272
0.960	1.108	0.442	0.136
1.108	1.403	0.340	0.102
1.403	1.624	0.477	0.136
1.624	2.289	0.136	0.034
2.289	3.175	0.034	0.017
3.175	3.692	0.136	0.034

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 2.9

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.000	0.079	119.983	3.174
0.079	0.158	65.388	2.539
0.158	0.238	22.536	1.587
0.238	0.317	5.967	0.762
0.317	0.396	1.809	0.413
0.396	0.475	1.047	0.317
0.475	0.554	1.238	0.349
0.554	0.633	0.571	0.222
0.633	0.713	1.143	0.317
0.713	0.792	1.047	0.317
0.792	0.950	0.571	0.159
0.950	1.109	0.667	0.190
1.109	1.346	0.381	0.095
1.346	1.663	0.222	0.063
1.663	2.296	0.095	0.032
2.296	3.088	0.032	0.016
3.088	3.959	0.063	0.022

PARKER 71.....NP B32 29 HBC

BEAM MOMENTUM= 2.97

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.163	75.692	16.000	$
0.347	19.385	1.846	$
0.531	2.523	0.431	$
0.633	3.046	0.369	$
0.776	2.738	0.369	$
0.960	2.954	0.338	$
0.960	2.646	0.369	$
1.184	1.046	0.185	$
1.348	1.169	0.185	$
1.450	1.108	0.215	$
1.695	0.523	0.154	$
1.715	0.892	0.185	$
2.022	0.462	0.154	$
2.062	0.585	0.123	$
2.348	0.215	0.123	$
2.695	0.123	0.123	$
2.736	0.185	0.154	$
3.022	0.123	0.123	$
3.022	0.215	0.092	$
3.288	0.215	0.246	$
3.349	0.154	0.123	$
3.635	0.092	0.154	$
3.859	0.123	0.277	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 3.

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.035	200.300	+-31.600
0.046	231.100	33.500
0.057	221.600	30.800
0.072	124.300	15.200
0.093	75.000	11.200
0.114	53.300	9.400
0.145	39.200	5.700
0.186	25.000	4.500
0.310	5.160	0.900
0.520	1.170	0.400
0.730	0.558	0.081
0.830	0.687	0.092
1.130	0.475	0.075
1.340	0.261	0.055
1.550	0.124	0.041
1.750	0.167	0.044
1.960	0.106	0.035
2.170	0.137	0.041
2.370	0.059	0.026
2.580	0.059	0.026
2.790	0.023	0.017
3.310	0.017	0.010
4.030	0.009	0.009

ESCOUBES 63.....PL 5 132 HBC

BEAM MOMENTUM= 3.28 +- .066

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.023	0.046	186.000	14.000	*†
0.046	0.070	129.000	11.000	*†
0.070	0.093	105.000	9.000	*†
0.093	0.116	74.100	8.300	*†
0.116	0.139	53.100	7.000	*†
0.139	0.162	49.000	7.100	*†
0.162	0.186	30.300	5.500	*†
0.186	0.209	23.500	4.700	*†
0.209	0.232	16.100	3.800	*†
0.232	0.278	6.579	1.597	*
0.278	0.325	4.928	1.354	*
0.325	0.418	1.706	0.539	*
0.418	0.603	0.655	0.244	*
0.603	0.789	0.655	0.244	*
0.789	0.975	0.655	0.244	*
0.975	1.160	1.113	0.298	*
1.160	1.346	0.363	0.181	*

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

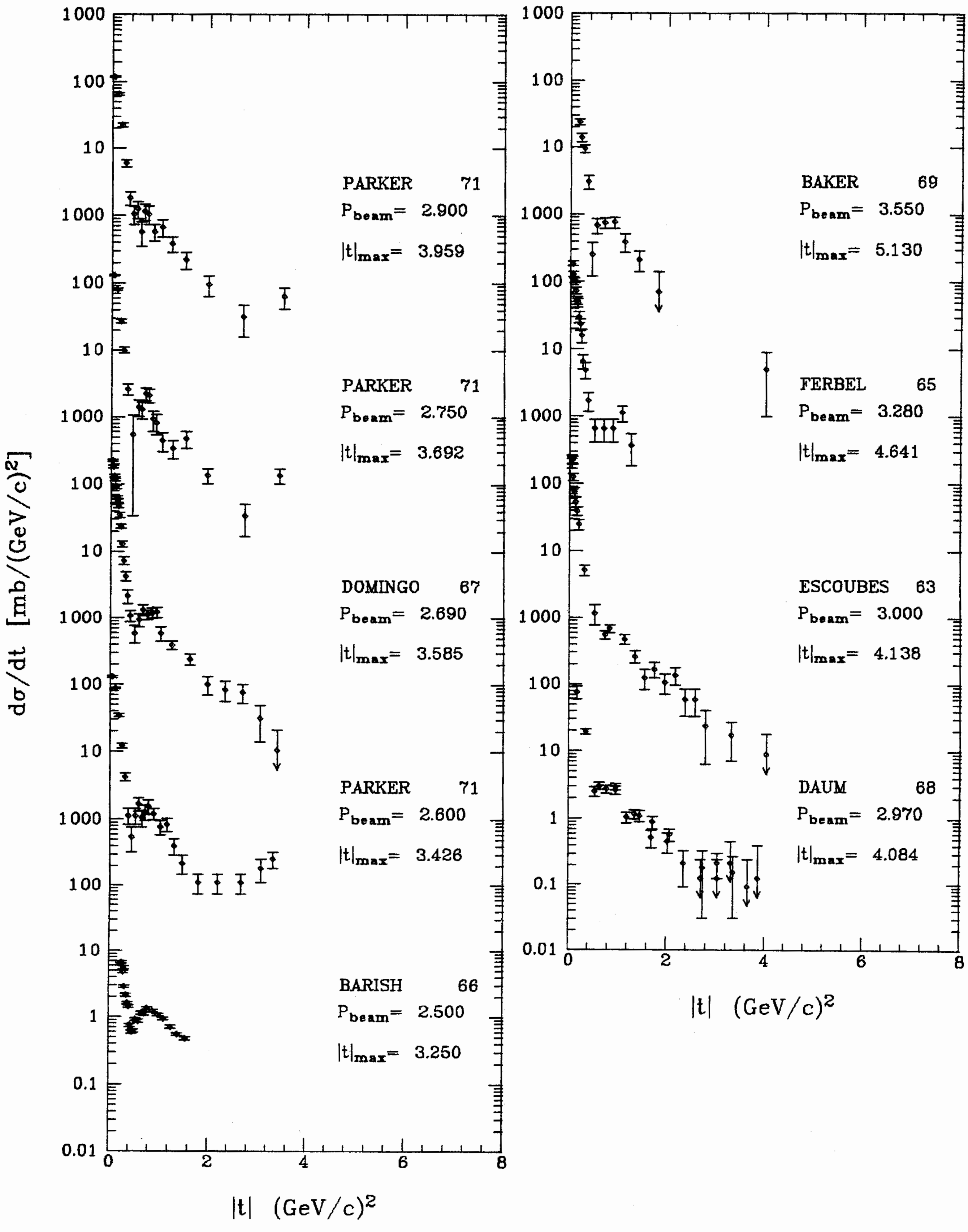
FERBEL 65.....PR 137B1250 HBC

BEAM MOMENTUM= 3.55 +- .05

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.160	0.200	23.700	2.400
0.200	0.240	13.900	1.900
0.240	0.320	9.400	1.300
0.320	0.400	3.040	0.700
0.400	0.480	0.250	0.130
0.480	0.600	0.680	0.170
0.600	0.800	0.740	0.130
0.800	1.000	0.750	0.140
1.000	1.200	0.390	0.120
1.200	1.600	0.210	0.070
1.600	2.000	0.070	0.070
3.500	4.500	0.005	0.004

BAKER 69.....NP B12 5 SPRK

$\bar{p}p$ elastic $d\sigma/dt$



p̄p elastic dσ/dt

BEAM MOMENTUM= 3.6

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.030	204.100	+-18.600
0.050	148.000	12.100
0.070	125.200	10.900
0.090	84.000	8.900
0.110	65.000	7.800

ESCOUBES 63.....PL 5 132 HBC

BEAM MOMENTUM= 3.66 +- .08

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.266	3.372	10.611 -0.920
0.373	0.788	0.542 -0.170
0.480	0.413	0.193 -0.092
0.586	0.330	0.083
0.693	0.599	0.111
0.799	0.722	0.123
0.906	0.599	0.111
1.013	0.679	0.118
1.119	0.495	0.101
1.226	0.206	0.066
1.332	0.165	0.059
1.492	0.103	0.033
1.705	0.052	0.021
1.972	0.027	0.014
2.398	0.037	0.012
2.931	0.021	0.009
3.731	0.008	0.004
4.797	0.004	0.003

KATZ 67.....PRL 19 265 HBC

BEAM MOMENTUM= 4.

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.020	208.000	24.000	*†
0.023	158.000	11.000	*†
0.049	127.000	10.000	*†
0.068	111.000	10.000	*†
0.083	77.200	8.500	*†
0.105	56.000	4.900	*†
0.135	38.100	2.300	*†
0.164	28.000	2.500	*†
0.209	18.400	1.700	*†
0.268	7.560	0.950	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

CZYZEWSKI 65.....PL 15 188 HBC

BEAM MOMENTUM= 5.7 +- .057

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.022	148.000	20.000	*
0.036	112.000	11.000	*
0.053	100.000	9.100	*
0.068	82.700	6.900	*
0.083	78.400	6.700	*
0.097	61.700	6.200	*
0.112	57.100	4.900	*
0.127	46.000	5.000	*
0.142	32.300	4.200	*
0.157	33.500	4.300	*
0.172	22.600	3.600	*
0.188	15.600	2.900	*
0.203	16.200	3.000	*
0.218	20.100	3.500	*
0.234	13.300	2.600	*
0.248	8.300	2.200	*
0.263	7.400	2.200	*
0.278	10.300	2.300	*
0.334	3.000	0.700	*
0.424	0.978	0.300	*
0.517	0.251	0.176	*
0.601	0.125	0.125	*
0.695	0.251	0.176	*
0.782	0.368	0.193	*
0.870	0.123	0.123	*
1.005	0.247	0.122	*
1.188	0.123	0.060	*
1.369	0.123	0.060	*
1.544	0.	0.100	*

* DATA READ FROM GRAPH

BOECKMANN 66.....NC 42A 954 HBC

BEAM MOMENTUM= 5.8

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.539	0.610	0.136	+- 0.023	$
0.610	0.684	0.190	0.027	$
0.684	0.762	0.187	0.024	$
0.762	0.843	0.167	0.023	$
0.843	0.927	0.154	0.018	$
0.927	1.014	0.155	0.019	$
1.014	1.104	0.095	0.012	$
1.104	1.196	0.073	0.010	$
1.196	1.291	0.068	0.008	$
1.291	1.388	0.032	0.005	$
1.388	1.588	0.023	0.003	$
1.588	1.794	0.015	0.002	$
1.794	2.006	0.009	0.002	$
2.006	2.222	0.009	0.002	$
2.222	2.440	0.009	0.002	$
2.440	2.660	0.005	0.002	$
2.660	2.991	0.005	0.002	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

OWEN 69.....PR 181 1794 SPRK

BEAM MOMENTUM= 5.9

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
2.421	2.760	0.004	0.001	$
2.760	3.099	0.005	0.001	$
3.099	3.548	0.001	0.000	$
3.548	3.988	0.000	0.000	$
3.988	4.413	0.000	0.000	$
4.413	5.017	0.000	0.000	$
5.017	5.485	0.000	0.000	$
5.485	6.001	0.000	0.000	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

OWEN 69.....PR 181 1794 SPRK

BEAM MOMENTUM= 6.9 +- .034

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.050	0.100	100.500	7.300	†
0.100	0.200	35.000	3.000	†
0.200	0.300	5.900	0.490	†
0.300	0.400	1.600	0.260	†
0.400	0.500	0.330	0.120	†
0.500	0.700	0.021	0.021	†
0.700	0.900	0.100	0.046	†
0.900	1.100	0.042	0.030	†
1.100	1.700	0.007	0.007	†

† SEE DATA LISTING FOR ADDITIONAL COMMENTS

KITAGAKI 68.....PRL 21 175 HBC

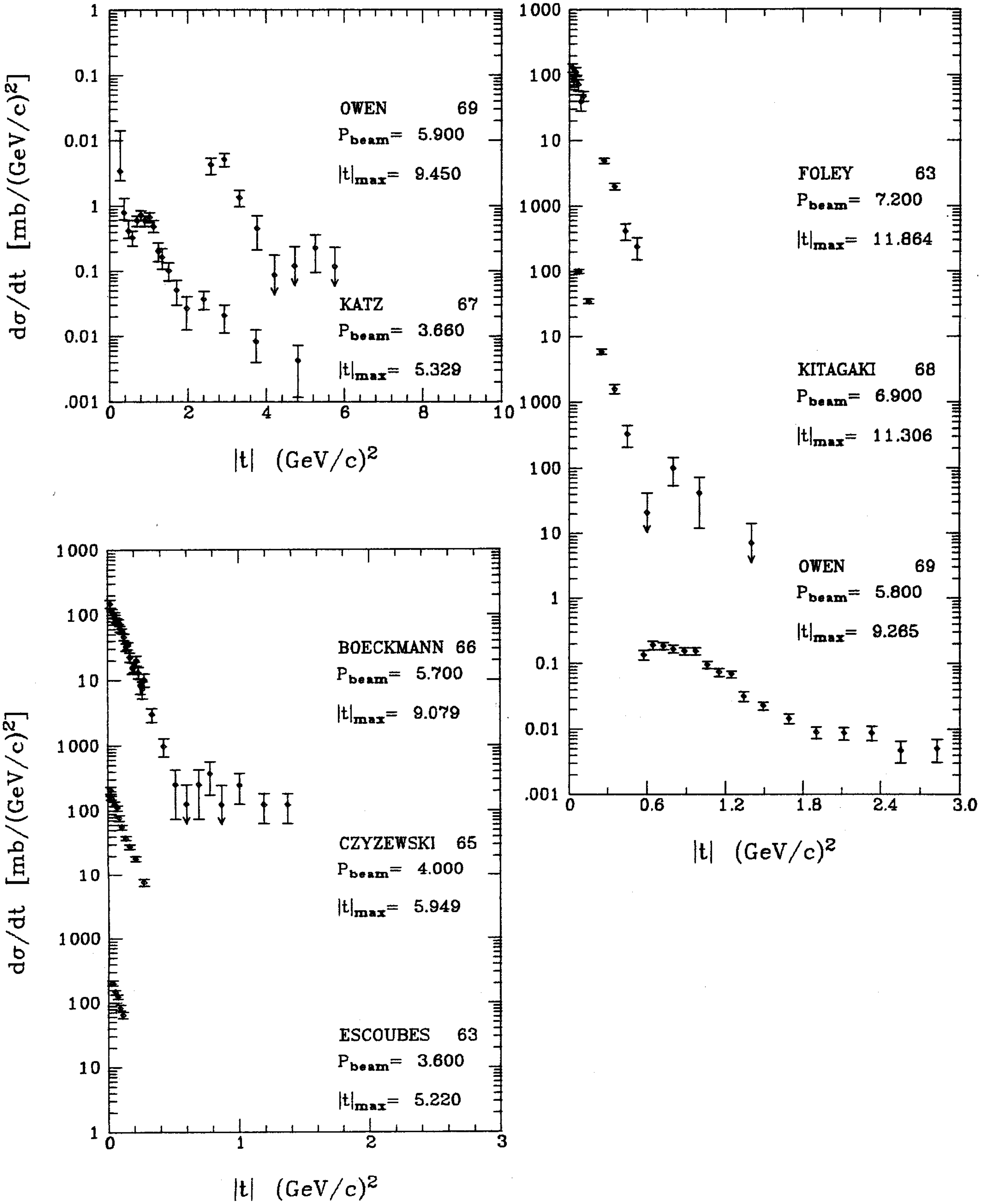
BEAM MOMENTUM= 7.2

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.026	131.000	20.000	$
0.037	84.000	18.000	$
0.052	113.000	18.000	$
0.070	72.000	14.000	$
0.089	39.000	11.100	$
0.109	47.900	8.200	$
0.272	4.950	0.440	$
0.349	2.010	0.250	$
0.434	0.420	0.120	$
0.524	0.240	0.090	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

FOLEY 63.....PRL 11 503 CNTR

$\bar{p}p$ elastic $d\sigma/dt$



$\bar{p}p$ elastic $d\sigma/dt$

BEAM MOMENTUM= 8. +- .024

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.046	93.300	+-0.428	†
0.053	84.420	0.407	†
0.060	76.990	0.389	†
0.068	70.800	0.373	†
0.076	63.580	0.354	†
0.085	56.900	0.335	†
0.094	50.950	0.318	†
0.104	44.840	0.298	†
0.114	39.190	0.280	†
0.125	33.900	0.260	†
0.136	29.150	0.329	†
0.148	25.920	0.311	†
0.160	21.770	0.285	†
0.172	18.300	0.262	†
0.186	15.710	0.243	†
0.199	12.880	0.221	†
0.213	10.800	0.203	†
0.222	11.090	0.289	†
0.237	9.244	0.264	†
0.254	7.222	0.235	†
0.270	5.944	0.214	†
0.287	4.711	0.191	†
0.305	3.544	0.167	†
0.323	2.809	0.149	†
0.342	2.153	0.132	†
0.361	1.710	0.119	†
0.381	1.425	0.109	†
0.402	0.981	0.092	†
0.423	0.760	0.081	†
0.444	0.572	0.072	†
0.555	0.202	0.038	†
0.581	0.154	0.032	†
0.622	0.095	0.022	†
0.678	0.090	0.021	†
0.736	0.095	0.021	†
0.797	0.099	0.020	†
0.860	0.096	0.020	†

† SEE DATA LISTING FOR ADDITIONAL COMMENTS

BIRNBAUM 69.....PRL 23 663 CNTR+SPRK

BEAM MOMENTUM= 8.9

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.024	127.000	6.300	$
0.038	114.000	5.200	$
0.058	83.900	3.900	$
0.082	57.000	3.100	$
0.110	43.900	2.800	$
0.138	32.600	2.200	$
0.172	20.500	1.600	$
0.264	5.230	0.420	$
0.338	2.480	0.240	$
0.422	0.770	0.130	$
0.508	0.282	0.077	$
0.602	0.091	0.045	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

FOLEY 63.....PRL 11 503 CNTR

BEAM MOMENTUM= 9.71

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.690	0.829	0.094	0.028	$
0.829	0.979	0.050	0.010	$
0.979	1.139	0.028	0.007	$
1.139	1.487	0.006	0.002	$
1.487	1.868	0.003	0.001	$
1.868	2.277	0.001	0.001	$
2.277	2.709	0.001	0.001	$
2.709	3.388	0.001	0.000	$
3.388	4.804	0.000	0.000	$
4.804	6.215	0.000	0.000	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

OWEN 69.....PR 181 1794 SPRK

BEAM MOMENTUM= 10.

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.030	122.000	+-31.000	$
0.049	75.000	23.000	$
0.074	82.000	18.000	$
0.105	56.000	15.000	$
0.140	27.000	12.000	$
0.176	19.000	10.000	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

FOLEY 63.....PRL 11 503 CNTR

BEAM MOMENTUM= 11.8

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.199	10.610	0.870	$
0.261	4.440	0.490	$
0.331	1.788	0.278	$
0.408	0.866	0.195	$
0.490	0.349	0.123	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

FOLEY 65.....PRL 15 45 CNTR

BEAM MOMENTUM= 12.

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.043	80.900	4.200	$
0.070	62.100	3.300	$
0.105	38.100	2.300	$
0.149	24.900	1.800	$
0.198	12.200	1.300	$
0.249	7.150	0.950	$
0.268	4.090	0.440	$
0.343	1.960	0.270	$
0.428	0.583	0.132	$
0.517	0.190	0.091	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

FOLEY 63.....PRL 11 503 CNTR

BEAM MOMENTUM= 15.91

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.219	6.140	0.700	$
0.287	3.700	0.480	$
0.364	1.893	0.307	$
0.450	0.727	0.183	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

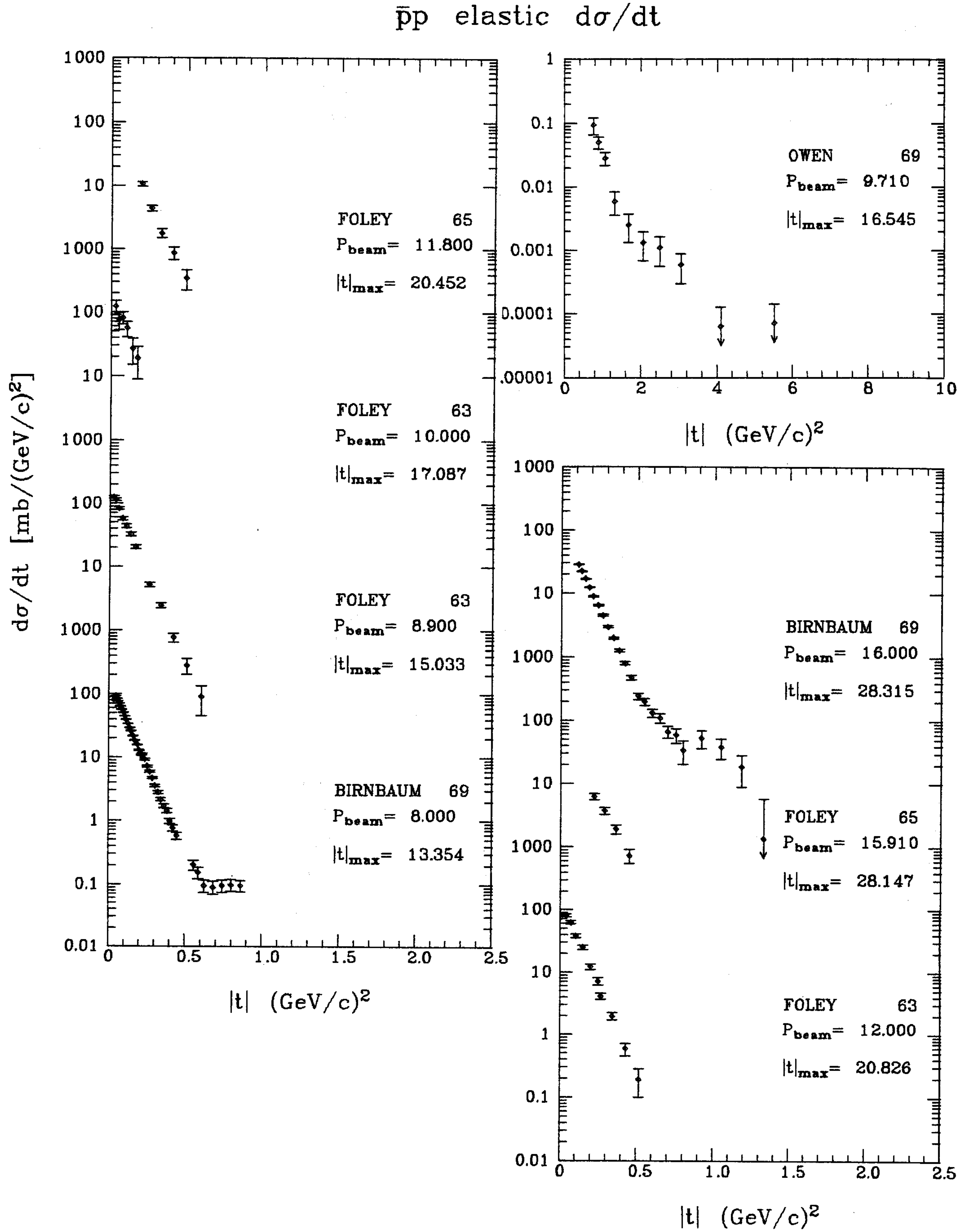
FOLEY 65.....PRL 15 45 CNTR

BEAM MOMENTUM= 16. +- .048

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.111	28.510	0.302	†
0.133	22.280	0.267	†
0.157	16.890	0.233	†
0.182	12.410	0.201	†
0.210	8.860	0.170	†
0.240	6.407	0.145	†
0.271	4.503	0.122	†
0.305	2.979	0.100	†
0.341	1.975	0.082	†
0.378	1.267	0.059	†
0.417	0.803	0.048	†
0.459	0.475	0.037	†
0.502	0.244	0.028	†
0.548	0.201	0.025	†
0.595	0.132	0.020	†
0.644	0.109	0.019	†
0.695	0.067	0.014	†
0.748	0.058	0.015	†
0.797	0.034	0.014	†
0.918	0.053	0.016	†
1.047	0.038	0.014	†
1.185	0.019	0.010	†
1.331	0.001	0.004	†

† SEE DATA LISTING FOR ADDITIONAL COMMENTS

BIRNBAUM 69.....PRL 23 663 CNTR+SPRK

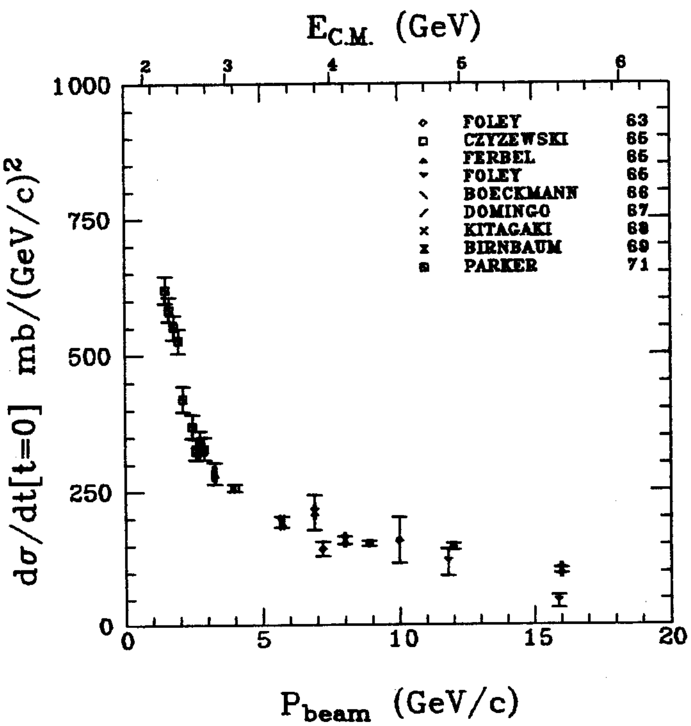

p̄p elastic dσ/dt
dσ/dt [mb/(GeV/c)²]
FOLEY 65
Pbeam= 11.800
|t|max= 20.452
FOLEY 63
Pbeam= 10.000
|t|max= 17.087
FOLEY 63
Pbeam= 8.900
|t|max= 15.033
BIRNBAUM 69
Pbeam= 8.000
|t|max= 13.354
|t| (GeV/c)²
OWEN 69
Pbeam= 9.710
|t|max= 16.545
|t| (GeV/c)²
BIRNBAUM 69
Pbeam= 16.000
|t|max= 28.315
FOLEY 65
Pbeam= 15.910
|t|max= 28.147
FOLEY 63
Pbeam= 12.000
|t|max= 20.826
|t| (GeV/c)²

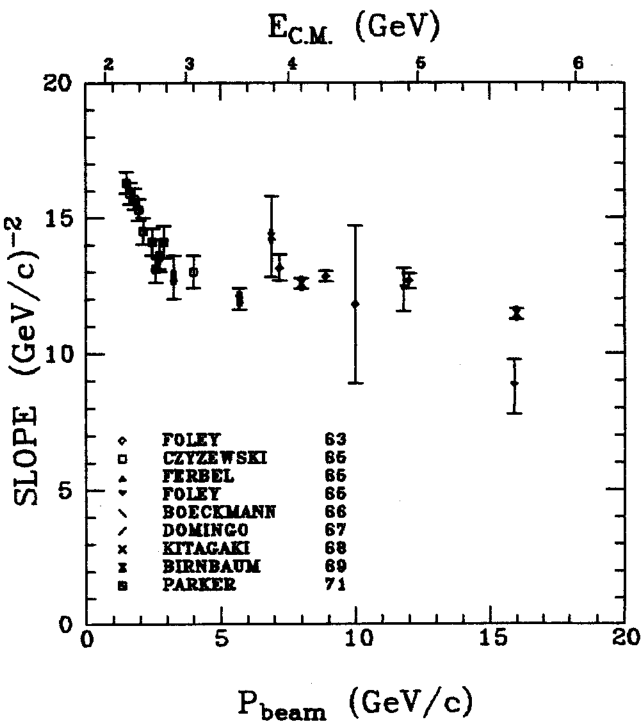
Authors' fits to the $\bar{p}p$ elastic scattering data

P_{beam} (GeV/c)	$\lvert t \rvert$ $(GeV/c)^2$ min	max	FORMULA		$d\sigma/dt[t=0]$ $mb/(GeV/c)^2$			SLOPE $(GeV/c)^{-2}$		References			
1.510	0.03	0.20	Y = B*EXP(A*T)	B	= 620.00	+-25.00	A	= 16.30	+-0.40	PARKER	71	NP B32	29
1.650	0.03	0.20	Y = B*EXP(A*T)	B	584.00	23.00	A	15.90	0.40	PARKER	71	NP B32	29
1.800	0.03	0.20	Y = B*EXP(A*T)	B	551.00	22.00	A	15.70	0.40	PARKER	71	NP B32	29
1.950	0.03	0.20	Y = B*EXP(A*T)	B	526.00	23.00	A	15.30	0.40	PARKER	71	NP B32	29
2.150	0.03	0.20	Y = B*EXP(A*T)	B	420.00	24.00	A	14.50	0.50	PARKER	71	NP B32	29
2.450	0.03	0.20	Y = B*EXP(A*T)	B	370.00	21.00	A	14.10	0.50	PARKER	71	NP B32	29
2.600	0.03	0.20	Y = B*EXP(A*T)	B	328.00	19.00	A	13.10	0.50	PARKER	71	NP B32	29
2.690	0.02	0.25	Y = A*EXP(B*T)	A	325.00	6.00	B	13.30	0.20	DOMINGO	67	PL 24B	642
2.750	0.03	0.20	Y = B*EXP(A*T)	B	340.00	21.00	A	13.60	0.60	PARKER	71	NP B32	29
2.900	0.03	0.20	Y = B*EXP(A*T)	B	329.00	21.00	A	14.10	0.60	PARKER	71	NP B32	29
3.280	0.	0.25	Y = A*EXP(B*T)	A	283.00	20.00	B	12.80	0.80	FERBEL	65	PR 137B	1250
4.000	0.02	0.27	Y = B*EXP(A*T)	B	257.00	7.10	A	13.00	0.60	CZYZEWSKI	65	PL 15	188
5.700	0.02	0.28	Y = C*EXP(A*T)	C	194.00	10.00	A	12.00	0.40	BOECKMANN	66	NC 42A	954
6.900	0.05	0.40	Y = A*EXP(B*T)	A	[211.00	32.00]	B	14.30	1.50	KITAGAKI	68	PRL 21	175
7.200	0.03	0.60	Y = A*EXP(B*T)	A	[143.00	13.00]	B	13.15	0.47	FOLEY	63	PRL 11	503
8.000	0.05	0.45	Y = A*EXP(B*T)	A	159.40	7.00	B	12.57	0.20	BIRNBAUM	69	PRL 23	663
8.900	0.03	0.60	Y = A*EXP(B*T)	A	[154.00	5.00]	B	12.84	0.21	FOLEY	63	PRL 11	503
10.000	0.03	0.60	Y = A*EXP(B*T)	A	[159.00	42.00]	B	11.80	2.90	FOLEY	63	PRL 11	503
11.800	0.20	0.50	Y = A*EXP(B*T)	A	[119.00	25.00]	B	12.33	0.79	FOLEY	65	PRL 15	45
12.000	0.03	0.60	Y = A*EXP(B*T)	A	[147.00	6.00]	B	12.66	0.29	FOLEY	63	PRL 11	503
15.910	0.20	0.45	Y = A*EXP(B*T)	A	[44.00	13.00]	B	8.78	1.00	FOLEY	65	PRL 15	45
16.000	0.11	0.45	Y = A*EXP(B*T)	A	103.50	5.00	B	11.44	0.20†	BIRNBAUM	69	PRL 23	663

† SEE DATA LISTING FOR ADDITIONAL COMMENTS

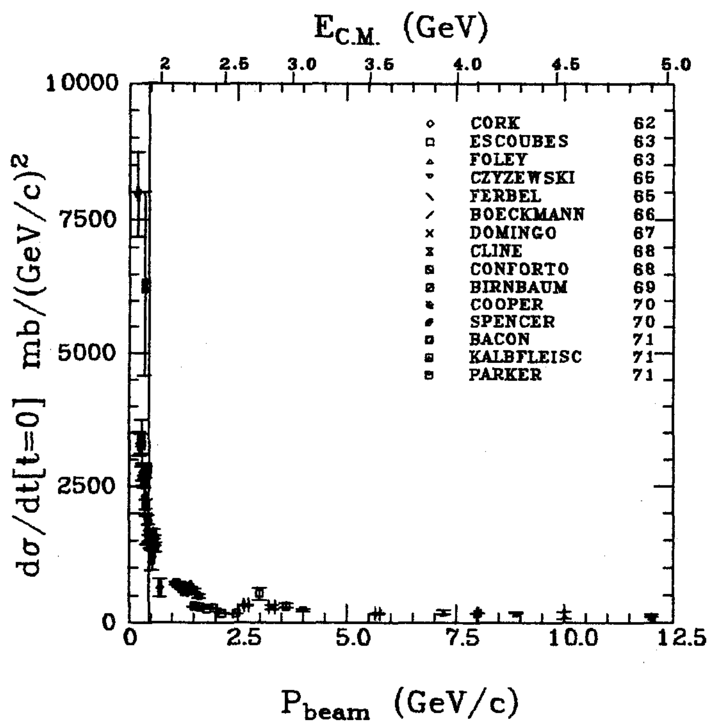
[] CALCULATED BY US FROM DATA IN THIS ARTICLE

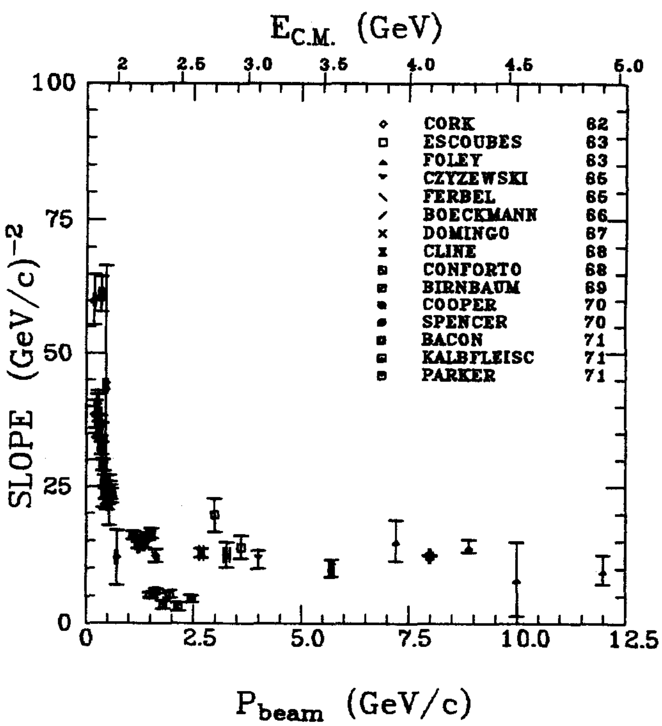




Our fits to the $\bar{p}p$ elastic scattering data

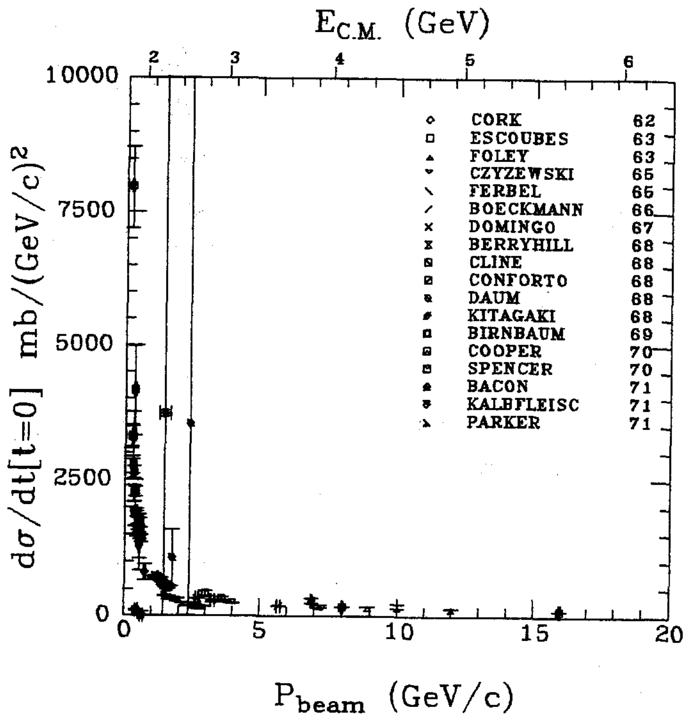
P_{beam} (GeV/c)	|t| (GeV/c)² min	|t| max	FORMULA		dσ/dt[t=0] mb/(GeV/c)²			SLOPE (GeV/c)⁻²		References		
0.195	0.00	0.10	Y = A*EXP(B*T)	A =	7966.43	+- 774.80	B =	60.10	+- 4.82	SPENCER	70	NP B19 501
0.239	0.00	0.10	Y = A*EXP(B*T)	A	3293.07	229.59	B	38.59	2.60	SPENCER	70	NP B19 501
0.277	0.00	0.10	Y = A*EXP(B*T)	A	3289.87	196.29	B	40.44	1.90	SPENCER	70	NP B19 501
0.294	0.00	0.10	Y = A*EXP(B*T)	A	3311.94	442.66	B	38.51	4.42	CORK	62	NC 25 497
0.310	0.00	0.10	Y = A*EXP(B*T)	A	2770.98	166.96	B	35.58	1.57	SPENCER	70	NP B19 501
0.341	0.00	0.10	Y = A*EXP(B*T)	A	2701.03	208.48	B	36.43	1.93	SPENCER	70	NP B19 501
0.349	0.00	0.10	Y = A*EXP(B*T)	A	2582.01	114.70	B	32.20	1.18	CONFORTO	68	NC 54A 441
0.350	0.00	0.10	Y = A*EXP(B*T)	A	6282.65	1724.16	B	61.21	3.40	CLINE	68	PRL 21 1268
0.369	0.00	0.10	Y = A*EXP(B*T)	A	2311.68	331.43	B	33.48	3.45	SPENCER	70	NP B19 501
0.405	0.00	0.10	Y = A*EXP(B*T)	A	2154.73	95.34	B	29.01	1.09	CONFORTO	68	NC 54A 441
0.421	0.00	0.10	Y = A*EXP(B*T)	A	1683.28	262.29	B	24.60	3.41	CORK	62	NC 25 497
0.444	0.00	0.10	Y = A*EXP(B*T)	A	1866.55	83.91	B	26.02	1.07	CONFORTO	68	NC 54A 441
0.450	0.00	0.10	Y = A*EXP(B*T)	A	2795.18	22579.06	B	43.88	22.85	CLINE	68	PRL 21 1268
0.467	0.00	0.10	Y = A*EXP(B*T)	A	1527.25	68.18	B	23.61	1.02	CONFORTO	68	NC 54A 441
0.499	0.00	0.10	Y = A*EXP(B*T)	A	1427.92	73.97	B	21.78	1.14	CONFORTO	68	NC 54A 441
0.525	0.00	0.10	Y = A*EXP(B*T)	A	1384.67	70.65	B	22.70	1.12	CONFORTO	68	NC 54A 441
0.541	0.00	0.10	Y = A*EXP(B*T)	A	1186.57	234.43	B	22.44	4.67	CORK	62	NC 25 497
0.553	0.00	0.10	Y = A*EXP(B*T)	A	1605.77	96.78	B	24.56	1.36	CONFORTO	68	NC 54A 441
0.577	0.00	0.10	Y = A*EXP(B*T)	A	1495.21	87.61	B	23.94	1.31	CONFORTO	68	NC 54A 441
0.599	0.00	0.10	Y = A*EXP(B*T)	A	1362.88	80.18	B	23.30	1.32	CONFORTO	68	NC 54A 441
0.721	0.00	0.10	Y = A*EXP(B*T)	A	634.94	161.38	B	12.02	4.96	CORK	62	NC 25 497
1.110	0.00	0.10	Y = A*EXP(B*T)	A	708.75	27.55	B	16.13	0.75	KALBFLEISC	71	NP B30 466
1.230	0.00	0.10	Y = A*EXP(B*T)	A	620.80	24.91	B	14.21	0.61	BACON	71	NP B32 66
1.300	0.00	0.10	Y = A*EXP(B*T)	A	613.32	27.05	B	15.29	0.68	BACON	71	NP B32 66
1.330	0.00	0.10	Y = A*EXP(B*T)	A	655.99	23.13	B	15.42	0.61	KALBFLEISC	71	NP B30 466
1.360	0.00	0.10	Y = A*EXP(B*T)	A	593.83	27.10	B	14.45	0.69	BACON	71	NP B32 66
1.430	0.00	0.10	Y = A*EXP(B*T)	A	626.91	26.88	B	15.78	0.66	BACON	71	NP B32 66
1.510	0.00	0.10	Y = A*EXP(B*T)	A	294.31	8.21	B	5.18	0.55	PARKER	71	NP B32 29
1.520	0.00	0.10	Y = A*EXP(B*T)	A	586.84	32.70	B	16.40	0.96	KALBFLEISC	71	NP B30 466
1.620	0.00	0.10	Y = A*EXP(B*T)	A	480.26	33.18	B	12.35	1.12	COOPER	70	NP B16 155
1.650	0.00	0.10	Y = A*EXP(B*T)	A	287.91	7.23	B	5.91	0.45	PARKER	71	NP B32 29
1.800	0.00	0.10	Y = A*EXP(B*T)	A	254.42	8.50	B	3.38	0.76	PARKER	71	NP B32 29
1.950	0.00	0.10	Y = A*EXP(B*T)	A	260.19	8.98	B	5.36	0.70	PARKER	71	NP B32 29
2.150	0.00	0.10	Y = A*EXP(B*T)	A	174.98	7.54	B	3.09	0.77	PARKER	71	NP B32 29
2.450	0.00	0.10	Y = A*EXP(B*T)	A	159.75	6.69	B	4.47	0.62	PARKER	71	NP B32 29
2.690	0.00	0.10	Y = A*EXP(B*T)	A	317.56	15.57	B	12.86	0.78	DOMINGO	67	PL 24B 642
3.000	0.00	0.10	Y = A*EXP(B*T)	A	526.25	115.33	B	19.76	3.06	ESCOUBES	63	PL 5 132
3.280	0.00	0.10	Y = A*EXP(B*T)	A	280.76	42.06	B	12.46	2.36	FERBEL	65	PR 137B1250
3.600	0.00	0.10	Y = A*EXP(B*T)	A	308.02	41.65	B	13.89	2.06	ESCOUBES	63	PL 5 132
4.000	0.00	0.10	Y = A*EXP(B*T)	A	223.73	19.63	B	11.65	1.65	CZYZEWSKI	65	PL 15 188
5.700	0.00	0.10	Y = A*EXP(B*T)	A	170.49	19.56	B	10.14	1.60	BOECKMANN	66	NC 42A 954
7.200	0.00	0.10	Y = A*EXP(B*T)	A	195.99	43.45	B	15.10	3.78	FOLEY	63	PRL 11 503
8.000	0.00	0.10	Y = A*EXP(B*T)	A	163.77	1.40	B	12.41	0.13	BIRNBAUM	69	PRL 23 663
8.900	0.00	0.10	Y = A*EXP(B*T)	A	186.77	11.78	B	14.12	1.15	FOLEY	63	PRL 11 503
10.000	0.00	0.10	Y = A*EXP(B*T)	A	141.39	66.52	B	8.12	6.79	FOLEY	63	PRL 11 503
12.000	0.00	0.10	Y = A*EXP(B*T)	A	123.27	20.66	B	9.80	2.68	FOLEY	63	PRL 11 503

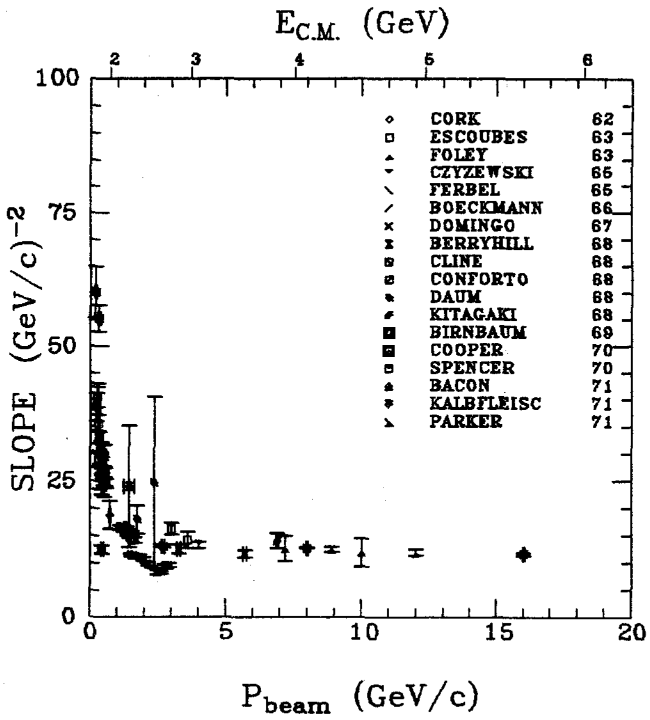




Our fits to the $\bar{p}p$ elastic scattering data

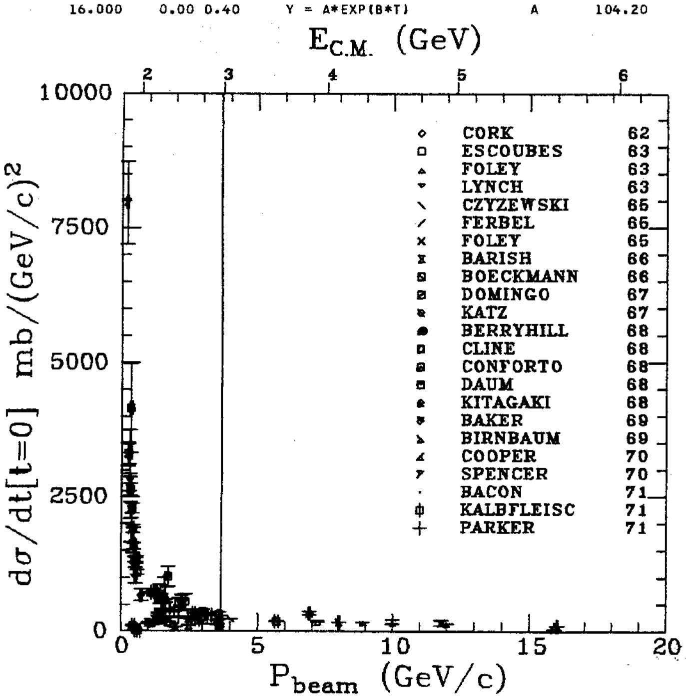
P_{beam} (GeV/c)	|t| (GeV/c)^2 min	|t| (GeV/c)^2 max	FORMULA		dσ/dt[t=0] mb/(GeV/c)^2			SLOPE (GeV/c)$^{-2}$		References		
0.195	0.00	0.20	Y = A*EXP(B*T)	A =	7966.43	+-774.80	B =	60.10	+-4.82	SPENCER	70	NP B19 501
0.239	0.00	0.20	Y = A*EXP(B*T)	A	3293.07	229.59	B	38.59	2.60	SPENCER	70	NP B19 501
0.277	0.00	0.20	Y = A*EXP(B*T)	A	3289.87	196.29	B	40.44	1.90	SPENCER	70	NP B19 501
0.294	0.00	0.20	Y = A*EXP(B*T)	A	3311.94	442.66	B	38.51	4.42	CORK	62	NC 25 497
0.310	0.00	0.20	Y = A*EXP(B*T)	A	2770.98	166.96	B	35.58	1.57	SPENCER	70	NP B19 501
0.341	0.00	0.20	Y = A*EXP(B*T)	A	2245.95	158.45	B	28.95	1.51	SPENCER	70	NP B19 501
0.349	0.00	0.20	Y = A*EXP(B*T)	A	2627.31	114.45	B	32.95	1.12	CONFORTO	68	NC 54A 441
0.350	0.00	0.20	Y = A*EXP(B*T)	A	4150.85	829.78	B	55.16	2.44	CLINE	68	PRL 21 1268
0.369	0.00	0.20	Y = A*EXP(B*T)	A	1872.46	226.41	B	25.72	2.20	SPENCER	70	NP B19 501
0.405	0.00	0.20	Y = A*EXP(B*T)	A	2280.08	93.94	B	31.23	0.91	CONFORTO	68	NC 54A 441
0.421	0.00	0.20	Y = A*EXP(B*T)	A	1687.50	232.09	B	24.94	2.47	CORK	62	NC 25 497
0.444	0.00	0.20	Y = A*EXP(B*T)	A	1894.91	72.25	B	26.80	0.70	CONFORTO	68	NC 54A 441
0.450	0.00	0.20	Y = A*EXP(B*T)	A	101.91	11.19	B	12.44	0.75	CLINE	68	PRL 21 1268
0.467	0.00	0.20	Y = A*EXP(B*T)	A	1622.10	62.12	B	25.82	0.68	CONFORTO	68	NC 54A 441
0.499	0.00	0.20	Y = A*EXP(B*T)	A	1567.10	70.69	B	24.88	0.80	CONFORTO	68	NC 54A 441
0.525	0.00	0.20	Y = A*EXP(B*T)	A	1472.51	64.34	B	24.63	0.74	CONFORTO	68	NC 54A 441
0.541	0.00	0.20	Y = A*EXP(B*T)	A	1264.28	208.73	B	24.85	2.78	CORK	62	NC 25 497
0.550	0.00	0.20	Y = A*EXP(B*T)	A	1350.41	523.18	B	29.54	2.07	CLINE	68	PRL 21 1268
0.553	0.00	0.20	Y = A*EXP(B*T)	A	1697.61	88.21	B	26.35	0.94	CONFORTO	68	NC 54A 441
0.577	0.00	0.20	Y = A*EXP(B*T)	A	1541.96	75.88	B	24.91	0.83	CONFORTO	68	NC 54A 441
0.599	0.00	0.20	Y = A*EXP(B*T)	A	1417.13	70.70	B	24.52	0.87	CONFORTO	68	NC 54A 441
0.650	0.00	0.20	Y = A*EXP(B*T)	A	0.87	65.20	B	-13.08	22.68	CLINE	68	PRL 21 1268
0.721	0.00	0.20	Y = A*EXP(B*T)	A	802.03	154.20	B	18.74	2.52	CORK	62	NC 25 497
1.110	0.00	0.20	Y = A*EXP(B*T)	A	714.58	20.46	B	16.43	0.36	KALBFLEISC	71	NP B30 466
1.230	0.00	0.20	Y = A*EXP(B*T)	A	684.84	15.36	B	15.85	0.23	BACON	71	NP B32 66
1.300	0.00	0.20	Y = A*EXP(B*T)	A	642.16	15.97	B	16.11	0.26	BACON	71	NP B32 66
1.330	0.00	0.20	Y = A*EXP(B*T)	A	685.85	16.13	B	16.34	0.28	KALBFLEISC	71	NP B30 466
1.360	0.00	0.20	Y = A*EXP(B*T)	A	624.37	15.84	B	15.32	0.26	BACON	71	NP B32 66
1.430	0.00	0.20	Y = A*EXP(B*T)	A	621.32	14.96	B	15.51	0.25	BACON	71	NP B32 66
1.440	0.00	0.20	Y = A*EXP(B*T)	A	3712.67	25303.15	B	23.98	11.15	BERRYHILL	68	PRL 21 770
1.510	0.00	0.20	Y = A*EXP(B*T)	A	372.37	7.93	B	11.42	0.28	PARKER	71	NP B32 29
1.520	0.00	0.20	Y = A*EXP(B*T)	A	558.16	20.19	B	15.42	0.41	KALBFLEISC	71	NP B30 466
1.620	0.00	0.20	Y = A*EXP(B*T)	A	522.94	23.69	B	14.14	0.45	COOPER	70	NP B16 155
1.650	0.00	0.20	Y = A*EXP(B*T)	A	363.25	7.00	B	11.51	0.23	PARKER	71	NP B32 29
1.730	0.00	0.20	Y = A*EXP(B*T)	A	1066.72	520.85	B	17.94	2.55	DAUM	68	NP B6 617
1.800	0.00	0.20	Y = A*EXP(B*T)	A	341.09	7.53	B	11.32	0.26	PARKER	71	NP B32 29
1.950	0.00	0.20	Y = A*EXP(B*T)	A	319.18	7.86	B	10.63	0.31	PARKER	71	NP B32 29
2.150	0.00	0.20	Y = A*EXP(B*T)	A	233.90	7.33	B	9.83	0.36	PARKER	71	NP B32 29
2.370	0.00	0.20	Y = A*EXP(B*T)	A	3528.24	41690.04	B	24.74	15.79	DAUM	68	NP B6 617
2.450	0.00	0.20	Y = A*EXP(B*T)	A	192.32	6.60	B	8.31	0.39	PARKER	71	NP B32 29
2.600	0.00	0.20	Y = A*EXP(B*T)	A	183.50	6.29	B	8.43	0.37	PARKER	71	NP B32 29
2.690	0.00	0.20	Y = A*EXP(B*T)	A	320.11	10.24	B	13.07	0.32	DOMINGO	67	PL 24B 642
2.750	0.00	0.20	Y = A*EXP(B*T)	A	191.11	6.94	B	9.20	0.39	PARKER	71	NP B32 29
2.900	0.00	0.20	Y = A*EXP(B*T)	A	179.97	6.73	B	9.53	0.39	PARKER	71	NP B32 29
3.000	0.00	0.20	Y = A*EXP(B*T)	A	420.24	47.58	B	16.23	1.08	ESCOUBES	63	PL 5 132
3.280	0.00	0.20	Y = A*EXP(B*T)	A	280.35	22.17	B	12.49	0.78	FERBEL	65	PR 137B1250
3.600	0.00	0.20	Y = A*EXP(B*T)	A	311.59	35.29	B	14.13	1.54	ESCOUBES	63	PL 5 132
4.000	0.00	0.20	Y = A*EXP(B*T)	A	237.40	13.65	B	13.30	0.57	CZYZEWSKI	65	PL 15 188
5.700	0.00	0.20	Y = A*EXP(B*T)	A	190.01	13.52	B	11.70	0.67	BOECKMANN	66	NC 42A 954
6.900	0.00	0.20	Y = A*EXP(B*T)	A	288.58	50.94	B	14.07	1.44	KITAGAKI	68	PRL 21 175
7.200	0.00	0.20	Y = A*EXP(B*T)	A	176.70	29.79	B	12.63	2.31	FOLEY	63	PRL 11 503
8.000	0.00	0.20	Y = A*EXP(B*T)	A	167.26	0.74	B	12.74	0.05	BIRNBAUM	69	PRL 23 663
8.900	0.00	0.20	Y = A*EXP(B*T)	A	173.69	6.87	B	12.49	0.45	FOLEY	63	PRL 11 503
10.000	0.00	0.20	Y = A*EXP(B*T)	A	174.20	44.44	B	11.97	2.56	FOLEY	63	PRL 11 503
12.000	0.00	0.20	Y = A*EXP(B*T)	A	137.92	8.48	B	11.91	0.58	FOLEY	63	PRL 11 503
16.000	0.00	0.20	Y = A*EXP(B*T)	A	103.81	3.67	B	11.62	0.25	BIRNBAUM	69	PRL 23 663

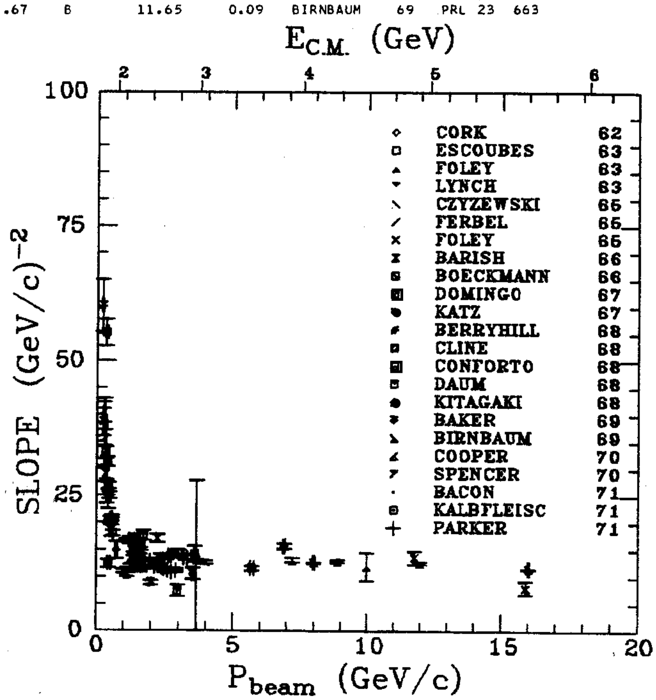




Our fits to the $\bar{p}p$ elastic scattering data

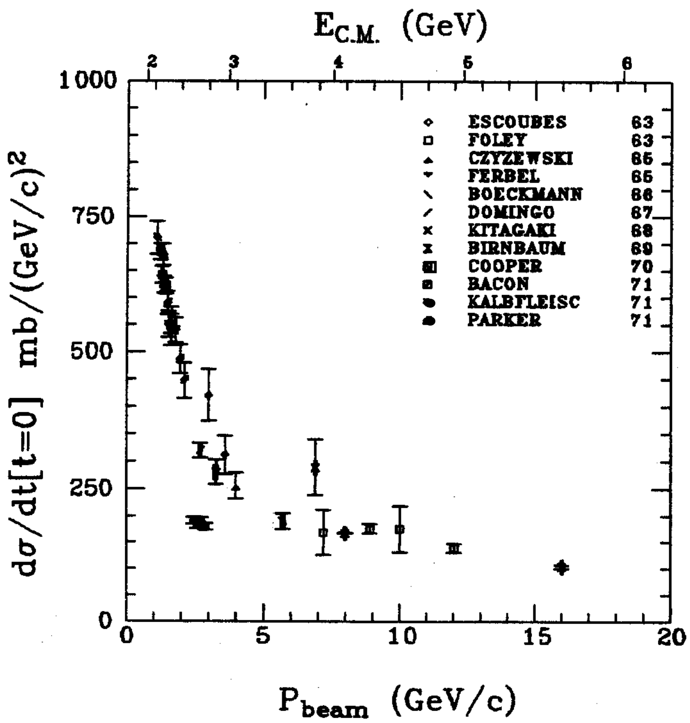
P_{beam} (GeV/c)	$\lvert t \rvert$ $(GeV/c)^2$ min	max	FORMULA		$d\sigma/dt[t=0]$ $mb/(GeV/c)^2$				SLOPE $(GeV/c)^{-2}$		References		
0.195	0.00	0.40	Y = A*EXP(B*T)	A =	7966.43	+-774.80	B	=	60.10	+-4.82	SPENCER	70	NP B19 501
0.239	0.00	0.40	Y = A*EXP(B*T)	A	3293.07	229.59	B		38.59	2.60	SPENCER	70	NP B19 501
0.277	0.00	0.40	Y = A*EXP(B*T)	A	3289.87	196.29	B		40.44	1.90	SPENCER	70	NP B19 501
0.294	0.00	0.40	Y = A*EXP(B*T)	A	3311.94	442.66	B		38.51	4.42	CORK	62	NC 25 497
0.310	0.00	0.40	Y = A*EXP(B*T)	A	2770.98	166.96	B		35.58	1.57	SPENCER	70	NP B19 501
0.341	0.00	0.40	Y = A*EXP(B*T)	A	2245.95	158.45	B		28.95	1.51	SPENCER	70	NP B19 501
0.349	0.00	0.40	Y = A*EXP(B*T)	A	2627.31	114.45	B		32.95	1.12	CONFORTO	68	NC 54A 441
0.350	0.00	0.40	Y = A*EXP(B*T)	A	4150.85	829.78	B		55.16	2.44	CLINE	68	PRL 21 1268
0.369	0.00	0.40	Y = A*EXP(B*T)	A	1872.46	226.41	B		25.72	2.20	SPENCER	70	NP B19 501
0.405	0.00	0.40	Y = A*EXP(B*T)	A	2280.08	93.94	B		31.23	0.91	CONFORTO	68	NC 54A 441
0.421	0.00	0.40	Y = A*EXP(B*T)	A	1687.50	232.09	B		24.94	2.47	CORK	62	NC 25 497
0.444	0.00	0.40	Y = A*EXP(B*T)	A	1894.91	72.25	B		26.80	0.70	CONFORTO	68	NC 54A 441
0.450	0.00	0.40	Y = A*EXP(B*T)	A	101.91	11.19	B		12.44	0.75	CLINE	68	PRL 21 1268
0.467	0.00	0.40	Y = A*EXP(B*T)	A	1579.80	59.33	B		25.04	0.65	CONFORTO	68	NC 54A 441
0.499	0.00	0.40	Y = A*EXP(B*T)	A	1333.86	54.18	B		20.45	0.60	CONFORTO	68	NC 54A 441
0.525	0.00	0.40	Y = A*EXP(B*T)	A	1233.88	48.20	B		20.00	0.54	CONFORTO	68	NC 54A 441
0.541	0.00	0.40	Y = A*EXP(B*T)	A	1036.03	149.85	B		19.19	1.88	CORK	62	NC 25 497
0.550	0.00	0.40	Y = A*EXP(B*T)	A	9.49	1.07	B		-2.08	0.51	CLINE	68	PRL 21 1268
0.553	0.00	0.40	Y = A*EXP(B*T)	A	1345.69	59.70	B		20.16	0.62	CONFORTO	68	NC 54A 441
0.577	0.00	0.40	Y = A*EXP(B*T)	A	1308.10	56.56	B		20.67	0.59	CONFORTO	68	NC 54A 441
0.599	0.00	0.40	Y = A*EXP(B*T)	A	1088.58	44.54	B		17.93	0.51	CONFORTO	68	NC 54A 441
0.650	0.00	0.40	Y = A*EXP(B*T)	A	2.67	0.49	B		-4.59	0.55	CLINE	68	PRL 21 1268
0.721	0.00	0.40	Y = A*EXP(B*T)	A	667.26	108.15	B		14.89	1.62	CORK	62	NC 25 497
1.000	0.00	0.40	Y = A*EXP(B*T)	A	151.71	16.98	B		10.96	0.37	BARISH	66	PRL 17 720
1.110	0.00	0.40	Y = A*EXP(B*T)	A	718.14	18.13	B		16.59	0.27	KALBFLEISC	71	NP B30 466
1.125	0.00	0.40	Y = A*EXP(B*T)	A	131.31	12.36	B		10.39	0.33	BARISH	66	PRL 17 720
1.230	0.00	0.40	Y = A*EXP(B*T)	A	728.66	13.34	B		16.66	0.16	BACON	71	NP B32 66
1.250	0.00	0.40	Y = A*EXP(B*T)	A	199.76	17.56	B		11.98	0.29	BARISH	66	PRL 17 720
1.300	0.00	0.40	Y = A*EXP(B*T)	A	662.72	13.36	B		16.54	0.18	BACON	71	NP B32 66
1.330	0.00	0.40	Y = A*EXP(B*T)	A	710.42	14.27	B		16.90	0.20	KALBFLEISC	71	NP B30 466
1.360	0.00	0.40	Y = A*EXP(B*T)	A	669.18	13.79	B		16.24	0.18	BACON	71	NP B32 66
1.375	0.00	0.40	Y = A*EXP(B*T)	A	310.59	29.18	B		14.22	0.33	BARISH	66	PRL 17 720
1.430	0.00	0.40	Y = A*EXP(B*T)	A	654.83	12.85	B		16.19	0.17	BACON	71	NP B32 66
1.430	0.00	0.40	Y = A*EXP(B*T)	A	209.86	76.27	B		11.94	1.08	COOPER	70	NP B16 155
1.440	0.00	0.40	Y = A*EXP(B*T)	A	690.29	171.44	B		15.17	0.89	BERRYHILL	68	PRL 21 770
1.500	0.00	0.40	Y = A*EXP(B*T)	A	202.52	17.74	B		12.77	0.29	BARISH	66	PRL 17 720
1.510	0.00	0.40	Y = A*EXP(B*T)	A	416.14	7.71	B		13.52	0.19	PARKER	71	NP B32 29
1.520	0.00	0.40	Y = A*EXP(B*T)	A	577.34	17.89	B		15.91	0.29	KALBFLEISC	71	NP B30 466
1.610	0.00	0.40	Y = A*EXP(B*T)	A	628.98	364.32	B		16.03	1.82	LYNCH	63	PR 131 1276
1.620	0.00	0.40	Y = A*EXP(B*T)	A	561.17	21.20	B		15.08	0.31	COOPER	70	NP B16 155
1.650	0.00	0.40	Y = A*EXP(B*T)	A	392.45	6.87	B		12.84	0.18	PARKER	71	NP B32 29
1.730	0.00	0.40	Y = A*EXP(B*T)	A	1018.92	186.01	B		17.60	0.90	DAUM	68	NP B6 617
1.750	0.00	0.40	Y = A*EXP(B*T)	A	173.88	13.56	B		11.57	0.26	BARISH	66	PRL 17 720
1.800	0.00	0.40	Y = A*EXP(B*T)	A	381.18	7.40	B		13.12	0.19	PARKER	71	NP B32 29
1.950	0.00	0.40	Y = A*EXP(B*T)	A	361.01	7.62	B		12.84	0.21	PARKER	71	NP B32 29
2.000	0.00	0.40	Y = A*EXP(B*T)	A	78.57	8.26	B		8.93	0.36	BARISH	66	PRL 17 720
2.130	0.00	0.40	Y = A*EXP(B*T)	A	534.62	88.55	B		12.65	0.59	DAUM	68	NP B6 617
2.150	0.00	0.40	Y = A*EXP(B*T)	A	262.70	7.29	B		11.80	0.26	PARKER	71	NP B32 29
2.250	0.00	0.40	Y = A*EXP(B*T)	A	540.82	150.40	B		17.05	0.77	BARISH	66	PRL 17 720
2.370	0.00	0.40	Y = A*EXP(B*T)	A	553.33	154.49	B		13.24	0.94	DAUM	68	NP B6 617
2.450	0.00	0.40	Y = A*EXP(B*T)	A	235.26	6.67	B		11.49	0.25	PARKER	71	NP B32 29
2.500	0.00	0.40	Y = A*EXP(B*T)	A	107.64	12.09	B		11.12	0.34	BARISH	66	PRL 17 720
2.600	0.00	0.40	Y = A*EXP(B*T)	A	219.38	6.30	B		11.11	0.25	PARKER	71	NP B32 29
2.690	0.00	0.40	Y = A*EXP(B*T)	A	336.56	9.33	B		13.78	0.23	DOMINGO	67	PL 24B 642
2.750	0.00	0.40	Y = A*EXP(B*T)	A	213.75	6.81	B		10.91	0.29	PARKER	71	NP B32 29
2.900	0.00	0.40	Y = A*EXP(B*T)	A	200.38	6.68	B		11.18	0.30	PARKER	71	NP B32 29
2.970	0.00	0.40	Y = A*EXP(B*T)	A	254.05	114.16	B		7.41	1.16	DAUM	68	NP B6 617
3.000	0.00	0.40	Y = A*EXP(B*T)	A	361.55	30.66	B		14.32	0.62	ESCOUBES	63	PL 5 132
3.280	0.00	0.40	Y = A*EXP(B*T)	A	304.28	18.94	B		13.58	0.48	FERBEL	65	PR 13781250
3.550	0.00	0.40	Y = A*EXP(B*T)	A	157.16	47.12	B		10.57	1.11	BAKER	69	NP B12 5
3.600	0.00	0.40	Y = A*EXP(B*T)	A	311.59	35.29	B		14.13	1.54	ESCOUBES	63	PL 5 132
3.660	0.00	0.40	Y = A*EXP(B*T)	A	127.89	21872.44	B		13.65	14.22	KATZ	67	PRL 19 265
4.000	0.00	0.40	Y = A*EXP(B*T)	A	227.90	11.13	B		12.67	0.38	CZYZEWSKI	65	PL 15 188
5.700	0.00	0.40	Y = A*EXP(B*T)	A	189.34	10.23	B		11.62	0.40	BOECKMANN	66	NC 42A 954
6.900	0.00	0.40	Y = A*EXP(B*T)	A	333.76	31.72	B		15.71	0.48	KITAGAKI	68	PRL 21 175
7.200	0.00	0.40	Y = A*EXP(B*T)	A	179.43	16.13	B		13.04	0.39	FOLEY	63	PRL 11 503
8.000	0.00	0.40	Y = A*EXP(B*T)	A	165.63	0.62	B		12.61	0.04	BIRNBAUM	69	PRL 23 663
8.900	0.00	0.40	Y = A*EXP(B*T)	A	177.57	5.37	B		12.86	0.24	FOLEY	63	PRL 11 503
10.000	0.00	0.40	Y = A*EXP(B*T)	A	174.20	44.44	B		11.97	2.56	FOLEY	63	PRL 11 503
11.800	0.00	0.40	Y = A*EXP(B*T)	A	157.50	52.97	B		13.59	1.19	FOLEY	65	PRL 15 45
12.000	0.00	0.40	Y = A*EXP(B*T)	A	145.63	6.64	B		12.59	0.31	FOLEY	63	PRL 11 503
15.910	0.00	0.40	Y = A*EXP(B*T)	A	36.27	15.38	B		8.06	1.26	FOLEY	65	PRL 15 45
16.000	0.00	0.40	Y = A*EXP(B*T)	A	104.20	1.67	B		11.65	0.09	BIRNBAUM	69	PRL 23 663

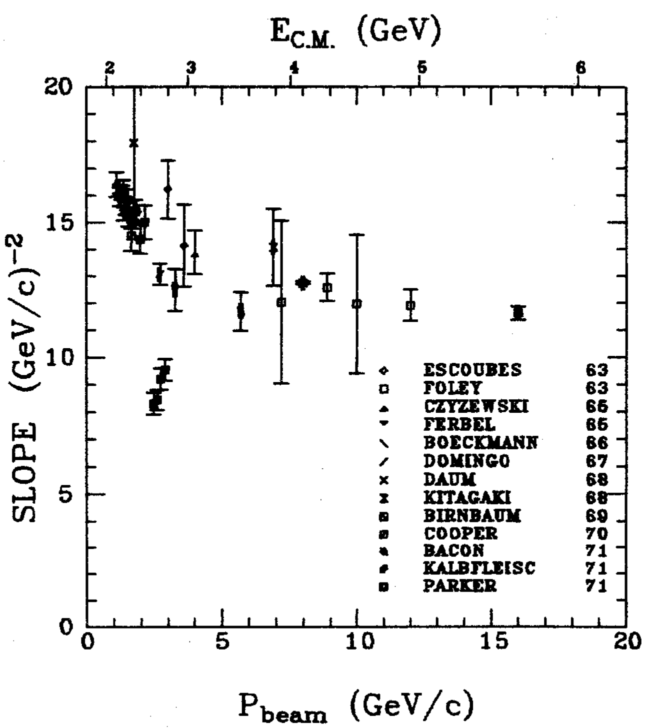




Our fits to the $\bar{p}p$ elastic scattering data

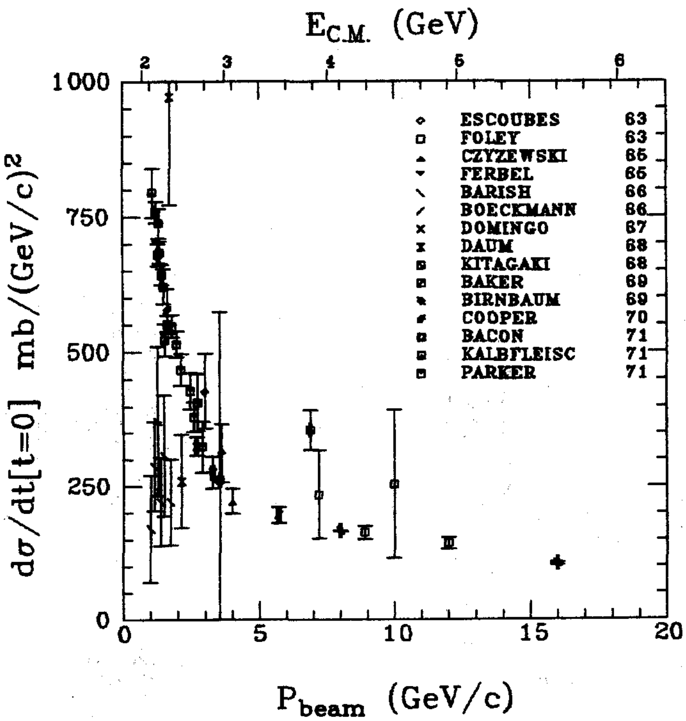
P_{beam} (GeV/c)	|t| (GeV/c)^2 min	|t| (GeV/c)^2 max	FORMULA		dσ/dt[t=0] mb/(GeV/c)^2			SLOPE (GeV/c)$^{-2}$		References		
1.110	0.03	0.20	Y = A*EXP(B*T)	A =	711.20	+- 30.72	B =	16.40	+- 0.46	KALBFLEISC	71	NP B30 466
1.230	0.03	0.20	Y = A*EXP(B*T)	A	684.84	15.36	B	15.85	0.23	BACON	71	NP B32 66
1.300	0.03	0.20	Y = A*EXP(B*T)	A	642.16	15.97	B	16.11	0.26	BACON	71	NP B32 66
1.330	0.03	0.20	Y = A*EXP(B*T)	A	679.89	19.78	B	16.26	0.32	KALBFLEISC	71	NP B30 466
1.360	0.03	0.20	Y = A*EXP(B*T)	A	624.37	15.84	B	15.32	0.26	BACON	71	NP B32 66
1.430	0.03	0.20	Y = A*EXP(B*T)	A	621.32	14.96	B	15.51	0.25	BACON	71	NP B32 66
1.440	0.03	0.20	Y = A*EXP(B*T)	A	3712.67	25303.15	B	23.98	11.15	BERRYHILL	68	PRL 21 770
1.510	0.03	0.20	Y = A*EXP(B*T)	A	590.09	20.94	B	15.85	0.39	PARKER	71	NP B32 29
1.520	0.03	0.20	Y = A*EXP(B*T)	A	550.47	24.38	B	15.30	0.46	KALBFLEISC	71	NP B30 466
1.620	0.03	0.20	Y = A*EXP(B*T)	A	547.04	35.50	B	14.51	0.58	COOPER	70	NP B16 155
1.650	0.03	0.20	Y = A*EXP(B*T)	A	551.92	18.26	B	15.09	0.32	PARKER	71	NP B32 29
1.730	0.03	0.20	Y = A*EXP(B*T)	A	1066.72	520.85	B	17.94	2.55	DAUM	68	NP B6 617
1.800	0.03	0.20	Y = A*EXP(B*T)	A	540.53	23.55	B	15.41	0.41	PARKER	71	NP B32 29
1.950	0.03	0.20	Y = A*EXP(B*T)	A	485.92	26.74	B	14.36	0.52	PARKER	71	NP B32 29
2.150	0.03	0.20	Y = A*EXP(B*T)	A	447.65	33.09	B	15.00	0.62	PARKER	71	NP B32 29
2.370	0.03	0.20	Y = A*EXP(B*T)	A	3528.24	41690.04	B	24.74	15.79	DAUM	68	NP B6 617
2.450	0.03	0.20	Y = A*EXP(B*T)	A	192.32	6.60	B	8.31	0.39	PARKER	71	NP B32 29
2.600	0.03	0.20	Y = A*EXP(B*T)	A	183.50	6.29	B	8.43	0.37	PARKER	71	NP B32 29
2.690	0.03	0.20	Y = A*EXP(B*T)	A	319.94	13.70	B	13.07	0.39	DOMINGO	67	PL 24B 642
2.750	0.03	0.20	Y = A*EXP(B*T)	A	191.11	6.94	B	9.20	0.39	PARKER	71	NP B32 29
2.900	0.03	0.20	Y = A*EXP(B*T)	A	179.97	6.73	B	9.53	0.39	PARKER	71	NP B32 29
3.000	0.03	0.20	Y = A*EXP(B*T)	A	420.24	47.58	B	16.23	1.08	ESCOUBES	63	PL 5 132
3.280	0.03	0.20	Y = A*EXP(B*T)	A	280.35	22.17	B	12.49	0.78	FERBEL	65	PR 137B1250
3.600	0.03	0.20	Y = A*EXP(B*T)	A	311.59	35.29	B	14.13	1.54	ESCOUBES	63	PL 5 132
4.000	0.03	0.20	Y = A*EXP(B*T)	A	255.32	24.40	B	13.88	0.81	CZYZEWSKI	65	PL 15 188
5.700	0.03	0.20	Y = A*EXP(B*T)	A	189.59	15.06	B	11.69	0.73	BOECKMANN	66	NC 42A 954
6.900	0.03	0.20	Y = A*EXP(B*T)	A	288.58	50.94	B	14.07	1.44	KITAGAKI	68	PRL 21 175
7.200	0.03	0.20	Y = A*EXP(B*T)	A	167.90	43.02	B	12.04	3.01	FOLEY	63	PRL 11 503
8.000	0.03	0.20	Y = A*EXP(B*T)	A	167.26	0.74	B	12.74	0.05	BIRNBAUM	69	PRL 23 663
8.900	0.03	0.20	Y = A*EXP(B*T)	A	175.56	8.84	B	12.58	0.53	FOLEY	63	PRL 11 503
10.000	0.03	0.20	Y = A*EXP(B*T)	A	174.20	44.44	B	11.97	2.56	FOLEY	63	PRL 11 503
12.000	0.03	0.20	Y = A*EXP(B*T)	A	137.92	8.48	B	11.91	0.58	FOLEY	63	PRL 11 503
16.000	0.03	0.20	Y = A*EXP(B*T)	A	103.81	3.67	B	11.62	0.25	BIRNBAUM	69	PRL 23 663

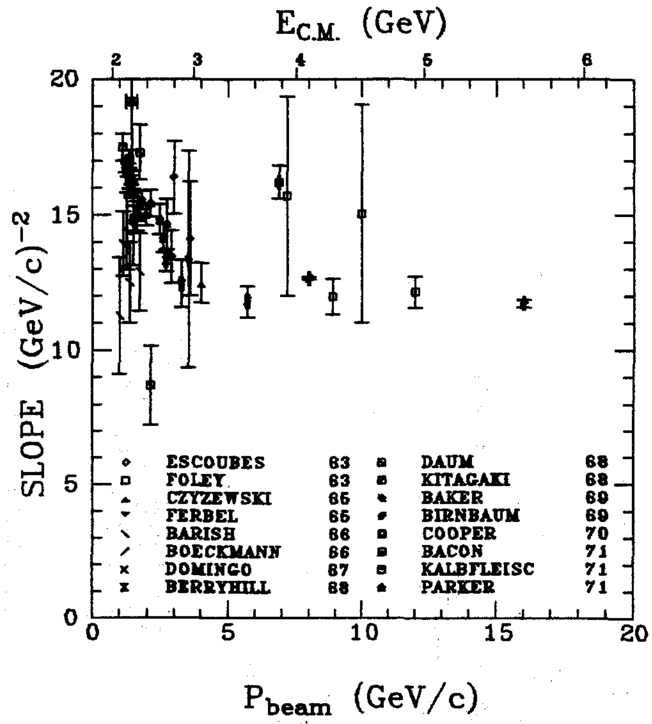




Our fits to the $\bar{p}p$ elastic scattering data

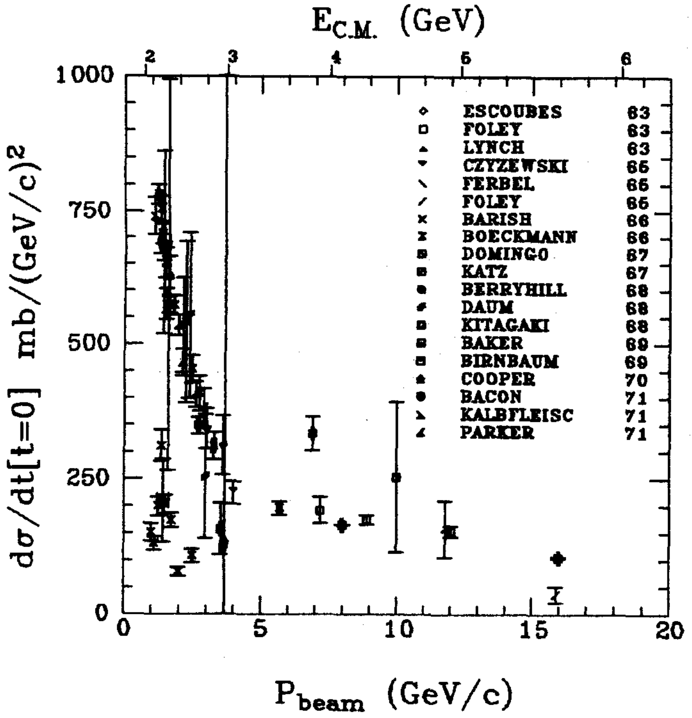
P_{beam} (GeV/c)	|t| $(GeV/c)^2$ min	|t| $(GeV/c)^2$ max	FORMULA		$d\sigma/dt[t=0]$ $mb/(GeV/c)^2$			SLOPE $(GeV/c)^{-2}$		References				
1.000	0.05	0.25	Y = A*EXP(B*T)	A =	170.27	+-99.60	B =	11.27	+-2.16	BARISH	66	PRL	17	720
1.110	0.05	0.25	Y = A*EXP(B*T)	A	794.72	45.76	B	17.50	0.50	KALBFLEISC	71	NP	B30	466
1.125	0.05	0.25	Y = A*EXP(B*T)	A	287.38	84.33	B	13.94	1.19	BARISH	66	PRL	17	720
1.230	0.05	0.25	Y = A*EXP(B*T)	A	758.47	20.40	B	16.80	0.23	BACON	71	NP	B32	66
1.250	0.05	0.25	Y = A*EXP(B*T)	A	370.98	139.07	B	14.40	1.44	BARISH	66	PRL	17	720
1.300	0.05	0.25	Y = A*EXP(B*T)	A	679.59	20.79	B	16.64	0.26	BACON	71	NP	B32	66
1.330	0.05	0.25	Y = A*EXP(B*T)	A	737.51	28.23	B	17.06	0.33	KALBFLEISC	71	NP	B30	466
1.360	0.05	0.25	Y = A*EXP(B*T)	A	683.47	20.73	B	16.22	0.25	BACON	71	NP	B32	66
1.375	0.05	0.25	Y = A*EXP(B*T)	A	220.33	82.59	B	12.50	1.50	BARISH	66	PRL	17	720
1.430	0.05	0.25	Y = A*EXP(B*T)	A	642.33	19.03	B	15.88	0.25	BACON	71	NP	B32	66
1.440	0.05	0.25	Y = A*EXP(B*T)	A	1546.47	1625.13	B	19.17	3.48	BERRYHILL	68	PRL	21	770
1.500	0.05	0.25	Y = A*EXP(B*T)	A	307.46	114.73	B	14.56	1.42	BARISH	66	PRL	17	720
1.510	0.05	0.25	Y = A*EXP(B*T)	A	620.65	32.49	B	16.21	0.41	PARKER	71	NP	B32	29
1.520	0.05	0.25	Y = A*EXP(B*T)	A	521.61	30.04	B	14.87	0.47	KALBFLEISC	71	NP	B30	466
1.620	0.05	0.25	Y = A*EXP(B*T)	A	576.52	40.47	B	14.95	0.54	COOPER	70	NP	B16	155
1.650	0.05	0.25	Y = A*EXP(B*T)	A	550.72	16.76	B	15.06	0.28	PARKER	71	NP	B32	29
1.730	0.05	0.25	Y = A*EXP(B*T)	A	969.85	198.10	B	17.31	1.02	DAUM	68	NP	B6	617
1.750	0.05	0.25	Y = A*EXP(B*T)	A	219.88	80.30	B	12.89	1.46	BARISH	66	PRL	17	720
1.800	0.05	0.25	Y = A*EXP(B*T)	A	547.28	20.96	B	15.55	0.34	PARKER	71	NP	B32	29
1.950	0.05	0.25	Y = A*EXP(B*T)	A	513.90	24.15	B	15.02	0.41	PARKER	71	NP	B32	29
2.000	0.05	0.25	Y = A*EXP(B*T)	A	12467.12	44052.20	B	31.98	6.90	BARISH	66	PRL	17	720
2.130	0.05	0.25	Y = A*EXP(B*T)	A	258.63	87.46	B	8.70	1.47	DAUM	68	NP	B6	617
2.150	0.05	0.25	Y = A*EXP(B*T)	A	466.76	29.18	B	15.44	0.49	PARKER	71	NP	B32	29
2.370	0.05	0.25	Y = A*EXP(B*T)	A	3528.24	41690.04	B	24.74	15.79	DAUM	68	NP	B6	617
2.450	0.05	0.25	Y = A*EXP(B*T)	A	428.03	32.86	B	14.83	0.56	PARKER	71	NP	B32	29
2.600	0.05	0.25	Y = A*EXP(B*T)	A	380.09	28.80	B	14.14	0.53	PARKER	71	NP	B32	29
2.690	0.05	0.25	Y = A*EXP(B*T)	A	324.10	17.01	B	13.30	0.40	DOMINGO	67	PL	24B	642
2.750	0.05	0.25	Y = A*EXP(B*T)	A	407.02	53.43	B	14.65	0.94	PARKER	71	NP	B32	29
2.900	0.05	0.25	Y = A*EXP(B*T)	A	323.15	48.42	B	13.46	0.99	PARKER	71	NP	B32	29
3.000	0.05	0.25	Y = A*EXP(B*T)	A	427.07	69.16	B	16.39	1.34	ESCOUBES	63	PL	5	132
3.280	0.05	0.25	Y = A*EXP(B*T)	A	275.45	29.89	B	12.43	0.88	FERBEL	65	PR	137B	1250
3.550	0.05	0.25	Y = A*EXP(B*T)	A	261.55	311.01	B	13.34	4.01	BAKER	69	NP	B12	5
3.600	0.05	0.25	Y = A*EXP(B*T)	A	311.12	55.19	B	14.11	2.12	ESCOUBES	63	PL	5	132
4.000	0.05	0.25	Y = A*EXP(B*T)	A	221.70	24.07	B	12.48	0.75	CZYZEWSKI	65	PL	15	188
5.700	0.05	0.25	Y = A*EXP(B*T)	A	195.10	14.88	B	11.79	0.58	BOECKMANN	66	NC	42A	954
6.900	0.05	0.25	Y = A*EXP(B*T)	A	355.33	38.06	B	16.21	0.61	KITAGAKI	68	PRL	21	175
7.200	0.05	0.25	Y = A*EXP(B*T)	A	234.17	81.92	B	15.69	3.69	FOLEY	63	PRL	11	503
8.000	0.05	0.25	Y = A*EXP(B*T)	A	165.94	0.79	B	12.64	0.05	BIRNBAUM	69	PRL	23	663
8.900	0.05	0.25	Y = A*EXP(B*T)	A	162.60	11.87	B	11.96	0.67	FOLEY	63	PRL	11	503
10.000	0.05	0.25	Y = A*EXP(B*T)	A	254.06	138.63	B	15.04	4.04	FOLEY	63	PRL	11	503
12.000	0.05	0.25	Y = A*EXP(B*T)	A	142.68	11.45	B	12.12	0.59	FOLEY	63	PRL	11	503
16.000	0.05	0.25	Y = A*EXP(B*T)	A	104.82	2.44	B	11.69	0.15	BIRNBAUM	69	PRL	23	663

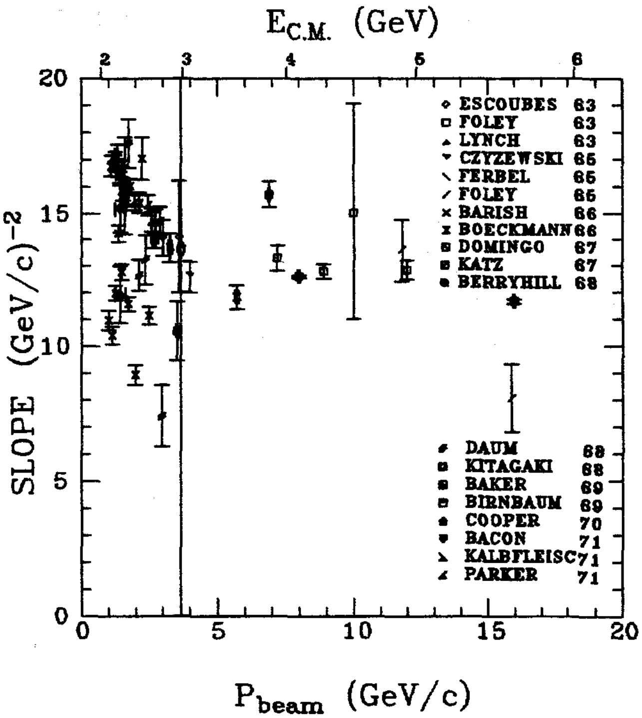




Our fits to the $\bar{p}p$ elastic scattering data

P_{beam} (GeV/c)	|t| $(GeV/c)^2$ min	max	FORMULA		$d\sigma/dt[t=0]$ $mb/(GeV/c)^2$			SLOPE $(GeV/c)^{-2}$		References		
1.000	0.05	0.40	Y = A*EXP(B*T)	A =	151.71	+-16.98	B =	10.96	+- 0.37	BARISH	66	PRL 17 720
1.110	0.05	0.40	Y = A*EXP(B*T)	A	740.50	35.37	B	16.78	0.38	KALBFLEISC	71	NP B30 466
1.125	0.05	0.40	Y = A*EXP(B*T)	A	131.31	12.36	B	10.39	0.33	BARISH	66	PRL 17 720
1.230	0.05	0.40	Y = A*EXP(B*T)	A	781.55	18.53	B	17.11	0.19	BACON	71	NP B32 66
1.250	0.05	0.40	Y = A*EXP(B*T)	A	199.76	17.56	B	11.98	0.29	BARISH	66	PRL 17 720
1.300	0.05	0.40	Y = A*EXP(B*T)	A	686.74	18.24	B	16.76	0.21	BACON	71	NP B32 66
1.330	0.05	0.40	Y = A*EXP(B*T)	A	754.36	24.67	B	17.30	0.26	KALBFLEISC	71	NP B30 466
1.360	0.05	0.40	Y = A*EXP(B*T)	A	706.23	18.75	B	16.57	0.21	BACON	71	NP B32 66
1.375	0.05	0.40	Y = A*EXP(B*T)	A	310.59	29.18	B	14.22	0.33	BARISH	66	PRL 17 720
1.430	0.05	0.40	Y = A*EXP(B*T)	A	672.32	17.48	B	16.35	0.20	BACON	71	NP B32 66
1.430	0.05	0.40	Y = A*EXP(B*T)	A	209.86	76.27	B	11.94	1.08	COOPER	70	NP B16 155
1.440	0.05	0.40	Y = A*EXP(B*T)	A	690.29	171.44	B	15.17	0.89	BERRYHILL	68	PRL 21 770
1.500	0.05	0.40	Y = A*EXP(B*T)	A	202.52	17.74	B	12.77	0.29	BARISH	66	PRL 17 720
1.510	0.05	0.40	Y = A*EXP(B*T)	A	651.54	28.12	B	16.67	0.31	PARKER	71	NP B32 29
1.520	0.05	0.40	Y = A*EXP(B*T)	A	573.73	29.00	B	15.87	0.38	KALBFLEISC	71	NP B30 466
1.610	0.05	0.40	Y = A*EXP(B*T)	A	628.98	364.32	B	16.03	1.82	LYNCH	63	PR 131 1276
1.620	0.05	0.40	Y = A*EXP(B*T)	A	626.68	35.86	B	15.74	0.40	COOPER	70	NP B16 155
1.650	0.05	0.40	Y = A*EXP(B*T)	A	572.51	15.53	B	15.51	0.23	PARKER	71	NP B32 29
1.730	0.05	0.40	Y = A*EXP(B*T)	A	1018.92	186.01	B	17.60	0.90	DAUM	68	NP B6 617
1.750	0.05	0.40	Y = A*EXP(B*T)	A	173.88	13.56	B	11.57	0.26	BARISH	66	PRL 17 720
1.800	0.05	0.40	Y = A*EXP(B*T)	A	571.54	18.16	B	16.03	0.26	PARKER	71	NP B32 29
1.950	0.05	0.40	Y = A*EXP(B*T)	A	534.12	19.93	B	15.42	0.29	PARKER	71	NP B32 29
2.000	0.05	0.40	Y = A*EXP(B*T)	A	78.57	8.26	B	8.93	0.36	BARISH	66	PRL 17 720
2.130	0.05	0.40	Y = A*EXP(B*T)	A	534.62	88.55	B	12.65	0.59	DAUM	68	NP B6 617
2.150	0.05	0.40	Y = A*EXP(B*T)	A	465.16	24.81	B	15.41	0.38	PARKER	71	NP B32 29
2.250	0.05	0.40	Y = A*EXP(B*T)	A	540.82	150.40	B	17.05	0.77	BARISH	66	PRL 17 720
2.370	0.05	0.40	Y = A*EXP(B*T)	A	553.33	154.49	B	13.24	0.94	DAUM	68	NP B6 617
2.450	0.05	0.40	Y = A*EXP(B*T)	A	452.85	26.31	B	15.32	0.38	PARKER	71	NP B32 29
2.500	0.05	0.40	Y = A*EXP(B*T)	A	107.64	12.09	B	11.12	0.34	BARISH	66	PRL 17 720
2.600	0.05	0.40	Y = A*EXP(B*T)	A	406.03	24.78	B	14.69	0.39	PARKER	71	NP B32 29
2.690	0.05	0.40	Y = A*EXP(B*T)	A	347.77	15.52	B	13.97	0.31	DOMINGO	67	PL 24B 642
2.750	0.05	0.40	Y = A*EXP(B*T)	A	408.24	32.57	B	14.66	0.50	PARKER	71	NP B32 29
2.900	0.05	0.40	Y = A*EXP(B*T)	A	381.35	35.85	B	14.72	0.55	PARKER	71	NP B32 29
2.970	0.05	0.40	Y = A*EXP(B*T)	A	254.05	114.16	B	7.41	1.16	DAUM	68	NP B6 617
3.000	0.05	0.40	Y = A*EXP(B*T)	A	342.27	37.30	B	14.05	0.70	ESCOUBES	63	PL 5 132
3.280	0.05	0.40	Y = A*EXP(B*T)	A	309.90	25.58	B	13.68	0.56	FERBEL	65	PR 137B1250
3.550	0.05	0.40	Y = A*EXP(B*T)	A	157.16	47.12	B	10.57	1.11	BAKER	69	NP B12 5
3.600	0.05	0.40	Y = A*EXP(B*T)	A	311.12	55.19	B	14.11	2.12	ESCOUBES	63	PL 5 132
3.660	0.05	0.40	Y = A*EXP(B*T)	A	127.89	21872.44	B	13.65	14.22	KATZ	67	PRL 19 265
4.000	0.05	0.40	Y = A*EXP(B*T)	A	224.34	20.24	B	12.58	0.57	CZYZEWSKI	65	PL 15 188
5.700	0.05	0.40	Y = A*EXP(B*T)	A	196.26	12.88	B	11.83	0.45	BOECKMANN	66	NC 42A 954
6.900	0.05	0.40	Y = A*EXP(B*T)	A	333.76	31.72	B	15.71	0.48	KITAGAKI	68	PRL 21 175
7.200	0.05	0.40	Y = A*EXP(B*T)	A	192.47	23.58	B	13.28	0.48	FOLEY	63	PRL 11 503
8.000	0.05	0.40	Y = A*EXP(B*T)	A	165.13	0.70	B	12.58	0.04	BIRNBAUM	69	PRL 23 663
8.900	0.05	0.40	Y = A*EXP(B*T)	A	174.71	7.93	B	12.79	0.29	FOLEY	63	PRL 11 503
10.000	0.05	0.40	Y = A*EXP(B*T)	A	254.06	138.63	B	15.04	4.04	FOLEY	63	PRL 11 503
11.800	0.05	0.40	Y = A*EXP(B*T)	A	157.50	52.97	B	13.59	1.19	FOLEY	65	PRL 15 45
12.000	0.05	0.40	Y = A*EXP(B*T)	A	153.14	9.47	B	12.84	0.37	FOLEY	63	PRL 11 503
15.910	0.05	0.40	Y = A*EXP(B*T)	A	36.27	15.38	B	8.06	1.26	FOLEY	65	PRL 15 45
16.000	0.05	0.40	Y = A*EXP(B*T)	A	104.20	1.67	B	11.65	0.09	BIRNBAUM	69	PRL 23 663





$\bar{p}p$ Two-Body Inelastic Differential Cross Sections

$d\sigma/dt$ for $\bar{p}p \to \pi^- \pi^+$

BEAM MOMENTUM= .7 +- .007

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.435	1.575	+-0.348 *$
0.448	1.952	0.367 *$
0.468	1.594	0.348 *$
0.487	1.101	0.232 *$
0.526	1.053	0.174 *$
0.565	0.609	0.126 *$
0.611	0.618	0.145 *$
0.663	0.473	0.164 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= .99 +- .01

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.349	0.928	0.102 *$
0.386	1.072	0.102 *$
0.423	0.751	0.061 *$
0.478	0.642	0.048 *$
0.533	0.478	0.048 *$
0.588	0.362	0.048 *$
0.644	0.266	0.048 *$
0.690	0.184	0.055 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 1.45 +- .015

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.265	0.250	0.028 *$
0.305	0.165	0.020 *$
0.359	0.099	0.020 *$
0.386	0.131	0.014 *$
0.481	0.110	0.010 *$
0.562	0.114	0.012 *$
0.643	0.145	0.016 *$
0.737	0.096	0.014 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 1.61

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.230	0.529	0.036	0.026 *
0.529	0.829	0.036	0.026 *
0.829	1.129	0.018	0.018 *
1.129	1.429	0.018	0.018 *
1.429	1.729	0.054	0.031 *
1.729	2.029	0.036	0.026 *
2.029	2.329	0.	*
2.329	2.629	0.036	0.026 *
2.629	2.928	0.072	0.036 *
2.928	3.228	0.090	0.040 *

* DATA READ FROM GRAPH

LYNCH 63.....PR 131 1287 HBC

BEAM MOMENTUM= 1.72 +- .017

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.233	0.118	+- 0.016 *$
0.265	0.067	0.016 *$
0.313	0.030	0.009 *$
0.393	0.016	0.005 *$
0.489	0.020	0.005 *$
0.569	0.044	0.008 *$
0.681	0.081	0.012 *$
0.793	0.086	0.014 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 1.9 +- .3

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.198	0.375	0.027	0.006 *
0.375	0.552	0.005	0.003 *
0.552	0.729	0.012	0.004 *
0.729	0.906	0.026	0.006 *
0.906	1.083	0.037	0.007 *
1.083	1.261	0.021	0.005 *
1.261	1.438	0.018	0.005 *
1.438	1.615	0.018	0.005 *
1.615	1.792	0.023	0.005 *
1.792	1.969	0.028	0.006 *
1.969	2.146	0.033	0.007 *
2.146	2.323	0.023	0.005 *
2.323	2.500	0.015	0.005 *
2.500	2.677	0.012	0.005 *
2.677	2.854	0.018	0.005 *
2.854	3.031	0.036	0.008 *
3.031	3.208	0.036	0.008 *
3.208	3.385	0.031	0.006 *
3.385	3.562	0.013	0.004 *
3.562	3.739	0.013	0.007 *

* DATA READ FROM GRAPH

CHAPMAN 68.....PRL 21 1718 HBC

BEAM MOMENTUM= 1.99 +- .02

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.209	0.087	0.011 *$
0.264	0.060	0.008 *$
0.357	0.044	0.007 *$
0.468	0.009	0.003 *$
0.580	0.017	0.005 *$
0.709	0.037	0.006 *$
0.858	0.047	0.008 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

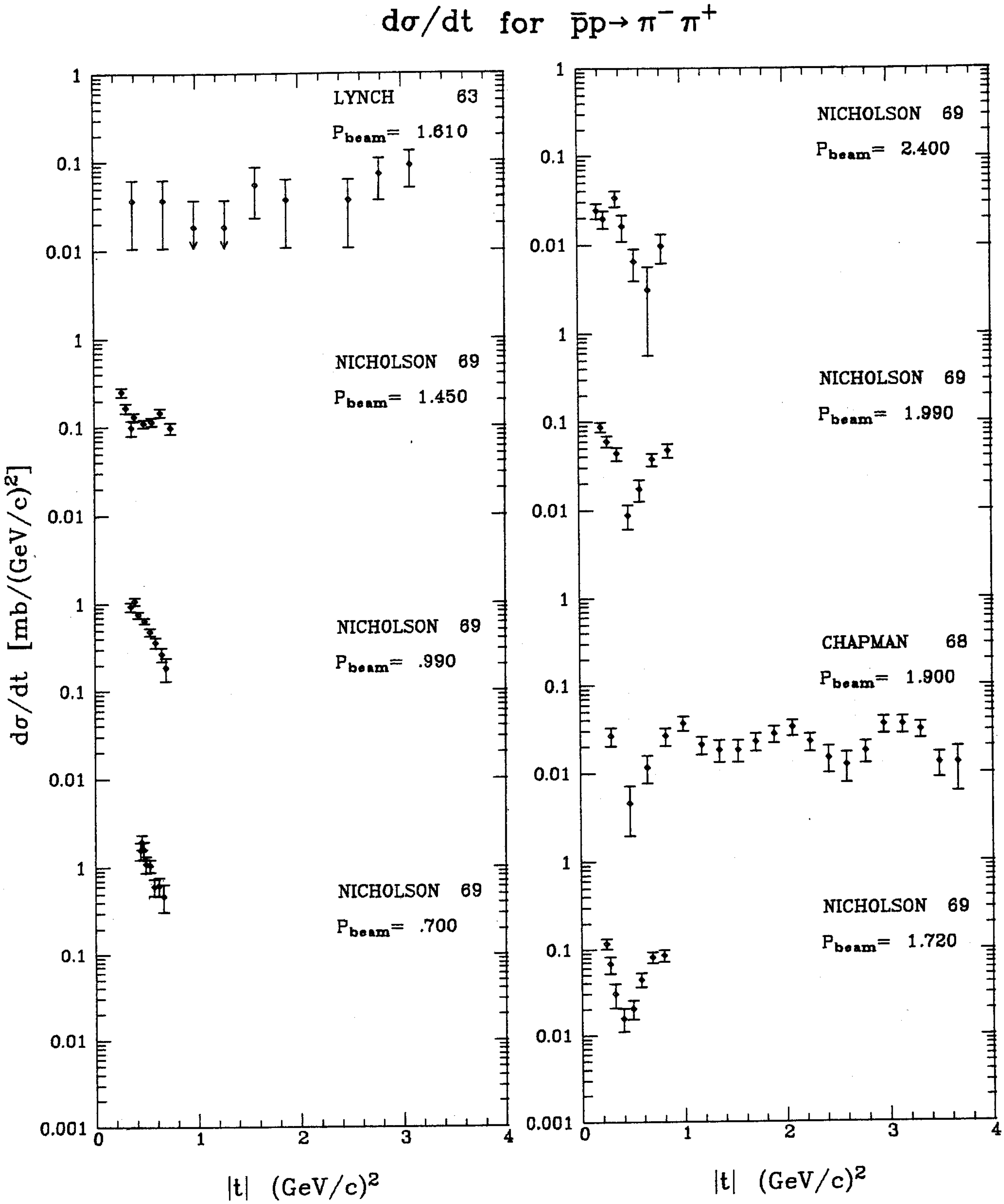
NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 2.4 +- .024

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.182	0.024	0.005 *$
0.249	0.020	0.004 *$
0.361	0.033	0.007 *$
0.428	0.016	0.005 *$
0.540	0.006	0.003 *$
0.675	0.003	0.003 *$
0.809	0.010	0.003 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR


dσ/dt for p̄p→π⁻π⁺
LYNCH 63
Pbeam= 1.610
NICHOLSON 69
Pbeam= 1.450
NICHOLSON 69
Pbeam= .990
NICHOLSON 69
Pbeam= .700
NICHOLSON 69
Pbeam= 2.400
NICHOLSON 69
Pbeam= 1.990
CHAPMAN 68
Pbeam= 1.900
NICHOLSON 69
Pbeam= 1.720
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²
1
0.1
0.01
0.001
0
1
2
3
4

$d\sigma/dt$ for $\bar{p}p \rightarrow K^- K^+$

BEAM MOMENTUM= .7 +- .007

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.290	0.771	+-0.264 *$
0.301	0.871	0.408 *$
0.341	1.289	0.287 *$
0.376	0.716	0.165 *$
0.410	0.617	0.165 *$
0.444	0.220	0.088 *$
0.490	0.474	0.264 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= .99 +- .01

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.227	0.349	0.071 *$
0.243	0.308	0.088 *$
0.284	0.217	0.032 *$
0.341	0.161	0.030 *$
0.390	0.170	0.035 *$
0.439	0.125	0.033 *$
0.496	0.078	0.026 *$
0.521	0.105	0.038 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 1.45 +- .015

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.168	0.110	0.023 *$
0.217	0.090	0.014 *$
0.290	0.074	0.012 *$
0.376	0.054	0.010 *$
0.461	0.026	0.008 *$
0.571	0.048	0.010 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 1.61

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.141	0.414	0.128	0.049 *
0.414	0.687	0.	*
0.687	0.959	0.018	0.018 *
0.959	1.232	0.	*
1.232	1.505	0.018	0.018 *
1.505	1.777	0.018	0.018 *
1.777	2.050	0.018	0.018 *
2.050	2.323	0.	*
2.323	2.595	0.	*
2.595	2.868	0.	*

* DATA READ FROM GRAPH

LYNCH 63.....PR 131 1287 HBC

BEAM MOMENTUM= 1.72 +- .017

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.147	0.049	+-0.014 *$
0.206	0.035	0.008 *$
0.293	0.051	0.012 *$
0.381	0.053	0.010 *$
0.469	0.042	0.010 *$
0.600	0.027	0.007 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

BEAM MOMENTUM= 1.9 +- .3

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	
0.120	0.283	0.030	0.008 *
0.283	0.445	0.033	0.007 *
0.445	0.607	0.011	0.004 *
0.607	0.770	0.020	0.006 *
0.770	0.932	0.015	0.005 *
0.932	1.095	0.012	0.004 *
1.095	1.420	0.008	0.002 *
1.420	1.744	0.008	0.002 *
1.744	2.069	0.012	0.003 *
2.069	2.394	0.010	0.003 *
2.394	2.719	0.006	0.002 *
2.719	3.044	0.005	0.002 *
3.044	3.368	0.001	0.001 *

* DATA READ FROM GRAPH

CHAPMAN 68.....PRL 21 1718 HBC

BEAM MOMENTUM= 1.99 +- .02

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.132	0.037	0.009 *$
0.183	0.025	0.007 *$
0.251	0.033	0.009 *$
0.337	0.016	0.004 *$
0.507	0.018	0.004 *$
0.695	0.017	0.005 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

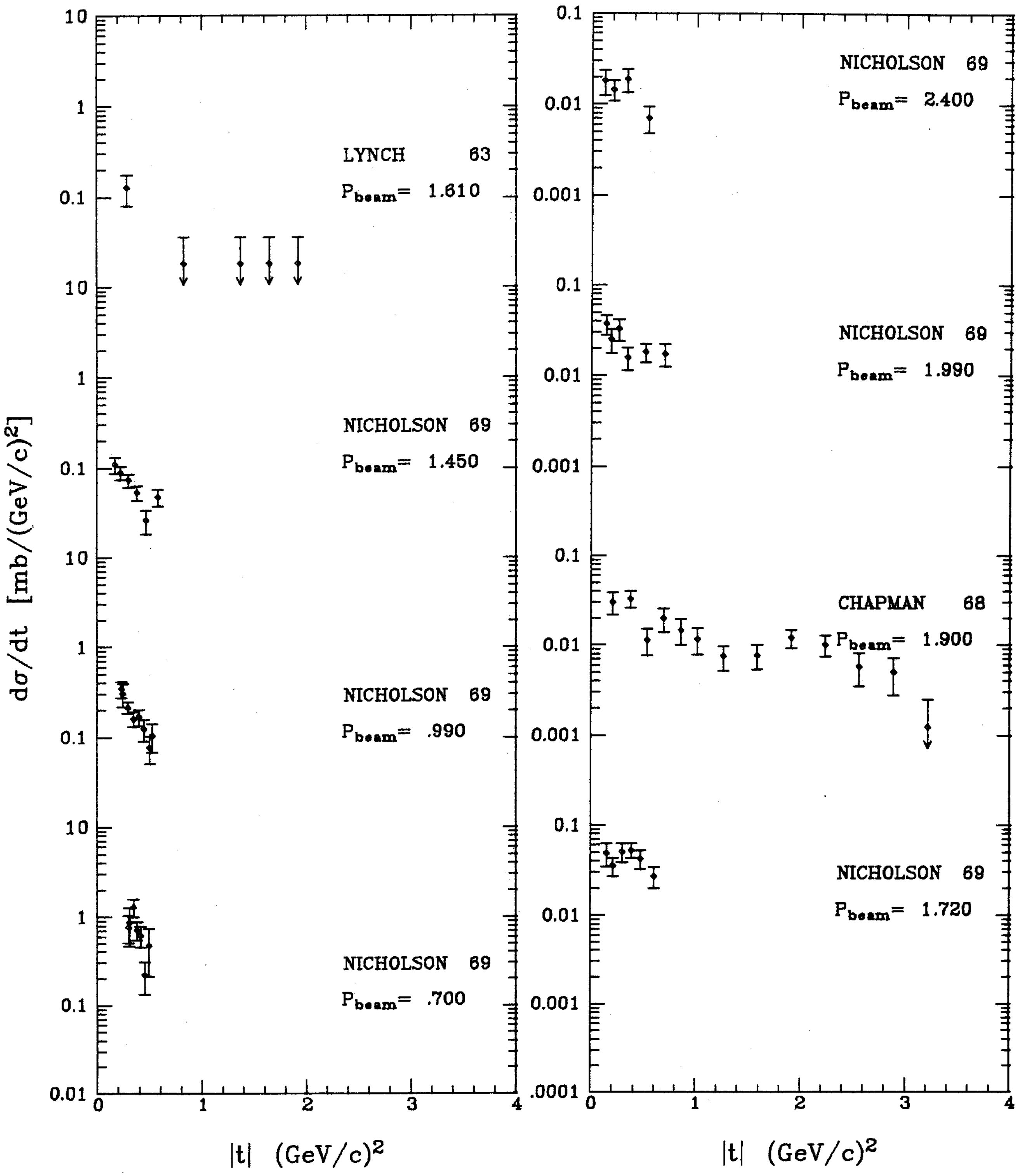
BEAM MOMENTUM= 2.4 +- .024

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.116	0.018	0.006 *$
0.199	0.015	0.004 *$
0.324	0.019	0.005 *$
0.532	0.007	0.002 *$

* DATA READ FROM GRAPH
$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

NICHOLSON 69.....PRL 23 603 CNTR

dσ/dt for $\bar{p}p \rightarrow K^-K^+$



dσ/dt for p̄p→n̄n

BEAM MOMENTUM= .428

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.009	243.789	+- 54.834
0.025	126.711	38.532
0.042	120.783	32.604
0.059	114.114	42.237
0.076	60.762	23.712
0.093	31.863	16.302
0.110	22.230	12.597
0.127	79.287	26.676
0.144	39.273	15.561
0.161	29.640	12.597

BIZZARI 68.....NC 54A 456 HBC

BEAM MOMENTUM= .549

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.014	110.706	21.958
0.041	112.078	25.618
0.069	66.332	17.384
0.096	42.086	13.266
0.124	25.160	10.522
0.151	14.181	8.234
0.179	16.926	8.692
0.206	7.319	5.032
0.234	8.692	5.032
0.261	11.894	5.032

BIZZARI 68.....NC 54A 456 HBC

BEAM MOMENTUM= 1.8 +- .045

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.	28.000	2.000 $
0.001	27.700	2.100 $
0.002	26.900	2.000 $
0.006	24.300	2.200 $
0.012	23.400	2.300 $
0.020	18.300	2.300 $
0.030	16.700	2.400 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ATWOOD 70.....PR D 2 2519 SPRK

BEAM MOMENTUM= 3.5

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.020	8.000	3.000 *
0.100	5.000	2.000 *
0.220	3.000	1.400 *
0.400	1.000	0.600 *
0.650	0.700	0.400 *

* DATA READ FROM GRAPH

CZYZEWSKI 66.....PL 20 554 HBC

BEAM MOMENTUM= 5. +- .05

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.020	2.572	0.197
0.060	1.846	0.167
0.100	1.740	0.162
0.140	1.513	0.151
0.180	1.135	0.131
0.220	0.801	0.110
0.260	0.938	0.119
0.300	0.923	0.118
0.340	0.651	0.099
0.380	0.469	0.084
0.430	0.414	0.064
0.490	0.212	0.046
0.560	0.181	0.037
0.650	0.212	0.036
0.750	0.043	0.016
0.900	0.048	0.012
1.100	0.012	0.006
1.300	0.006	0.004

ASTBURY 66.....PL 23 160 SPRK

BEAM MOMENTUM= 6. +- .06

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.020	2.185	+-0.192
0.060	2.051	0.185
0.100	1.784	0.173
0.140	1.434	0.155
0.180	1.101	0.135
0.220	1.084	0.134
0.260	0.650	0.104
0.300	0.684	0.107
0.340	0.500	0.091
0.380	0.400	0.082
0.430	0.411	0.068
0.490	0.189	0.046
0.560	0.208	0.042
0.650	0.100	0.026
0.750	0.087	0.024
0.900	0.037	0.011
1.100	0.020	0.008
1.300	0.007	0.004

ASTBURY 66.....PL 23 160 SPRK

BEAM MOMENTUM= 7. +- .07

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.020	1.484	0.152
0.060	1.218	0.138
0.100	1.156	0.134
0.140	0.765	0.109
0.180	0.797	0.112
0.220	0.734	0.107
0.260	0.468	0.086
0.300	0.500	0.088
0.340	0.344	0.073
0.380	0.359	0.075
0.430	0.219	0.048
0.490	0.177	0.043
0.560	0.125	0.031
0.650	0.037	0.015
0.750	0.081	0.023
0.900	0.023	0.009
1.100	0.019	0.008
1.300	0.009	0.005

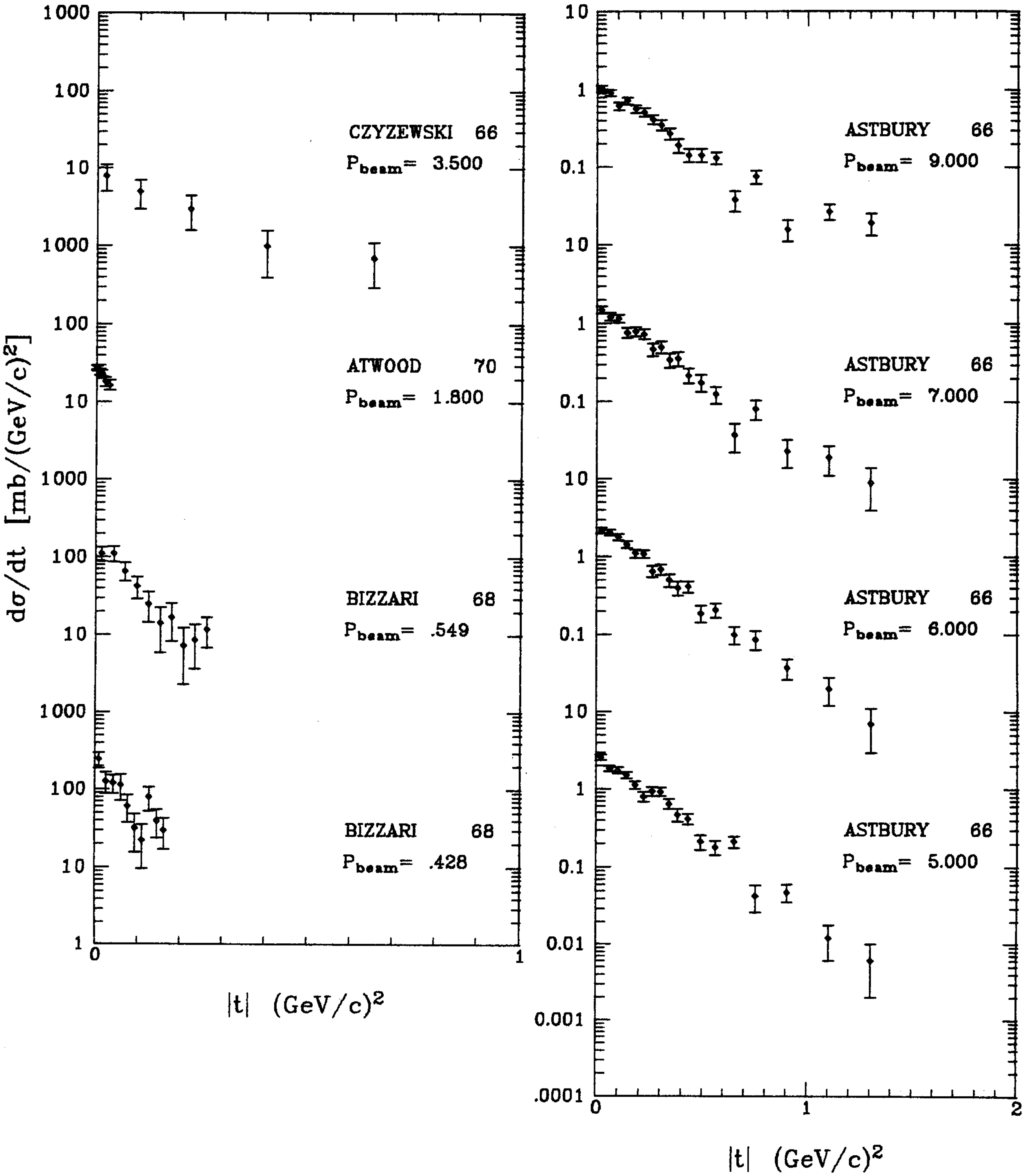
ASTBURY 66.....PL 23 160 SPRK

BEAM MOMENTUM= 9. +- .09

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]	
0.020	1.035	0.091
0.060	0.923	0.086
0.100	0.613	0.070
0.140	0.724	0.076
0.180	0.565	0.067
0.220	0.517	0.064
0.260	0.414	0.057
0.300	0.350	0.053
0.340	0.271	0.046
0.380	0.191	0.039
0.430	0.143	0.028
0.490	0.143	0.028
0.560	0.131	0.025
0.650	0.038	0.011
0.750	0.076	0.015
0.900	0.016	0.005
1.100	0.027	0.006
1.300	0.019	0.006

ASTBURY 66.....PL 23 160 SPRK

dσ/dt for $\bar{p}p \rightarrow \bar{n}n$



dσ/dt for $\bar{p}p \to \bar{\Delta}(1238)^{--}\Delta(1238)^{++}$, $\bar{\Delta}^{--} \to \bar{p}\pi^-$, $\Delta^{++} \to p\pi^+$

BEAM MOMENTUM= 2.375 +- .075

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.	0.060	0.		*†
0.060	0.120	0.331	+- 0.092	*†
0.120	0.180	1.300	0.182	*†
0.180	0.240	2.065	0.229	*†
0.240	0.300	2.652	0.260	*†
0.300	0.360	2.065	0.229	*†
0.360	0.420	1.836	0.216	*†
0.420	0.480	1.555	0.199	*†
0.480	0.540	1.581	0.201	*†
0.540	0.600	1.275	0.180	*†
0.600	0.660	0.918	0.153	*†
0.660	0.720	0.892	0.151	*†
0.720	0.780	0.714	0.135	*†
0.780	0.840	0.892	0.151	*†
0.840	0.900	0.535	0.117	*†
0.900	0.960	0.586	0.122	*†
0.960	1.020	0.561	0.120	*†
1.020	1.080	0.382	0.099	*†
1.080	1.140	0.357	0.095	*†
1.140	1.200	0.535	0.117	*†
1.200	1.260	0.255	0.081	*†
1.260	1.320	0.280	0.085	*†
1.320	1.380	0.357	0.095	*†
1.380	1.440	0.127	0.057	*†
1.440	1.500	0.102	0.051	*†
1.500	1.560	0.153	0.062	*†
1.560	1.620	0.127	0.057	*†
1.620	1.680	0.051	0.036	*†
1.680	1.740	0.025	0.025	*†
1.740	1.800	0.		*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

JESPERSON 70.....PR D 1 2483 HBC

BEAM MOMENTUM= 2.5

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.050	0.100	0.223	0.083	*†
0.100	0.150	0.908	0.168	*†
0.150	0.200	1.652	0.226	*†
0.200	0.250	2.449	0.276	*†
0.250	0.300	2.802	0.295	*†
0.300	0.350	2.139	0.258	*†
0.350	0.400	1.342	0.204	*†
0.400	0.450	1.705	0.230	*†
0.450	0.500	1.311	0.202	*†
0.500	0.550	1.497	0.215	*†
0.550	0.600	1.311	0.202	*†
0.600	0.650	0.543	0.130	*†
0.650	0.700	0.722	0.150	*†
0.700	0.750	0.632	0.140	*†
0.750	0.800	0.632	0.140	*†
0.800	0.850	0.849	0.162	*†
0.850	0.900	0.601	0.137	*†
0.900	0.950	0.381	0.109	*†
0.950	1.000	0.406	0.112	*†
1.000	1.050	0.251	0.088	*†
1.050	1.100	0.471	0.121	*†
1.100	1.150	0.437	0.116	*†
1.150	1.200	0.285	0.094	*†
1.200	1.250	0.158	0.070	*†
1.250	1.300	0.127	0.063	*†
1.300	1.350	0.248	0.088	*†
1.350	1.400	0.102	0.056	*†
1.400	1.450	0.127	0.063	*†
1.450	1.500	0.158	0.070	*†
1.500	1.550	0.037	0.034	*†
1.550	1.600	0.065	0.045	*†
1.600	1.650	0.065	0.045	*†
1.650	1.700	0.037	0.034	*†
1.700	1.750	0.		*†
1.750	1.800	0.068	0.046	*†
1.800	1.850	0.037	0.034	*†
1.850	1.900	0.130	0.064	*†
1.900	1.950	0.034	0.033	*†
1.950	2.000	0.068	0.046	*†
2.000	2.050	0.037	0.034	*†
2.050	2.100	0.		*†
2.100	2.150	0.037	0.034	*†
2.150	2.200	0.		*†
2.200	2.250	0.		*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

MASON 71.....NP B30 617 HBC

BEAM MOMENTUM= 2.7

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.	0.078	0.071	+-0.050	*†
0.078	0.156	0.779	0.166	*†
0.156	0.234	3.752	0.364	*†
0.234	0.312	3.859	0.370	*†
0.312	0.390	3.221	0.338	*†
0.390	0.468	2.301	0.285	*†
0.468	0.546	1.876	0.258	*†
0.546	0.624	1.451	0.227	*†
0.624	0.702	0.956	0.184	*†
0.702	0.780	1.097	0.197	*†
0.780	0.858	1.062	0.194	*†
0.858	0.936	0.920	0.181	*†
0.936	1.014	0.566	0.142	*†
1.014	1.092	0.283	0.100	*†
1.092	1.170	0.460	0.128	*†
1.170	1.248	0.496	0.132	*†
1.248	1.326	0.389	0.117	*†
1.326	1.404	0.212	0.087	*†
1.404	1.482	0.177	0.079	*†
1.482	1.560	0.071	0.050	*†
1.560	1.638	0.212	0.087	*†
1.638	1.716	0.106	0.061	*†
1.716	1.794	0.071	0.050	*†
1.794	1.872	0.142	0.071	*†
1.872	1.950	0.		*†
1.950	2.028	0.071	0.050	*†
2.028	2.106	0.106	0.061	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

CRAWLEY 67.....PR 154 1264 HBC

BEAM MOMENTUM= 2.885 +- .080

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.	0.060	0.		*†
0.060	0.120	1.318	0.233	*†
0.120	0.180	5.026	0.455	*†
0.180	0.240	5.356	0.470	*†
0.240	0.300	4.532	0.432	*†
0.300	0.360	3.337	0.371	*†
0.360	0.420	3.790	0.395	*†
0.420	0.480	2.266	0.306	*†
0.480	0.540	2.225	0.303	*†
0.540	0.600	1.978	0.285	*†
0.600	0.660	1.277	0.229	*†
0.660	0.720	0.948	0.198	*†
0.720	0.780	1.236	0.226	*†
0.780	0.840	0.906	0.193	*†
0.840	0.900	0.824	0.184	*†
0.900	0.960	0.659	0.165	*†
0.960	1.020	1.236	0.226	*†
1.020	1.080	0.412	0.130	*†
1.080	1.140	0.412	0.130	*†
1.140	1.200	0.371	0.124	*†
1.200	1.260	0.288	0.109	*†
1.260	1.320	0.371	0.124	*†
1.320	1.380	0.330	0.117	*†
1.380	1.440	0.330	0.117	*†
1.440	1.500	0.165	0.082	*†
1.500	1.560	0.124	0.071	*†
1.560	1.620	0.247	0.101	*†
1.620	1.680	0.124	0.071	*†
1.680	1.740	0.288	0.109	*†
1.740	1.800	0.247	0.101	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

JESPERSON 70.....PR D 1 2483 HBC

BEAM MOMENTUM= 5.7

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.042	0.217	+- 0.093	*†
0.067	9.002	1.167	*†
0.092	11.669	1.000	*†
0.118	8.002	0.834	*†
0.143	7.668	1.000	*†
0.168	6.001	0.917	*†
0.192	5.584	0.917	*†
0.218	4.001	0.667	*†
0.242	2.867	0.433	*†
0.268	3.301	0.500	*†
0.293	2.501	0.500	*†
0.318	3.084	0.333	*†
0.342	1.550	0.333	*†
0.367	2.167	1.084	*†
0.393	1.334	0.333	*†
0.418	1.067	0.267	*†
0.443	1.067	0.267	*†
0.467	1.067	0.267	*†
0.492	1.067	0.267	*†
0.560	0.634	0.083	*†
0.680	0.583	0.083	*†
0.820	0.237	0.050	*†
0.930	0.197	0.050	*†
1.060	0.118	0.028	*†
1.200	0.100	0.037	*†
1.300	0.100	0.037	*†
1.600	0.031	0.009	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

ALLES-BORE 67.....NC 48A 360 HBC

BEAM MOMENTUM= 5.7 +- .057

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.	0.050	0.736	0.289	*†
0.050	0.100	5.434	0.784	*†
0.100	0.150	3.656	0.643	*†
0.150	0.200	2.932	0.576	*†
0.200	0.250	2.038	0.480	*†
0.250	0.300	1.936	0.468	*†
0.300	0.350	0.906	0.320	*†
0.350	0.400	1.585	0.424	*†
0.400	0.450	0.906	0.320	*†
0.450	0.500	0.238	0.164	*†
0.500	0.550	0.		*†
0.550	0.600	0.113	0.113	*†
0.600	0.650	0.215	0.156	*†
0.650	0.700	0.		*†
0.700	0.750	0.102	0.107	*†
0.750	0.800	0.192	0.148	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

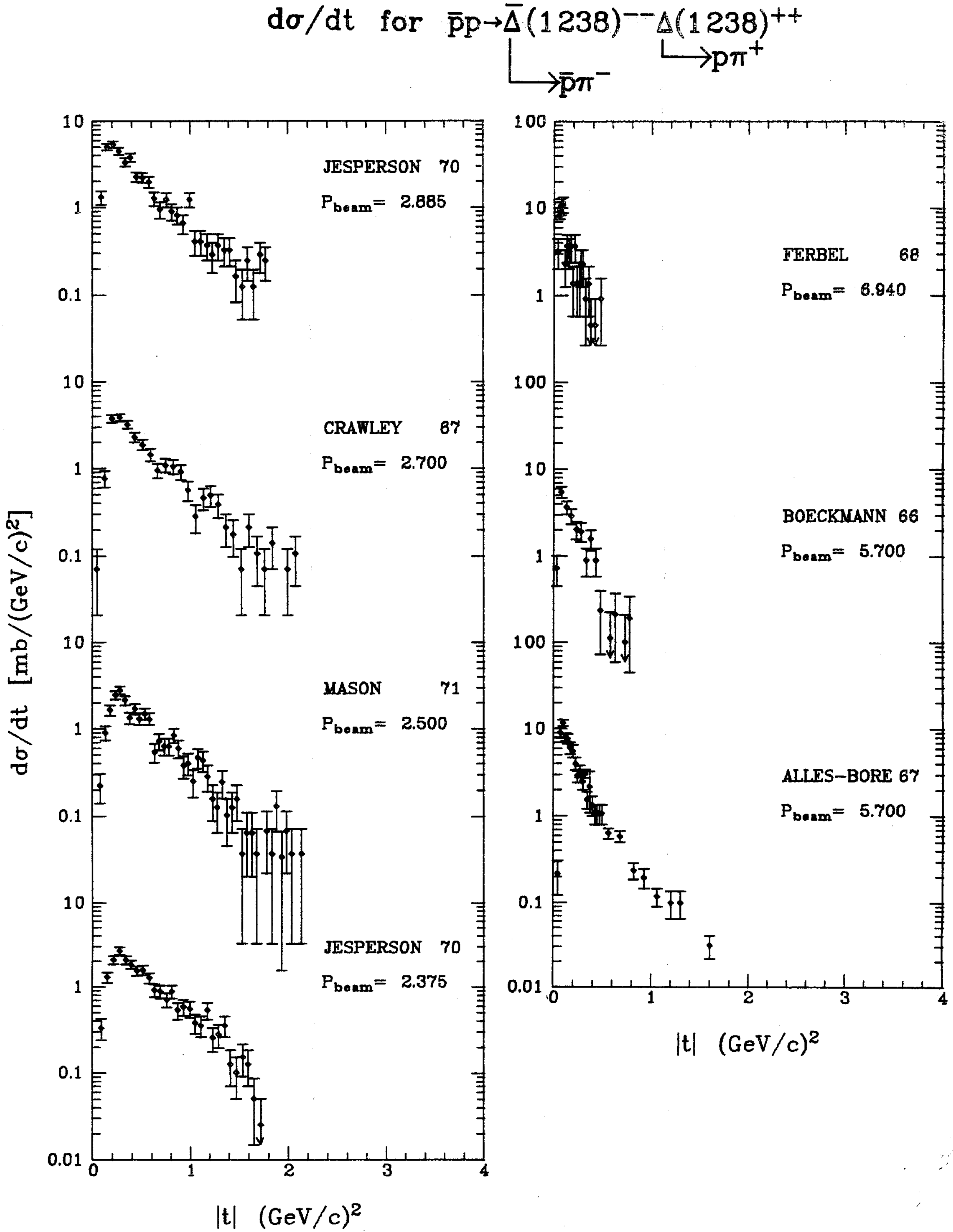
BOECKMANN 66.....NC 42A 954 HBC

BEAM MOMENTUM= 6.94 +- .104

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.020	0.040	3.192	1.206	*†
0.040	0.060	9.576	2.090	*†
0.060	0.080	10.488	2.187	*†
0.080	0.100	10.944	2.234	*†
0.100	0.120	2.280	1.020	*†
0.120	0.140	3.648	1.290	*†
0.140	0.160	3.192	1.206	*†
0.160	0.180	3.648	1.290	*†
0.180	0.200	1.368	0.790	*†
0.200	0.220	3.648	1.290	*†
0.220	0.240	1.368	0.790	*†
0.240	0.260	1.368	0.790	*†
0.260	0.280	2.280	1.020	*†
0.280	0.300	2.280	1.020	*†
0.300	0.320	0.912	0.645	*†
0.320	0.340	0.		*†
0.340	0.360	1.368	0.790	*†
0.360	0.380	0.456	0.456	*†
0.380	0.400	0.		*†
0.400	0.420	0.456	0.456	*†
0.420	0.440	0.		*†
0.440	0.460	0.		*†
0.460	0.480	0.912	0.645	*†
0.480	0.500	0.		*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

FERBEL 68.....PR 173 1307 HBC


dσ/dt for p̄p→Δ̄(1238)⁻⁻Δ(1238)⁺⁺
→p̄π⁻
→pπ⁺
JESPERSON 70
Pbeam= 2.885
CRAWLEY 67
Pbeam= 2.700
MASON 71
Pbeam= 2.500
JESPERSON 70
Pbeam= 2.375
FERBEL 68
Pbeam= 6.940
BOECKMANN 66
Pbeam= 5.700
ALLES-BORE 67
Pbeam= 5.700
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²

dσ/dt for $\bar{p}p \to \bar{\Lambda}\Lambda$

BEAM MOMENTUM= 1.61

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.156	0.225	0.149	+- 0.105	*
0.225	0.295	0.223	0.129	*
0.295	0.365	0.074	0.074	*
0.365	0.434	0.074	0.074	*
0.434	0.504	0.074	0.074	*
0.504	0.573	0.074	0.074	*
0.573	0.643	0.074	0.074	*
0.643	0.713	0.		*
0.713	0.782	0.074	0.074	*
0.782	0.852	0.		*

* DATA READ FROM GRAPH

LYNCH 61.....RMP 33 395 HBC

BEAM MOMENTUM= 2.19

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.040	0.080	0.660	0.040	*
0.100	0.150	0.430	0.070	*
0.200	0.280	0.230	0.050	*
0.280	0.380	0.085	0.035	*
0.420	0.480	0.054	0.026	*
0.480	0.580	0.030	0.021	*
0.620	0.680	0.043	0.024	*
0.700	0.800	0.014	0.014	*
0.880	1.000	0.014	0.014	*
1.200	1.280	0.016	0.016	*
1.660	1.800	0.016	0.016	*

* DATA READ FROM GRAPH

KWAK 69.....PR 186 1392 HBC

BEAM MOMENTUM= 2.434 +- .030

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.056	0.079	0.740	0.137	*
0.079	0.102	0.427	0.088	*
0.102	0.125	0.477	0.077	*
0.125	0.148	0.449	0.082	*
0.148	0.171	0.307	0.071	*
0.171	0.286	0.186	0.027	*
0.286	0.400	0.137	0.022	*
0.400	0.515	0.079	0.019	*
0.515	0.630	0.053	0.013	*
0.630	0.744	0.018	0.008	*
0.744	0.859	0.020	0.008	*
0.859	0.974	0.020	0.008	*
0.974	1.088	0.027	0.010	*
1.088	1.203	0.015	0.006	*
1.203	1.432	0.014	0.005	*
1.432	1.662	0.007	0.004	*
1.662	1.891	0.010	0.004	*
1.891	2.120	0.004	0.002	*
2.120	2.349	0.012	0.004	*

* DATA READ FROM GRAPH

BADIER 67.....PL 25B 152 HBC

BEAM MOMENTUM= 2.7 +- .07

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.070	0.667	+- 0.132	*
0.140	0.410	0.109	*
0.210	0.185	0.121	*
0.280	0.104	0.052	*
0.350	0.025	0.025	*
0.420	0.022	0.022	*
0.490	0.069	0.038	*
0.560	0.012	0.012	*
0.630	0.025	0.025	*
0.700	0.024	0.024	*
0.770	0.023	0.023	*
0.840	0.012	0.012	*
0.910	0.012	0.012	*
0.980	0.034	0.034	*

* DATA READ FROM GRAPH

FISHER 67.....PR 161 1335 HBC

BEAM MOMENTUM= 3.5 +- .5

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.100	0.200	0.496	0.111	*
0.200	0.300	0.074	0.043	*
0.300	0.400	0.037	0.030	*
0.400	0.500	0.074	0.043	*
0.500	0.600	0.025	0.025	*
0.600	0.700	0.025	0.025	*
0.700	0.800	0.		*
0.800	0.900	0.037	0.030	*
0.900	1.000	0.		*
1.000	1.100	0.		*
1.100	1.200	0.		*
1.200	1.300	0.		*
1.300	1.400	0.		*
1.400	1.500	0.		*
1.500	1.600	0.		*

* DATA READ FROM GRAPH

MUSGRAVE 65.....NC 35 735 HBC

BEAM MOMENTUM= 3.66 +- .055

-T (GEV/C)**2	D SIGMA/D T [(MB/(GEV/C)**2]		
0.020	0.487	0.072	*
0.070	0.288	0.044	*
0.120	0.210	0.044	*
0.170	0.177	0.039	*
0.220	0.089	0.028	*
0.270	0.077	0.022	*
0.320	0.072	0.022	*
0.370	0.041	0.022	*
0.420	0.089	0.028	*
0.470	0.072	0.017	*
0.520	0.022	0.011	*
0.570	0.022	0.011	*
0.620	0.047	0.017	*
0.670	0.017	0.011	*
0.720	0.061	0.022	*
0.770	0.028	0.017	*
0.820	0.017	0.011	*
0.870	0.011	0.011	*
0.920	0.017	0.011	*
0.970	0.011	0.011	*
1.020	0.008	0.011	*
1.070	0.		*
1.120	0.		*
1.170	0.022	0.011	*
1.220	0.008	0.008	*
1.270	0.		*
1.320	0.017	0.011	*
1.370	0.008	0.011	*

* DATA READ FROM GRAPH

BALTAY 65.....PR 140B1027 HBC

BEAM MOMENTUM= 5.7 +- .057

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.	0.050	0.303	+- 0.047	*
0.050	0.100	0.164	0.034	*
0.100	0.150	0.150	0.015	*
0.150	0.200	0.064	0.006	*
0.200	0.250	0.090	0.009	*
0.250	0.300	0.056	0.012	*
0.300	0.350	0.038	0.008	*
0.350	0.400	0.032	0.009	*
0.400	0.450	0.024	0.006	*
0.450	0.500	0.018	0.003	*
0.500	0.550	0.013	0.005	*
0.550	0.600	0.007	0.004	*
0.600	0.650	0.002	0.002	*
0.650	0.700	0.016	0.006	*
0.700	0.750	0.012	0.006	*
0.750	0.800	0.003	0.003	*
0.800	0.850	0.001	0.001	*
0.850	0.900	0.001	0.001	*
0.900	0.950	0.001	0.001	*
0.950	1.000	0.001	0.001	*
1.000	1.050	0.003	0.002	*
1.050	1.100	0.003	0.002	*
1.100	1.150	0.007	0.004	*
1.150	1.200	0.004	0.004	*
1.200	1.250	0.002	0.002	*
1.250	1.300	0.002	0.001	*
1.300	1.350	0.001	0.001	*
1.350	1.400	0.001	0.001	*
1.400	1.450	0.001	0.001	*
1.450	1.500	0.001	0.001	*
1.500	1.550	0.001	0.001	*
1.550	1.600	0.001	0.001	*
1.600	1.650	0.001	0.001	*
1.650	1.700	0.001	0.001	*
1.700	1.750	0.001	0.001	*
1.750	1.800	0.001	0.001	*
1.800	1.850	0.002	0.002	*
1.850	1.900	0.002	0.002	*
1.900	1.950	0.002	0.002	*

* DATA READ FROM GRAPH

ATHERTON 69.....PL 30B 494 HBC

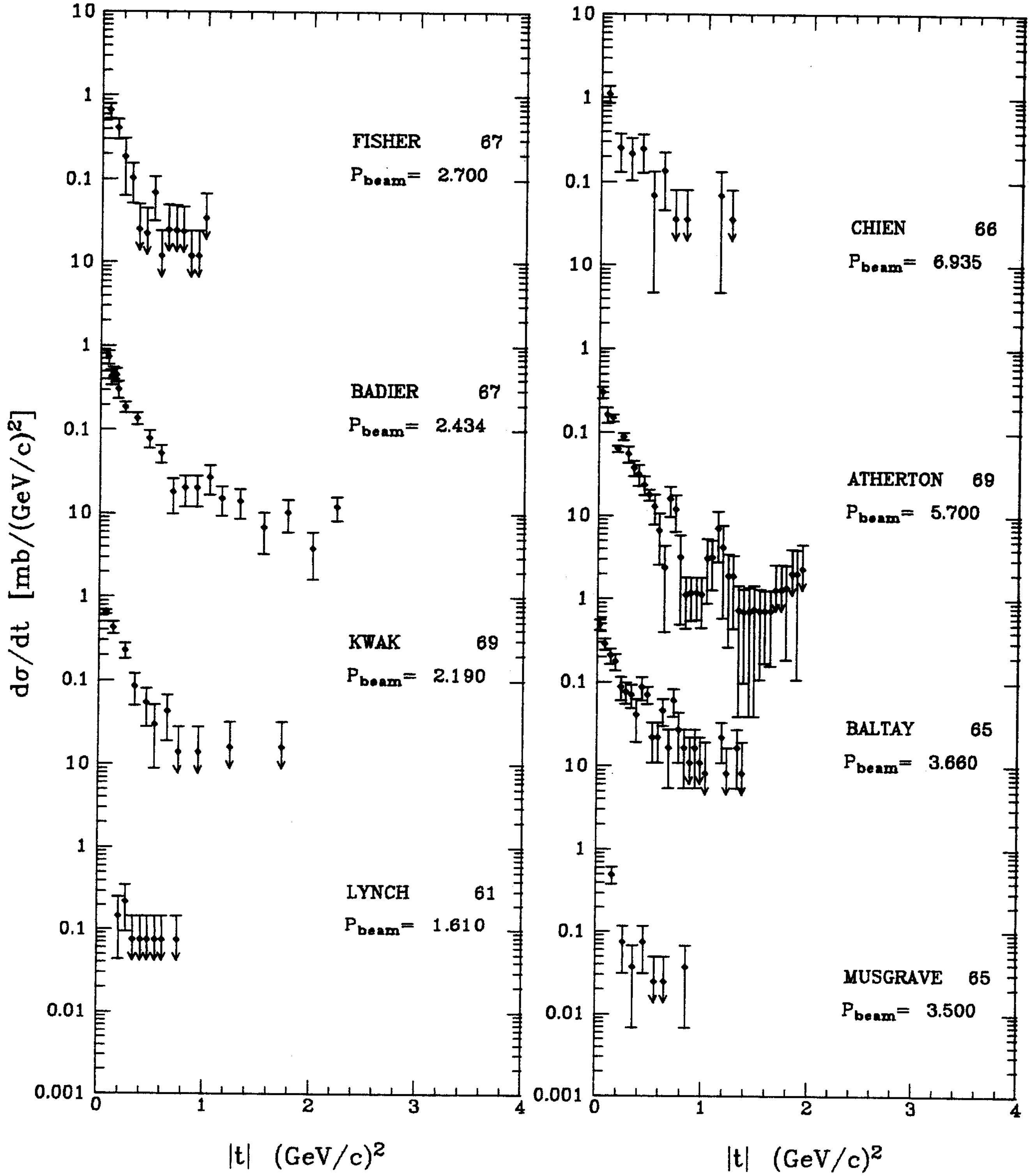
BEAM MOMENTUM= 6.935 +- .139

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.012	0.119	1.117	0.257	*†
0.119	0.225	0.254	0.123	*†
0.225	0.331	0.218	0.114	*†
0.331	0.437	0.249	0.121	*†
0.437	0.543	0.069	0.064	*†
0.543	0.650	0.136	0.090	*†
0.650	0.756	0.036	0.045	*†
0.756	0.862	0.036	0.045	*†
0.862	0.968	0.		*†
0.968	1.074	0.		*†
1.074	1.180	0.069	0.064	*†
1.180	1.287	0.036	0.045	*†
1.287	1.393	0.		*†
1.393	1.499	0.		*†
1.499	1.605	0.		*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

CHIEN 66.....PR 152 1171 HBC

$d\sigma/dt$ for $\bar{p}p \to \bar{\Lambda}\Lambda$



dσ/dt for $\bar{p}p \to \bar{\Lambda}\Sigma^0$ + c.c.

BEAM MOMENTUM= 2.19

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.100	0.200	0.220	+-0.060	*
0.200	0.300	0.170	0.060	*
0.300	0.400	0.015	0.015	*
0.400	0.500	0.034	0.024	*
0.500	0.600	0.038	0.019	*
0.600	0.700	0.014	0.014	*
0.700	0.800	0.012	0.012	*
0.800	0.900	0.013	0.013	*
0.900	1.000	0.028	0.020	*
1.100	1.200	0.030	0.021	*
1.200	1.300	0.013	0.013	*
1.600	1.700	0.013	0.013	*

* DATA READ FROM GRAPH

KWAK 69.....PR 186 1392 HBC

BEAM MOMENTUM= 2.434 +- .030

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.094	0.115	0.382	0.074	*
0.115	0.135	0.274	0.080	*
0.135	0.156	0.290	0.086	*
0.156	0.176	0.126	0.048	*
0.176	0.196	0.168	0.059	*
0.196	0.298	0.116	0.025	*
0.298	0.400	0.068	0.015	*
0.400	0.502	0.022	0.011	*
0.502	0.604	0.009	0.006	*
0.604	0.706	0.026	0.011	*
0.706	0.808	0.017	0.008	*
0.808	0.910	0.013	0.007	*
0.910	1.012	0.013	0.008	*
1.012	1.114	0.013	0.007	*
1.114	1.318	0.007	0.004	*
1.318	1.522	0.004	0.003	*
1.522	1.726	0.004	0.003	*
1.726	1.930	0.007	0.004	*
1.930	2.134	0.015	0.005	*

* DATA READ FROM GRAPH

BADIER 67.....PL 25B 152 HBC

BEAM MOMENTUM= 3.5 +- .5

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.050	0.100	0.312	+-0.085	*
0.100	0.150	0.298	0.083	*
0.150	0.200	0.322	0.087	*
0.200	0.300	0.058	0.037	*
0.300	0.400	0.047	0.033	*
0.400	0.500	0.012	0.016	*
0.500	0.600	0.023	0.023	*
0.600	0.700	0.023	0.023	*
0.700	0.800	0.033	0.028	*
0.800	0.900	0.009	0.015	*
0.900	1.000	0.023	0.023	*

* DATA READ FROM GRAPH

MUSGRAVE 65.....NC 35 735 HBC

BEAM MOMENTUM= 3.66 +- .055

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.045	0.090	0.511	0.081	*
0.090	0.135	0.232	0.058	*
0.135	0.180	0.191	0.041	*
0.180	0.225	0.087	0.029	*
0.225	0.270	0.055	0.023	*
0.270	0.315	0.020	0.015	*
0.315	0.360	0.020	0.015	*
0.360	0.405	0.064	0.029	*
0.405	0.450	0.029	0.017	*
0.450	0.495	0.035	0.017	*
0.495	0.540	0.012	0.009	*
0.540	0.585	0.026	0.017	*
0.585	0.630	0.026	0.017	*
0.630	0.675	0.026	0.017	*
0.675	0.720	0.015	0.012	*
0.720	0.765	0.026	0.017	*
0.765	0.810	0.		*
0.810	0.855	0.026	0.017	*
0.855	0.900	0.		*
0.900	0.945	0.026	0.017	*
0.945	0.990	0.012	0.009	*
0.990	1.035	0.		*
1.035	1.080	0.012	0.009	*
1.080	1.125	0.026	0.012	*
1.125	1.170	0.		*
1.170	1.215	0.012	0.009	*
1.215	1.260	0.		*
1.260	1.305	0.012	0.009	*

* DATA READ FROM GRAPH

BALTAY 65.....PR 140B1027 HBC

BEAM MOMENTUM= 5.7 +- .057

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.	0.050	0.192	+-0.039	*
0.050	0.100	0.153	0.023	*
0.100	0.150	0.140	0.029	*
0.150	0.200	0.048	0.015	*
0.200	0.250	0.012	0.005	*
0.250	0.300	0.033	0.009	*
0.300	0.350	0.019	0.006	*
0.350	0.400	0.005	0.004	*
0.400	0.450	0.007	0.006	*
0.450	0.500	0.007	0.005	*
0.500	0.550	0.025	0.012	*
0.550	0.600	0.012	0.006	*
0.600	0.650	0.012	0.005	*
0.650	0.700	0.006	0.004	*
0.700	0.750	0.005	0.003	*
0.750	0.800	0.005	0.003	*
0.800	0.850	0.003	0.001	*
0.850	0.900	0.003	0.001	*
0.900	0.950	0.003	0.001	*
0.950	1.000	0.003	0.001	*
1.000	1.050	0.001	0.001	*
1.050	1.100	0.001	0.001	*
1.100	1.150	0.001	0.001	*
1.150	1.200	0.001	0.001	*
1.200	1.250	0.001	0.001	*
1.250	1.300	0.001	0.001	*
1.300	1.350	0.001	0.001	*
1.350	1.400	0.001	0.001	*
1.400	1.450	0.001	0.001	*
1.450	1.500	0.001	0.001	*
1.500	1.550	0.000	0.000	*
1.550	1.600	0.000	0.000	*
1.600	1.650	0.000	0.000	*
1.650	1.700	0.000	0.000	*
1.700	1.750	0.000	0.000	*
1.750	1.800	0.000	0.000	*
1.800	1.850	0.000	0.000	*
1.850	1.900	0.000	0.000	*
1.900	1.950	0.000	0.000	*
1.950	2.000	0.000	0.000	*

* DATA READ FROM GRAPH

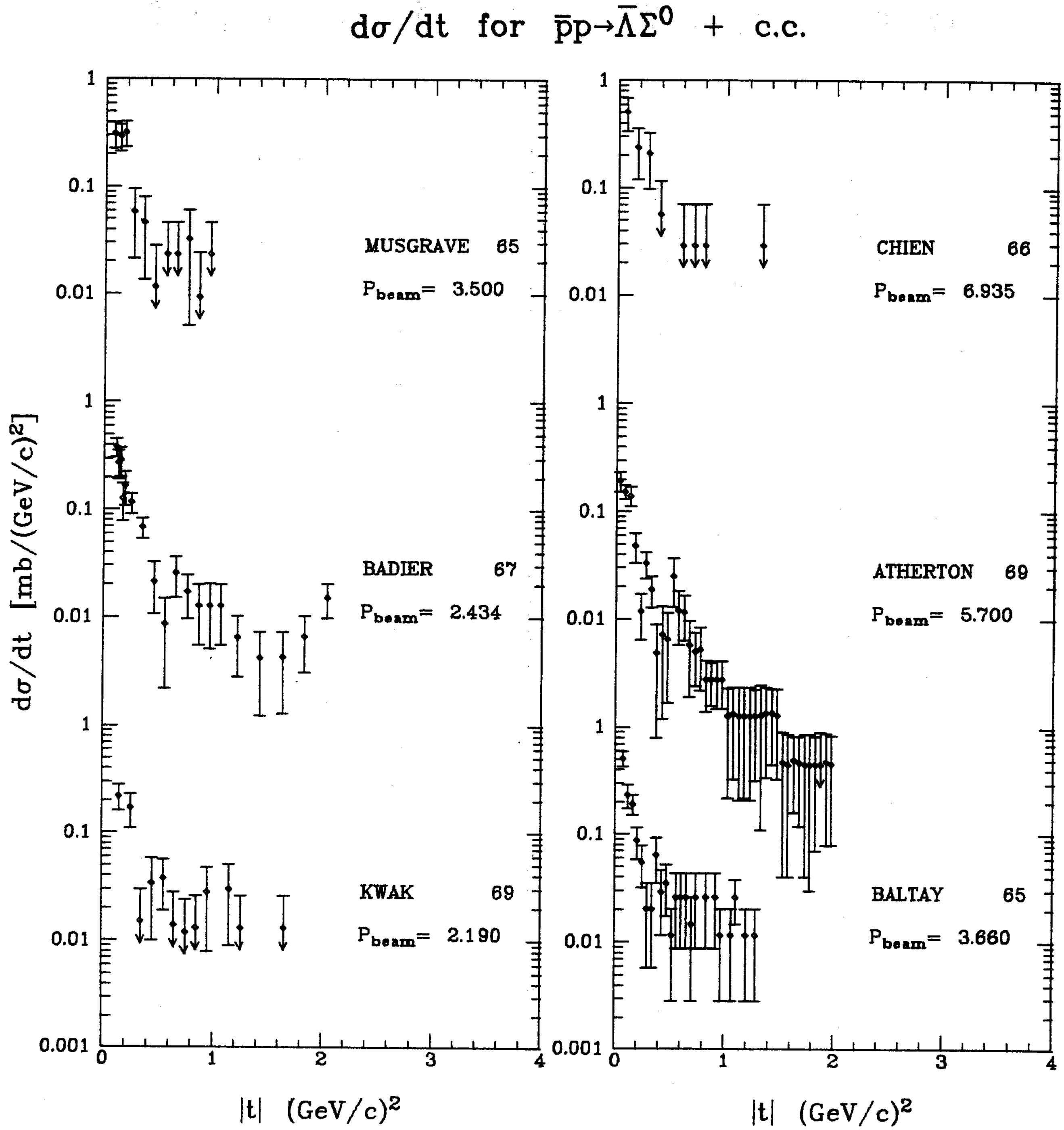
ATHERTON 69.....PL 30B 494 HBC

BEAM MOMENTUM= 6.935 +- .139

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.019	0.123	0.512	0.176	*†
0.123	0.228	0.240	0.121	*†
0.228	0.332	0.211	0.113	*†
0.332	0.436	0.057	0.059	*†
0.436	0.540	0.		*†
0.540	0.645	0.029	0.042	*†
0.645	0.749	0.029	0.042	*†
0.749	0.853	0.029	0.042	*†
0.853	0.958	0.		*†
0.958	1.062	0.		*†
1.062	1.166	0.		*†
1.166	1.270	0.		*†
1.270	1.375	0.029	0.042	*†
1.375	1.479	0.		*†
1.479	1.583	0.		*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

CHIEN 66.....PR 152 1171 HBC



dσ/dt for p̄p→Λ̄Σ⁰ + c.c.
MUSGRAVE 65
Pbeam= 3.500
CHIEN 66
Pbeam= 6.935
BADIER 67
Pbeam= 2.434
ATHERTON 69
Pbeam= 5.700
KWAK 69
Pbeam= 2.190
BALTAY 65
Pbeam= 3.660
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²

$d\sigma/dt$ for $\bar{p}p \to \bar{\Sigma}^{-}\Sigma^{+}$

BEAM MOMENTUM= 3.5 +- .5

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.100	0.150	0.188	0.034	*
0.150	0.200	0.087	0.023	*
0.200	0.300	0.050	0.018	*
0.300	0.400	0.037	0.015	*
0.400	0.500	0.013	0.009	*
0.500	0.600	0.025	0.013	*
0.600	0.700	0.031	0.014	*
0.700	0.800	0.019	0.011	*
0.800	0.900	0.031	0.014	*
0.900	1.000	0.019	0.011	*
1.000	1.100	0.019	0.011	*
1.100	1.200	0.037	0.015	*
1.200	1.300	0.		*
1.300	1.400	0.006	0.006	*
1.400	1.500	0.006	0.006	*
1.500	1.600	0.013	0.009	*
1.600	1.700	0.		*
1.700	1.800	0.		*
1.800	1.900	0.		*
1.900	2.000	0.006	0.006	*
2.000	2.100	0.		*
2.100	2.200	0.		*
2.200	2.300	0.013	0.009	*
2.300	2.400	0.		*

* DATA READ FROM GRAPH

MUSGRAVE 65.....NC 35 735 HBC

BEAM MOMENTUM= 3.66 +- .055

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.071	0.481	0.049	0.015	*
0.481	0.891	0.027	0.010	*
0.891	1.301	0.017	0.010	*
1.301	1.711	0.009	0.005	*
1.711	2.121	0.		*
2.121	2.531	0.		*
2.531	2.941	0.		*
2.941	3.351	0.		*
3.351	3.761	0.005	0.005	*
3.761	4.171	0.		*

* DATA READ FROM GRAPH

BALTAY 65.....PR 140B1027 HBC

BEAM MOMENTUM= 5.7 +- .057

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.	0.050	0.300	0.118	*
0.050	0.100	0.141	0.046	*
0.100	0.150	0.080	0.037	*
0.150	0.200	0.030	0.008	*
0.200	0.250	0.038	0.010	*
0.250	0.300	0.030	0.008	*
0.300	0.350	0.023	0.006	*
0.350	0.400	0.024	0.009	*
0.400	0.450	0.017	0.006	*
0.450	0.500	0.023	0.006	*
0.500	0.550	0.023	0.007	*
0.550	0.600	0.012	0.005	*
0.600	0.650	0.010	0.004	*
0.650	0.700	0.012	0.005	*
0.700	0.750	0.010	0.004	*
0.750	0.800	0.012	0.004	*
0.800	0.850	0.009	0.004	*
0.850	0.900	0.005	0.002	*
0.900	0.950	0.007	0.003	*
0.950	1.000	0.012	0.005	*
1.000	1.050	0.005	0.002	*
1.050	1.100	0.002	0.002	*
1.100	1.150	0.005	0.004	*
1.150	1.200	0.002	0.001	*
1.200	1.250	0.001	0.001	*
1.250	1.300	0.001	0.001	*
1.300	1.350	0.001	0.001	*
1.350	1.400	0.001	0.001	*
1.400	1.450	0.001	0.001	*
1.450	1.500	0.001	0.001	*
1.500	1.550	0.001	0.001	*
1.550	1.600	0.006	0.003	*
1.600	1.650	0.002	0.002	*
1.650	1.700	0.002	0.002	*

* DATA READ FROM GRAPH

ATHERTON 69.....PL 30B 494 HBC

$d\sigma/dt$ for $\bar{p}p \to \bar{\Sigma}^{+}\Sigma^{-}$

BEAM MOMENTUM= 3.5 +- .5

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.100	0.150	0.		*
0.150	0.200	0.030	0.015	*
0.200	0.300	0.023	0.013	*
0.300	0.400	0.038	0.017	*
0.400	0.500	0.038	0.017	*
0.500	0.600	0.008	0.008	*
0.600	0.700	0.015	0.011	*
0.700	0.800	0.008	0.008	*
0.800	0.900	0.		*
0.900	1.000	0.		*
1.000	1.100	0.008	0.008	*
1.100	1.200	0.015	0.011	*
1.200	1.300	0.008	0.008	*
1.300	1.400	0.015	0.011	*
1.400	1.500	0.008	0.008	*
1.500	1.600	0.		*
1.600	1.700	0.		*
1.700	1.800	0.		*
1.800	1.900	0.		*
1.900	2.000	0.		*
2.000	2.100	0.008	0.008	*
2.100	2.200	0.		*
2.200	2.300	0.		*
2.300	2.400	0.		*

* DATA READ FROM GRAPH

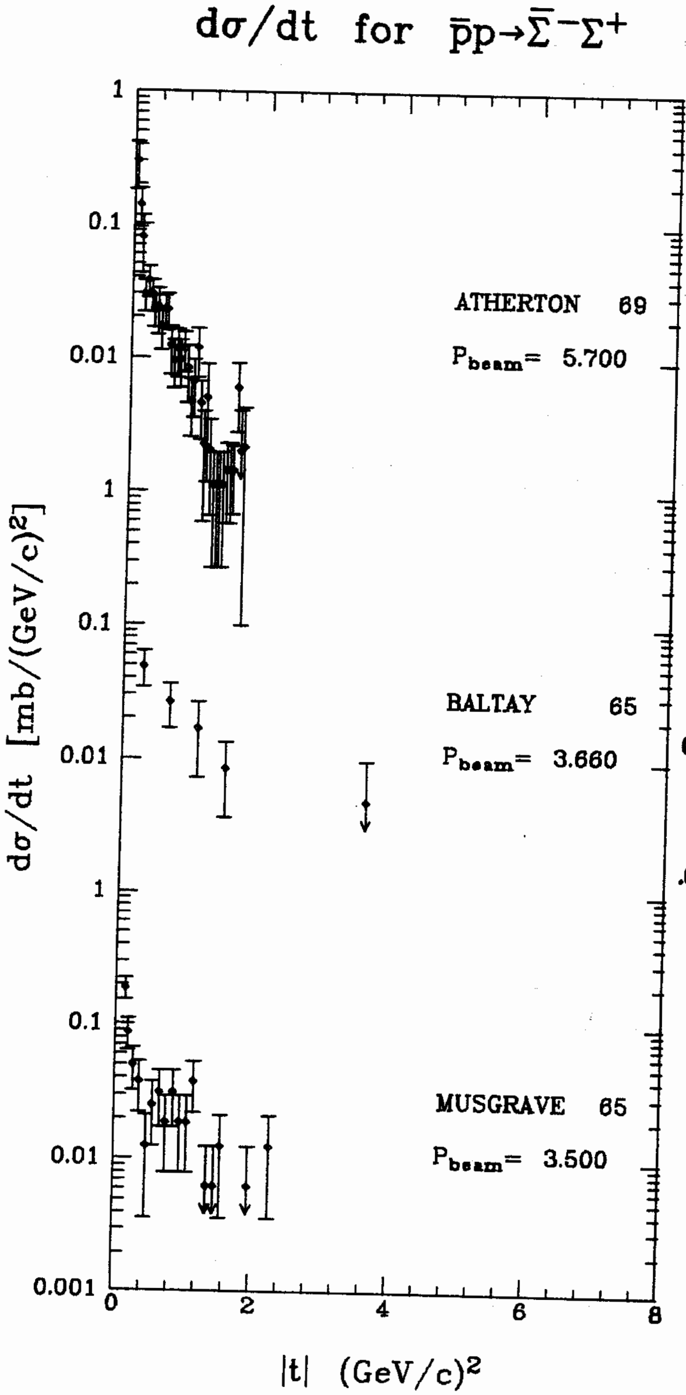
MUSGRAVE 65.....NC 35 735 HBC

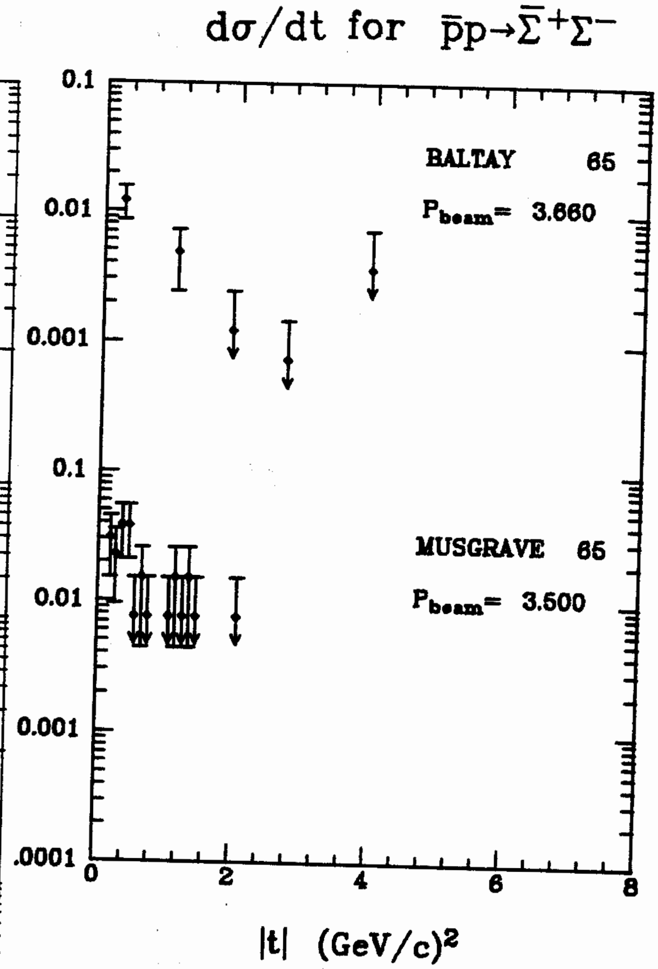
BEAM MOMENTUM= 3.66 +- .055

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.071	0.481	0.012	0.004	*
0.481	0.891	0.		*
0.891	1.301	0.005	0.002	*
1.301	1.711	0.		*
1.711	2.121	0.001	0.001	*
2.121	2.531	0.		*
2.531	2.941	0.001	0.001	*
2.941	3.351	0.		*
3.351	3.761	0.		*
3.761	4.171	0.004	0.004	*

* DATA READ FROM GRAPH

BALTAY 65.....PR 140B1027 HBC


dσ/dt for p̄p→Σ̄⁻Σ⁺
ATHERTON 69
Pbeam= 5.700
BALTAY 65
Pbeam= 3.660
MUSGRAVE 65
Pbeam= 3.500
dσ/dt [mb/(GeV/c)²]
|t| (GeV/c)²


dσ/dt for p̄p→Σ̄⁺Σ⁻
BALTAY 65
Pbeam= 3.660
MUSGRAVE 65
Pbeam= 3.500
|t| (GeV/c)²

$d\sigma/dt$ for $\bar{p}p \to \bar{Y}^*(1385)^0 \Lambda$ + c.c. ($\bar{Y}^*(1385)^0 \to \bar{\Lambda}\pi^0$)

BEAM MOMENTUM= 5.7 +- .06

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.	0.050	0.054	0.022	*†
0.050	0.100	0.107	0.034	*†
0.100	0.150	0.082	0.026	*†
0.150	0.200	0.108	0.045	*†
0.200	0.250	0.058	0.024	*†
0.250	0.300	0.047	0.029	*†
0.300	0.350	0.076	0.032	*†
0.350	0.500	0.018	0.006	*†
0.500	2.500	0.001	0.000	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

ATHERTON 71.....NP B29 477 HBC

$d\sigma/dt$ for $\bar{p}p \to \bar{Y}^*(1385)^- Y^*(1385)^+$ ($\bar{Y}^*(1385)^- \to \bar{\Lambda}\pi^-$, $Y^*(1385)^+ \to \Lambda\pi^+$)

BEAM MOMENTUM= 5.7 +- .06

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.150	0.200	0.053	0.019	*†
0.200	0.300	0.012	0.007	*†
0.300	0.350	0.022	0.012	*†
0.350	0.400	0.030	0.014	*†
0.400	0.500	0.023	0.009	*†
0.500	1.150	0.006	0.002	*†
1.150	2.100	0.000	0.000	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

ATHERTON 71.....NP B29 477 HBC

$d\sigma/dt$ for $\bar{p}p \to \bar{Y}^*(1385)^- \Sigma^+$ + c.c. ($\bar{Y}^*(1385)^- \to \bar{\Lambda}\pi^-$)

BEAM MOMENTUM= 3.66 +- .055

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]	+-	
0.160	0.332	0.063	0.020	*†
0.332	0.504	0.063	0.020	*†
0.504	0.676	0.025	0.013	*†
0.676	0.849	0.025	0.013	*†
0.849	1.021	0.006	0.006	*†
1.021	1.193	0.		*†
1.193	1.365	0.013	0.009	*†
1.365	1.537	0.006	0.006	*†
1.537	1.709	0.		*†
1.709	1.881	0.006	0.006	*†

* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

BALTAY 65.....PR 140B1027 HBC

BEAM MOMENTUM= 5.7 +- .06

-T (GEV/C)**2 MIN	MAX	D SIGMA/D T [(MB/(GEV/C)**2]		
0.050	0.100	0.087	0.036	*†
0.100	0.150	0.093	0.022	*†
0.150	0.200	0.062	0.020	*†
0.200	0.250	0.081	0.019	*†
0.250	0.300	0.076	0.018	*†
0.300	0.350	0.066	0.015	*†
0.350	0.400	0.054	0.012	*†
0.400	0.450	0.047	0.015	*†
0.450	0.500	0.087	0.028	*†
0.500	0.550	0.062	0.014	*†
0.550	0.600	0.027	0.014	*†
0.600	0.650	0.017	0.009	*†
0.650	0.700	0.018	0.007	*†
0.700	0.900	0.011	0.004	*†
0.900	1.200	0.008	0.003	*†
1.200	1.600	0.003	0.001	*†
1.600	2.500	0.003	0.001	*†

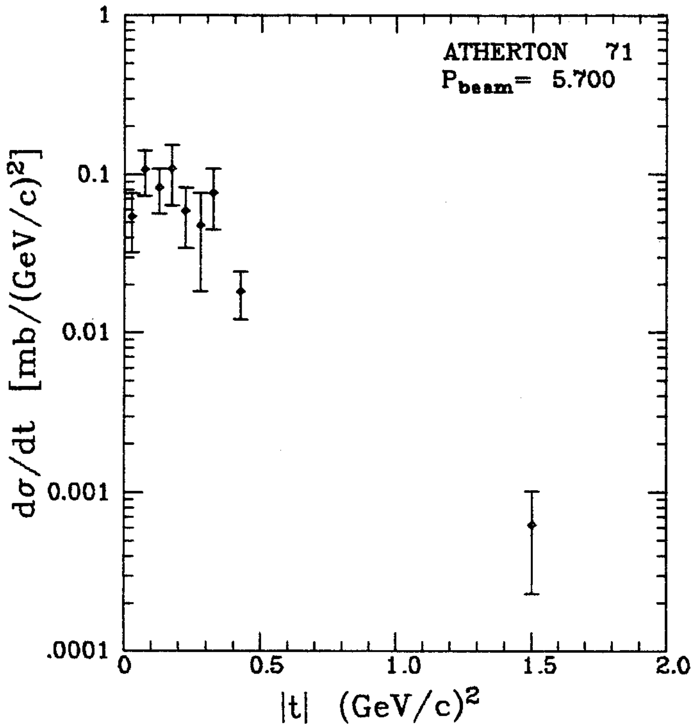
* DATA READ FROM GRAPH
† SEE DATA LISTING FOR ADDITIONAL COMMENTS

ATHERTON 71.....NP B29 477 HBC

$d\sigma/dt$ for

$\bar{p}p \to \bar{Y}^*(1385)^0 \Lambda$ + c.c.

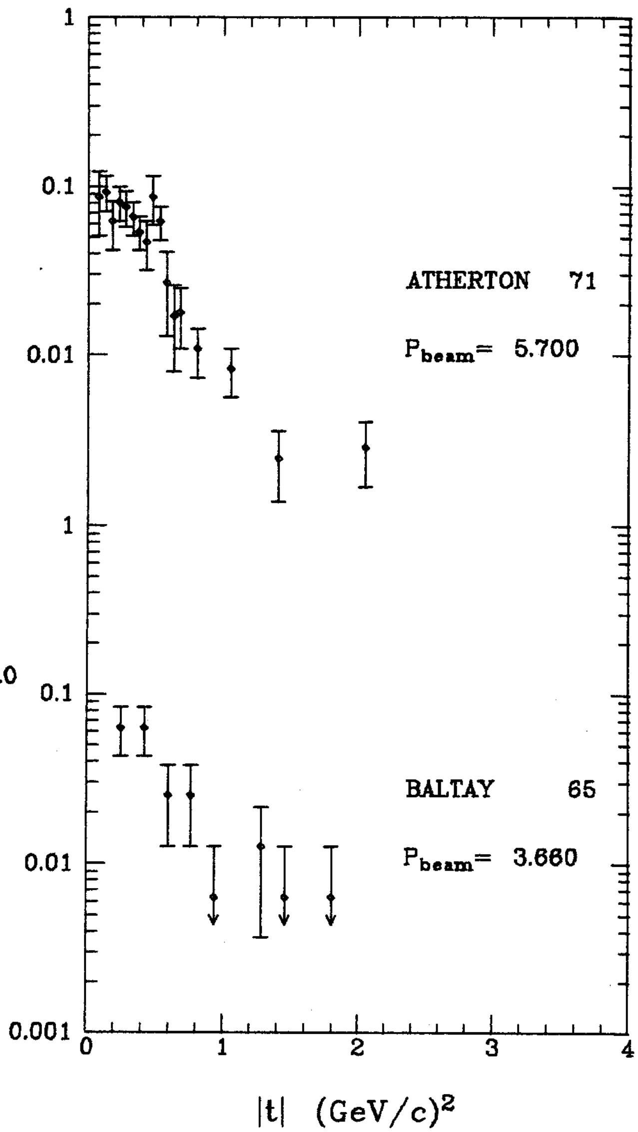
$\hookrightarrow \bar{\Lambda}\pi^0$



$d\sigma/dt$ for

$\bar{p}p \to \bar{Y}^*(1385)^- \Sigma^+$ + c.c.

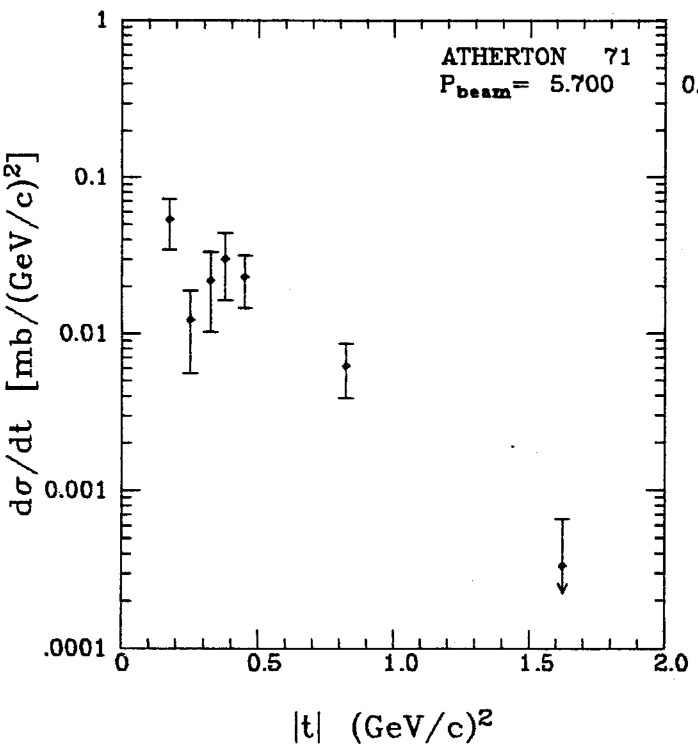
$\hookrightarrow \bar{\Lambda}\pi^-$



$d\sigma/dt$ for

$\bar{p}p \to \bar{Y}^*(1385)^- Y^*(1385)^+$

$\hookrightarrow \bar{\Lambda}\pi^-$, $\hookrightarrow \Lambda\pi^+$



Polarization in $\bar{p}p$ Elastic Scattering

The measurements of polarization we have presented have made use of the following theorem based on time reversal invariance: $P(\theta) = [N_L(\theta)-N_R(\theta)]/[N_L(\theta)+N_R(\theta)]$, as explained below. Consider an antiproton beam incident in the z direction on a hydrogen target polarized in the y direction. Define $N_L(\theta)$ to be the number of antiprotons scattering elastically through an angle θ into the $x > 0$ half of the xz plane (to the left if y is vertical), and define $N_R(\theta)$ similarly. Then $P(\theta)$ is the polarization in the y direction of a proton recoiling from an unpolarized target after an elastic collision in which an antiproton is scattered through an angle θ to the left. This theorem was first proven in slightly different form by L. Wolfenstein and J. Ashkin, Phys. Rev. 85, 947 (1952). It is also true for a beam of arbitrary spin.

p̄p elastic polarization

BEAM MOMENTUM= .91

-T (GEV/C)**2	POLARIZATION	
0.093	0.360	+-0.100 $
0.111	0.350	0.150 $
0.125	0.300	0.090 $
0.142	0.280	0.080 $
0.159	0.370	0.110 $
0.170	0.420	0.150 $
0.190	0.450	0.180 $
0.211	0.100	0.210 $
0.239	0.020	0.230 $
0.253	0.730	0.530 $
0.270	0.510	0.340 $
0.301	0.040	0.520 $
0.325	0.050	0.590 $
0.356	-0.310	0.520 $
0.388	-0.370	0.470 $
0.422	0.160	0.350 $
0.467	-0.340	0.290 $
0.509	0.220	0.620 $
0.543	0.180	0.650 $
0.585	0.760	0.820 $
0.630	0.740	0.900 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

BEAM MOMENTUM= 1.005

-T (GEV/C)**2	POLARIZATION	
0.098	0.170	0.100 $
0.107	0.390	0.130 $
0.131	0.310	0.070 $
0.152	0.390	0.070 $
0.172	0.270	0.070 $
0.193	0.510	0.090 $
0.209	0.460	0.130 $
0.242	0.430	0.170 $
0.258	0.310	0.280 $
0.279	0.290	0.430 $
0.291	0.100	0.500 $
0.307	-0.630	0.730 $
0.348	-0.060	0.620 $
0.389	0.330	0.420 $
0.410	0.940	1.100 $
0.451	0.150	0.430 $
0.488	0.160	0.300 $
0.520	0.590	0.390 $
0.565	-0.130	0.270 $
0.610	-0.580	0.580 $
0.647	0.650	0.950 $
0.688	-0.380	1.020 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

BEAM MOMENTUM= 1.048

-T (GEV/C)**2	POLARIZATION	
0.097	0.310	0.100 $
0.110	0.170	0.130 $
0.132	0.160	0.080 $
0.154	0.300	0.080 $
0.180	0.320	0.090 $
0.198	0.100	0.180 $
0.211	0.220	0.160 $
0.220	0.130	0.200 $
0.237	0.250	0.230 $
0.250	0.540	0.260 $
0.264	0.220	0.380 $
0.277	0.420	0.390 $
0.299	0.620	0.650 $
0.312	-0.760	0.380 $
0.352	0.760	0.530 $
0.387	0.090	0.370 $
0.417	0.470	0.320 $
0.457	0.510	0.450 $
0.505	0.330	0.280 $
0.549	0.	0.330 $
0.584	0.440	0.590 $
0.620	-0.150	0.560 $
0.659	0.320	0.590 $
0.716	-0.190	0.770 $
0.743	0.050	1.130 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

BEAM MOMENTUM= 1.175

-T (GEV/C)**2	POLARIZATION	
0.095	0.140	+-0.090 $
0.122	0.210	0.060 $
0.159	0.360	0.070 $
0.186	0.290	0.090 $
0.228	0.330	0.090 $
0.271	0.320	0.190 $
0.302	-0.200	0.290 $
0.340	0.280	0.360 $
0.377	0.090	0.320 $
0.424	-0.050	0.240 $
0.472	-0.060	0.240 $
0.520	0.430	0.170 $
0.568	0.250	0.360 $
0.615	0.390	0.230 $
0.695	0.270	0.200 $
0.753	0.280	0.360 $
0.817	0.040	0.410 $
0.897	-0.350	0.470 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

BEAM MOMENTUM= 1.255

-T (GEV/C)**2	POLARIZATION	
0.106	0.110	0.110 $
0.147	0.260	0.070 $
0.177	0.430	0.100 $
0.212	0.350	0.200 $
0.248	0.460	0.150 $
0.277	0.390	0.270 $
0.307	0.300	0.250 $
0.342	-0.080	0.440 $
0.383	-0.210	0.830 $
0.425	0.060	0.470 $
0.466	-0.220	0.370 $
0.496	-0.100	0.490 $
0.531	0.480	0.320 $
0.572	0.520	0.320 $
0.625	0.540	0.300 $
0.678	0.420	0.440 $
0.726	0.430	0.500 $
0.814	0.310	0.360 $
0.920	-0.260	0.560 $
1.032	-0.680	0.770 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

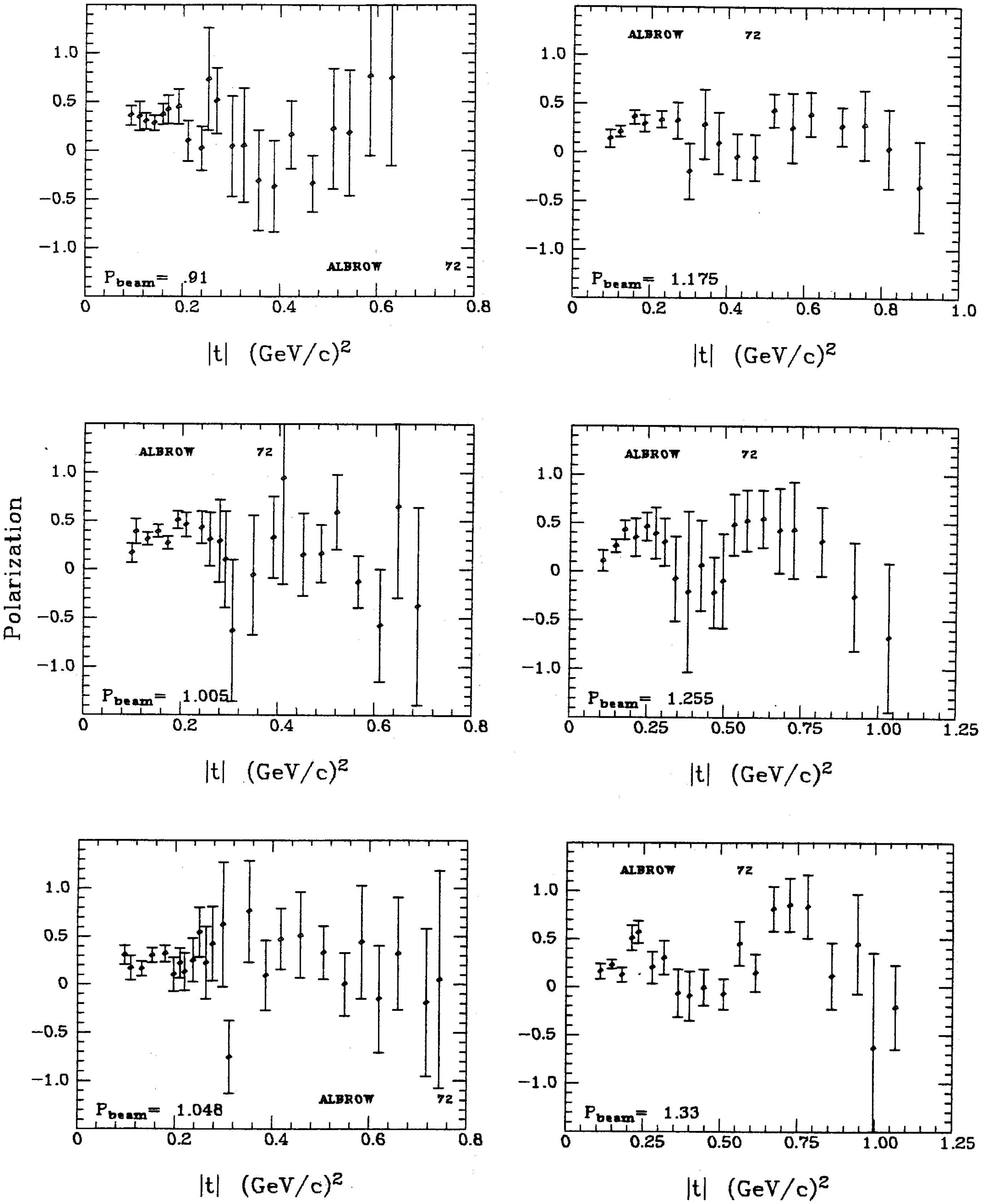
BEAM MOMENTUM= 1.33

-T (GEV/C)**2	POLARIZATION	
0.110	0.160	0.080 $
0.149	0.230	0.050 $
0.181	0.120	0.080 $
0.213	0.510	0.130 $
0.233	0.570	0.120 $
0.278	0.200	0.170 $
0.317	0.300	0.180 $
0.362	-0.070	0.250 $
0.401	-0.100	0.260 $
0.446	-0.010	0.190 $
0.511	-0.080	0.160 $
0.563	0.450	0.230 $
0.614	0.140	0.200 $
0.673	0.810	0.230 $
0.724	0.850	0.280 $
0.783	0.830	0.330 $
0.860	0.110	0.350 $
0.944	0.440	0.520 $
0.996	-0.630	0.980 $
1.067	-0.210	0.440 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

$\bar{p}p$ elastic polarization



$\bar{p}p$ elastic polarization

BEAM MOMENTUM= 1.73

-T (GEV/C)**2	POLARIZATION		
0.097	0.270	+-0.080	$
0.106	0.120	0.060	$
0.145	0.330	0.040	$
0.174	0.280	0.040	$
0.242	0.340	0.070	$
0.386	0.660	0.620	$
0.425	0.550	0.170	$
0.483	0.290	0.170	$
0.570	0.450	0.150	$
0.589	0.110	0.140	$
0.705	0.260	0.120	$
0.734	0.190	0.160	$
0.831	0.620	0.170	$
0.899	0.330	0.210	$
0.966	0.450	0.190	$
1.063	0.520	0.230	$
1.111	0.180	0.210	$
1.227	0.570	0.500	$
1.256	-0.250	0.400	$
1.372	-0.320	0.650	$
1.401	-0.330	0.410	$
1.517	1.160	1.130	$
1.546	-0.820	0.610	$
1.672	0.490	0.710	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 1.74

-T (GEV/C)**2	POLARIZATION		
0.107	0.260	0.080	$
0.146	0.260	0.030	$
0.195	0.220	0.040	$
0.244	0.450	0.060	$
0.283	0.180	0.160	$
0.312	0.420	0.120	$
0.361	0.710	0.180	$
0.400	0.550	0.260	$
0.429	0.370	0.160	$
0.507	0.310	0.110	$
0.575	0.350	0.130	$
0.653	0.200	0.100	$
0.731	0.190	0.130	$
0.799	0.360	0.150	$
0.867	0.370	0.150	$
0.935	0.590	0.180	$
1.023	0.440	0.170	$
1.111	0.160	0.270	$
1.179	-0.130	0.300	$
1.247	-1.040	0.670	$
1.316	0.510	1.040	$
1.384	0.410	0.610	$
1.452	-0.560	0.750	$
1.520	0.090	0.990	$
1.579	0.400	0.430	$
1.666	0.590	0.410	$
1.764	0.140	0.600	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

BEAM MOMENTUM= 2.13

-T (GEV/C)**2	POLARIZATION		
0.130	0.120	0.040	$
0.130	0.180	0.040	$
0.222	0.180	0.030	$
0.378	0.240	0.100	$
0.469	0.290	0.160	$
0.574	0.110	0.110	$
0.587	0.020	0.120	$
0.730	0.140	0.120	$
0.795	0.230	0.110	$
0.886	-0.010	0.130	$
1.017	0.270	0.130	$
1.043	0.250	0.200	$
1.225	0.290	0.170	$
1.238	-0.100	0.210	$
1.421	0.070	0.280	$
1.460	-0.020	0.320	$
1.629	0.030	0.350	$
1.668	-0.070	0.320	$
1.838	0.060	0.280	$
1.864	0.190	0.480	$
2.033	-0.160	0.290	$
2.046	0.690	0.550	$
2.203	-0.390	0.750	$
2.216	-0.820	0.810	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 2.37

-T (GEV/C)**2	POLARIZATION		
0.151	0.220	+-0.040	$
0.166	0.190	0.040	$
0.317	0.220	0.090	$
0.453	0.190	0.130	$
0.514	-0.210	0.140	$
0.680	0.010	0.110	$
0.937	0.290	0.110	$
0.982	0.350	0.180	$
1.164	0.440	0.260	$
1.194	-0.150	0.150	$
1.375	0.090	0.300	$
1.466	-0.290	0.360	$
1.602	-0.260	0.510	$
1.723	0.090	0.320	$
1.844	-0.070	0.260	$
1.965	0.090	0.310	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

BEAM MOMENTUM= 2.5

-T (GEV/C)**2	POLARIZATION		
0.130	0.110	0.030	$
0.179	0.200	0.050	$
0.228	0.260	0.050	$
0.325	0.320	0.190	$
0.390	0.010	0.170	$
0.488	0.030	0.170	$
0.601	0.020	0.130	$
0.715	0.030	0.140	$
0.764	0.050	0.220	$
0.845	0.100	0.120	$
0.926	0.070	0.170	$
0.991	0.040	0.150	$
1.105	0.260	0.190	$
1.235	0.080	0.210	$
1.381	-0.500	0.320	$
1.495	-0.200	0.440	$
1.609	-0.830	0.430	$
1.739	0.210	0.360	$
1.853	0.040	0.500	$
1.966	0.080	0.390	$
2.096	0.730	0.380	$
2.210	-1.030	0.470	$
2.324	-0.850	0.420	$
2.438	-0.050	0.970	$
2.795	-0.490	0.650	$
2.925	-0.690	0.770	$
3.055	-0.760	0.930	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

ALBROW 72.....NP B37 349 CNTR

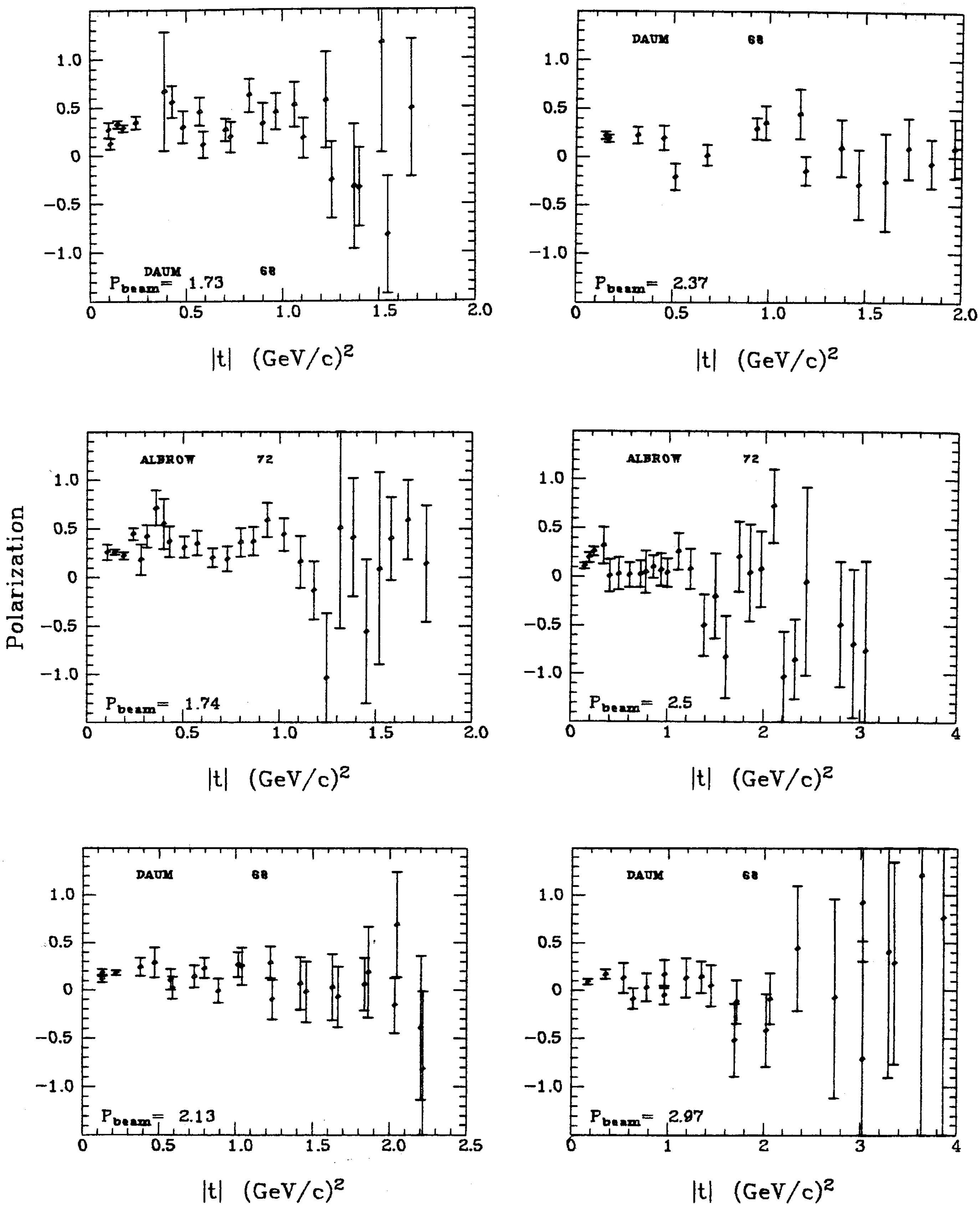
BEAM MOMENTUM= 2.97

-T (GEV/C)**2	POLARIZATION		
0.163	0.090	0.030	$
0.347	0.170	0.050	$
0.531	0.130	0.160	$
0.633	-0.090	0.110	$
0.776	0.030	0.150	$
0.960	-0.050	0.100	$
0.960	0.170	0.150	$
1.184	0.130	0.210	$
1.348	0.140	0.170	$
1.450	0.050	0.220	$
1.695	-0.520	0.380	$
1.715	-0.120	0.230	$
2.022	-0.420	0.380	$
2.062	-0.090	0.270	$
2.348	0.440	0.660	$
2.695	-2.230	2.660	$
2.736	-0.080	1.040	$
3.022	-0.710	1.230	$
3.022	0.920	0.620	$
3.288	0.400	1.310	$
3.349	0.290	1.060	$
3.635	1.210	3.240	$
3.859	0.760	2.930	$

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

DAUM 68.....NP B6 617 CNTR

$\bar{p}p$ elastic polarization



$\bar{p}p$ elastic polarization

BEAM MOMENTUM= 6.

-T (GEV/C)**2 MIN	MAX	POLARIZATION	
0.050	0.150	0.106	← 0.074 $
0.150	0.250	0.119	0.082 $
0.250	0.400	0.085	0.127 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BORGHINI 70.....PL 31B 405 CNTR

BEAM MOMENTUM= 10.

-T (GEV/C)**2 MIN	MAX	POLARIZATION	
0.100	0.150	-0.084	0.058 $
0.150	0.200	-0.010	0.030 $
0.200	0.250	0.025	0.036 $
0.250	0.300	-0.073	0.046 $
0.300	0.350	0.033	0.065 $
0.350	0.400	-0.128	0.084 $
0.400	0.550	-0.053	0.088 $
0.550	0.750	-0.260	0.180 $
0.750	0.900	0.138	0.360 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BORGHINI 71.....PL 36B 497 CNTR

BEAM MOMENTUM= 14.

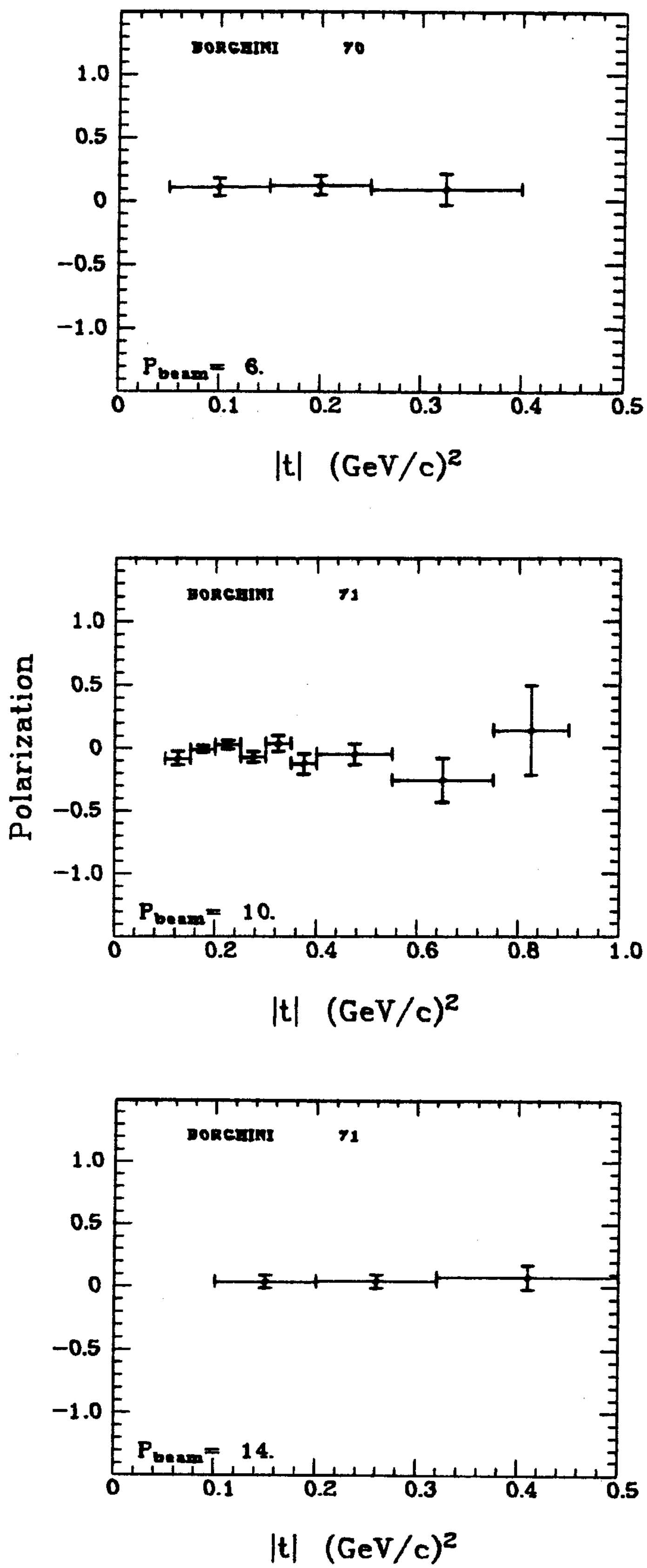
-T (GEV/C)**2 MIN	MAX	POLARIZATION	
0.100	0.200	0.032	0.052 $
0.200	0.320	0.038	0.058 $
0.320	0.500	0.076	0.100 $

$ SEE DATA LISTING FOR POSSIBLE SYSTEMATIC ERRORS

BORGHINI 71.....PL 36B 497 CNTR

PLOT 1 LEVEL 1 KBOX 1 NSPECS 1

$\bar{p}p$ elastic polarization



Section III.

ARTICLE DATA LISTINGS

In this section we present a listing of all the $\overline{N}N$ and $\overline{N}D$ articles on our DATA TAPE. These are the actual data used in forming the graphs and tables in Section II. The information is presented article-by-article, just as we store it. These listings contain a certain amount of information not included in the previous section. In particular there are several articles for which we have punched no data but have punched the bibliographic information, keywords, and some comments.

- In addition we have also punched the title and abstract for every article, to assist you in your selection of articles for further reading.

- Also in this section you will find comments on many pieces of data—it is in general not practical to present these comments in Section II.

- Many articles give data that we feel we cannot meaningfully compile at present (only partially corrected, integrated only over a certain interval, etc). These data have in many cases been punched and will be found in this section.

- You will also find in this section data reported as upper and lower limits, approximate values, etc.

- Occasionally we do not use the data as originally given in the article. This section tells exactly where our data came from (private communications, unpublished companion report, etc.).

- The size of an experiment is frequently indicated by the total number of pictures taken, or by the number of events in various distributions.

- To give you an idea of the scope of a particular article, KEYWORDS are included for each article. These words can also be used to form classified indices (see Section IV).

To repeat, the above items are some of the things you will find in this section that are not presented in Section II.

Finally, this section may serve the useful function of permitting the reader to easily check on the accuracy of our input data. The data is arranged article-by-article, and in most cases we have indicated [in square brackets] the exact location of the data in the article (i.e., the figure, table, or page number). If you find any errors or misinterpretations, please let us know as soon as possible.

As for the organization of the information in this section, we should mention that the order of the articles is alphabetical by first author and chronological within the same first author.

Above the double dotted line in each article you will find the title, authors and institutions, abstract (if the article had one) related citations, beam information, comments, KEYWORDS, etc.

Below the double line in each article appear the data. We generally enter the data in exactly the same units as given by the authors. (This is done primarily to facilitate the verification of the data.) If we do alter the data in any way, we indicate this fact by an appropriate comment.

Occasionally authors give the same data in two different forms. We usually punch only the form we feel is most useful. Furthermore, some of the data in this section is displayed in a different form in Section II.

We have tried to be particularly careful about including systematic errors, whenever given by the authors. In some cases it is quite unclear from the original article and we have had to contact the authors directly.

Another reason for contacting authors has been to get tables of data that correspond to the published graphs. If we are unable to get tables from an author, or if the article is more than a couple of years old, we read the data off the published graph, and then include the warning that "these data were read from a graph." (In some cases the tables we received have been more up to date than the published graphs.)

1 STRUCTURES IN THE PBAR P AND PBAR D TOTAL CROSS SECTIONS BETWEEN 1.0 AND 3.3 GEV/C [PHYS. REV. LETTERS 18, 1209 (1967)]

R.J.ABRAMS, R.L.COOL, G.GIACOMELLI, T.F.KYCIA, B.A.LEONTIC, K.K.LI, D.N. MICHAEL [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT THREE STRUCTURES ARE OBSERVED IN PBAR P AND PBAR D TOTAL CROSS SECTIONS IN A TRANSMISSION EXPERIMENT. TWO STRUCTURES, AT CENTER-OF-MASS ENERGIES 2190 +/- 5 AND 2345 +/-10 MEV RESPECTIVELY, ARE FOUND IN THE ISOSPIN-ONE STATE. THE THIRD STRUCTURE, AT 2380 +/-10 MEV, IS FOUND IN THE ISOSPIN-ZERO STATE.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. D1, 1917 (1970).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.0 TO 3.3 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON FROM 1.0 TO 3.3 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

2 TOTAL CROSS SECTIONS OF K+- MESONS AND ANTIPROTONS ON NUCLEONS UP TO 3.3 GEV/C [PHYS. REV. D1, 1917 (1970)]

R.J.ABRAMS, R.L.COOL, G.GIACOMELLI, T.F.KYCIA, B.A.LEONTIC, K.K.LI, D.N. MICHAEL [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT TOTAL CROSS SECTIONS OF K+/- AND PBAR ON HYDROGEN AND DEUTERIUM WERE MEASURED IN A STANDARD TRANSMISSION EXPERIMENT WITH STATISTICAL PRECISIONS OF THE ORDER OF 0.05-0.25 PERCENT. DATA WERE OBTAINED IN THE MOMENTUM RANGE 2.45-3.30 GEV/C FOR K(MINUS)N, 1.55-3.30 GEV/C FOR K(PLUS)N, AND 1.00-3.30 GEV/C FOR PBAR-N. CROSS SECTIONS FOR THE PURE ISOTOPIC SPIN STATES ARE OBTAINED USING A PROCEDURE FOR THE DEUTERIUM DATA WHICH TAKES INTO ACCOUNT FERMI MOTION AND THE SHADOW EFFECT. EVIDENCE FOR THE FOLLOWING NEW STRUCTURES WAS FOUND - Y(SUB 1)*(2455), Y(SUB 1)*(2620), Y(SUB 0)*(2585), Z(SUB 1)*(2150), Z(SUB 1)*(2500), PI(SUB 1)*(2190), PI(SUB 1)*(2350), AND PI(SUB 0)*(2375).

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. D1, 1887 (1970).
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 18, 1209 (1967).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.0 TO 3.3 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON FROM 1.0 TO 3.3 GEV/C.
THIS EXPERIMENT USES COUNTERS.
GENERAL COMMENTS ON THIS ARTICLE
1 ABSOLUTE UNCERTAINTY IN BEAM MOMENTUM +/-0.5 PERCENT; RELATIVE UNCERTAINTY+/-0.1 PERCENT.
KEY WORDS + CROSS SECTION RESONANCE PRODUCTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 4]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1,2]	
1.000	117.42 +-	.21
1.050	114.59	.17
1.100	111.64	.16
1.150	110.11	.12
1.200	108.96	.11
1.250	107.75	.10
1.300	106.47	.10
1.345	105.50	.10
1.400	102.78	.09
1.450	101.12	.08
1.490	100.26	.06
1.550	98.82	.06
1.600	97.81	.06
1.650	97.05	.06
1.700	96.46	.06
1.750	95.61	.06
1.806	94.48	.06
1.850	93.71	.06
1.875	93.05	.06
1.900	92.52	.06
1.925	92.07	.06
1.950	91.38	.06
2.000	90.23	.04
2.050	88.84	.05
2.095	88.46	.06
2.150	87.39	.06
2.200	86.81	.06
2.250	85.62	.06
2.300	85.00	.05
2.350	84.45	.05
2.400	83.66	.06
2.450	83.16	.06
2.500	82.32	.04
2.550	81.64	.05
2.600	81.12	.05
2.650	80.61	.05
2.700	79.90	.05
2.750	79.47	.05
2.800	78.91	.05
2.850	78.21	.05
2.900	77.79	.05
2.950	77.23	.05
3.000	76.68	.05
3.050	76.29	.05
3.100	75.66	.05
3.150	75.16	.05
3.200	74.66	.05
3.250	74.20	.05
3.300	73.67	.05

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 1 PER CENT.

ANTIPROTON DEUTERON TOTAL CROSS SECTION. [TABLE 4]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1,2]	
1.000	208.18 +-	.21
1.050	203.37	.20
1.100	199.84	.19
1.150	197.14	.15
1.200	195.21	.13
1.250	193.77	.13
1.300	191.71	.12
1.345	190.17	.12
1.400	186.19	.12
1.450	183.51	.10
1.490	181.47	.09
1.550	178.80	.08
1.600	176.97	.08
1.650	175.16	.08
1.700	173.75	.08
1.750	172.33	.08
1.806	169.88	.07
1.850	168.49	.09
1.875	167.55	.07
1.900	166.59	.07
1.925	165.69	.07
1.950	164.59	.07
2.000	162.69	.06
2.050	160.46	.07
2.095	159.99	.07
2.150	157.76	.07
2.200	156.45	.07
2.250	154.53	.07
2.300	153.13	.07
2.350	152.24	.07
2.400	150.56	.07
2.450	149.46	.07
2.500	148.21	.05
2.550	147.09	.07
2.600	145.93	.07
2.650	145.01	.06
2.700	143.99	.06
2.750	143.12	.07
2.800	141.90	.06
2.850	140.87	.06
2.900	140.03	.06
2.950	139.19	.06
3.000	138.25	.06
3.050	137.30	.06
3.100	136.37	.06
3.150	135.70	.06
3.200	134.84	.06
3.250	134.05	.06
3.300	133.23	.06

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 1 PER CENT.

I = 0 ANTIPROTON NUCLEON TOTAL CROSS SECTION. [TABLE 7]

GLAUBER + FERMI MOTION CORRECTIONS MADE

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1,2]	
1.000	124.67 +-	.66
1.050	121.40	.55
1.100	115.87	.52
1.150	113.45	.39
1.200	111.19	.35
1.250	108.31	.33
1.300	106.45	.32
1.345	105.56	.32
1.400	102.71	.30
1.450	101.59	.26
1.490	101.60	.20
1.550	100.16	.20
1.600	98.90	.20
1.650	98.26	.20
1.700	97.76	.20
1.750	96.69	.20
1.806	96.15	.19
1.850	95.76	.20
1.875	95.07	.19
1.900	94.76	.19
1.925	94.68	.19
1.950	94.02	.19
2.000	93.00	.13
2.050	91.40	.17
2.095	91.00	.19
2.150	90.32	.19
2.200	90.16	.19
2.250	88.75	.19
2.300	88.49	.17
2.350	87.94	.17
2.400	87.49	.19
2.450	87.31	.19
2.500	86.20	.13
2.550	85.43	.17
2.600	85.17	.17
2.650	84.75	.16
2.700	83.78	.16
2.750	83.46	.17
2.800	83.16	.16
2.850	82.33	.16
2.900	82.10	.16
2.950	81.42	.16
3.000	80.89	.16
3.050	80.88	.16
3.100	80.11	.16
3.150	79.42	.16
3.200	78.96	.16
3.250	78.52	.16
3.300	77.70	.16

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 6 PER CENT.

ANTIPROTON NEUTRON TOTAL CROSS SECTION. [TABLE 7]

THIS CROSS SECTION IS IDENTICAL TO THE I=1 ANTIPROTON NUCLEON TOTAL CROSS SECTION

GLAUBER + FERMI MOTION CORRECTIONS MADE

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1,2]	
1.000	110.17 +-	.30
1.050	107.78	.26
1.100	107.41	.25
1.150	106.66	.19
1.200	106.73	.17
1.250	107.19	.16
1.300	106.49	.16
1.345	105.44	.16
1.400	102.85	.15
1.450	100.65	.13
1.490	98.92	.11
1.550	97.48	.10
1.600	96.72	.10
1.650	95.84	.10
1.700	95.16	.10
1.750	94.53	.10
1.806	92.81	.09
1.850	91.66	.11
1.875	91.03	.09
1.900	90.28	.09
1.925	89.46	.09
1.950	88.74	.09
2.000	87.46	.07
2.050	86.28	.09
2.095	85.92	.09
2.150	84.46	.09
2.200	83.46	.09
2.250	82.49	.09
2.300	81.51	.09
2.350	80.96	.09
2.400	79.83	.09
2.450	79.01	.09
2.500	78.44	.06
2.550	77.85	.09
2.600	77.07	.09
2.650	76.47	.08
2.700	76.02	.08
2.750	75.48	.09
2.800	74.66	.08
2.850	74.09	.08
2.900	73.48	.08
2.950	73.04	.08
3.000	72.47	.08
3.050	71.70	.08
3.100	71.21	.08
3.150	70.90	.08
3.200	70.36	.08
3.250	69.88	.08
3.300	69.64	.08

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 4 PER CENT.

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3 ANNIHILATIONS OF 5.7 GEV/C ANTIPROTONS IN HYDROGEN INTO FOUR CHARGED PIONS [PHYS. LETTERS 20, 557 (1966)]

A.ACCENSI,V.ALLES-BORELLI,B.FRENCH,A.FRISK,J.M.HOWIE,W.KRISCHER,L.MICHEJDA, W.G.MOORHEAD,B.W.POWELL,P.SEYBOTH,P.VILLEMOES
[CERN, GENEVA, SWITZERLAND]

ABSTRACT ANNIHILATIONS OF 5.7 GEV/C ANTIPROTONS IN HYDROGEN INTO FOUR CHARGED PIONS HAVE BEEN STUDIED. PRODUCTION OF RHO0 AND F0 MESONS AND A POSSIBLE ENHANCEMENT IN BOTH PI+- PI+- AND PI+ PI- MASS DISTRIBUTIONS AT 1.54 GEV IS SEEN. UPPER LIMITS FOR QUASI- 2-BODY ANNIHILATIONS ARE GIVEN.

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS • ANNIHILATION CROSS SECTION PION PRODUCTION RHO(765) F(1260)
COMPOUND KEY WORDS • ANNIHILATION CROSS SECTION PION PRODUCTION

....
....

CROSS SECTION FOR ANTIPROTON PROTON • PI+ PI+ PI- PI-. [PAGE 557]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]
5.7	173. +- 16.

[1] ERRORS ARE STATISTICAL ONLY.

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[PAGE 559]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MICROBARNS
ANTIPROTON PROTON •	
RHO(765)0 RHO(765)0	< 10.00 (.95 CONF LEVEL)
RHO(765)0 • PI+ PI- [1]	
RHO(765)0 • PI+ PI- [1]	
F(1260) F(1260)	< 31.00 (.95 CONF LEVEL)
F(1260) • PI+ PI- [1]	
RHO(765)0 F(1260)	< 22.00 (.95 CONF LEVEL)
RHO(765)0 • PI+ PI- [1]	
F(1260) • PI+ PI- [1]	
RHO(765)0 PI+ PI-	42.00 +- 13.00 [2]
RHO(765)0 • PI+ PI- [1]	
F(1260) PI+ PI-	43.00 12.00 [2]
F(1260) • PI+ PI- [1]	

[1] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[2] ERRORS INCLUDE SYSTEMATICS.

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4 STRUCTURE IN THE K KBAR DECAY MODE OF THE A2 MESON. [PHYS. LETTERS 29B, 62 (1969)]

M.AGUILAR-BENITEZ, J.BARLOW, L.D.JACOBS, P.MALECKI, L.MONTANET, M.TOMAS [CERN, GENEVA, SWITZERLAND]
M.DELLA NEGRA, J.COHEN-GANOUNA, B.LOERSTAD [COLLEGE DE FRANCE, PARIS, FRANCE]
N.WEST [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT EVIDENCE FROM THE K KBAR DECAY MODE FOR THE SPLITTING OF THE A2 MESON IS PRESENTED.

CLOSELY RELATED REFERENCES
SEE ALSO NUC. PHYS. B3, 469 (1967).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 25B, 294 (1967), AND NUOVO CIMENTO 50, 701 (1967).

BEAM IS ANTIPROTON ON PROTON FROM .7 TO 1.2 GEV/C.
THIS EXPERIMENT USES BUBBLE CHAMBERS.
KEY WORDS * ANNIHILATION MESONS RESONANCE PRODUCTION A2(1300)
COMPOUND KEY WORDS * MESONS RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

5 KO1 KO1 ENHANCEMENTS AS OBSERVED IN ANNIHILATIONS OF SLOW ANTI-PROTONS IN HYDROGEN. [PHYS. LETTERS 29B, 241 (1969)]

M.AGUILAR-BENITEZ, J.BARLOW, L.D.JACOBS, P.MALECKI, L.MONTANET [CERN, GENEVA, SWITZERLAND]
C.D'ANDLAU, A.ASTIER, J.COHEN-GANOUNA, M.DELLA NEGRA, B.LOERSTAD [COLLEGE DE FRANCE, PARIS, FRANCE]

ABSTRACT EXPERIMENTAL RESULTS ARE PRESENTED AND DISCUSSED FOR THE KO1 KO1 SYSTEM THRESHOLD, WITH EVIDENCE FOR THE PRESENCE OF THE S* AND THE FO MESONS.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 50, 701 (1967).

BEAM NO. 1 IS ANTIPROTON ON PROTON AT .7 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS * ANNIHILATION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS * MESONS RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

6 EVIDENCE FOR A NON-STRANGE I = 1 MESON OF MASS 1540 MEV. [PHYS. LETTERS 29B, 379 (1969)]

M.AGUILAR-BENITEZ, J.BARLOW, L.D.JACOBS, P.MALECKI, L.MONTANET [CERN, GENEVA, SWITZERLAND]
C.D'ANDLAU, A.ASTIER, J.COHEN-GANOUNA, M.DELLA-NEGRA, B.LOERSTAD [COLLEGE DE FRANCE, PARIS, FRANCE]

ABSTRACT EVIDENCE IS PRESENTED FOR THE EXISTENCE OF A NON-STRANGE ISOSPIN 1 MESON WITH MASS MO APPROX. = 1540 MEV AND WIDTH GAMMAO APPROX = 40 MEV DECAYING INTO K*KBAR AND KBAR* K. SPIN-PARITIES PREFERRED ARE 2- AND 1+ (1).

BEAM IS ANTIPROTON ON PROTON AT .7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS * ANNIHILATION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS * MESONS RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

7 AN ANALYSIS OF THE REACTION PBAR P * KO KOBAR PI+ PI- AT 0.7 GEV/C AND THE SPIN-PARITY OF THE F1 MESON. [NUC. PHYS. B14, 195 (1969)]

M.AGUILAR-BENITEZ, J.BARLOW, L.D.JACOBS, P.MALECKI, L.MONTANET [CERN, GENEVA, SWITZERLAND]
C.D'ANDLAU, A.ASTIER, J.COHEN-GANOUNA, M.DELLA-NEGRA, B.LOERSTAD [COLLEGE DE FRANCE, PARIS, FRANCE]

ABSTRACT EXPERIMENTAL RESULTS ARE PRESENTED ON THE REACTIONS PBAR P * KO1 KO1 PI+ PI- AND PBAR P * KO1 KO1 PI+ PI- AT 0.7 GEV/C. THE PRODUCTION OF K*,S*, FO, PHI, RHO IS OBSERVED, AS WELL AS THE RECENTLY PROPOSED F1 MESON -- ITS SPIN-PARITY QUANTUM NUMBERS ARE DISCUSSED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. LETTERS 29B, 379 (1969).

BEAM IS ANTIPROTON ON PROTON AT .7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 360000 PICTURES ARE REPORTED ON.
KEY WORDS * ANNIHILATION MESONS PRODUCTION
COMPOUND KEY WORDS * MESONS PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

8 POLARIZATION IN ELASTIC ANTIPROTON-PROTON SCATTERING BETWEEN 0.9 AND 2.5 GEV/C. [NUC. PHYS. B37, 349 (1972)]

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ABSTRACT POLARIZATION AND DIFFERENTIAL CROSS-SECTION DATA ARE PRESENTED FOR ELASTIC SCATTERING OF ANTIPROTONS ON POLARIZED PROTONS AT EIGHT MOMENTA BETWEEN 0.9 AND 2.5 GEV/C. THE DATA ARE FITTED WITH A DIFFRACTION MODEL.

BEAM IS ANTIPROTON ON HYDROGEN FROM .9 TO 2.5 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + ELASTIC SCATTERING POLARIZATION

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = .91 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.73	.36 +-	.10
.68	.35	.15
.64	.30	.09
.59	.28	.08
.54	.37	.11
.51	.42	.15
.45	.45	.18
.39	.10	.21
.31	.02	.23
.27	.73	.53
.22	.51	.34
.13	.04	.52
.06	.05	.59
-.03	-.31	.52
-.12	-.37	.47
-.22	.16	.35
-.35	-.34	.29
-.47	.22	.62
-.57	.18	.65
-.69	.76	.82
-.82	.74	.90

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 1.005 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.76	.17 +-	.10
.74	.39	.13
.68	.31	.07
.63	.39	.07
.58	.27	.07
.53	.51	.09
.49	.46	.13
.41	.43	.17
.37	.31	.28
.32	.29	.43
.29	.10	.50
.25	-.63	.73
.15	-.06	.62
.05	.33	.42
.00	.94	1.10
-.10	.15	.43
-.19	.16	.30
-.27	.59	.39
-.38	-.13	.27
-.49	-.58	.58
-.58	.65	.95
-.68	-.38	1.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 3]

LABORATORY BEAM MOMENTUM = 1.048 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.78	.31 +-	.10
.75	.17	.13
.70	.16	.08
.65	.30	.08
.59	.32	.09
.55	.10	.18
.52	.22	.16
.50	.13	.20
.46	.25	.23
.43	.54	.26
.40	.22	.38
.37	.42	.39
.32	.62	.65
.29	-.76	.38
.20	.76	.53
.12	.09	.37
.05	.47	.32
-.04	.51	.45
-.15	.33	.28
-.25	.00	.33
-.33	.44	.59
-.41	-.15	.56
-.50	.32	.59
-.63	-.19	.77
-.69	.05	1.13

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 4]

LABORATORY BEAM MOMENTUM = 1.175 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.82	.14 +-	.09
.77	.21	.06
.70	.36	.07
.65	.29	.09
.57	.33	.09
.49	.32	.19
.43	-.20	.29
.36	.28	.36
.29	.09	.32
.20	-.05	.24
.11	-.06	.24
.02	.43	.17
-.07	.25	.36
-.16	.39	.23
-.31	.27	.20
-.42	.28	.36
-.54	.04	.41
-.69	-.35	.47

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 5]

LABORATORY BEAM MOMENTUM = 1.255 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.82	.11 +-	.11
.75	.26	.07
.70	.43	.10
.64	.35	.20
.58	.46	.15
.53	.39	.27
.48	.30	.25
.42	-.08	.44
.35	-.21	.83
.28	.06	.47
.21	-.22	.37
.16	-.10	.49
.10	.48	.32
.03	.52	.32
-.06	.54	.30
-.15	.42	.44
-.23	.43	.50
-.38	.31	.36
-.56	-.26	.56
-.75	-.68	.77

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 6]

LABORATORY BEAM MOMENTUM = 1.33 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.83	.16 +-	.08
.77	.23	.05
.72	.12	.08
.67	.51	.13
.64	.57	.12
.57	.20	.17
.51	.30	.18
.44	-.07	.25
.38	-.10	.26
.31	-.01	.19
.21	-.08	.16
.13	.45	.23
.05	.14	.20
-.04	.81	.23
-.12	.85	.28
-.21	.83	.33
-.33	.11	.35
-.46	.44	.52
-.54	-.63	.98
-.65	-.21	.44

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 7]

LABORATORY BEAM MOMENTUM = 1.74 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.89	.26 +-	.08
.85	.26	.03
.80	.22	.04
.75	.45	.06
.71	.18	.16
.68	.42	.12
.63	.71	.18
.59	.55	.26
.56	.37	.16
.48	.31	.11
.41	.35	.13
.33	.20	.10
.25	.19	.13
.18	.36	.15
.11	.37	.15
.04	.59	.18
-.05	.44	.17
-.14	.16	.27
-.21	-.13	.30
-.28	-1.04	.67
-.35	.51	1.04
-.42	.41	.61
-.49	-.56	.75
-.56	.09	.99
-.62	.40	.43
-.71	.59	.41
-.81	.14	.60

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

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ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 8]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.92	.11 +-	.03
.89	.20	.05
.86	.26	.05
.80	.32	.19
.76	.01	.17
.70	.03	.17
.63	.02	.13
.56	.03	.14
.53	.05	.22
.48	.10	.12
.43	.07	.17
.39	.04	.15
.32	.26	.19
.24	.08	.21
.15	-.50	.32
.08	-.20	.44
.01	-.83	.43
-.07	.21	.36
-.14	.04	.50
-.21	.08	.39
-.29	.73	.38
-.36	-1.03	.47
-.43	-.85	.42
-.50	-.05	.97
-.72	-.49	.65
-.80	-.69	.77
-.88	-.76	.93

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

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9 HEAVY-BOSON PRODUCTION IN PBAR P MULTIPION ANNIHILATION AT 6.94 GEV/C [PHYS. REV. LETTERS 25, 63 (1970)]

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ABSTRACT PRODUCTION OF HEAVY BOSONS IS STUDIED IN PBAR P SIX-PRONG ANNIHILATIONS AT 6.94 GEV/C. EVIDENCE IS PRESENTED FOR THE EXISTENCE OF A HEAVY BOSON WITH A MASS OF 3.035 GEV AND A FULL WIDTH OF 0.200 GEV DECAYING INTO FOUR AND SIX PIONS. THE POSSIBLE EXISTENCE OF ANOTHER BOSON AT 3.4 GEV IS ALSO DISCUSSED.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY NUC. PHYS. B23, 557 (1970).
THIS ARTICLE SUPERSEDES PART OF PHYS. REV. 173, 1307 (1968).

BEAM IS ANTIPROTON ON PROTON AT 6.94 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 25000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION MESONS PRODUCTION
COMPOUND KEY WORDS + MESONS PRODUCTION

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NO DATA PUNCHED FOR THIS ARTICLE

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10 GENERAL FEATURES OF PBAR P ANNIHILATION INTO SIX CHARGED PIONS AT 6.94 GEV/C INCIDENT MOMENTUM. [NUC. PHYS. B23, 557 (1970)]

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ABSTRACT THE REACTIONS PBAR P → 3PI+ 3PI- M PIO (M ≥ 0) HAVE BEEN STUDIED AT AN INCIDENT MOMENTUM OF 6.94 GEV/C. THE FOLLOWING CROSS SECTIONS HAVE BEEN OBTAINED.
SIGMA (PBAR P → 3PI+ 3PI-) = 0.25 +- 0.03 MB,
SIGMA (PBAR P → 3PI+ 3PI- PIO) = 1.57 +- 0.11 MB,
SIGMA (PBAR P → 3PI+ 3PI- M PIO) = 3.65 +- 0.24 MB, (M ≥ 2).
THE ANGULAR DISTRIBUTIONS AND THE TRANSVERSE AND LONGITUDINAL MOMENTUM DISTRIBUTIONS FOR THE OUT GOING PIONS ARE PRESENTED AND COMPARED WITH THE LORENTZ INVARIANT PHASE SPACE. THE COLLIMATION, ASYMMETRY AND TWO-PARTICLE CORRELATION PARAMETERS ARE GIVEN. THE ROLE OF BOSON RESONANCE PRODUCTION HAS BEEN INVESTIGATED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 173, 1307 (1968).
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 25, 63 (1970).

BEAM IS ANTIPROTON ON PROTON AT 6.94 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 25000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

[TABLE 1]

LABORATORY BEAM MOMENTUM = 6.94 GEV/C.

REACTION	MILLIBARNS [1]		NO. EVENTS
ANTIPROTON PROTON →			
PI+ PI+ PI+ PI- PI- PI-	.25 +-	.03	117
PI+ PI+ PI+ PI- PI- PI- PIO	1.57	.11	735
PI+ PI+ PI+ PI- PI- PI- MM≥2PIO	3.65	.24	1714
SIX PRONG PION ANNIHILATION	5.47	.27	

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → RHO(765)0 PI+ PI+ PI- PI-. [1] [PAGE 571]
RHO(765)0 → PI+ PI-

BREIT-WIGNER FIT YIELDS A PRODUCTION RATE OF (1.0 +- 0.3) RHO MESON PER EVENT FOR SIX-PION CHANNEL [MASS = .731 GEV; WIDTH = .046 GEV]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [2]
6.94	.25 +- .08

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → OMEGA(783) PI+ PI+ PI- PI-. [1] [PAGE 573]
OMEGA(783) → PI+ PI- PIO

FIT YIELDS A PRODUCTION RATE OF (0.27 +- 0.09) OMEGA MESONS PER EVENT FOR SEVEN-PION CHANNEL [MASS = .785; WIDTH = .018]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [2]
6.94	.424 +- .141

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERRORS INCLUDE SYSTEMATICS.

11 TOTAL CROSS SECTIONS OF PI-, K-, AND PBAR ON PROTONS AND DEUTERONS IN THE MOMENTUM RANGE 20-65 GEV/C [PHYS. LETTERS 30B, 500 (1969)]

J.V.ALLABY, Y.B.BUSHNIN, S.P.DENISOV, A.N.DIDDENS, R.W.DOBINSON, S.V. DONSKOV, G.GIACOMELLI, Y.P.GORIN, A.KLOVNING, A.I.PETRUKHIN, Y.D.PROKOSHKIN, R.S.SHUVALOV, C.A.STAHLBRANDT, D.A.STOYANOVA [CERN, GENEVA, SWITZERLAND, AND INST. OF HIGH EN. PHYS., SERPUKOV, USSR]

ABSTRACT TOTAL CROSS-SECTION DATA ARE PRESENTED FOR NEGATIVE PIONS, KAON, AND ANTIPROTONS ON PROTONS AND DEUTERONS IN THE MOMENTUM RANGE 20 GEV/C TO 65 GEV/C IN 5 GEV/C STEPS.

CLOSELY RELATED REFERENCES
SEE ALSO SOVIET JNP 12, 295 (1971).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 20 TO 50 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON FROM 20 TO 50 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS [1]	
20.	+- 1	49.0	+- 1.1
25.	1	46.1	.6
30.	1	47.1	.6
35.	1	45.5	.7
40.	1	45.0	.7
45.	1	44.9	.7
50.	1	43.6	.8

[1] ERRORS ARE STATISTICAL ONLY.

ANTIPROTON DEUTERON TOTAL CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS [1]	
20.	+- 1	89.5	+- 1.3
25.	1	86.5	.9
30.	1	87.0	.9
35.	1	86.4	1.0
40.	1	83.5	.9
45.	1	84.8	.9
50.	1	83.1	.9

[1] ERRORS ARE STATISTICAL ONLY.

ANTIPROTON NEUTRON TOTAL CROSS SECTION. [TABLE 1]

THIS CROSS SECTION IS IDENTICAL TO THE I=1 ANTIPROTON NUCLEON TOTAL CROSS SECTION

GLAUBER + FERMI MOTION CORRECTIONS MADE

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS [1,2]	
20.	+- 1	46.0	+- 1.7
25.	1	45.3	1.1
30.	1	44.9	1.1
35.	1	45.9	1.2
40.	1	43.2	1.1
45.	1	44.6	1.1
50.	1	44.1	1.2

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.

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12 TOTAL INTERACTION CROSS SECTIONS AND ABSORPTION CROSS SECTIONS OF PI- AND K- MESONS AND ANTIPROTONS IN THE MOMENTUM REGION FROM 20 TO 65 BEV/C. [SOVIET JNP 12, 295 (1971)]

J.C.ALLABY, Y.B.BUSHNIN, Y.P.GORIN, S.P.DENISOV, G.GIACOMELLI, A.N.DIDDENS, R.W.DOBINSON, S.V.DONSKOV, A.KLOVNING, A.I.PETRUKHIN, Y.D.PROKOSHKIN, C.A.STAHLBRANDT, D.A.STOYANOVA, R.S.SHUVALOV [CERN, GENEVA, SWITZERLAND, AND INST. OF HIGH EN. PHYS., SERPUKOV, USSR]

ABSTRACT TOTAL CROSS SECTIONS HAVE BEEN MEASURED FOR INTERACTION OF PI- AND K- MESONS AND ANTIPROTONS WITH PROTONS AND DEUTERONS IN THE MOMENTUM REGION 20-65 BEV/C IN 5-BEV/C STEPS. THE ABSORPTION CROSS SECTIONS FOR THE SAME PARTICLES HAVE BEEN MEASURED FOR THE NUCLEI HE, LI, BE, C, AL, CU, SN, PB, AND U.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 30B, 500 (1969).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 20 TO 65 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON FROM 20 TO 65 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION

I = 0 ANTIPROTON NUCLEON TOTAL CROSS SECTION. [TABLE 7]

GLAUBER + FERMI MOTION CORRECTIONS MADE

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS [1,2]	
20.	+- 1	52.0	+- 2.8
25.	1	47.0	1.7
30.	1	49.3	1.7
35.	1	45.2	1.9
40.	1	46.8	1.8
45.	1	45.3	1.8
50.	1	43.0	2.0

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3.5 PER CENT.

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13 OBSERVATION OF SPIN ALIGNMENT OF RESONANCES PRODUCED IN THE 3-BODY REACTIONS PBAR P → PBAR P OMEGAO AND PBAR P → NBAR*-- N*++ PIO AT 5.7 GEV/C. [NUOVO CIMENTO 46A, 438 (1966)]

V.ALLES-BORELLI, B.FRENCH, A.FRISK, L.MICHEJDA [CERN, GENEVA, SWITZERLAND]

ABSTRACT THE REACTION PBAR P → PBAR P PI- PI+ PIO HAS BEEN STUDIED AT 5.7 GEV/C IN THE 81 CM SACLAY HYDROGEN BUBBLE CHAMBER. PRODUCTION OF OMEGAO AND ETAO MESONS HAS BEEN OBSERVED. THE OMEGAO MESONS ARE COLLIMATED IN THE FORWARD AND BACKWARD DIRECTIONS IN THE C.M.S. THE DECAY ANGULAR DISTRIBUTION OF THE OMEGAO INDICATES THAT IT IS PRODUCED WITH THE SPIN ALIGNED IN THE PLANE PERPENDICULAR TO THE INCIDENT PBAR (OR P) MOMENTUM TRANSFORMED TO THE OMEGAO REST FRAME, AN EFFECT WHICH IS ENHANCED WHEN THE FOUR-MOMENTUM TRANSFER T IS LIMITED TO /T/ < 0.5(GEV/C)**2. IT HAS BEEN FOUND THAT OF THE OBSERVED N*(1238)++ AND NBAR*(1238)-- ISOBARS ABOUT 80 PERCENT ARE PRODUCED IN PAIRS IN THE 3-BODY REACTION PBAR P → NBAR*-- N*++ PIO. IN THIS REACTION THE N* ISOBARS ARE PRODUCED IN ALIGNED STATES WITH THE SPIN DIRECTIONS OF THE N* AND NBAR* BEING STRONGLY CORRELATED SUCH THAT THERE ARE FEW EVENTS IN WHICH BOTH THE N* AND NBAR* DECAY WITH THE P AND PBAR FROM THE ISOBARS MAKING LARGE ANGLES RELATIVE TO INITIAL P OR PBAR DIRECTION TRANSFORMED INTO THE ISOBAR REST FRAME.

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION RESONANCE PRODUCTION DELTA(1238)++

[PAGE 440]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MILLIBARNS [1]
ANTIPROTON PROTON →	
4 PRONGS	17.30 +- .70
ANTIPROTON PROTON PI+ PI- PIO	2.16 .14

[1] ERRORS INCLUDE SYSTEMATICS.

[PAGE 441]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MICROBARNS [1]
ANTIPROTON PROTON →	
ANTIPROTON PROTON OMEGA(783)	233. +- 36.
OMEGA(783) → PI+ PI- PIO [2]	
ANTIPROTON PROTON ETA(548)	43. 8.
ETA(548) → PI+ PI- PIO [2]	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

[PAGE 449]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MICROBARNS [1]
ANTIPROTON PROTON →	
ANTIDELTA(1238)-- DELTA(1238)++ PIO	580. +- 95. [2]
ANTIDELTA(1238)-- → ANTIPROTON PI-	
DELTA(1238)++ → PROTON PI+	
ANTIDELTA(1238)-- PROTON PI+ PIO	145. 80. [2]
ANTIDELTA(1238)-- → ANTIPROTON PI-	
ANTIPROTON PI- DELTA(1238)++ PIO	145. 80. [2]
DELTA(1238)++ → PROTON PI+	
ANTIPROTON PI- DELTA(1238)++ PIO + CHARGE CONJUGATE	290. 160. [3,2]
DELTA(1238)++ → PROTON PI+	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] MADE OVERALL FIT TO FINAL STATE.
[3] CALCULATED BY US FROM DATA IN THIS ARTICLE.

14 PRODUCTION OF N*(1518) AND N*(1688) ISOBARS IN PBAR P INTERACTIONS AT 5.7 GEV/C. DETERMINATION OF THEIR WIDTHS AND DECAY BRANCHING RATIOS. [NUOVO CIMENTO 47A, 232 (1967)]

V.ALLES-BORELLI, B.FRENCH, A.FRISK, AND L.MICHEJDA [CERN, GENEVA, SWITZERLAND]

ABSTRACT THE NUCLEON ISOBARS N*(1518) AND N*(1688) ARE OBSERVED IN INELASTIC INTERACTIONS OF 5.7 GEV/C ANTIPROTONS IN HYDROGEN. THE WIDTHS OF BOTH OF THEM ARE FOUND TO BE SMALL ((55 +/- 15) MEV AND (70 +/- 20) MEV RESPECTIVELY), IN AGREEMENT WITH RECENT PHASE-SHIFT DATA. THE 2-BODY TO 3-BODY BRANCHING RATIOS ARE ESTIMATED (BEING 1.25 + 0.44 OR -0.71 IN THE CASE OF THE N*(1518) AND LESS THAN 1.26 WITH 95 PERCENT CONFIDENCE FOR THE N*(1688)) AND SHOW THAT THE INELASTICITIES OF BOTH RESONANCES IN PI(-)P SCATTERING ARE HIGH. A DETAILED STUDY OF THE 3-BODY N PI PI DECAYS PROVIDES NO EVIDENCE IN EITHER CASE FOR THE CASCADE DECAY INTO N*(1238) + PI. DEVIATIONS FROM UNIFORM POPULATION OF THE DALITZ PLOTS FOR THE 3-BODY DECAYS ARE OBSERVED AND ARE STUDIED IN TERMS OF THE 3-BODY DECAY MATRIX ELEMENTS. UPPER LIMITS FOR DECAY OF THE N*(1688) INTO N ETA AND LAMBDA K FINAL STATES ARE ESTIMATED.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 46A, 438 (1966).
ANALYSIS OF THESE DATA IN PHYS. LETTERS 17, 166 (1965).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION RESONANCE PRODUCTION N*(1520)D13 'N*(1688)'

[PAGE 233]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MILLIBARNS [1]
ANTIPROTON PROTON →	
ANTIPROTON PROTON PI+ PI-	3.311 +- .160 [2]
ANTIPROTON NEUTRON PI+ PI+ PI-	.959 .100 [2]
PROTON ANTINEUTRON PI- PI- PI+	.863 .090 [2]
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	1.820 .140 [2]

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

15 THE REACTION P PBAR → N*(3,3) ANTI N*(3,3) AT 5.7 GEV/C. [NUOVO CIMENTO 48A, 360 (1967)]

V.ALLES-BORELLI, B.FRENCH, A.FRISK, L.MICHEJDA (CERN, *GENEVA, SWITZERLAND*)

ABSTRACT A STUDY OF 3638 EVENTS OF THE REACTION P PBAR → P PBAR PI+ PI- AT 5.7 GEV/C IN THE 81 CM SACLAY HYDROGEN BUBBLE CHAMBER IS REPORTED. THE MEASUREMENTS WERE MADE WITH THE CERN HPD SYSTEM. THE CROSS SECTION FOR THE CHANNEL P PBAR → P PBAR PI+ PI- WAS FOUND TO BE (3.31 +/- 0.16) MB. ABUNDANT ASSOCIATED PRODUCTION OF N*(3,3)(1238) ANTI-N*(3,3)(1238) HAS BEEN OBSERVED. THE CROSS SECTION FOP THE PROCESS P PBAR → N*(3,3) ANTI-N*(3,3) IS (2.08 +/- 0.14) MB WHICH *CORRESPONDS TO (63 +/- 3) PERCENT* OF THE TOTAL CROSS SECTION FOR THE STUDIED CHANNEL. THE PRODUCTION MECHANISM OF N*(3,3) ANTI-N*(3,3) HAS BEEN INVESTIGATED AND THE EXPERIMENTAL RESULTS COMPARED WITH VARIOUS PREDICTIONS OF THE ONE-PION EXCHANGE MODEL MODIFIED TO TAKE INTO ACCOUNT ABSORPTION IN THE INITIAL AND FINAL STATES (ABSORPTION MODEL). THE SLOPE OF THE DIFFERENTIAL CROSS SECTION IS RATHER WELL REPRODUCED BY THIS MODE, THE EXPERIMENTAL VALUE IS HOWEVER EXCEEDED BY A FACTOR OF ABOUT THREE. THE DECAY PARAMETERS OF THE JOINT DECAY DISTRIBUTION HAVE BEEN MEASURED AND FOUND TO BE IN REASONABLE AGREEMENT WITH THE THEORETICAL PREDICTIONS. A SMALL CORRELATION BETWEEN THE DECAY ANGLES OF THE N*(3,3) AND ANTI-N*(3,3) RESPECTIVELY OF 0.10 +/- 0.04 HAS BEEN FOUND AND IS IN AGREEMENT WITH THE PREDICTION OF 0.05 FROM THE ABSORPTION MODEL.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 20, 557 (1966), NUOVO CIMENTO 46A, 438 (1966), AND NUOVO CIMENTO 47A, 232 (1967).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION DIFFERENTIAL CROSS SECTION DELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS → DELTA(1238) RESONANCE PRODUCTION

[PAGE 366]
LABORATORY BEAM MOMENTUM = 5.7 GEV/C (MEAN VALUE).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON →		
ANTIDELTA(1238)-- DELTA(1238)++	2.08 +-	.14
ANTIDELTA(1238)-- → ANTIPROTON PI- [2]		
DELTA(1238)++ → PROTON PI+ [2]		
ANTIDELTA(1238)-- PROTON PI+	.33	.07
ANTIDELTA(1238)-- → ANTIPROTON PI- [2]		
DELTA(1238)++ ANTIPROTON PI-	.33	.07
DELTA(1238)++ → PROTON PI+ [2]		
DELTA(1238)++ ANTIPROTON PI- + CHARGE CONJUGATE	.66	.14 [3]
DELTA(1238)++ → PROTON PI+ [2]		

[1] ERRORS ARE STATISTICAL ONLY.
[2] FITTED FOR MASS AND/OR WIDTH [MASS = 1.224 GEV; WIDTH = .117 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[3] CALCULATED BY US FROM DATA IN THIS ARTICLE.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIDELTA(1238)-- DELTA(1238)++. [FIGURE 3]
ANTIDELTA(1238)-- → ANTIPROTON PI- [1]
DELTA(1238)++ → PROTON PI+ [1]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

NORMALIZED TO 2.08 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [2]	D-SIGMA/D-T MB/(GEV/C)**2 [3]	
.0425	.217 +-	.093
.0675	9.002	1.167
.0925	11.669	1.000
.1175	8.002	.834
.1425	7.668	1.000
.1675	6.001	.917
.1925	5.584	.917
.2175	4.001	.667
.2425	2.867	.433
.2675	3.301	.500
.2925	2.501	.500
.3175	3.084	.333
.3425	1.550	.333
.3675	2.167	1.084
.3925	1.334	.333
.4175	1.067	.267
.4425	1.067	.267
.4675	1.067	.267
.4925	1.067	.267
.5600	.634	.083
.6800	.583	.083
.8200	.237	.050
.9300	.197	.050
1.0600	.118	.028
1.2000	.100	.037
1.3000	.100	.037
1.6000	.031	.009

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIDELTA(1238)--].

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.150 TO 1.350 GEV].
[2] MEAN VALUES.
[3] ERRORS INCLUDE SYSTEMATICS.

16 ANTIPROTON-PROTON ANNIHILATIONS INTO FIVE PIONS AT 5.7 GEV/C. [NUOVO CIMENTO 50A, 776 (1967)]

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E.PAUL [UNIV. BONN, BONN, GERMANY]

ABSTRACT A STUDY OF 872 EVENTS OF THE REACTION PBAR P → PI+ PI+ PI- PI- PIO IS REPORTED. THE CROSS-SECTION FOR THIS REACTION IS FOUND TO BE (0.9 +/- 0.1) MB. THE POSITIVE PIONS TEND TO BE EMITTED IN THE DIRECTION OF THE PROTON AND THE NEGATIVE PIONS IN THE DIRECTION OF THE ANTIPROTON. THE FORWARD TO BACKWARD AND POLAR TO EQUALTORIAL RATIOS (F-B)/(F+B) AND (P-E)/(P+E) ARE FOUND TO BE 0.17 +/- 0.02 AND 0.27 +/- 0.02 RESPECTIVELY, THE FORMER VALUE CORRESPONDING TO AN EXCESS OF TWO-THIRDS OF A PI+ OR A PI- PER EVENT IN THE BACKWARD OR FORWARD DIRECTION RESPECTIVELY IN THE C.M.S. THERE IS A CONSIDERABLE AMOUNT OF RHOO(+/-), OMEGAO AND FO RESONANCE PRODUCTION BUT NO A(1), A(2), OR B MESON PRODUCTION HAS BEEN OBSERVED. NO EVIDENCE FOR AN ASSOCIATED PRODUCTION OF RESONANCES HAS BEEN FOUND WHICH MAKES ANY SIMPLE INTERPRETATION OF THE ANNIHILATION PROCESS IN TERMS OF THREE-MESON FINAL STATES DIFFICULT. IN THE PI+ PI- PIO MASS DISTRIBUTION AN ENHANCEMENT IS SEEN WITH A MASS (2207 +/- 13) MEV AND WIDTH (62 +/- 52) MEV WHICH COULD CORRESPOND TO THE NEUTRALLY CHARGED STATE OF THE PEAK OBSERVED BY CHIKOVANI ET AL. AT 2195 MEV. A SIMPLE MODEL IS PROPOSED WHICH EXPLAINS PART OF THE DATA ON FOUR- AND FIVE-PION ANNIHILATIONS.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 20, 557 (1966), NUOVO CIMENTO 46A, 438 (1966), AND NUOVO CIMENTO 48A, 360 (1967).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION CROSS SECTION RESONANCE PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI- PIO. [PAGE 779]

LABORATORY BEAM MOMENTUM GEV/C [1]	MILLIBARNS [2]
5.7	.9 +- .1

[1] MEAN VALUE.
[2] ERRORS INCLUDE SYSTEMATICS.

[PAGE 789]
LABORATORY BEAM MOMENTUM = 5.7 GEV/C (MEAN VALUE).

REACTION ANTIPROTON PROTON →	MICROBARNS		
RHO(765)0 PI+ PI- PIO RHO(765)0 → PI+ PI- [2]	240. +-	70.	[1]
F(1260) PI+ PI- PIO F(1260) → PI+ PI- [2]	80.	40.	[1]
RHO(765)+ PI+ PI- PI- + CHARGE CONJUGATE RHO(765)+ → PI+ PIO [2]	420.	100.	[1]
OMEGA(783) PI+ PI- OMEGA(783) → PI+ PI- PIO [2]	84.	26.	[1]
ETA(548) PI+ PI- ETA(548) → PI+ PI- PIO [2]	4.	2.	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

17 OBSERVATION OF RHO-OMEGA INTERFERENCE IN ANTIPROTON ANNIHILATIONS. [PHYS. REV. LETTERS 24, 618 (1970)]

W.W.M.ALLISON, W.A.COOPER, T.FIELDS, D.S.RHINES [ARGONNE NAT. LAB., ARGONNE, ILL., USA]

ABSTRACT EVIDENCE FOR STRUCTURE NEAR THE OMEGAO MASS IN THE (PI+ PI-) MASS SPECTRUM FROM THE REACTION PBAR P → 2PI+ 2PI-, AT INCIDENT MOMENTA FROM 1.26 TO 1.65 GEV/C, IS PRESENTED. WE INTERPRET THIS STRUCTURE AS ARISING FROM RHO-OMEGA INTERFERENCE IN THE 2PI DECAY MODE, WITH A STATISTICAL SIGNIFICANCE OF ABOUT 3.5 STANDARD DEVIATIONS. THE EFFECT CAN BE WELL FITTED BY A PARTIAL WIDTH GAMMA(OMEGA → 2PI) IN THE RANGE 0.18 TO 5.3 MEV (95 PERCENT CONFIDENCE LEVEL). ALTERNATIVELY, IF GAMMA(OMEGA → 2PI) IS TAKEN FROM E+E- COLLIDING-BEAM RESULTS, OUR DATA CAN BE USED TO STUDY BOTH THE RELATIVE PHASE AND COHERENCE OF RHO AND OMEGA PRODUCTION IN PBAR P ANNIHILATION.

BEAM IS ANTIPROTON ON PROTON FROM 1.26 TO 1.65 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 122000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS → MESONS RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

18 ANTI-PROTON PROTON TOTAL CROSS SECTIONS BETWEEN 0.575 AND 5.35 GEV/C. [NUOVO CIMENTO 34, 825 (1964)]

U.AMALDI, T.FAZZINI,G.FIDECARO,C.GHESQUIERE,M.LEGROS,H.STEINER [CERN, GENEVA, SWITZERLAND]

ABSTRACT TOTAL ANTI-PROTON,PROTON CROSS-SECTION MEASUREMENTS HAVE BEEN MADE AT 28 MOMENTA, IN THE RANGE (0.575/5.35) GEV/C. THE CROSS SECTION DECREASES MONOTONICALLY WITH INCREASING MOMENTUM. NO IMPORTANT IRREGULARITY HAS BEEN FOUND.

CLOSELY RELATED REFERENCES
THIS ARTICLE SUPERSEDES INT'L. CONF. ON ELEM. PARTICLES, AIX-EN-PROVENCE 1, 283 (1961).

BEAM IS ANTIPROTON ON PROTON FROM .575 TO 5.350 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 4]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
4.015	66.84 +-	.32
3.068	75.24	.70
2.886	77.82	.28
2.686	79.33	.25
2.485	78.04	.52
2.285	83.76	.43
2.082	88.48	.20
1.884	87.83	.24
1.683	96.17	.39
1.380	103.30	.40
1.178	111.60	.60
1.074	113.30	.90
.972	120.50	.90
.888	116.80	3.30
.867	120.70	1.30
.837	128.00	2.90
.785	132.70	3.00
.733	142.10	3.30
.681	144.30	3.70
.629	156.30	7.30
.575	167.40	7.80
5.350	57.90	2.60
4.700	65.80	.90
4.300	60.60	.80
3.860	67.70	.90
3.540	69.70	.50
3.240	72.90	1.00
2.940	74.30	6.10

[1] ERRORS INCLUDE SYSTEMATICS.

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19 ANTIPROTON-PROTON ELASTIC AND INELASTIC TOTAL CROSS-SECTIONS BETWEEN 57 AND 178 MEV. [NUOVO CIMENTO 46A, 171 (1966)]

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ABSTRACT ABOUT 25,000 INTERACTIONS OF ANTIPROTONS OF KINETIC ENERGY BETWEEN 57 AND 178 MEV HAVE BEEN MEASURED IN A HYDROGEN BUBBLE CHAMBER. ELASTIC AND INELASTIC TOTAL CROSS-SECTIONS HAVE BEEN DETERMINED AT 15 VALUES OF THE ANTIPROTON ENERGY. THE RESULTS ARE COMPARED WITH THEORETICAL PREDICTIONS.

CLOSELY RELATED REFERENCES
PART OF THIS ARTICLE SUPERSEDED BY NUOVO CIMENTO 54A, 441 (1968).

BEAM IS ANTIPROTON ON PROTON FROM .332 TO .605 GEV/C. (BEAM KINETIC ENERGY = .057 TO .178 GEV)
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 25000 PICTURES ARE REPORTED ON.
KEY WORDS + ELASTIC SCATTERING CROSS SECTION
COMPOUND KEY WORDS + ELASTIC SCATTERING CROSS SECTION

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....

CROSS SECTION FOR ANTIPROTON PROTON + 0 PRONGS. [TABLE 5]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.05759 +-	.01043	24.4 +-	1.9
.07114	.00877	18.7	1.6
.08277	.00776	20.8	1.7
.09337	.00706	19.8	1.6
.10301	.00657	19.5	1.2
.11205	.00615	17.8	1.2
.12063	.00581	18.4	1.5
.12863	.00554	19.6	1.5
.13635	.00529	18.0	1.4
.14391	.00511	15.9	1.1
.15094	.00497	14.9	1.4
.15797	.00477	15.7	1.4
.16461	.00469	15.7	1.4
.17128	.00451	14.5	1.3
.17752	.00441	16.4	1.3

[1] ERRORS ARE STATISTICAL ONLY.

....

ANTIPROTON PROTON TOTAL INELASTIC CROSS SECTION. [TABLE 5]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.05759 +-	.01043	157.4 +-	5.3
.07114	.00877	128.8	5.1
.08277	.00776	130.0	4.9
.09337	.00706	128.1	4.6
.10301	.00657	119.2	3.4
.11205	.00615	114.7	3.3
.12063	.00581	110.6	3.9
.12863	.00554	106.0	3.7
.13635	.00529	111.3	3.6
.14391	.00511	99.6	3.0
.15094	.00497	103.1	3.7
.15797	.00477	104.1	3.6
.16461	.00469	100.5	3.4
.17128	.00451	95.8	3.3
.17752	.00441	97.5	3.2

[1] ERRORS ARE STATISTICAL ONLY.

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20 COHERENT PBAR D INTERACTIONS AND RELATED DISSOCIATION REACTIONS AT 7.0 GEV/C. [NUC. PHYS. B29, 327 (1971)]

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ABSTRACT IN A 3.5 EVENT/MU-B EXPOSURE OF THE BNL 80-INCH BUBBLE CHAMBER WE HAVE OBSERVED THE FOLLOWING REACTIONS.
PBAR D → PBAR D PI+ PI-, (1)
PBAR D → PBAR P N PI+ PI (2)
PBAR D → PBAR D PI+ PI- PIO. (3)
THE INCIDENT PBAR MOMENTUM WAS 7.0 GEV/C. WE GIVE CROSS SECTIONS FOR THE REACTIONS, AS WELL AS FOR OTHER REACTIONS INVOLVING PRODUCTION OF ANTI-LAMBDA. WE GIVE DETAILED DESCRIPTIONS OF THE COHERENT FINAL STATES (1) AND (3). IT IS OBSERVED THAT REACTIONS (1)-(3) ARE DOMINATED BY PRODUCTION OF ANTI-DELTA(1236)--. WE APPLY A DECK MODEL, BOTH IN REGGEIZED AND AND NON-REGGEIZED FORM, TO THE REACTION PBAR D → ANTI-DELTA-- PI+ D AND OBTAIN SATISFACTORY FITS TO THE DISTRIBUTIONS OF ALL KINEMATIC VARIABLES. IN PARTICULAR, THE PI+ D MASS SPECTRUM, WHICH SHOWS A PROMINENT PEAK (THE SO-CALLED D*) AT A MASS M(PI D) APPROX. = 2170 MEV, IS WELL REPRODUCED BY THE PREDICTIONS OF THE MODEL WITHOUT INTRODUCING A RESONANT INTERPRETATION FOR THIS EFFECT. MODIFIED VERSIONS OF THIS MODEL ARE APPLIED TO THE REACTIONS PBAR D → ANTI-DELTA-- PI+ P N, AND PBAR D → ANTI-DELTA-- PIO PI+ D, WHICH OCCUR AS SUB-SAMPLES OF THE FINAL STATES (2) AND (3) RESPECTIVELY. HERE ALSO, PROMINENT PEAKS ARE OBSERVED IN THE PI+ P N MASS SPECTRUM (IN THE FORMER REACTION) AND IN THE PI+ D AND PIO D MASS SPECTRUM (IN THE LATTER REACTION). AGAIN THE PREDICTIONS OF THE MODEL AGREE WELL WITH THE OBSERVED DISTRIBUTIONS OF ALL THE KINEMATIC VARIABLES.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 21, 1609 (1968), PHYS. REV. LETTERS 20, 1194 (1968), AND PHYS. REV. 188, 2023 (1969).

BEAM IS ANTIPROTON ON DEUTERON AT 7 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION RESONANCE PRODUCTION DELTA(1238)++

[TABLE 1]

LABORATORY BEAM MOMENTUM = 7. GEV/C.

REACTION ANTIPROTON DEUTERON →	MICROBARNS [1]	NO. EVENTS
ANTIPROTON DEUTERON PI+ PI-	260. +- 25. [2]	310
ANTIPROTON PROTON NEUTRON PI+ PI-	1120. 90. [2]	1090
ANTIPROTON DEUTERON PI+ PI- PIO	180. 32. [2]	172
K- DEUTERON ANTILAMBDA	3. 2. [2]	4
K- PROTON NEUTRON ANTILAMBDA	13. 4. [2]	14
K- DEUTERON ANTILAMBDA PIO	2. 2. [2]	2

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CROSS SECTION BASED ON EVENTS WITH VISIBLE PROTON (.09 GEV/C < P < .35 GEV/C) OR WITH RECOIL DEUTERON (.14 GEV/C < P < .50 GEV/C).

[TABLE 2]

LABORATORY BEAM MOMENTUM = 7. GEV/C.

REACTION ANTIPROTON DEUTERON →	MICROBARNS [1]
ANTIDELTA(1238)-- PI+ DEUTERON ANTIDELTA(1238)-- → ANTIPROTON PI- [3]	185. +- 20. [2]
ANTIPROTON PI- D*(2200)++ D*(2200)++ → PI+ DEUTERON [4]	55. 10. [2]
ANTIDELTA(1238)-- D*(2200)++ ANTIDELTA(1238)-- → ANTIPROTON PI- [3] D*(2200)++ → PI+ DEUTERON [4]	45. 10. [2]
ANTIDELTA(1238)-- PI+ DEUTERON PIO ANTIDELTA(1238)-- → ANTIPROTON PI- [3]	110. 24. [2]
ANTIPROTON OMEGA(783) DEUTERON OMEGA(783) → PI+ PI- PIO [5]	6. + 10. [2] - 2.

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CROSS SECTION BASED ON EVENTS WITH DEUTERON MOMENTA IN THE RANGE .14 - .50 GEV/C.
[3] COUNTED ALL EVENTS IN MASS BAND (INCLUDING SOME BACKGROUND) [MASS CUT FROM 1.140 TO 1.340 GEV].
[4] COUNTED ALL EVENTS IN MASS BAND (INCLUDING SOME BACKGROUND) [MASS CUT FROM 2.100 TO 2.260 GEV].
[5] COUNTED ONLY EVENTS ABOVE BACKGROUND.

21 ANTIPROTON-PROTON CROSS SECTIONS AT 1.0, 1.25, AND 2.0 BEV [PHYS. REV. 119, 2068 (1960)]

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ABSTRACT THE INTERACTION OF 1.0-, 1.25-, AND 2.0-BEV ANTIPROTONS WITH PROTONS HAS BEEN STUDIED WITH THE AID OF A 4 PI SOLID-ANGLE SCINTILLATION-COUNTER DETECTOR SYSTEM. THE MEASURED TOTAL CROSS SECTIONS AT THE ABOVE ENERGIES ARE 100, 89, AND 80 MB, RESPECTIVELY. AT EACH ENERGY, THE CHARGE-EXCHANGE CROSS SECTION IS APPROXIMATELY 5 MB. THE TOTAL ELASTIC CROSS SECTIONS ARE 33, 28, AND 25 MB, RESPECTIVELY, AT THE THREE ENERGIES. THE ANGULAR DISTRIBUTION OF ELASTIC SCATTERING HAS BEEN FITTED WITH A SIMPLE OPTICAL-MODEL CALCULATION.

BEAM IS ANTIPROTON ON PROTON FROM 1.696 TO 2.784 GEV/C. (BEAM KINETIC ENERGY = 1 TO 2 GEV)
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → CROSS SECTION ELASTIC SCATTERING CHARGE EXCHANGE DIFFERENTIAL CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 2]

LABORATORY BEAM ENERGY GEV	MILLIBARNS [1]
1.00 +- .05	100. +- 3.
1.25 .07	89. 4.
2.00 .09	80. 6.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 2]

LABORATORY BEAM ENERGY GEV	MILLIBARNS [1]
1.00 +- .05	33. +- 2.
1.25 .07	28. 2.
2.00 .09	25. 4.

[1] ERRORS INCLUDE SYSTEMATICS.

....

ANTIPROTON PROTON TOTAL INELASTIC CROSS SECTION. [1] [TABLE 2]

THE TOTAL INELASTIC CROSS SECTION IS THE SUM OF THE 'INELASTIC' AND 'CHARGE EXCHANGE' CROSS SECTIONS

LABORATORY BEAM ENERGY GEV	MILLIBARNS [2]
1.00 +- .05	67.0 + 3.2 - 3.4
1.25 .07	61.0 + 4.1 - 4.1
2.00 .09	55.0 + 6.3 - 6.7

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERRORS INCLUDE SYSTEMATICS.

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CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 2]

LABORATORY BEAM ENERGY GEV	MILLIBARNS [1]
1.00 +- .05	5.0 + 1.0 - 1.5
1.25 .07	4.0 + 1.0 - 1.0
2.00 .09	6.0 + 2.0 - 3.0

[1] ERRORS INCLUDE SYSTEMATICS.

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 5]

LABORATORY BEAM ENERGY = 1.00 +- .05 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
8.	67.5 +- 15.0
10.	62.0 7.0
15.	36.0 6.0
18.	35.0 5.0
25.	19.0 1.0
35.	5.5
45.	1.0

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 6]

LABORATORY BEAM ENERGY = 1.25 +- .07 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
8.	61. +- 25.
12.	58. 11.
15.	43. 7.
19.	28. 4.
25.	14. 2.
35.	3. 1.

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 7]

LABORATORY BEAM ENERGY = 2.00 +- .09 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
12.	76. +- 16.
16.	27. 13.
20.	20. 7.
30.	4. 2.
40.	1.

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

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22 HIGH-ENERGY PI- P, K- P, AND PBAR P ELASTIC SCATTERING [PHYS. REV. LETTERS 21, 387 (1968)]

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ABSTRACT DIFFERENTIAL CROSS SECTIONS FOR ELASTIC SCATTERING OF 6-GEV/C PI-, K-, AND PBAR FROM PROTONS HAVE BEEN MEASURED IN THE ANGULAR RANGE 25-105 DEGREES (C.M. SYSTEM) AND FOR 8-GEV/C PI- IN THE ANGULAR RANGE 75-115 DEGREES(C. M. SYSTEM). STRUCTURE IN THE ANGULAR DISTRIBUTIONS HAS BEEN OBSERVED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 21, 389 (1968).
DATA SUPERSEDED BY PHYS. REV. 181, 1794 (1969).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 19, 460 (1967).

BEAM NO. 1 IS PI- ON PROTON FROM 5.8 TO 7.9 GEV/C.
NO. 2 IS K- ON PROTON FROM 5.8 TO 7.9 GEV/C.
NO. 3 IS ANTIPROTON ON PROTON FROM 5.8 TO 7.9 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS + ELASTIC SCATTERING

NO DATA PUNCHED FOR THIS ARTICLE

23 THE CHARGE EXCHANGE ANTI-PROTON,PROTON + ANTI-NEUTRON,NEUTRON AT 5, 6, 7 AND 9 GEV/C. [PHYS. LETTERS 22, 537 (1966)]

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ABSTRACT THE REACTION ANTI-PROTON,PROTON + ANTI-NEUTRON,NEUTRON HAS BEEN STUDIED WITH A MAGNET SPARK CHAMBER SYSTEM. THE RESULTS OBTAINED ON THE TOTAL CROSS SECTION AT 5, 6, 7 AND 9 GEV/C AND ON THE DIFFERENTIAL CROSS SECTION AT 7 GEV/C ARE GIVEN.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. LETTERS 23, 160 (1966), AND HELVETICA PHYSICA ACTA 41, 451 (1968).

BEAM IS ANTIPROTON ON PROTON FROM 5 TO 9 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS + CHARGE EXCHANGE

NO DATA PUNCHED FOR THIS ARTICLE

24 FURTHER RESULTS ON THE CHARGE EXCHANGE ANTI-PROTON,PROTON + ANTI-NEUTRON,NEUTRON AT 5, 6, 7, AND 9 GEV/C. [PHYS. LETTERS 23, 160 (1966)]

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ABSTRACT DATA ARE PRESENTED ON THE TOTAL AND DIFFERENTIAL CROSS SECTIONS AT 5, 6, 7, AND 9 GEV/C FOR THE REACTION ANTI-PROTON, PROTON + ANTI-NEUTRON, NEUTRON. THE RESULTS ARE COMPARED WITH THE REGGE-POLE AND THE COHERENT DROPLET MODELS.

CLOSELY RELATED REFERENCES
SEE ALSO HELVETICA PHYSICA ACTA 41, 451 (1968).
THIS ARTICLE SUPERSEDES PHYS. LETTERS 22, 537 (1966).

BEAM IS ANTIPROTON ON PROTON FROM 5 TO 9 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS + CROSS SECTION DIFFERENTIAL CROSS SECTION CHARGE EXCHANGE

CROSS SECTION FOR ANTIPROTON PROTON + ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]	
5.	598. +-	86.
6.	563.	82.
7.	373.	54.
9.	284.	41.

[1] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 5. GEV/C +- 1(PER CENT).
NUMBER OF EVENTS = 988.

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.02	2.572 +-	.197
.06	1.846	.167
.10	1.740	.162
.14	1.513	.151
.18	1.135	.131
.22	.801	.110
.26	.938	.119
.30	.923	.118
.34	.651	.099
.38	.469	.084
.43	.414	.064
.49	.212	.046
.56	.181	.037
.65	.212	.036
.75	.043	.016
.90	.048	.012
1.10	.012	.006
1.30	.006	.004

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 6. GEV/C +- 1(PER CENT).
NUMBER OF EVENTS = 844.

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.02	2.185 +-	.192
.06	2.051	.185
.10	1.784	.173
.14	1.434	.155
.18	1.101	.135
.22	1.084	.134
.26	.650	.104
.30	.684	.107
.34	.500	.091
.38	.400	.082
.43	.411	.068
.49	.189	.046
.56	.208	.042
.65	.100	.026
.75	.087	.024
.90	.037	.011
1.10	.020	.008
1.30	.007	.004

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 7. GEV/C +- 1(PER CENT).
NUMBER OF EVENTS = 597.

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.02	1.484 +-	.152
.06	1.218	.138
.10	1.156	.134
.14	.765	.109
.18	.797	.112
.22	.734	.107
.26	.468	.086
.30	.500	.088
.34	.344	.073
.38	.359	.075
.43	.219	.048
.49	.177	.043
.56	.125	.031
.65	.037	.015
.75	.081	.023
.90	.023	.009
1.10	.019	.008
1.30	.009	.005

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 9. GEV/C +- 1(PER CENT).
NUMBER OF EVENTS = 892.

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.02	1.035 +-	.091
.06	.923	.086
.10	.613	.070
.14	.724	.076
.18	.565	.067
.22	.517	.064
.26	.414	.057
.30	.350	.053
.34	.271	.046
.38	.191	.039
.43	.143	.028
.49	.143	.028
.56	.131	.023
.65	.038	.011
.75	.076	.015
.90	.016	.005
1.10	.027	.006
1.30	.019	.006

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 5. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM .0 TO .6 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
NUMBER OF EVENTS = 988.
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUE
A = 2.69 +- .40
B = 4.42 +- .18

FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON • ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 6. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM .0 TO .6 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
NUMBER OF EVENTS = 844.
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 2.65 +- .40
B = 4.70 +- .21

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FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON • ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 7. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM .0 TO .6 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
NUMBER OF EVENTS = 597.
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.66 +- .25
B = 4.44 +- .25

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FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON • ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 9. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM .0 TO .6 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
NUMBER OF EVENTS = 892.
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.15 +- .17
B = 4.09 +- .19

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25 FURTHER STUDY OF THE I=1 K KBAR STRUCTURE NEAR THRESHOLD. [PHYS. LETTERS 25B, 294 (1967)]

A.ASTIER,J.COHEN-GANOUNA,M.DELLA NEGRA [COLLEGE DE FRANCE, PARIS, FRANCE]
B.MARECHAL,L.MONTANET,M.TOMAS [CERN, GENEVA, SWITZERLAND]
M.BAUBILLIER,J.DUBOC [INSTITUTE DU RADIUM, PARIS, FRANCE]

ABSTRACT WE SUMMARIZE THE PRESENT EXPERIMENTAL EVIDENCE FOR AN I=1 (K ANTI-K) ENHANCEMENT IN P PBAR ANNIHILATIONS AT REST AND AT 1.2 GEV/C. WE PROPOSE DIFFERENT POSSIBLE INTERPRETATIONS FOR THE ENHANCEMENT

THIS IS A COMPILATION.

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE CERN 80 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS • ANNIHILATION K KBAR PRODUCTION

....

NO DATA PUNCHED FOR THIS ARTICLE

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26 TWO-BODY HYPERON PRODUCTION BY 5.7 GEV/C ANTIPROTONS ON PROTONS. [PHYS. LETTERS 30B, 494 (1969)]

H.W.ATHERTON, L.M.CELNIKIER, B.FRENCH, J.B.KINSON, K.MYKLEBOST, J.PERNEGR, E.QUERCIGH, B.SADOULET [CERN, GENEVA, SWITZERLAND]

ABSTRACT TOTAL AND DIFFERENTIAL CROSS SECTIONS ARE PRESENTED ON THE REACTIONS PBAR P • LAMBDABAR LAMBDA, LAMBDABAR SIGMA0 + C.C., SIGMABAR(-) SIGMA(+) AT AN INCIDENT MOMENTUM OF 5.7 GEV/C, FROM 200000 PHOTOGRAPHS (13 EVENTS/MU-B) OF THE CERN 2 METER HYDROGEN BUBBLE CHAMBER. THE SO-CALLED FORBIDDEN REACTION PBAR P • SIGMABAR(+)SIGMA(-) IS ALSO OBSERVED AND ITS CROSS SECTION IS 1.3 +- 0.4 MU-B. POLARIZATION AND CORRELATION OF POLARIZATIONS ARE PRESENTED FOR THE REACTION PBAR P • LAMBDABAR LAMBDA.

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.
KEY WORDS • CROSS SECTION HYPERON PRODUCTION
COMPOUND KEY WORDS • HYPERON PRODUCTION

....

[TABLE 1]
LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON •		
ANTILAMBDA LAMBDA	46.0 +-	4.0
ANTILAMBDA SIGMA0 + CHARGE CONJUGATE	35.0	4.0
ANTISIGMA- SIGMA+	33.0	4.0
ANTISIGMA+ SIGMA-	1.9	1.0 [2]

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 1A]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2	+-
.00	.05	303.00	47.00
.05	.10	164.00	34.00
.10	.15	150.00	15.00
.15	.20	64.00	6.00
.20	.25	90.00	9.00
.25	.30	56.00	12.00
.30	.35	38.00	8.00
.35	.40	32.00	9.00
.40	.45	24.00	6.00
.45	.50	18.20	2.80
.50	.55	13.10	5.20
.55	.60	6.70	4.10
.60	.65	2.40	2.00
.65	.70	16.10	6.40
.70	.75	12.10	5.60
.75	.80	3.20	2.70
.80	.85	1.13	.69
.85	.90	1.19	.64
.90	.95	1.20	.64
.95	1.00	1.15	.70
1.00	1.05	3.10	2.20
1.05	1.10	3.20	1.90
1.10	1.15	7.10	4.30
1.15	1.20	4.20	3.60
1.20	1.25	1.89	1.62
1.25	1.30	1.90	1.46
1.30	1.35	.74	.70
1.35	1.40	.71	.61
1.40	1.45	.71	.67
1.45	1.50	.75	.71
1.50	1.55	.72	.61
1.55	1.60	.72	.55
1.60	1.65	.72	.56
1.65	1.70	1.29	1.29
1.70	1.75	1.30	1.30
1.75	1.80	1.36	1.17
1.80	1.85	2.01	2.01
1.85	1.90	2.02	1.91
1.90	1.95	2.30	2.30

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA SIGMAO + CHARGE CONJUGATE. [FIGURE 1B]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2	+-
.00	.05	192.00	39.00
.05	.10	153.00	23.00
.10	.15	140.00	29.00
.15	.20	48.00	15.00
.20	.25	11.90	5.40
.25	.30	33.00	9.00
.30	.35	19.00	6.10
.35	.40	4.90	4.10
.40	.45	7.20	6.00
.45	.50	6.60	4.90
.50	.55	25.00	12.00
.55	.60	12.10	6.30
.60	.65	11.60	5.20
.65	.70	5.80	3.90
.70	.75	5.00	2.60
.75	.80	5.30	3.10
.80	.85	2.80	1.40
.85	.90	2.80	1.20
.90	.95	2.80	1.30
.95	1.00	2.80	1.30
1.00	1.05	1.27	1.05
1.05	1.10	1.33	1.00
1.10	1.15	1.27	1.06
1.15	1.20	1.28	1.06
1.20	1.25	1.28	1.07
1.25	1.30	1.28	.96
1.30	1.35	1.29	1.18
1.35	1.40	1.35	1.01
1.40	1.45	1.36	.91
1.45	1.50	1.30	.97
1.50	1.55	.47	.43
1.55	1.60	.45	.41
1.60	1.65	.49	.33
1.65	1.70	.47	.35
1.70	1.75	.45	.41
1.75	1.80	.45	.42
1.80	1.85	.45	.38
1.85	1.90	.45	.45
1.90	1.95	.48	.40
1.95	2.00	.46	.38

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTISIGMA- SIGMA+. [FIGURE 1C]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2	
.00	.05	300.00 +-	118.00
.05	.10	141.00	46.00
.10	.15	80.00	37.00
.15	.20	30.00	8.00
.20	.25	38.00	10.00
.25	.30	30.00	8.00
.30	.35	23.00	6.00
.35	.40	24.00	9.00
.40	.45	17.10	5.60
.45	.50	23.00	6.00
.50	.55	23.00	7.00
.55	.60	12.30	4.80
.60	.65	9.70	3.80
.65	.70	11.80	4.60
.70	.75	9.80	3.80
.75	.80	11.80	3.90
.80	.85	8.50	3.90
.85	.90	4.80	2.20
.90	.95	6.70	3.10
.95	1.00	11.90	4.70
1.00	1.05	4.60	2.10
1.05	1.10	2.30	1.70
1.10	1.15	5.10	3.90
1.15	1.20	2.09	1.42
1.20	1.25	1.13	.86
1.25	1.30	1.14	.87
1.30	1.35	1.14	.87
1.35	1.40	1.14	.87
1.40	1.45	1.45	.87
1.45	1.50	1.45	.87
1.50	1.55	1.45	.77
1.55	1.60	6.00	3.20
1.60	1.65	2.03	2.03
1.65	1.70	2.20	2.10

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTISIGMA-].

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27 ANTIPROTON-PROTON ANNIHILATIONS INTO PI- AND K-MESONS AT 5.7 GEV/C. [NUC. PHYS. B16, 416 (1970)]

H.W.ATHERTON, B.J.FRANEK, B.R.FRENCH, A.FRISK, J.B.KINSON, K.MYKLEBOST, B.NELLEN, T.NISAR, J.PERNEGR, E.QUERCIGH [CERN, GENEVA, SWITZERLAND]
M.BEDNAR, V.CHALOUPKA, M.JIRES, J.HERYNEK, Z.SEKERA, J.SKURA, V.SIMAK, M.VOTRUBA [INST. OF PHYSICS - CSAV, PRAGUE, CZECHOSLOVAKIA]

ABSTRACT 12357 EVENTS FROM ANTIPROTON-PROTON ANNIHILATIONS INTO KAONS AND PIONS HAVE BEEN ANALYSED. PARTIAL CROSS SECTIONS ARE DETERMINED FOR VARIOUS K KBAR + N PI (N = 0,1,2...) FINAL STATES AND THE TOTAL CROSS SECTION IS FOUND TO BE (3.5 +- 0.3) MB. THE ANGULAR AND THE MOMENTUM DISTRIBUTIONS ARE PRESENTED AND COMPARED WITH THE PREDICTIONS OF THEORETICAL MODELS. STRONG PRODUCTION OF K*(890) (K*+- FAVORED) IS OBSERVED (0.7 K*/EVENT). IN THE C.M., THE K*+(K*-) ARE COLLIMATED ALONG THE INCIDENT PROTON (ANTIPROTON) DIRECTION.

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES BUBBLE CHAMBERS. A TOTAL OF 350000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

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....

[TABLE 2]
LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION ANTIPROTON PROTON →	MICROBARNS			NO. EVENTS
KOS K+ PI- + CHARGE CONJUGATE	5. +-	1.		23
KOS KOS PI+ PI-	18.	3.		43
KOS K+ PI+ PI- PI- + CHARGE CONJUGATE	80.	6.	[1]	339
KOS KOS PI+ PI+ PI- PI-	25.	4.		60
KOS KOS PI0	2.	2.		4
KOS K+ PI- PI0 +, CHARGE CONJUGATE	67.	6.	[1]	310
KOS KOL PI+ PI-	25.	5.	[1]	168
KOS KOS PI+ PI- PI0	57.	5.		136
KOS KOL PI+ PI+ PI- PI-	68.	6.	[1]	350
KOS K+ PI+ PI- PI- PI0 + CHARGE CONJUGATE	230.	15.	[1]	946
KOS KOS PI+ PI+ PI- PI- PI0	76.	7.		181
KOS KOS MM≥2PI0	32.	4.		75
KOS PI+ PI- MM≥(1PI0+1K0)	140.	8.	[1]	560
KOS K+ PI- MM≥2PI0 + CHARGE CONJUGATE	250.	20.	[1]	1057
KOS KOS PI+ PI- MM≥2PI0	125.	10.		295
KOS PI+ PI+ PI- PI- MM≥(1PI0+1K0)	120.	20.	[1]	562
KOS K+ PI+ PI- PI- MM≥2PI0 + CHARGE CONJUGATE	250.	20.	[1]	935
KOS KOS PI+ PI+ PI- PI- MM≥2PI0	40.	5.		109

[1] ADD POSSIBLE SYSTEMATIC ERROR OF AT LEAST +- 30 PER CENT.

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CROSS SECTION FOR ANTIPROTON PROTON → TOTAL KAON ANNIHILATION. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C PER CENT	MILLIBARNS
5.7 +- 1	3.5 +- .3

....

[TABLE 5]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION	MICROBARNS	
ANTIPROTON PROTON →		
K*(890)+ K- + CHARGE CONJUGATE	1.5 +-	.5 [1]
K*(890)+ → KOS PI+ [2]		
K*(890)+ KOS PI- + CHARGE CONJUGATE	2.7	2.0 [1]
K*(890)+ → KOS PI+ [2]		
K*(890)+ KOS PI- PIO + CHARGE CONJUGATE	26.0	5.0 [1]
K*(890)+ → KOS PI+ [3]		
K*(890)+ K- PI+ PI- + CHARGE CONJUGATE	45.0	6.0 [1]
K*(890)+ → KOS PI+ [4]		
K*(890)+ KOS PI+ PI- PI- + CHARGE CONJUGATE	27.0	5.0 [1]
K*(890)+ → KOS PI+ [5]		
K*(890)+ KOS PI+ PI- PI- PIO + CHARGE CONJUGATE	47.0	10.0 [1]
K*(890)+ → KOS PI+ [6]		
K*(890)0 KOS PI+ PI-	14.0	4.0 [1]
K*(890)0 → KOS PIO [3]		
K*(890)0 KOS PI+ PI-	16.0	4.0 [1]
K*(890)0 → K+ PI- + CHARGE CONJUGATE [4]		
K*(890)0 KOS PI+ PI+ PI- PI-	21.0	8.0 [1]
K*(890)0 → KOS PIO [6]		
KOS KOS OMEGA(783)	2.3	1.2 [1]
OMEGA(783) → PI+ PI- PIO [2]		
KOS KOS PI+ PI- OMEGA(783)	17.0	3.0 [1]
OMEGA(783) → PI+ PI- PIO [7]		

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[3] FITTED FOR MASS AND/OR WIDTH [MASS = .903 GEV; WIDTH = .053 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[4] FITTED FOR MASS AND/OR WIDTH [MASS = .883 GEV; WIDTH = .066 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[5] FITTED FOR MASS AND/OR WIDTH [MASS = .884 GEV; WIDTH = .058 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[6] FITTED FOR MASS AND/OR WIDTH [MASS = .884 GEV; WIDTH = .061 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[7] FITTED FOR MASS AND/OR WIDTH [MASS = .790 GEV; WIDTH = .026 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

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28 GENERAL CHARACTERISTICS OF THE ANNIHILATION REACTION PBAR P → 3PI+ 3PI- (PIO) AT 3.6 GEV/C. [NUC. PHYS. B18, 221 (1970)]

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ABSTRACT IN THE REACTION PBAR P → 3PI+ 3PI- 2227 EVENTS, AND IN THE REACTION PBAR P → 3PI+ 3PI- PIO 6578 EVENTS HAVE BEEN ANALYZED. THE GENERAL CHARACTERISTICS OF THE REACTIONS, SUCH AS TOTAL CROSS SECTIONS, ANGULAR AND MOMENTUM DISTRIBUTIONS, THE PRODUCTION OF RHO, F, OMEGA, AND ETA MESONS, AND ANGULAR CORRELATIONS ARE PRESENTED. THE WELL-KNOWN TENDENCY OF CHARGED PIONS TO FOLLOW THE LINE OF FLIGHT OF BARYONS OF THE SAME CHARGE (FORWARD PEAKING) IS OBSERVED. IN ADDITION, THE ANGULAR DISTRIBUTIONS SHOW A SIGNIFICANT BACKWARD PEAK FOR PIONS OF HIGH MOMENTA IN THE C.M. THESE EFFECTS ARE COMPARED WITH THE RESULTS OF A MULTIPERIPHERAL MODEL WITH NUCLEON EXCHANGE (MODIFIED CLA). COPIOUS RHO(0+-) AND OMEGA PRODUCTION IS FOUND WITH AN AVERAGE OF MORE THAN ONE RESONANCE PER EVENT, RHO(0) OMEGA ASSOCIATED PRODUCTION IS EVALUATED. THE ANGULAR DISTRIBUTIONS OF THE RHO(0) AND OMEGA ARE GIVEN AND ARE FOUND TO BE MORE ANISOTROPIC THAN FOR THE INDIVIDUAL PIONS. THE ANGULAR CORRELATIONS ARE SUCCESSFULLY DESCRIBED BY PHASE SPACE MODIFIED FOR THE OBSERVED RESONANCE PRODUCTION AND BOSE-EINSTEIN SYMMETRIZATION.

BEAM IS ANTIPROTON ON PROTON AT 3.6 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION PION PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION

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[PAGE 223]

LABORATORY BEAM MOMENTUM = 3.59 GEV/C +- 1.5(PER CENT).

REACTION	MILLIBARNS [1]		NO. EVENTS
ANTIPROTON PROTON →			
6 PRONGS	7.26 +-	.27	
PI+ PI+ PI+ PI- PI- PI-	.92	.06	2227
PI+ PI+ PI+ PI- PI- PI- PIO	2.68	.16	6578

[1] ERRORS INCLUDE SYSTEMATICS.

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[TABLE 6]

LABORATORY BEAM MOMENTUM = 3.59 GEV/C +- 1.5(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON →		
RHO(765)0 PI+ PI+ PI- PI-	1.240 +-	.320 [2]
RHO(765)0 → PI+ PI- [3]		
F(1260) PI+ PI+ PI- PI-	.166	.028 [2]
F(1260) → PI+ PI- [3]		
RHO(765)0 PI+ PI+ PI- PI- PIO	1.880	.150 [2]
RHO(765)0 → PI+ PI- [3]		
RHO(765)+ PI+ PI+ PI- PI- PI- + CHARGE CONJUGATE	.670	.080 [2]
RHO(765)+ → PI+ PIO [3]		
OMEGA(783) PI+ PI+ PI- PI-	1.210	.100 [2]
OMEGA(783) → PI+ PI- PIO [3]		
ETA(548) PI+ PI+ PI- PI-	.032	.005 [2]
ETA(548) → PI+ PI- PIO [3]		

[1] ERRORS ARE STATISTICAL ONLY.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[3] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

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CROSS SECTION FOR ANTIPROTON PROTON → RHO(765)0 OMEGA(783) PI+ PI-. [1] [PAGE 236]
RHO(765)0 → PI+ PI- [2]
OMEGA(783) → PI+ PI- PIO [2]

LABORATORY BEAM MOMENTUM GEV/C PER CENT	MILLIBARNS [3]
3.59 +- 1.5	.54 +- .11

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[3] ERRORS ARE STATISTICAL ONLY.

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29 Y*(1385) PRODUCTION IN PBAR REACTIONS AT 5.7 GEV/C. [NUC. PHYS. B29, 477 (1971)]

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[CERN, GENEVA, SWITZERLAND]

ABSTRACT FROM A BUBBLE CHAMBER EXPOSURE IN AN ANTIPROTON BEAM AT 5.7 GEV/C YIELDING 13 EVENTS/MU-B, THE FINAL STATES PBAR P + ANTI-Y*(1385) + LAMBDA, ANTI-Y*(1385) + SIGMA+, ANTI-Y*(1385) + ANTI-Y*(1385)+ HAVE BEEN ISOLATED. WE HAVE MEASURED THE TOTAL CROSS SECTION, DSIGMA/DT, AND THE COMPLETE DENSITY MATRIX OF THE Y* FOR THESE PROCESSES. UPPER LIMITS HAVE BEEN SET TO THE FORBIDDEN REACTIONS PBAR P + ANTI-Y*(1385)- SIGMA-, ANTI-Y*(1385)- ANTI-Y*(1385)-. THE COMPARISON OF OUR RESULTS WITH OTHER HYPERCHARGE REACTIONS INDICATES THE FAILURE OF FACTORISATION PREDICTED BY EXCHANGE DEGENERACY AND STRONGLY SUGGESTS THE PRESENCE OF TWO REACTION MECHANISMS.

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION HYPERON PRODUCTION Y*(1385)+
COMPOUND KEY WORDS + HYPERON PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 5.70 +- .06 GEV/C.

REACTION	MICROBARNS [1]
ANTIPROTON PROTON +	
ANTILAMBDA LAMBDA PIO	29.00 +- 5.00
ANTILAMBDA SIGMA+ PI- + CHARGE CONJUGATE	84.00 14.00
ANTILAMBDA SIGMA- PI+ + CHARGE CONJUGATE	35.00 6.00
ANTILAMBDA LAMBDA PI+ PI-	36.00 4.00
ANTI-Y*(1385)0 LAMBDA + CHARGE CONJUGATE	32.00 7.00
ANTI-Y*(1385)0 + ANTILAMBDA PIO [2]	
ANTIY*(1385)- SIGMA+ + CHARGE CONJUGATE	46.00 9.00
ANTIY*(1385)- + ANTILAMBDA PI- [2]	
ANTIY*(1385)+ SIGMA- + CHARGE CONJUGATE	< 3.60 (.95 CONF LEVEL)
ANTIY*(1385)+ + ANTILAMBDA PI+ [2]	
Y*(1385)- ANTIY*(1385)+	< 4.50 (.95 CONF LEVEL)
Y*(1385)- + LAMBDA PI- [2]	
ANTIY*(1385)+ + ANTILAMBDA PI+ [2]	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

CROSS SECTION FOR ANTIPROTON PROTON + ANTISIGMAO SIGMAO. [PAGE 481]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]
5.70 +- .06	15. +- 5.

[1] ERRORS INCLUDE SYSTEMATICS.

[PAGE 484]
LABORATORY BEAM MOMENTUM = 5.70 +- .06 GEV/C.

REACTION	MICROBARNS
ANTIPROTON PROTON +	
ANTILAMBDA PI- Y*(1385)+	4.7 +- 2.4 [1]
Y*(1385)+ + LAMBDA PI+ [2]	
ANTIY*(1385)- LAMBDA PI+	5.4 2.1 [1]
ANTIY*(1385)- + ANTILAMBDA PI- [2]	
Y*(1385)+ ANTIY*(1385)-	11.9 2.5 [1]
Y*(1385)+ + LAMBDA PI+ [2]	
ANTIY*(1385)- + ANTILAMBDA PI- [2]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + ANTI-Y*(1385)0 LAMBDA + CHARGE CONJUGATE. [FIGURE 6A]
ANTI-Y*(1385)0 + ANTILAMBDA PIO [1]

LABORATORY BEAM MOMENTUM = 5.70 +- .06 GEV/C.

NORMALIZED TO 32. MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2	
.00	.05	54.00 +-	22.00
.05	.10	107.00	34.00
.10	.15	82.00	26.00
.15	.20	108.00	45.00
.20	.25	58.00	24.00
.25	.30	47.00	29.00
.30	.35	76.00	32.00
.35	.50	18.00	6.00
.50	2.50	.62	.39

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTI-Y*(1385)0].

[1] USED SIMPLE MASS CUT (NEGLIGIBLE BACKGROUND) [MASS CUT FROM 1.325 TO 1.455 GEV].

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIY*(1385)- SIGMA+ + CHARGE CONJUGATE. [FIGURE 6B]
ANTIY*(1385)- → ANTILAMBDA PI- [1]

LABORATORY BEAM MOMENTUM = 5.70 +- .06 GEV/C.

NORMALIZED TO 46. MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2	+-
.05	.10	87.0	36.0
.10	.15	93.0	22.0
.15	.20	62.0	20.0
.20	.25	81.0	19.0
.25	.30	76.0	18.0
.30	.35	66.0	15.0
.35	.40	54.0	12.0
.40	.45	47.0	15.0
.45	.50	87.0	28.0
.50	.55	62.0	14.0
.55	.60	27.0	14.0
.60	.65	17.0	9.0
.65	.70	18.0	7.0
.70	.90	10.9	3.5
.90	1.20	8.3	2.6
1.20	1.60	2.5	1.1
1.60	2.50	2.9	1.2

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIY*(1385)-].

[1] USED SIMPLE MASS CUT (NEGLIGIBLE BACKGROUND) [MASS CUT FROM 1.325 TO 1.455 GEV].

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIY*(1385)- Y*(1385)+. [FIGURE 6C]
ANTIY*(1385)- → ANTILAMBDA PI- [1]
Y*(1385)+ → LAMBDA PI+ [1]

LABORATORY BEAM MOMENTUM = 5.70 +- .06 GEV/C.

NORMALIZED TO 11.9 MB CROSS SECTION GIVEN ON PAGE 484

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2	+-
.15	.20	53.10	19.30
.20	.30	12.20	6.70
.30	.35	21.60	11.50
.35	.40	30.00	13.70
.40	.50	22.90	8.50
.50	1.15	6.17	2.35
1.15	2.10	.33	.33

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIY*(1385)-].

[1] USED SIMPLE MASS CUT (NEGLIGIBLE BACKGROUND) [MASS CUT FROM 1.325 TO 1.455 GEV].

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30 MEASUREMENT OF ANTIPROTON-PROTON FORWARD CHARGE-EXCHANGE SCATTERING. [PHYS. REV. D 2, 2519 (1970)]

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F.LOBKOWICZ, Y.NAGASHIMA [UNIV. OF ROCHESTER, ROCHESTER, N. Y., USA]

ABSTRACT THERE IS A WELL-KNOWN FORWARD PEAK IN THE NP FORWARD CHARGE-EXCHANGE CROSS SECTION, FOR MOMENTUM TRANSFERS /T/ APPROX. ≤ M(PI)**2. WE HAVE PERFORMED AN EXPERIMENT TO LOOK FOR ANALOGOUS BEHAVIOR IN THE REACTION PBAR P → NBAR N. THE DATA COVER THE KINEMATICAL REGION 0 ≤ /T/ ≤ 1.5 M(PI)**2 AT AN INCIDENT ANTIPROTON MOMENTIM OF 1.60 GEV/C. A FORWARD PEAK IS OBSERVED, WHICH IS ESTIMATED (FROM RESULTS OF OTHER EXPERIMENTS) TO BE CONSIDERABLY SMALLER THAN THAT FOR NP CHARGE EXCHANGE. THIS RESULT CAN BE UNDERSTOOD IN TERMS OF INTERFERENCE BETWEEN ONE-PION EXCHANGE AND EXCHANGE OF A PARTICLE WITH EVEN G PARITY.

BEAM IS ANTIPROTON ON PROTON AT 1.8 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS → CHARGE EXCHANGE DIFFERENTIAL CROSS SECTION
COMPOUND KEY WORDS → CHARGE EXCHANGE DIFFERENTIAL CROSS SECTION

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.8 GEV/C +- 2.5(PER CENT).

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	
.0005	27.7 +-	2.1
.0022	26.9	2.0
.0061	24.3	2.2
.0120	23.4	2.3
.0200	18.3	2.3
.0300	16.7	2.4

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 1.8 GEV/C +- 2.5(PER CENT).

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]
0.	28. +- 2.

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUE.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

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31 OBSERVATION OF THE REACTION PBAR + D → LAMBDA + SIGMA- + XIBAR+. [PHYS. REV. 134, B1339 (1964)]

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A.ENGLER, H.E.FISK, C.M.MELTZER, J.B.WESTGARD [CARNEGIE-MELLON UNIV., PITTSBURGH, PA., USA]

ABSTRACT A PBAR D INTERACTION INVOLVING ALL THREE NUCLEONS IN THE PRODUCTION OF THE HYPERONS LAMBDA + SIGMA- + XIBAR+ HAS BEEN OBSERVED IN A DEUTERIUM-FILLED BUBBLE CHAMBER. ALL THE SUBSEQUENT STRANGENESS-CHANGING DECAYS, AND THE FINAL PBAR N ANNIHILATION, APPEARED IN THE CHAMBER.

BEAM IS ANTIPROTON ON DEUTERON AT 2.8 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → HYPERON PRODUCTION
COMPOUND KEY WORDS → HYPERON PRODUCTION

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NO DATA PUNCHED FOR THIS ARTICLE

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32 ANTI-ISOBAR PRODUCTION IN ANTI-PROTON, N INTERACTIONS [PHYS. REV. 139, B1420 (1965)]

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A.ENGLER,H.E.FISK, C.M.MELTZER,J.WESTGARD [CARNEGIE-MELLON UNIV., PITTSBURGH, PA., USA]

ABSTRACT SINGLE-PION PRODUCTION IN ANTI-PROTON, N INTERACTIONS HAS BEEN STUDIED IN THE BNL 20-IN. DEUTERIUM-FILLED BUBBLE CHAMBER AT AN INCIDENT ANTI-PROTON MOMENTUM OF 1.96 GEV/C. COPIOUS PRODUCTION OF THE 3/2, 3/2 ANTI-ISOBAR WAS OBSERVED. THE DIFFERENTIAL CROSS SECTION AS A FUNCTION OF MOMENTUM TRANSFER HAS A DISTRIBUTION CONSISTENT WITH THAT PREDICTED BY ONE-PION EXCHANGE (OPE). THE EXPERIMENTAL CROSS SECTION OF 5.1 +- 0.5 MB, HOWEVER, IS ABOUT HALF THAT PREDICTED BY THE OPE MODEL OF FERRARI AND SELLERI.

BEAM IS ANTIPROTON ON DEUTERON AT 1.96 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 25000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION DIFFERENTIAL CROSS SECTION ANTIDELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS + ANTIDELTA(1238) RESONANCE PRODUCTION

....

CROSS SECTION FOR ANTIPROTON NEUTRON + ANTIDELTA(1238)-- PROTON. [PAGE 1422]
ANTIDELTA(1238)-- + ANTIPROTON PI-

CALCULATION BY AUTHORS IS UNCLEAR, BUT IT APPEARS THAT GLAUBER AND ABSORPTION CORRECTIONS (+30 PER CENT) HAVE BEEN APPLIED TO A CROSS SECTION BASED ON EVENTS WITH A SPECTATOR PROTON MOMENTUM < 0.20 GEV. FIT TO BREIT-WIGNER CURVE FOR MASS AND WIDTH.

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.960 +- .025	5.1 +- .5

[1] ERRORS INCLUDE SYSTEMATICS.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON + ANTIDELTA(1238)-- PROTON. [FIGURE 8]
ANTIDELTA(1238)-- + ANTIPROTON PI- [1]

LABORATORY BEAM MOMENTUM = 1.960 +- .025 GEV/C.

NORMALIZED TO 5.1 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [2]	D-SIGMA/D-T MB/(GEV/C)**2 [3,4]		NO. EVENTS
.05	31.7 +-	3.9	66
.07	29.8	3.8	62
.09	23.5	3.4	49
.11	20.6	3.1	43
.13	18.2	3.0	38
.15	18.2	3.0	38
.17	13.9	2.6	29
.19	7.2	1.9	15
.21	6.2	1.7	13
.23	4.8	1.5	10
.25	5.3	1.6	11
.27	5.3	1.6	11
.29	3.8	1.4	8
.31	3.8	1.4	8
.33	4.3	1.4	9
.35	5.8	1.7	12
.37	3.8	1.4	8
.39	2.4	1.1	5
.41	2.9	1.2	6
.43	.5	.5	1
.45	1.4	.8	3
.47	2.4	1.1	5
.49	1.9	1.0	4
.51	1.4	.8	3
.53	1.0	.7	2
.55	1.4	.8	3
.57	.5	.5	1
.59	1.4	.8	3
.61	1.4	.8	3
.63	.5	.5	1
.65	1.0	.7	2
.67	3.4	1.3	7
.69	1.0	.7	2
.71	.0	.5	0
.73	.0	.5	0
.75	.0	.5	0
.77	.5	.5	1
.79	.5	.5	1
.81	1.0	.7	2
.83	.5	.5	1
.85	.5	.5	1
.87	1.0	.7	2
.89	.5	.5	1
.91	1.0	.7	2
.93	1.0	.7	2
.95	1.0	.7	2
.97	.5	.5	1
.99	.5	.5	1
1.01	.0	.5	0
1.03	.0	.5	0
1.05	1.4	.8	3
1.07	.5	.5	1
1.09	.5	.5	1
1.11	.5	.5	1
1.13	.5	.5	1
1.15	.5	.5	1
1.17	.5	.5	1
1.19	.5	.5	1
1.21	1.9	1.0	4
1.23	.0	.5	0
1.25	.5	.5	1
1.27	1.4	.8	3
1.29	.5	.5	1

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIDELTA(1238)--].

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.160 TO 1.300 GEV].
[2] MEAN VALUES.
[3] ERRORS ARE STATISTICAL ONLY.
[4] COUNTS WERE MULTIPLIED BY .48 TO GET THESE.

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33 COMPARISON OF ISOBAR PRODUCTION IN PP AND ANTI-PROTON N INTERACTIONS AT 2.8 GEV/C . [PHYS. REV. 162, 1320 (1967)]

T.C.BACON,F.M.BOMSE,T.B.COCHRAN,W.J.FICKINGER,E.R.GOZA,H.W.K.HOPKINS, E.O.SALANT [VANDERBILT UNIV., NASHVILLE, TENN., USA]

ABSTRACT THE REACTIONS PP→N*++(1238)N AND ANTI-PROTON N → ANTI-N*(1238)++ P AT 2.8 GEV/C INCIDENT LABORATORY MOMENTUM ARE ANALYZED WITH THE BROOKHAVEN NATIONAL LABORATORY 20-IN. BUBBLE CHAMBER. ISOBAR AND ANTI-ISOBAR PRODUCTION DIFFERENTIAL CROSS SECTIONS AND DECAY ANGULAR DISTRIBUTIONS ARE COMPARED WITH THE PREDICTIONS OF AN ABSORPTIVE SINGLE-PION-EXCHANGE MODEL. THE ABSOLUTE VALUES, SHAPES, AND RATIOS OF THE CROSS SECTIONS ARE IN GOOD AGREEMENT WITH THE THEORY WHEN THE ABSORPTIVE PARAMETERS GAMMA(1) AND GAMMA(2) ARE 0.033 AND 0.016 FOR THE ANTI-PROTON N REACTION, AND 0.057 AND 0.019, RESPECTIVELY, FOR THE PP REACTION.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 125, 2082 (1962).

BEAM NO. 1 IS PROTON ON PROTON AT 2.8 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON AT 2.8 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → RESONANCE PRODUCTION DELTA(1238)++

NO DATA PUNCHED FOR THIS ARTICLE

34 EVIDENCE FOR PRODUCTION OF AN N*(1400) AND NBAR*(1400) IN THE REACTION PBAR P (N) → PBAR P PI+ PI- (N) AT 2.8 GEV/C. [PHYS. REV. LETTERS 22, 43 (1969)]

T.C.BACON, F.BOMSE, T.B.BORAK, T.B.COCHRAN, W.J.FICKINGER, E.R.GOZA, H.W.K.HOPKINS, E.O.SALANT [VANDERBILT UNIV., NASHVILLE, TENN., USA]

ABSTRACT IN THE REACTION PBAR P (N) → PBAR P PI+ PI- (N) AT 2.8 GEV/C, ENHANCEMENTS IN THE MASS SPECTRA OF PBAR PI- PI+ AND P PI- PI+ HAVE BEEN OBSERVED NEAR 1400 MEV. ANALYSIS INDICATES THAT THESE ENHANCEMENTS CANNOT BE ADEQUATELY EXPLAINED AS KINEMATIC REFLECTIONS OF N*(1238) AND/OR NBAR*(1238) PRODUCTION.

BEAM IS ANTIPROTON ON DEUTERON AT 2.8 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → RESONANCE PRODUCTION DELTA(1238)

NO DATA PUNCHED FOR THIS ARTICLE

35 DOUBLE-PION PRODUCTION REACTIONS IN PBAR N COLLISIONS AT 2.8 GEV/C. [PHYS. REV. D 2, 463 (1970)]

T.C.BACON, F.BOMSE, T.B.BORAK, W.J.FICKINGER, E.R.GOZA, E.J.MOSES, E.O.SALANT [VANDERBILT UNIV., NASHVILLE, TENN., USA]

ABSTRACT THE REACTIONS PBAR N → PBAR N PI+ PI-, PBAR N → PBAR P PI- PI0, AND PBAR N → NBAR P PI- PI- AT 2.8-GEV/C INCIDENT PBAR LABORATORY MOMENTUM ARE ANALYZED WITH DATA FROM THE BROOKHAVEN NATIONAL LABORATORY 20-IN. BUBBLE CHAMBER. N*(1238) ISOBAR PRODUCTION IN THESE CHANNELS IS STUDIED. IT IS FOUND THAT THE ABSORPTIVE SINGLE-PION-EXCHANGE MODEL CANNOT ADEQUATELY EXPLAIN ALL THE FEATURES OF SIMULTANEOUS ISOBAR PRODUCTION IN THESE REACTIONS. WHEN THE REACTIONS PBAR N → (NBAR*-- N*++ OR NBAR*0 N*-) → PBAR PI- N PI+ ARE COMPARED WITH THEIR COUNTERPART PP → N*++ N*0 → P P PI+ PI-, THE FORMER ARE FOUND TO BE LESS PERIPHERAL THAN THE LATTER, IN SHARP DISAGREEMENT WITH A PREDICTION OF THE MODEL. A GENERALIZED SINGLE-PION-EXCHANGE MODEL IS DISCUSSED WHICH GIVES BETTER AGREEMENT WITH THE NUCLEON-PION TWO-BODY MASS AND ANGULAR DISTRIBUTIONS. SOME EVIDENCE FOR ENHANCEMENTS IN THE NUCLEON AND ANTINUCLEON DIPION SYSTEMS AT 1400 MEV IS DISCUSSED.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 22, 43 (1969), AND PHYS. REV. 162, 1320 (1967).

BEAM IS ANTIPROTON ON PROTON AT 2.8 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 48000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION RESONANCE PRODUCTION DELTA(1238)

[TABLE 1]

LABORATORY BEAM MOMENTUM = 2.790 +- .035 GEV/C.

REACTION	MILLIBARNS	NO. EVENTS
ANTIPROTON DEUTERON →		
ANTIPROTON NEUTRON PI- PI+ (PROTON SPECTATOR)	1.50 +- .20 [1]	529
ANTIPROTON PROTON PI- PI0 (PROTON SPECTATOR)	.90 .10 [1]	331
ANTINEUTRON PROTON PI- PI- (PROTON SPECTATOR)	.30 .04 [1]	110

[1] PROTON SPECTATOR MOMENTUM < .25 GEV/C.

[PAGE 466]

LABORATORY BEAM MOMENTUM = 2.790 +- .035 GEV/C.

REACTION	MILLIBARNS
ANTIPROTON NEUTRON →	
ANTIDELTA(1238)-- DELTA(1238)+	.78 +- .08 [1]
ANTIDELTA(1238)-- → ANTIPROTON PI- [2]	
DELTA(1238)+ → NEUTRON PI+ [2]	
ANTIDELTA(1238)0 DELTA(1238)-	.78 .08 [1]
ANTIDELTA(1238)0 → ANTIPROTON PI+ [2]	
DELTA(1238)- → NEUTRON PI- [2]	

[1] PROTON SPECTATOR MOMENTUM < .25 GEV/C.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON • ANTIDELTA(1238)0 DELTA(1238)-. [FIGURE 3]
ANTIDELTA(1238)0 • ANTIPROTON PI+ [1]
DELTA(1238)- • NEUTRON PI- [1]

LABORATORY BEAM MOMENTUM = 2.790 +- .035 GEV/C.

NORMALIZED TO 0.78 MB

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) MB [2]		NO. EVENTS
-1.0	-.9	.11 +-	.08	2
-.9	-.8	.06	.06	1
-.8	-.7	.22	.11	4
-.7	-.6	.11	.08	2
-.6	-.5	.11	.08	2
-.5	-.4	.17	.10	3
-.4	-.3	.11	.08	2
-.3	-.2	.22	.11	4
-.2	-.1	.17	.10	3
-.1	.0	.17	.10	3
.0	.1	.17	.10	3
.1	.2	.28	.12	5
.2	.3	.33	.14	6
.3	.4	.39	.15	7
.4	.5	.44	.16	8
.5	.6	.55	.18	10
.6	.7	.83	.21	15
.7	.8	.89	.22	16
.8	.9	.89	.22	16
.9	1.0	1.55	.29	28

THETA IS THE ANGLE THAT THE ANTIDELTA(1238)0 MAKES WITH THE BEAM IN THE GRAND C.M.

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.160 TO 1.300 GEV].
[2] COUNTS WERE MULTIPLIED BY .0555 TO GET THESE.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON • ANTIDELTA(1238)-- DELTA(1238)+. [FIGURE 3]
ANTIDELTA(1238)-- • ANTIPROTON PI- [1]
DELTA(1238)+ • NEUTRON PI+ [1]

LABORATORY BEAM MOMENTUM = 2.790 +- .035 GEV/C.

NORMALIZED TO 0.78 MB

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) MB [2]		NO. EVENTS
-1.0	-.9	.33 +-	.14	6
-.9	-.8	.06	.06	1
-.8	-.7	.17	.10	3
-.7	-.6	.06	.06	1
-.6	-.5	.22	.11	4
-.5	-.4	.28	.12	5
-.4	-.3	.06	.06	1
-.3	-.2	.11	.08	2
-.2	-.1	.17	.10	3
-.1	.0	.06	.06	1
.0	.1	.22	.11	4
.1	.2	.50	.17	9
.2	.3	.44	.16	8
.3	.4	.39	.15	7
.4	.5	.61	.18	11
.5	.6	.22	.11	4
.6	.7	.61	.18	11
.7	.8	1.00	.24	18
.8	.9	.89	.22	16
.9	1.0	2.00	.33	36

THETA IS THE ANGLE THAT THE ANTIDELTA(1238)-- MAKES WITH THE BEAM IN THE GRAND C.M.

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.160 TO 1.300 GEV].
[2] COUNTS WERE MULTIPLIED BY .0555 TO GET THESE.

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36 NON-ANNIHILATION CHANNELS IN PBAR P INTERACTIONS NEAR CENTRE OF MASS ENERGY 2200 MEV. [NUC. PHYS. B32, 66 (1971)]

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ABSTRACT THE ELASTIC AND ONE-PION PRODUCTION CHANNELS FROM THE PBAR P INTERACTION AT FOUR C.M. ENERGIES BETWEEN 2150 AND 2240 MEV ARE DESCRIBED. NO EVIDENCE OF FORMATION OF THE NARROW T(2195) MESON IS OBSERVED. THE ELASTIC DIFFERENTIAL CROSS SECTION IS MEASURED IN THE RANGE OF SQUARED FOUR-MOMENTUM TRANSFER /T/ > 0.03 GEV**2. THIS HAS BEEN EXTRAPOLATED TO THE FORWARD DIRECTION WHERE RE/IM PARTS OF THE AMPLITUDE ARE DEDUCED. THE ONE-PION FINAL STATES ARE WELL DESCRIBED BY ASSUMING THAT THEY ARE DOMINATED BY DELTA-PRODUCTION.

BEAM IS ANTIPROTON ON PROTON FROM 1.23 TO 1.43 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER.
KEY WORDS • ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION PION PRODUCTION
COMPOUND KEY WORDS • ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION PION PRODUCTION

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.23 +- .02 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	
.03	.04	379.00 +-	11.00
.04	.05	319.40	9.20
.05	.06	275.20	8.20
.06	.07	265.10	7.60
.07	.08	221.60	7.20
.08	.09	171.40	6.30
.09	.10	161.10	6.10
.10	.11	134.30	5.70
.11	.12	109.50	4.90
.12	.13	100.60	4.70
.13	.14	81.40	4.20
.14	.15	62.90	3.70
.15	.16	57.40	3.60
.16	.17	51.30	3.40
.17	.18	42.50	3.10
.18	.19	31.70	2.60
.19	.20	28.30	2.50
.20	.21	24.00	2.30
.21	.22	18.50	2.00
.22	.23	15.60	1.90
.23	.24	14.30	1.80
.24	.26	9.90	1.00
.26	.28	7.59	.91
.28	.30	4.95	.74
.30	.32	2.97	.57
.32	.34	2.09	.48
.34	.36	.99	.33
.36	.38	1.10	.35
.38	.40	1.32	.38
.40	.44	1.16	.25
.44	.48	2.86	.40
.48	.52	2.80	.39
.52	.56	2.64	.38
.56	.60	3.14	.42
.60	.64	3.69	.45
.64	.68	2.75	.39
.68	.72	2.97	.40
.72	.76	2.20	.35
.76	.80	1.93	.33
.80	.88	.96	.16
.88	.96	.69	.14
.96	1.04	.72	.14
1.04	1.12	.82	.16
1.12	1.16	.63	.20

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.30 +- .02 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	
.03	.04	355.00 +-	11.00
.04	.05	308.20	9.80
.05	.06	270.80	8.90
.06	.07	219.00	7.80
.07	.08	202.80	7.50
.08	.09	170.10	6.80
.09	.10	137.50	6.10
.10	.11	117.20	5.60
.11	.12	103.50	5.20
.12	.13	84.30	4.70
.13	.14	69.90	4.30
.14	.15	61.90	4.00
.15	.16	50.60	3.60
.16	.17	45.90	3.50
.17	.18	38.10	3.20
.18	.19	34.70	3.00
.19	.20	25.50	2.50
.20	.21	22.20	2.40
.21	.22	19.80	2.30
.22	.23	14.90	2.00
.23	.24	12.00	1.80
.24	.26	9.70	1.10
.26	.28	5.22	.83
.28	.30	5.48	.85
.30	.32	2.61	.58
.32	.34	1.96	.51
.34	.36	1.83	.49
.36	.38	2.22	.54
.38	.40	1.44	.43
.40	.44	2.87	.43
.44	.48	1.70	.33
.48	.52	1.96	.36
.52	.56	2.48	.40
.56	.60	2.35	.39
.60	.64	3.52	.48
.64	.68	3.07	.45
.68	.72	2.15	.37
.72	.76	1.89	.35
.76	.80	1.83	.35
.80	.88	.95	.18
.88	.96	.88	.17
.96	1.04	.52	.13
1.04	1.12	.29	.10
1.12	1.16	.65	.15
1.20	1.26	.38	.13

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.36 +- .02 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	
.03	.04	364.00 +-	12.00
.04	.05	298.00	10.00
.05	.06	277.00	9.10
.06	.07	222.40	8.00
.07	.08	214.10	7.80
.08	.09	164.70	6.80
.09	.10	152.40	6.50
.10	.11	122.60	5.90
.11	.12	103.10	5.30
.12	.13	94.20	5.10
.13	.14	79.60	4.70
.14	.15	68.70	4.30
.15	.16	64.50	4.10
.16	.17	44.40	3.40
.17	.18	42.20	3.30
.18	.19	35.90	3.10
.19	.20	28.80	2.80
.20	.21	19.00	2.20
.21	.22	17.20	2.10
.22	.23	20.10	2.30
.23	.24	14.00	1.90
.24	.26	9.80	1.10
.26	.28	5.15	.82
.28	.30	4.62	.78
.30	.32	4.36	.76
.32	.34	2.11	.53
.34	.36	1.58	.46
.36	.38	.92	.35
.38	.40	1.98	.51
.40	.44	2.38	.40
.44	.48	2.18	.38
.48	.52	3.10	.45
.52	.56	3.23	.46
.56	.60	2.44	.40
.60	.64	3.04	.45
.64	.68	2.84	.43
.68	.72	2.18	.38
.72	.76	3.50	.48
.76	.80	2.18	.38
.80	.88	1.12	.19
.88	.96	.99	.18
.96	1.04	.59	.14
1.04	1.12	.30	.10
1.12	1.16	.37	.11
1.20	1.26	.89	.18
1.28	1.33	.81	.22

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.43 +- .02 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	
.03	.04	368.00 +-	11.00
.04	.05	302.90	9.40
.05	.06	262.80	8.50
.06	.07	221.10	7.70
.07	.08	188.00	7.00
.08	.09	172.60	6.70
.09	.10	137.80	6.00
.10	.11	126.10	5.90
.11	.12	118.60	5.50
.12	.13	90.20	4.70
.13	.14	76.80	4.30
.14	.15	61.30	3.90
.15	.16	53.50	3.60
.16	.17	52.00	3.60
.17	.18	38.40	3.10
.18	.19	35.40	2.90
.19	.20	27.20	2.60
.20	.21	27.50	2.60
.21	.22	17.30	2.00
.22	.23	18.00	2.10
.23	.24	14.10	1.90
.24	.26	10.20	1.10
.26	.28	8.01	.99
.28	.30	4.62	.75
.30	.32	3.16	.62
.32	.34	2.19	.52
.34	.36	1.58	.44
.36	.38	.97	.34
.38	.40	1.34	.40
.40	.44	1.40	.29
.44	.48	1.82	.33
.48	.52	3.22	.44
.52	.56	2.43	.38
.56	.60	3.46	.46
.60	.64	2.61	.40
.64	.68	2.86	.42
.68	.72	2.68	.40
.72	.76	1.88	.34
.76	.80	1.40	.29
.80	.88	1.15	.19
.88	.96	.94	.17
.96	1.04	.94	.17
1.04	1.12	.33	.10
1.12	1.16	.76	.15
1.20	1.26	.37	.11
1.28	1.33	.48	.13
1.36	1.44	.46	.13

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.

....

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C		MILLIBARNS [1]	
1.23 +-	.02	43.3 +-	1.3
1.30	.02	41.5	1.2
1.36	.02	42.2	1.2
1.43	.02	41.8	1.2

[1] ERRORS ARE STATISTICAL ONLY.

....

CROSS SECTION FOR ANTIPROTON PROTON → ANTIPROTON PROTON PIO. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C		MICROBARNS [1]		NO. EVENTS
1.23 +-	.02	526. +-	35.	239
1.30	.02	739.	46.	283
1.36	.02	1011.	54.	383
1.43	.02	1247.	60.	513

[1] ERRORS ARE STATISTICAL ONLY.

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CROSS SECTION FOR ANTIPROTON PROTON → ANTIPROTON NEUTRON PI+. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C		MICROBARNS [1]		NO. EVENTS
1.23 +-	.02	200. +-	21.	91
1.30	.02	279.	28.	107
1.36	.02	388.	33.	147
1.43	.02	586.	39.	241

[1] ERRORS ARE STATISTICAL ONLY.

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CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON PROTON PI-. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C		MICROBARNS [1]		NO. EVENTS
1.23 +-	.02	207. +-	22.	94
1.30	.02	355.	32.	136
1.36	.02	459.	36.	174
1.43	.02	646.	42.	266

[1] ERRORS ARE STATISTICAL ONLY.

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CROSS SECTION FOR ANTIPROTON PROTON → ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE. [1] [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C		MICROBARNS [2]	
1.23 +-	.02	407. +-	31.
1.30	.02	634.	43.
1.36	.02	847.	49.
1.43	.02	1232.	58.

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERRORS ARE STATISTICAL ONLY.

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37 REACTIONS PBAR P → LAMBDA-BAR LAMBDA AT 2.5 GEV/C [PHYS. LETTERS 25B, 152 (1967)]

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ABSTRACT A SAMPLE OF LAMBDA-BAR LAMBDA, LAMBDA BAR SIGMA 0, SIGMA-BAR 0 LAMBDA HAS BEEN OBTAINED FROM INTERACTIONS IN HYDROGEN OF ANTIPROTONS AT 2.434 GEV/C. THE TOTAL AND DIFFERENTIAL CROSS SECTIONS ARE GIVEN AND A COMPARISON WITH RESULTS AT OTHER ENERGIES IS MADE. THE POLARIZATIONS AND SPIN CORRELATIONS ARE EVALUATED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 161, 1335 (1967), NUOVO CIMENTO 35, 735 (1965), PHYS. REV. 140, B1027 (1965), DUBNA CONFERENCE 1, 686 (1964), PHYS. REV. 152, 1171 (1966), DUBNA CONFERENCE 1, 697 (1964), AND PHYS. REV. 121, 1788 (1961).

BEAM IS ANTI-PROTON ON PROTON AT 2.434 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION DIFFERENTIAL CROSS SECTION RESONANCE PRODUCTION LAMBDA SIGMA

....
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[PAGE 152]
LABORATORY BEAM MOMENTUM = 2.434 +- .030 GEV/C.

REACTION ANTIPROTON PROTON →	MICROBARNS		
ANTI-LAMBDA LAMBDA	127. +-	9.	
ANTI-SIGMAO LAMBDA	33.	5.	
ANTI-LAMBDA SIGMAO	31.	5.	
SIGMAO ANTI-LAMBDA + CHARGE CONJUGATE	64.	7.	[1]
ANTI-SIGMAO SIGMAO	11.	5.	
ANTI-LAMBDA LAMBDA PIO	19.	5.	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTI-LAMBDA LAMBDA. [FIGURE 2]

LABORATORY BEAM MOMENTUM = 2.434 +- .030 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA UB/SR [1]	
.98	1.00	135.00 +-	25.00
.96	.98	78.00	16.00
.94	.96	87.00	14.00
.92	.94	82.00	15.00
.90	.92	56.00	13.00
.80	.90	34.00	5.00
.70	.80	25.00	4.00
.60	.70	14.50	3.50
.50	.60	9.70	2.30
.40	.50	3.30	1.50
.30	.40	3.70	1.50
.20	.30	3.70	1.50
.10	.20	5.00	1.90
.00	.10	2.80	1.10
-.20	.00	2.60	1.00
-.40	-.20	1.25	.65
-.60	-.40	1.90	.80
-.80	-.60	.70	.40
-1.00	-.80	2.20	.70

THETA IS THE ANGLE THAT THE ANTI-LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTI-LAMBDA SIGMA0 + CHARGE CONJUGATE. [FIGURE 3]

LABORATORY BEAM MOMENTUM = 2.434 +- .030 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA UB/SR [1]	
.98	1.00	62.00 +-	12.00
.96	.98	44.40	13.00
.94	.96	47.00	14.00
.92	.94	20.50	7.80
.90	.92	27.20	9.50
.80	.90	18.90	4.00
.70	.80	11.10	2.40
.60	.70	3.50	1.76
.50	.60	1.40	1.04
.40	.50	4.18	1.71
.30	.40	2.79	1.23
.20	.30	2.08	1.18
.10	.20	2.08	1.25
.00	.10	2.09	1.19
-.20	.00	1.06	.60
-.40	-.20	.69	.49
-.60	-.40	.70	.49
-.80	-.60	1.08	.58
-1.00	-.80	2.45	.86

THETA IS THE ANGLE THAT THE ANTI-LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.

38 STUDY OF PBAR P ANNIHILATION AT 2.5 GEV/C WITH PRODUCTION OF TWO KAONS IN FINAL STATE. [NUC. PHYS. B22, 512 (1970)]

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ABSTRACT CROSS SECTIONS FOR FINAL STATES AND RESONANCE PRODUCTION ARE GIVEN AND COMPARED TO A STATISTICAL MODEL PROPOSED BY LAMB. TRANSVERSE AND LONGITUDINAL MOMENTA ARE STUDIED AND THE GOLDHABER EFFECT IS TESTED. BARYON EXCHANGE MECHANISMS APPEAR.

BEAM IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER. A TOTAL OF 120000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

[TABLE 2]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

REACTION ANTIPROTON PROTON →	MICROBARNS [1]		
KOS KOS	12. +-	5.	
KOS KOS PI0	11.	2.	
KOS KOS MM≥2PI0	45.	1.	
KOS KOS PI+ PI-	81.	7.	
KOS KOS PI+ PI- PI0	136.	9.	
KOS KOS PI+ PI+ PI- PI-	13.	2.	
KOS KOS PI+ PI+ PI- PI- PI0	10.	2.	
KOS KOS PI+ PI+ PI- PI- MM≥2PI0	< 1.		
KOS KOS PI+ PI- MM≥2PI0	57.	6.	
KOS KOL PI+ PI-	204.	13.	
KOS PI+ PI- MM≥(1PI0+1K0)	224.	16.	
KOS KOL PI+ PI+ PI- PI-	29.	4.	
KOS PI+ PI+ PI- PI- MM≥(1PI0+1K0)	26.	3.	
KOS K+ PI-	37.	3.	
KOS K+ PI- + CHARGE CONJUGATE	74.	6.	[2]
KOS K+ PI- PI0	144.	8.	
KOS K+ PI- PI0 + CHARGE CONJUGATE	288.	16.	[2]
KOS K+ PI- MM≥2PI0	84.	5.	
KOS K+ PI- MM≥2PI0 + CHARGE CONJUGATE	168.	10.	[2]
KOS K+ PI+ PI- PI-	105.	10.	
KOS K+ PI+ PI- PI- + CHARGE CONJUGATE	210.	20.	[2]
KOS K+ PI+ PI- PI- PI0	105.	7.	
KOS K+ PI+ PI- PI- PI0 + CHARGE CONJUGATE	210.	14.	[2]
KOS K+ PI+ PI- PI- MM≥2PI0	21.	3.	
KOS K+ PI+ PI- PI- MM≥2PI0 + CHARGE CONJUGATE	42.	6.	[2]

[1] ERRORS ARE STATISTICAL ONLY.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

39 ANTIPROTON-PROTON ELASTIC SCATTERING AT 3.55 GEV/C. [NUC. PHYS. B12, 5 (1969)]

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ABSTRACT ANTIPROTON-PROTON ELASTIC SCATTERING HAS BEEN MEASURED AT 3.55 GEV/C IN THE C.M. ANGULAR RANGE FROM 20 DEGREES TO 77 DEGREES AND FROM 109 DEGREES TO 160 DEGREES. FORWARD PBAR P ELASTIC SCATTERING SHOWS A STRUCTURE NEAR T = -0.5 (GEV/C)-SQUARED. IN THE BACKWARD REGION TWO EVENTS ARE OBSERVED.

BEAM IS ANTIPROTON ON PROTON AT 3.55 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 3.55 +- .05 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]		NO. EVENTS
.16	.20	23.700 +-	2.400	96
.20	.24	13.900	1.900	53
.24	.32	9.400	1.300	50
.32	.40	3.040	.700	19
.40	.48	.250	.130	4
.48	.60	.680	.170	16
.60	.80	.740	.130	34
.80	1.00	.750	.140	30
1.00	1.20	.390	.120	10
1.20	1.60	.210	.070	8
1.60	2.00	.070	.070	1
3.50	4.50	.005	.004	2

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.

40 PRODUCTION OF HYPERON RESONANCES IN LAMBDA 0 + ANTILAMBDA 0 + PI+ PI- FINAL STATES. [PHYS. REV. LETTERS 11, 32 (1963)]

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CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 140, B1027 (1965).

BEAM IS ANTIPROTON ON PROTON FROM 3.25 TO 3.69 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.
KEY WORDS + HYPERON RESONANCE PRODUCTION LAMBDA
COMPOUND KEY WORDS + HYPERON RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

41 OBSERVATION OF THE PRODUCTION OF AN ANTI-XI-ZERO PARTICLE. [PHYS. REV. LETTERS 11, 165 (1963)]

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CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 140, B1027 (1965).

BEAM IS ANTIPROTON ON PROTON AT 3.69 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS + HYPERON PRODUCTION ANTIXIO
COMPOUND KEY WORDS + HYPERON PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

42 INVESTIGATION OF Y* AND ANTI-Y* PRODUCTION IN REACTIONS OF THE TYPE ANTIPROTON + P • Y + ANTI-Y + PI. [PHYS. REV. LETTERS 11, 346 (1963)]

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CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 140, B1027 (1965).

BEAM IS ANTIPROTON ON PROTON FROM 3.25 TO 3.69 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS • ANGULAR DISTRIBUTION RESONANCE PRODUCTION Y*(1385) Y*(1405) Y*(1520)

NO DATA PUNCHED FOR THIS ARTICLE

43 ANTIHYPERON PRODUCTION IN ANTIPROTON-PROTON REACTIONS AT 3.7 BEV/C. [PHYS. REV. 140, B1027 (1965)]

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ABSTRACT RESULTS ON THE PRODUCTION OF ANTIHYPERONS IN THE REACTIONS OF 3.7 BEV/C ANTIPROTONS WITH PROTONS ARE PRESENTED. EXAMPLES WERE OBSERVED OF THE PRODUCTION OF THE ANTIPARTICLES OF ALL THE BARYONS WITH HYPERCHARGE 0 AND 1, SEVERAL OF WHICH HAD NOT BEEN OBSERVED PRIOR TO THIS EXPERIMENT. THE MASS AND LIFETIME OF THE ANTI-LAMBDA AND THE LIFETIMES OF THE CHARGED ANTI-SIGMA WERE MEASURED AND ARE CONSISTENT WITH THE CORRESPONDING QUANTITIES OF THE LAMBDA AND CHARGED SIGMA, AS REQUIRED BY CPT INVARIANCE. IN THE TWO-BODY LAMBDA-ANTI-LAMBDA, LAMBDA-ANTI-SIGMA 0, ANTI-LAMBDA-SIGMA 0 AND SIGMA+ ANTI-SIGMA- FINAL STATES, THE ANTIHYPERONS DISPLAYED A VERY SHARPLY FORWARD PEAKED ANGULAR DISTRIBUTION. THE PRODUCTION OF THE THREE-BODY FINAL STATES Y ANTI-Y PI AND LAMBDA ANTI-N K OR ANTI-LAMBDA N ANTI-K TEND TO PROCEED THROUGH THE Y ANTI-Y* OR ANTI-Y Y* INTERMEDIATE STATES, WHERE THE Y* IS EITHER THE Y1*(1385), THE Y0*(1405), OR THE Y0*(1520). THE FOUR-BODY LAMBDA ANTI-LAMBDA PI+ PI- FINAL STATE IS DOMINATED BY THE PAIR PRODUCTION OF THE Y1*(1385) HYPERON ISOBAR.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 137, B1250 (1965).
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 11, 32 (1963), AND PHYS. REV. LETTERS 11, 346 (1963).

BEAM IS ANTIPROTON ON PROTON FROM 3.28 TO 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS • CROSS SECTION ANGULAR DISTRIBUTION HYPERON RESONANCE PRODUCTION LAMBDA SIGMA
COMPOUND KEY WORDS • HYPERON RESONANCE PRODUCTION

[TABLE 2]
LABORATORY BEAM MOMENTUM = 3.28 GEV/C +- 1.5(PER CENT).

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON •		
ANTILAMBDA LAMBDA	87.0 +-	13.0
ANTILAMBDA SIGMAO + CHARGE CONJUGATE	56.0	11.0
SIGMA+ ANTISIGMA-	36.0	13.0
SIGMA- ANTISIGMA+	2.0 +	8.0
	-	2.0
XI- ANTIXI+	4.0	2.8
LAMBDA ANTILAMBDA PI+ PI-	15.0	6.0
LAMBDA ANTISIGMAO PI+ PI- + CHARGE CONJUGATE	< 5.0	
LAMBDA ANTILAMBDA PI+ PI- PIO	< 5.0	
SIGMA+ ANTISIGMA- PIO + SIGMA- ANTISIGMA+ PIO	7.0	5.0
SIGMA+ ANTILAMBDA PI- PIO + SIGMA- ANTILAMBDA PI+ PIO + CHARGE CONJUGATE	6.0	6.0
XI- ANTIXIO PI+ + CHARGE CONJUGATE	< 5.0	
TOTAL HYPERON PRODUCTION	438.0	52.0

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 2]
LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON •		
ANTILAMBDA LAMBDA	82.0 +-	8.0
ANTILAMBDA SIGMAO + CHARGE CONJUGATE	69.0	10.0
SIGMA+ ANTISIGMA-	44.0	9.0
SIGMA- ANTISIGMA+	8.0	4.0
XI- ANTIXI+	2.0	1.1
LAMBDA ANTILAMBDA PI+ PI-	27.0	4.0
LAMBDA ANTISIGMAO PI+ PI- + CHARGE CONJUGATE	10.0	3.0
LAMBDA ANTILAMBDA PI+ PI- PIO	3.0	1.0
SIGMA+ ANTISIGMA- PIO + SIGMA- ANTISIGMA+ PIO	12.0	3.0
SIGMA+ ANTILAMBDA PI- + CHARGE CONJUGATE	70.0	8.0
SIGMA- ANTILAMBDA PI+ + CHARGE CONJUGATE	24.0	4.0
SIGMA+ ANTISIGMAO PI- + CHARGE CONJUGATE	11.0	3.0
SIGMA- ANTISIGMAO PI+ + CHARGE CONJUGATE	4.0	2.0
SIGMA+ ANTILAMBDA PI- PIO + SIGMA- ANTILAMBDA PI+ PIO + CHARGE CONJUGATE	19.0	3.0
LAMBDA ANTINEUTRON KO + CHARGE CONJUGATE	35.0	7.0
LAMBDA ANTIPROTON K+ + CHARGE CONJUGATE	29.0	5.0
SIGMAO ANTIPROTON K+ + CHARGE CONJUGATE	13.0	4.0
SIGMA+ ANTIPROTON KO + CHARGE CONJUGATE	14.0	4.0
XI- ANTIXIO PI+ + CHARGE CONJUGATE	3.0	1.7
TOTAL HYPERON PRODUCTION	720.0	30.0

[1] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 5]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [1]	D-SIGMA/D-OMEGA UB/SR [2]	
.02	176. +-	26.
.07	104.	16.
.12	76.	16.
.17	64.	14.
.22	32.	10.
.27	28.	8.
.32	26.	8.
.37	15.	8.
.42	32.	10.
.47	26.	6.
.52	8.	4.
.57	8.	4.
.62	17.	6.
.67	6.	4.
.72	22.	8.
.77	10.	6.
.82	6.	4.
.87	4.	4.
.92	6.	4.
.97	4.	4.
1.02	3.	4.
1.07	0.	
1.12	0.	
1.17	8.	4.
1.22	3.	3.
1.27	0.	
1.32	6.	4.
1.37	3.	4.

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA SIGMA0 + CHARGE CONJUGATE. [FIGURE 6]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-OMEGA UB/SR	
.045	.090	176. +-	28.
.090	.135	80.	20.
.135	.180	66.	14.
.180	.225	30.	10.
.225	.270	19.	8.
.270	.315	7.	5.
.315	.360	7.	5.
.360	.405	22.	10.
.405	.450	10.	6.
.450	.495	12.	6.
.495	.540	4.	3.
.540	.585	9.	6.
.585	.630	9.	6.
.630	.675	9.	6.
.675	.720	5.	4.
.720	.765	9.	6.
.765	.810	0.	
.810	.855	9.	6.
.855	.900	0.	
.900	.945	9.	6.
.945	.990	4.	3.
.990	1.035	0.	
1.035	1.080	4.	3.
1.080	1.125	9.	4.
1.125	1.170	0.	
1.170	1.215	4.	3.
1.215	1.260	0.	
1.260	1.305	4.	3.

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTISIGMA- SIGMA+. [FIGURE 7]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB	
-1.0	-.8	.0 +-	
-.8	-.6	10.0	10.0
-.6	-.4	.0	
-.4	-.2	.0	
-.2	.0	.0	
.0	.2	.0	
.2	.4	17.5	10.0
.4	.6	35.0	20.0
.6	.8	55.0	20.0
.8	1.0	100.0	30.0

THETA IS THE ANGLE THAT THE ANTISIGMA- MAKES WITH THE BEAM IN THE GRAND C.M.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTISIGMA+ SIGMA-. [FIGURE 7]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB	
-1.0	-.8	7.5 +-	7.5
-.8	-.6	.0	
-.6	-.4	.0	
-.4	-.2	1.5	1.5
-.2	.0	.0	
.0	.2	2.5	2.5
.2	.4	.0	
.4	.6	10.0	5.0
.6	.8	.0	
.8	1.0	25.0	7.5

THETA IS THE ANGLE THAT THE ANTISIGMA+ MAKES WITH THE BEAM IN THE GRAND C.M.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIY*(1405) LAMBDA + CHARGE CONJUGATE. [FIGURE 10]
ANTIY*(1405) → ANTISIGMA+ PI- + ANTISIGMA- PI+ [1]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

NORMALIZED TO 28. MB

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB [2,3]		NO. EVENTS
.9	1.0	117.0 +-	30.2	15
.8	.9	54.6	20.6	7
.7	.8	15.6	11.0	2
.6	.7	23.4	13.5	3
.5	.6	.0	7.8	0
.4	.5	7.8	7.8	1
.3	.4	15.6	11.0	2
.2	.3	.0	7.8	0
.1	.2	.0	7.8	0
.0	.1	.0	7.8	0
-.1	.0	.0	7.8	0
-.2	-.1	.0	7.8	0
-.3	-.2	7.8	7.8	1
-.4	-.3	15.6	11.0	2
-.5	-.4	.0	7.8	0
-.6	-.5	.0	7.8	0
-.7	-.6	7.8	7.8	1
-.8	-.7	7.8	7.8	1
-.9	-.8	.0	7.8	0
-1.0	-.9	7.8	7.8	1

THETA IS THE ANGLE THAT THE ANTIY*(1405) MAKES WITH THE BEAM IN THE GRAND C.M.

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.355 TO 1.455 GEV].
[2] ERRORS INCLUDE SYSTEMATICS.
[3] COUNTS WERE MULTIPLIED BY 7.8 TO GET THESE.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIY*(1520) LAMBDA + CHARGE CONJUGATE. [FIGURE 10]
ANTIY*(1520) → ANTISIGMA+ PI- + ANTISIGMA- PI+ [1]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

NORMALIZED TO 37. MB

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB [2,3]		NO. EVENTS
.9	1.0	78.0 +-	39.0	4
.8	.9	78.0	39.0	4
.7	.8	58.5	33.8	3
.6	.7	39.0	27.6	2
.5	.6	.0	19.5	0
.4	.5	19.5	19.5	1
.3	.4	19.5	19.5	1
.2	.3	.0	19.5	0
.1	.2	19.5	19.5	1
.0	.1	.0	19.5	0
-.1	.0	19.5	19.5	1
-.2	-.1	.0	19.5	0
-.3	-.2	.0	19.5	0
-.4	-.3	19.5	19.5	1
-.5	-.4	.0	19.5	0
-.6	-.5	.0	19.5	0
-.7	-.6	.0	19.5	0
-.8	-.7	.0	19.5	0
-.9	-.8	19.5	19.5	1
-1.0	-.9	.0	19.5	0

THETA IS THE ANGLE THAT THE ANTIY*(1520) MAKES WITH THE BEAM IN THE GRAND C.M.

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.505 TO 1.535 GEV].
[2] ERRORS INCLUDE SYSTEMATICS.
[3] COUNTS WERE MULTIPLIED BY 19.5 TO GET THESE.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIY*(1385)- SIGMA+ + CHARGE CONJUGATE. [FIGURE 10]
ANTIY*(1385)- → ANTILAMBDA PI- [1]

LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

NORMALIZED TO 36. MB

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB [2,3]		NO. EVENTS
.9	1.0	109.0 +-	34.5	10
.8	.9	109.0	34.5	10
.7	.8	43.6	21.8	4
.6	.7	43.6	21.8	4
.5	.6	10.9	10.9	1
.4	.5	.0	10.9	0
.3	.4	21.8	15.4	2
.2	.3	10.9	10.9	1
.1	.2	.0	10.9	0
.0	.1	10.9	10.9	1

THETA IS THE ANGLE THAT THE ANTIY*(1385)- MAKES WITH THE BEAM IN THE GRAND C.M.

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.355 TO 1.415 GEV].
[2] ERRORS INCLUDE SYSTEMATICS.
[3] COUNTS WERE MULTIPLIED BY 10.9 TO GET THESE.

[TABLE 6]
LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 1.5(PER CENT).

REACTION ANTIPROTON PROTON →	MICROBARNS [1]	
LAMBDA ANTIY*(1405) + CHARGE CONJUGATE ANTIY*(1405) → ANTISIGMA+ PI- + ANTISIGMA- PI+ [2]	28. +-	10.
LAMBDA ANTIY*(1520) + CHARGE CONJUGATE ANTIY*(1520) → TOTAL [2]	37.	18.
SIGMA+ ANTIY*(1385)- + CHARGE CONJUGATE ANTIY*(1385)- → ANTILAMBDA PI- [3]	36.	11.
SIGMA- ANTIY*(1385)+ + CHARGE CONJUGATE ANTIY*(1385)+ → ANTILAMBDA PI+ [2]	< 9.	
Y*(1385)+ ANTIY*(1385)- Y*(1385)+ → LAMBDA PI+ [2] ANTIY*(1385)- → ANTILAMBDA PI- [2]	5.	2.
Y*(1385)- ANTIY*(1385)+ Y*(1385)- → LAMBDA PI- [2] ANTIY*(1385)+ → ANTILAMBDA PI+ [2]	8.	3.

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[3] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

44 STUDY OF ANTIPROTON-PROTON ANNIHILATIONS INTO K AND PI MESONS AT 3.7 BEV/C. [PHYS. REV. 142, 932 (1966)]

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ABSTRACT AT 3.66 BEV/C, THE TOTAL CROSS SECTION FOR ANTIPROTON-PROTON → K + ANTI-K + M PI WHERE M = 1,2, ..., IS 2.9 +- 0.4 MB. NO TWO-BODY REACTIONS OF THE FORM ANTIPROTON-PROTON → K ANTI-K, K K*, OR K*ANTI-K* HAVE BEEN OBSERVED. THE ANGULAR DISTRIBUTION OF KAONS FOR THREE-BODY FINAL STATES SHOWS STRIKING ANISOTROPY BUT THIS EFFECT DIMINISHES WITH INCREASING MULTIPLICITY. AN ENHANCEMENT AT LOW K ANTI-K EFFECTIVE MASS, WITH POSSIBLE ASSIGNMENT OF I = 1, HAS BEEN OBSERVED, AND THIS IS COMPARED WITH THE [(K1)0 (K1)0] EFFECT NOTED PREVIOUSLY BY SEVERAL GROUPS. THE K*(888), RHO, AND OMEGA ARE PROMINENT IN SEVERAL CHANNELS, BUT THE DATA ARE CONSISTENT WITH NO PRODUCTION OF THE PHI. UPPER LIMITS ON THE PHI/OMEGA PRODUCTION RATIO ARE PRESENTED. A SEARCH FOR RESONANCES IN THE K PI PI SYSTEM AT 1175, 1215, AND 1270 MEV, AS WELL AS THE K ANTI-K PI AT 1280 AND 1410 MEV, HAS YIELDED NEGATIVE RESULTS.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 137, B1250 (1965).

BEAM IS ANTIPROTON ON PROTON AT 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 250000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION RESONANCE PRODUCTION K KBAR PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION

[TABLE 2]
LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 2(PER CENT).

REACTION ANTIPROTON PROTON →	MILLIBARNS [1]
TOTAL KAON ANNIHILATION	2.900 +- .400
KO KOBAR	< .002

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 3]
LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 2(PER CENT).

REACTION ANTIPROTON PROTON →	MICROBARNS [1]		NO. EVENTS
KOS K+ PI- + CHARGE CONJUGATE	11. +-	6.	27
KOS K+ PI- PIO + CHARGE CONJUGATE	74. +	48.	133
	-	36.	
KOS KOS PI+ PI-	10.	3.	48
KOS KO PI+ PI-	61. +	63. [2]	105
	-	43.	
KOS K+ PI+ PI- PI- + CHARGE CONJUGATE	97. +	41.	160
	-	14.	
KOS KOS PI+ PI- PIO	34. +	5.	118
	-	11.	
KOS K+ PI+ PI- PI- PIO + CHARGE CONJUGATE	201. +	47.	360
	-	75.	
KOS KOS PI+ PI+ PI- PI-	11.	3.	43
KOS KO PI+ PI+ PI- PI-	75. +	110. [2]	101
	-	64.	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] UNOBSERVED KO CONSISTS OF KOS DECAYS WHICH ESCAPE DETECTION AND KOL DECAYS.

45 PBAR P ELASTIC SCATTERING FOR INCIDENT MOMENTA BETWEEN 1.0 AND 2.50 BEV/C [PHYS. REV. LETTERS 17, 720 (1966)]

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BEAM IS ANTIPROTON ON PROTON FROM 1.0 TO 2.5 GEV/C.
THIS EXPERIMENT USES COUNTERS.
GENERAL COMMENTS ON THIS ARTICLE
1 DATA SUPPLIED BY AUTHORS.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1. GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.197	18.50 +-	5
.229	12.90	5
.264	7.50	5
.302	4.90	5
.338	4.27	5
.338	3.73	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.125 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.186	21.25 +-	5
.215	14.73	5
.244	9.47	5
.283	6.44	5
.321	3.74	5
.364	3.77	5
.412	5.08	5
.476	5.53	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.25 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.197	21.10 +-	5
.220	16.60	5
.245	10.60	5
.270	6.74	5
.307	4.23	5
.340	2.60	5
.388	2.71	5
.448	3.43	5
.508	4.18	5
.588	5.00	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.375 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.188	20.50 +-	5
.214	16.10	5
.234	11.45	5
.260	7.78	5
.292	4.77	5
.318	2.84	5
.359	2.13	5
.416	2.18	5
.468	2.62	5
.528	3.24	5
.596	3.72	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.5 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.200	17.50	+- 5
.218	12.00	5
.248	8.55	5
.280	5.43	5
.312	3.76	5
.344	2.16	5
.392	1.56	5
.430	1.49	5
.490	2.02	5
.556	2.41	5
.624	2.62	5
.716	2.92	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.75 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.194	20.60	+- 5
.204	13.40	5
.239	10.50	5
.274	8.32	5
.298	6.33	5
.325	3.90	5
.364	2.37	5
.392	1.86	5
.450	1.35	5
.492	1.35	5
.554	1.75	5
.604	1.94	5
.688	2.09	5
.788	2.09	5
.872	1.93	5
.972	1.90	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 2. GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.214	13.30	+- 5
.224	9.66	5
.251	9.82	5
.275	5.94	5
.302	4.38	5
.380	2.97	5
.410	1.43	5
.460	1.21	5
.494	1.09	5
.544	1.38	5
.600	1.67	5
.648	1.80	5
.724	1.98	5
.800	1.85	5
.920	1.51	5
1.044	1.27	5
1.168	1.15	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

....

ELASTIC DIFFERENTIAL CROSS SECTIJN FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 2.25 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.280	4.72 +-	5
.297	3.49	5
.312	2.76	5
.330	1.62	5
.362	1.24	5
.410	1.04	5
.468	.82	5
.502	.86	5
.566	.97	5
.600	1.22	5
.668	1.47	5
.730	1.46	5
.830	1.46	5
.916	1.33	5
1.040	1.15	5
1.160	.83	5
1.300	.70	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C (MEAN VALUE).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.; DATA SUPPLIED BY AUTHORS

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2,3]	PER CENT
.245	6.310 +-	5
.260	6.690	5
.276	4.780	5
.292	5.530	5
.310	2.870	5
.342	2.130	5
.378	1.600	5
.395	1.430	5
.424	.742	5
.466	.593	5
.492	.619	5
.552	.920	5
.600	.866	5
.672	1.140	5
.720	1.110	5
.792	1.350	5
.892	1.230	5
1.000	1.070	5
1.110	.935	5
1.250	.707	5
1.390	.550	5
1.550	.476	5

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 50 PER CENT.

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46 EXPERIMENTAL RESULTS ON PBAR P ANNIHILATIONS AT 1.2 GEV/C WITH PRODUCTION OF AT LEAST ONE K01 MESON. [NUOVO CIMENTO 50A, 701 (1967)]

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A.M.ADAMSON, J.DUBOC, F.JAMES, M.GOLDBERG [INSTITUTE DU RADIUM, PARIS, FRANCE]
R.A.DONALD, R.JAMES, J.E.A. LYS, T.NISAR [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT WE PRESENT RESULTS ON ANNIHILATIONS OF ANTIPROTONS AT 1.2 GEV/C INTO 2-, 3-, AND 4-BODY FINAL STATES INCLUDING AT LEAST ONE VISIBLE K01. THE 3- AND 4-BODY CHANNELS ARE DOMINATED BY K*(891). RESONANCES IN THE K-KBAR AND K-KBAR-PI SYSTEMS ARE DISCUSSED AND CROSS SECTIONS ARE GIVEN. IT IS FOUND THAT AT 1.2 GEV/C IT IS NO LONGER TRUE THAT ANNIHILATION OCCURS PREDOMINANTLY FROM S-STATES.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. LETTERS 17, 347 (1964).
PART OF THIS ARTICLE SUPERSEDED BY NUC. PHYS. B5, 693 (1968).

BEAM IS ANTIPROTON ON PROTON AT 1.18 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION CROSS SECTION RESONANCE PRODUCTION K KBAR PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION

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....

[PAGE 703]

LABORATORY BEAM MOMENTUM = 1.18 +- .01 GEV/C.

REACTION	MICROBARNS [1]	NO. EVENTS
ANTIPROTON PROTON →		
KOS KOS	5.9 +- 2.3	8
KOS KOL	27.0 5.0	

[1] ERRORS INCLUDE SYSTEMATICS.

[PAGE 704]

LABORATORY BEAM MOMENTUM = 1.18 +- .01 GEV/C.

REACTION	MICROBARNS [1]	NO. EVENTS
ANTIPROTON PROTON →		
KOS K+ PI-	128. +- 10.	375
KOS K- PI+	124. 10.	365
KOS K+ PI- + CHARGE CONJUGATE	252. 14. [2]	
KOS KOS PIO	59. 7.	92

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

[PAGE 708]

LABORATORY BEAM MOMENTUM = 1.18 +- .01 GEV/C.

REACTION	MICROBARNS
ANTIPROTON PROTON →	
K*(1420)+ K- + CHARGE CONJUGATE	10. +- 6. [1]
K*(1420)+ → KOS PI+ [2]	
K*(1420)0 KOS	10. 6. [1]
K*(1420)0 → K+ PI- + CHARGE CONJUGATE [2]	
K*(890)0 KOS	35. 6. [3]
K*(890)0 → K+ PI- + CHARGE CONJUGATE [2]	
K*(890)+ K- + CHARGE CONJUGATE	70. 7. [3]
K*(890)+ → KOS PI+ [2]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[3] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON PROTON → KOS KOS PI+ PI-. [PAGE 709]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]	NO. EVENTS
1.18 +- .01	208. +- 20.	397

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 3]

LABORATORY BEAM MOMENTUM = 1.18 +- .01 GEV/C.

REACTION	MICROBARNS [1]
ANTIPROTON PROTON →	
KOS KOS RHO(765)0	52. +- 15.
RHO(765)0 → PI+ PI- [2]	
K*(890)+ KOS PI- + CHARGE CONJUGATE	118. 18.
K*(890)+ → KOS PI+ [2]	

[1] ERRORS ARE STATISTICAL ONLY.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

CROSS SECTION FOR ANTIPROTON PROTON → PHI(1019) PI+ PI-. [PAGE 713]
PHI(1019) → KOS KOL [1]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [2]
1.18 +- .01	12. +- 3.

[1] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[2] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → D(1285) PIO. [PAGE 717]
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [1]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS
1.18	7. +- 2.

[1] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH [MASS = 1.290 GEV; WIDTH = .025 GEV], AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

[TABLE 4]

LABORATORY BEAM MOMENTUM = 1.18 +- .01 GEV/C.

REACTION	MICROBARNS [1]
ANTIPROTON PROTON →	
K*(890)+ K- PIO + CHARGE CONJUGATE	220. +- 22.
K*(890)+ → KOS PI+ [2]	
K*(890)0 K+ PI- + CHARGE CONJUGATE	113. 18.
K*(890)0 → KOS PIO [2]	
KOS K- RHO(765)+ + CHARGE CONJUGATE	119. 22.
RHO(765)+ → PI+ PIO [2]	

[1] ERRORS ARE STATISTICAL ONLY.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

47 ANTIPROTON-PROTON ANNIHILATION AT 6.94 GEV/C LEADING TO 8 AND MORE PIONS. [NUC. PHYS. B20, 45 (1970)]

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ABSTRACT THE PBAR-P ANNIHILATION INTO 8 AND MORE PIONS HAS BEEN STUDIED AT AN INCIDENT MOMENTUM OF 6.94 GEV/C. CROSS SECTIONS, ANGULAR DISTRIBUTIONS AND ANGULAR CORRELATIONS ARE PRESENTED. THE 2 AND 3 PIONS INVARIANT-MASS DISTRIBUTIONS ARE DISCUSSED.

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 38, 12 (1965), PHYS. REV. 176, 1595 (1968), AND PHYS. REV. 173, 1307 (1968).

BEAM IS ANTIPROTON ON PROTON AT 6.94 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 25000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION PION PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1(PER CENT).

REACTION	MILLIBARNS [1]		NO. EVENTS
ANTIPROTON PROTON →			
PI+ PI+ PI+ PI+ PI- PI- PI- PI-	.150 +-	.020	67
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI0	.650	.050	310
PI+ PI+ PI+ PI+ PI- PI- PI- PI- MM≥2PI0	.960	.070	409
EIGHT PRONG PION ANNIHILATION	1.770	.100	
PI+ PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI-	.013 +	.007	5
	-	.004	
PI+ PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI- PI0	.060	.013	23
PI+ PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI- MM≥2PI0	.068	.014	24
TEN PRONG PION ANNIHILATION	.140	.020	

[1] ERRORS INCLUDE SYSTEMATICS.

48 EXPERIMENTAL EVIDENCE FOR A HIGH-MASS VECTOR MESON. [PHYS. REV. LETTERS 27, 283 (1971)]

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ABSTRACT WE HAVE MEASURED THE CROSS SECTION FOR THE REACTION PBAR P → K(OS) K(OL) FROM 100-800 MEV/C. A SIGNIFICANT ENHANCEMENT IN THE CROSS SECTION IS OBSERVED AT A MEAN MOMENTUM OF 600 MEV/C. A LEGENDRE-POLYNOMINAL ANALYSIS OF THE ANGULAR DISTRIBUTIONS ALSO SHOWS AN ENHANCEMENT IN THE A2 COEFFICIENT IN THE SAME MOMENTUM RANGE. A PLAUSIBLE EXPLANATION OF THE DATA INDICATES A NEW MESON STATE RHO(1970) WITH A MASS M = 1968 MEV, WIDTH GAMMA = 35 MEV, AND J(PC) = 1--.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 21, 1268 (1968), AND PHYS. REV. LETTERS 27, 71 (1971).

BEAM IS ANTIPROTON ON PROTON FROM .1 TO .8 GEV/C.
THIS EXPERIMENT USES THE BNL 30 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 250000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION KAON RESONANCE PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION KAON RESONANCE PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → KOS K*(890). [FIGURE 1A]
K*(890) → KOS PI0 [1]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MICROBARNS	
.2	.3	680. +-	380.
.3	.4	72.	22.
.4	.5	61.	13.
.5	.6	54.	13.
.6	.7	64.	15.
.7	.8	30.	9.

[1] USED SIMPLE MASS CUT (NEGLIGIBLE BACKGROUND) [MASS CUT FROM .840 TO .940 GEV].

CROSS SECTION FOR ANTIPROTON PROTON → KOS KOL. [FIGURE 1B]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MICROBARNS	
.1	.2	4100. +-	3700.
.2	.3	420.	240.
.3	.4	39.	13.
.4	.5	19.	6.
.5	.6	57.	12.
.6	.7	76.	16.
.7	.8	22.	6.

49 COMPARISON OF THE DIP-BUMP STRUCTURE IN PBAR-P AND PBAR-N ELASTIC SCATTERING. [PHYS. REV. LETTERS 21, 770 (1968)]

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ABSTRACT PBAR-N AND PBAR-P ELASTIC SCATTERING HAVE BEEN STUDIED IN THE MOMENTUM-T-ANSFE- -EG+ON OF T = -0.15 TO T = -1.0 (BEV/C)**2 USING THE REACTION PBAR D + PBAR N P(S) OR PBAR P N(S), WHERE P(S) AND N(S) ARE SPECTATORS. THE PBAR N ELASTIC CROSS SECTION SHOWS A DIP AT T APPROX. -0.4 SIMILAR TO THAT SEEN IN THE PBAR P CROSS SECTION. A COMPARISON OF THE PBAR N AND PBAR P CROSS SECTIONS SHOWS THAT THEY APPEAR TO CROSS OVER EACH OTHER, T APPROX. -0.4(BEV/C)**2.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 181, 1794 (1969), PHYS. REV. LETTERS 17, 720 (1966), AND PHYS. REV. LETTERS 19, 265 (1967).

BEAM IS ANTIPROTON ON DEUTERON FROM 1.23 TO 1.65 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON. [FIGURE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 1.23 TO 1.65 GEV/C.

PROTON SPECTATOR MOMENTUM < .150 GEV/C; DIFFERENTIAL CROSS SECTION NORMALIZED TO ANTIPROTON PROTON DATA IN PHYS. REV. LETTERS 17, 720 (1966) WITH AN UNCERTAINTY OF 15 PER CENT

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2	+-
.16	.18	83.0	15.0
.18	.20	33.0	4.0
.20	.24	17.0	2.0
.24	.28	5.3	.9
.28	.32	2.7	.6
.32	.36	2.6	.5
.36	.40	2.7	.5
.40	.44	3.1	.5
.44	.48	4.1	.9
.48	.58	5.5	.6
.58	.64	3.9	.5
.64	.80	2.8	.2
.80	1.00	1.7	.3
1.00	1.50	.9	.3

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 1.23 TO 1.65 GEV/C.

PROTON SPECTATOR MOMENTUM < .150 GEV/C; DIFFERENTIAL CROSS SECTION NORMALIZED TO ANTIPROTON PROTON DATA IN PHYS. REV. LETTERS 17, 720 (1966) WITH AN UNCERTAINTY OF 15 PER CENT

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2	+-
.16	.18	63.00	13.00
.18	.20	39.00	5.00
.20	.24	23.00	2.00
.24	.28	14.00	2.00
.28	.32	7.20	1.20
.32	.36	4.20	.90
.36	.40	2.20	.50
.40	.44	1.80	.50
.44	.48	2.80	.60
.48	.58	3.40	.40
.58	.64	3.00	.40
.64	.80	2.30	.30
.80	1.00	.63	.13
1.00	1.50	.54	.19

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

50 THE ANNIHILATION PBAR N + PI+ PI- PI- BETWEEN 1.0 AND 1.6 GEV/C AND ITS COMPARISON WITH THE VENEZIANO MODEL. [NUOVO CIMENTO 1 A, 333 (1971)]

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ABSTRACT WE HAVE ANALYSED THE REACTION PBAR N + PI+ PI- PI- BETWEEN 2.08 AND 2.29 GEV C.M. ENERGY. THE POPULATION OF THE 3 PI DALITZ PLOT (A TOTAL OF 2328 EVENTS AT ALL ENERGIES) IS STRONGLY NONUNIFORM AND SHOWS A STRUCTURE THAT CAN BE QUALITATIVELY INTERPRETED WITH SIMPLE VENEZIANO-TYPE FORMULAE. THE MOMENTS OF THE ANGULAR DISTRIBUTIONS OF THE THREE-PION PLANE ARE ALSO EXAMINED.

BEAM IS ANTIPROTON ON DEUTERON FROM 1.0 TO 1.6 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM DEUTERIUM BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION CROSS SECTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION

CROSS SECTION FOR ANTIPROTON NEUTRON → PI+ PI- PI-. [FIGURE 1]

CROSS SECTIONS BASED ON EVENTS WITH PROTON SPECTATOR MOMENTUM < .150 GEV/C

THESE DATA WERE READ FROM A GRAPH

GLAUBER + FERMI MOTION CORRECTIONS MADE

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1,2]	
.91	1.52 +-	.22
.96	1.28	.14
1.02	1.01	.09
1.08	.80	.08
1.14	1.02	.07
1.20	1.00	.06
1.25	.95	.06
1.31	.78	.06
1.38	.71	.06
1.43	.73	.06
1.49	.65	.06
1.55	.62	.06
1.61	.53	.05
1.66	.71	.10

[1] ERRORS INCLUDE SYSTEMATICS.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3.5 PER CENT.

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51 PBAR P ANNIHILATION INTO BOSON PAIRS AT 6 AND 8 GEV/C. [PHYS. REV. LETTERS 23, 433 (1969)]

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ABSTRACT WE HAVE STUDIED THE REACTION PBAR + P → PI-+ + B+- WITH SMALL MOMENTUM TRANSFER TO THE PION AT 6 AND 8 GEV/C. FOR B+ IDENTICAL TO PI+ THE AVERAGE DIFFERENTIAL CROSS SECTIONS D SIGMA/DT ARE 4.6 +- 1.9 MU-B/(GEV/C)**2 FOR -0.08 *(GEV/C)**2 > T > -0.16 (GEV/C)**2 AT 6 GEV/C*, AND 1.5 +- 0.6 MU-B/(GEV/C)**2 FOR -0.07 (GEV/C)**2 > T > -/.45 (GEV/C)**2 AT 8 GEV/C. AT 8 GEV/C THE CROSS SECTIONS ARE 0.56 +- 0.33 MU-B/(GEV/C)**2 FOR B- IDENTICAL TO PI- AND 1.9 +- 1.1 MU-B/(GEV/C)**2 FOR B- IDENTICAL TO RHO- AVERAGED OVER THE MOMENTUM-TRANSFER INTERVAL -0.05 (GEV/C)**2 >T> -0.46 (GEV/C)**2.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 20, 1529 (1968).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 6 TO 8 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 8 GEV/C.
THIS EXPERIMENT USES COUNTERS AND SPARK CHAMBERS.
KEY WORDS → ANNIHILATION DIFFERENTIAL CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION DIFFERENTIAL CROSS SECTION MESONS PRODUCTION

....
....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI- PI+. [TABLE 1]

LABORATORY BEAM MOMENTUM = 8. GEV/C.

-T (GEV/C)**2 MIN	MAX	*D-SIGMA/D-T UB/(GEV/C)**2*	
.07	.12	2.7 +-	1.2
.12	.20	.8	.6
.20	.45	1.3	.9

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PI-].

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI- PI+. [TABLE 1]

LABORATORY BEAM MOMENTUM = 6. GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2
.08	.16	4.6 +- 1.9

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PI-].

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [TABLE 1]

LABORATORY BEAM MOMENTUM = 8. GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2
.07	.47	.56 +- .33

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PI+].

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ RHO(765)-. [TABLE 1]
RHO(765)- → PI- PI0

LABORATORY BEAM MOMENTUM = 8. GEV/C.

RHO(765)- FITTED TO BREIT-WIGNER CURVE OVER THE RANGE 0.36 GEV**2< MISSING MASS < 0.92 GEV**2 AND CORRECTED BY 20 PER CENT FOR TRUNCATION

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2
.03	.45	1.9 +- 1.1

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PI+].

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52

PBAR-P ELASTIC SCATTERING AT 8 AND 16 GEV/C [PHYS. REV. LETTERS 23, 663 (1969)]

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ABSTRACT ANGULAR DISTRIBUTIONS ARE PRESENTED FOR PBAR P ELASTIC SCATTERING AT 8 AND 16 GEV/C FOR ABS(T) < 1.3 (GEV/C)**2. AT BOTH ENERGIES THERE IS STRUCTURE IN THE DIFFERENTIAL CROSS SECTIONS IN THE REGION 0.5 < ABS(T) < 1.0 (GEV/C)**2, SIMILAR TO THAT OBSERVED AT LOWER ENERGIES. THE DIFFRACTION PEAK CONTINUES TO EXPAND WITH INCREASING INCIDENT MOMENTUM.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. LETTERS 24B, 642 (1967), PHYS. REV. LETTERS 17, 720 (1966), PHYS. REV. 137, B1250 (1965), PHYS. REV. LETTERS 19, 265 (1967), PHYS. LETTERS 5, 132 (1963), NUOVO CIMENTO 52A, 954 (1966), PHYS. REV. LETTERS 21, 175 (1968), PHYS. REV. LETTERS 11, 503 (1963), PHYS. REV. LETTERS 15, 45 (1965), PHYS. REV. LETTERS 21, 387 (1968), AND PHYS. LETTERS 28B, 61 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 20, 1529 (1968).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 7.98 TO 8.02 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON FROM 15.95 TO 16.05 GEV/C.
THIS EXPERIMENT USES COUNTERS AND SPARK CHAMBERS.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 8.000 +- .024 GEV/C.

DATA SUPPLIED BY AUTHORS IN TABULAR FORM

-T (GEV/C)**2	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.0460	93.300 +-	.428
.0528	84.420	.407
.0602	76.990	.389
.0680	70.800	.373
.0763	63.580	.354
.0851	56.900	.335
.0943	50.950	.318
.1040	44.840	.298
.1143	39.190	.280
.1249	33.900	.260
.1361	29.150	.329
.1477	25.920	.311
.1598	21.770	.285
.1724	18.300	.262
.1855	15.710	.243
.1990	12.880	.221
.2131	10.800	.203
.2218	11.090	.289
.2374	9.244	.264
.2535	7.222	.235
.2702	5.944	.214
.2874	4.711	.191
.3051	3.544	.167
.3234	2.809	.149
.3422	2.153	.132
.3615	1.710	.119
.3813	1.425	.109
.4017	.981	.092
.4226	.760	.081
.4441	.572	.072
.5553	.202	.038
.5815	.154	.032
.6220	.095	.022
.6780	.090	.021
.7360	.095	.021
.7970	.099	.020
.8600	.096	.020

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 16.000 +- .048 GEV/C.

DATA SUPPLIED BY AUTHORS IN TABULAR FORM; ABSOLUTE NORMALIZATION IN QUESTION DUE TO EXTRAPOLATED FORWARD DIFFERENTIAL CROSS SECTION BEING 20 PER CENT BELOW THE OPTICAL POINT

-T (GEV/C)**2	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.1110	28.510 +-	.302
.1328	22.280	.267
.1568	16.890	.233
.1823	12.410	.201
.2101	8.860	.170
.2397	6.407	.145
.2713	4.503	.122
.3049	2.979	.100
.3405	1.975	.082
.3780	1.267	.059
.4174	.803	.048
.4588	.475	.037
.5022	.244	.028
.5476	.201	.025
.5948	.132	.020
.6441	.109	.019
.6953	.067	.014
.7485	.058	.015
.7970	.034	.014
.9180	.053	.016
1.0470	.038	.014
1.1850	.019	.010
1.3310	.001	.004

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 8.000 +- .024 GEV/C.

DATA ARE FIT OVER -T FROM .046 TO .450 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPPOTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND T IS IN (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED VALUES
A = 159.4 +- 7.0
B = 12.57 +- .20

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FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 16.000 +- .048 GEV/C.

DATA ARE FIT OVER -T FROM .111 TO .450 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

ABSOLUTE NORMALIZATION IN QUESTION DUE TO EXTRAPOLATED FORWARD DIFFERENTIAL CROSS SECTION BEING 20 PER CENT BELOW THE OPTICAL POINT
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND T IS IN (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED VALUES
A = 103.5 +- 5.0
B = 11.44 +- .20

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53 UPPER LIMITS ON RARE TWO-BODY PROCESSES IN K- P AND PBAR P SCATTERING AT HIGH ENERGIES. [PHYS. LETTERS 31B, 36 (1970)]

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E.W.ANDERSON, E.J.BLESER, H.R.BLIEDEN, G.B.COLLINS, D.GARELICK, J.MENES, F.TURKOT [BROOKHAVEN NAT. LAB., UPTON, L.I., N.Y., USA]

ABSTRACT A MISSING MASS SPECTROMETER SEARCH WAS MADE FOR SEVERAL TWO-BODY, COUBLE CHARGE EXCHANGE REACTIONS, INCLUDING BACKWARD K- P AND PBAR P ELASTIC SCATTERING AT 8 AND 16 GEV/C AND SMALL MOMENTUM TRANSFER. NO EXAMPLES OF ANY OF THESE PROCESSES WERE OBSERVED.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 20, 1529 (1968).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 8 TO 16 GEV/C.
NO. 2 IS K- ON PROTON FROM 8 TO 16 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS • DIFFERENTIAL CROSS SECTION ELASTIC SCATTERING

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....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 8. GEV/C.

-U (GEV/C)**2 MIN	MAX	D-SIGMA/D-U UB/(GEV/C)**2 [1]
.026	.395	.18

U IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PROTON].

[1] VALUE IS APPROXIMATE ONLY.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON • PROTON ANTIDELTA(1238). [TABLE 1]

LABORATORY BEAM MOMENTUM = 8. GEV/C.

-U (GEV/C)**2 MIN	MAX	D-SIGMA/D-U UB/(GEV/C)**2 [1]
.032	.306	.24

U IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PROTON].

[1] VALUE IS APPROXIMATE ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 16. GEV/C.

-U (GEV/C)**2 MIN	MAX	D-SIGMA/D-U UB/(GEV/C)**2 [1]
.09	1.46	.25

U IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [PROTON].

[1] VALUE IS APPROXIMATE ONLY.

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54 ANTIPROTON-PROTON CHARGE-EXCHANGE DIFFERENTIAL CROSS-SECTIONS BETWEEN 50 AND 180 MEV. [NUOVO CIMENTO 54A, 456 (1968)]

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ABSTRACT THE ANGULAR DISTRIBUTION OF THE CHARGE-EXCHANGE REACTION PBAR P • NBAR N HAS BEEN MEASURED FOR ANTIPROTONS OF KINETIC ENERGY BETWEEN 50 AND 180 MEV. THE MEASUREMENT IS BASED ON 215 EVENTS IN WHICH THE ANNIHILATION STAR OF THE ANTINEUTRON IS DETECTED. THE RESULTS ARE COMPARED WITH THE EXISTING THEORETICAL MODELS.

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 54A, 441 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 46A, 171 (1966).

BEAM IS ANTIPROTON ON PROTON FROM .310 TO .608 GEV/C. (BEAM KINETIC ENERGY = .05 TO .18 GEV)
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 57140 PICTURES ARE REPORTED ON.
KEY WORDS • CROSS SECTION DIFFERENTIAL CROSS SECTION CHARGE EXCHANGE

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CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 1]

LABORATORY BEAM ENERGY GEV	MILLIBARNS [1]	NO. EVENTS
.093 + .022 - .043	14.7 +- 1.6	111
.149 + .031 - .034	11.4 1.2	104

[1] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 2]

LABORATORY BEAM ENERGY = .093 GEV (MEAN VALUE).

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]
-.9	.40 +- .17
-.7	.53 .21
-.5	1.07 .36
-.3	.30 .17
-.1	.43 .22
.1	.82 .32
.3	1.54 .57
.5	1.63 .44
.7	1.71 .52
.9	3.29 .74

THETA IS THE ANGLE THAT THE ANTINEUTRON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 2]

LABORATORY BEAM ENERGY = .149 GEV (MEAN VALUE).

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]
-.9	.26 +- .11
-.7	.19 .11
-.5	.16 .11
-.3	.37 .19
-.1	.31 .18
.1	.55 .23
.3	.92 .29
.5	1.45 .38
.7	2.45 .56
.9	2.42 .48

THETA IS THE ANGLE THAT THE ANTINEUTRON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

55 LOW-ENERGY PBAR P ANNIHILATION INTO PI+ PI- AND K+ K-. [NUOVO CIMENTO LETTERS 1, 749 (1969)]

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CLOSELY RELATED REFERENCES
SEE ALSO ARGONNE NAT.LAB. REPORT NO. HEP 6812 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 46A, 171 (1966), NUOVO CIMENTO 54A, 441 (1968), AND NUOVO CIMENTO 54A, 456 (1968).

BEAM IS ANTIPROTON ON PROTON FROM .33 TO .61 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION CROSS SECTION PION KAON
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 2]

THESE DATA WERE READ FROM A GRAPH

C.M. ENERGY GEV MIN	MAX	MILLIBARNS
1.908	1.920	.68 +- .14
1.920	1.930	.70 .13
1.930	1.947	.39 .08
1.951	1.963	.34 .08

CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 2]

THESE DATA WERE READ FROM A GRAPH

C.M. ENERGY GEV MIN	MAX	MILLIBARNS
1.908	1.920	.08 +- .05
1.920	1.930	.34 .09
1.930	1.947	.12 .06
1.951	1.963	.14 .05

56 EVIDENCE FOR A (K PI PI) RESONANCE WITH T(Z) = +-3/2 AT 1270 MEV. [PHYS. LETTERS 12, 65 (1964)]

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BEAM IS ANTIPROTON ON PROTON AT 3 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 120000 PICTURES ARE REPORTED ON.
KEY WORDS + MASS SPECTRUM RESONANCE PRODUCTION

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NO DATA PUNCHED FOR THIS ARTICLE

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57 A SEARCH FOR HEAVY HYPERON RESONANCES PRODUCED BY 5.7 GEV/C ANTIPROTONS IN HYDROGEN. [PHYS. LETTERS 17, 166 (1965)]

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BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS + HYPERON RESONANCE PRODUCTION
COMPOUND KEY WORDS + HYPERON RESONANCE PRODUCTION

....
....

[TABLE 1]
LABORATORY BEAM MOMENTUM = 5.7 GEV/C (MEAN VALUE).

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON +		
LAMBDA K+ ANTIPROTON + CHARGE CONJUGATE	29.0 +-	4.0
LAMBDA KO ANTINEUTRON + CHARGE CONJUGATE	70.0	11.0
SIGMAO K+ ANTIPROTON + CHARGE CONJUGATE	15.0	3.0
SIGMA+ KO ANTIPROTON + CHARGE CONJUGATE	20.0	5.0
LAMBDA KO ANTIPROTON PI+ + CHARGE CONJUGATE	39.0	4.0
LAMBDA K+ ANTINEUTRON PI- + CHARGE CONJUGATE	18.0	3.0
LAMBDA K+ ANTIPROTON PIO + CHARGE CONJUGATE	30.0	3.0
SIGMAO KO ANTIPROTON PI+ + CHARGE CONJUGATE	8.0	4.0
SIGMA+ KO ANTIPROTON PIO + CHARGE CONJUGATE	19.0	4.0
SIGMA+ KO ANTINEUTRON PI- + CHARGE CONJUGATE	25.0	5.0
SIGMA+ ANTILAMBDA PI- + CHARGE CONJUGATE	60.0	6.0
SIGMA- ANTILAMBDA PI+ + CHARGE CONJUGATE	22.0	4.0
SIGMA+ ANTISIGMAO PI- + CHARGE CONJUGATE	18.5	3.0
SIGMA- ANTISIGMAO PI+ + CHARGE CONJUGATE	15.0	3.0
SIGMA+ ANTILAMBDA PI- PIO + CHARGE CONJUGATE	48.0	6.0
SIGMA- ANTILAMBDA PI+ PIO + CHARGE CONJUGATE	27.0	4.0
SIGMA+ ANTISIGMA- PI+ PI- + SIGMA+		
ANTISIGMA+ PI- PI- + CHARGE CONJUGATE	15.0	3.0

[1] ERRORS ARE STATISTICAL ONLY.

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58 INVESTIGATION OF THE REACTION PROTON ANTIPROTON + N*(3,3) ANTI-N*(3,3) AT 5.7 GEV/C AND 3.6 GEV/C. [PHYS. LETTERS 15, 356 (1965)]

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CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 136, B843 (1964).
DATA SUPERSEDED BY NUOVO CIMENTO 42, 954 (1966).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + DELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS + DELTA(1238) RESONANCE PRODUCTION

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NO DATA PUNCHED FOR THIS ARTICLE

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59 ELASTIC SCATTERING, PION PRODUCTION, AND ANNIHILATION INTO PIONS IN ANTIPROTON-PROTON INTERACTIONS AT 5.7 GEV/C. [NUOVO CIMENTO 42A, 954 (1966)]

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ABSTRACT AN EXTENSIVE INVESTIGATION OF ANTIPROTON-PROTON INTERACTIONS AT 5.7 GEV/C WITHOUT STRANGE-PARTICLE PRODUCTION WAS CARRIED OUT USING A HYDROGEN BUBBLE CHAMBER. CROSS-SECTIONS FOR DIFFERENT CHANNELS ARE GIVEN AND DISCUSSED. THE RELIABILITY OF THE ANALYSIS WAS CHECKED USING ARTIFICIALLY GENERATED EVENTS. THE CROSS-SECTIONS FOR ELASTIC SCATTERING, FOR ALL PROCESSES INVOLVING ANNIHILATION, AND FOR ALL OTHER INELASTIC PROCESSES ARE RESPECTIVELY, (16.3 +- 0.6) MB, (22.5 +- 2.0) MB, AND (24.8 +- 2.0) MB. THE N*(1238) IS PRESENT BOTH IN THE SINGLE AND MULTIPLE PION PRODUCTION CHANNELS. FOR THE REACTION P PBAR + N* NBAR* A CROSS SECTION OF (1.05 +- 0.21) MB WAS OBTAINED. CROSS SECTIONS FOR N*(1238) PRODUCTION IN OTHER CHANNELS ARE ALSO GIVEN. SOME INDICATION OF THE PRESENCE OF I = 1/2 ISOBARS WAS FOUND IN THE NUCLEON-PION AND THE NUCLEON-TWO-PION SYSTEMS. THE INELASTIC NONANNIHILATION REACTIONS WERE FOUND TO BE STRONGLY PERIPHERAL. THE ONE-PION EXCHANGE MODEL INCLUDING EITHER A FORM FACTOR OR CORRECTIONS FOR ABSORPTION WAS APPLIED TO THE REACTION P PBAR + N* NBAR* . NEITHER VERSION OF THE MODEL COULD CORRECTLY ACCOUNT FOR ALL FEATURES OF THE REACTION. THE AVERAGE NUMBER OF PIONS IN THE ANNIHILATION WAS FOUND TO BE 7.3 +- 0.6. THE PRESENCE OF AN ASYMMETRY IN THE ANGULAR DISTRIBUTION OF THE CHARGED PIONS WAS CONFIRMED AT THIS ENERGY; IT IS DUE MOSTLY TO HIGH-ENERGY PIONS. THE PRODUCTION OF RHO AND OMEGA MESONS WAS OBSERVED IN VARIOUS ANNIHILATION CHANNELS. RATES OF UP TO 90 PERCENT FOR RHO PRODUCTION AND UP TO 15 PERCENT FOR OMEGA PRODUCTION WERE OBTAINED BY FITTING PHASE-SPACE AND BREIT-WIGNER CURVES TO THE EFFECTIVE-MASS DISTRIBUTIONS OF DIFFERENT CHANNELS.

CLOSELY RELATED REFERENCES
ERRATUM NUOVO CIMENTO 44A, 316 (1966).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 15, 356 (1965).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 16000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION CROSS SECTION ELASTIC SCATTERING DELTA(1238) RESONANCE PRODUCTION PION PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION DELTA(1238) RESONANCE PRODUCTION PION PRODUCTION

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....

ANTIPROTON PROTON TOTAL CROSS SECTION. [PAGE 957]

LABORATORY BEAM MOMENTUM GEV/C PER CENT	MILLIBARNS [1]
5.7 +- 1	63.6 +- 1.4

[1] ERRORS ARE STATISTICAL ONLY.

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[TABLE 1]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION ANTIPROTON PROTON →	MILLIBARNS		
0 PRONGS	3.3 +-	.3	[1]
2 PRONGS	33.7	.8	[1]
4 PRONGS	18.2	.5	[1]
6 PRONGS	7.2	.4	[1]

[1] ERROR GIVEN IS STATISTICAL ERROR ESTIMATED FROM PAGE 958.

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[TABLE 2]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION ANTIPROTON PROTON →	MILLIBARNS [1]		
ELASTIC	16.30 +-	.60	
ANTIPROTON PROTON PI0	2.10	.23	
PROTON ANTINEUTRON PI-	1.77	.37	
NEUTRON ANTIPROTON PI+	1.82	.34	
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	3.59	.51	[2]
PI+ PI-	< .05		
PI+ PI- PI0	< .30		
PI+ PI- MM≥2PI0	4.50	1.20	
TWO PRONG PION ANNIHILATION	4.50	1.00	[2]
ANTIPROTON PROTON PI+ PI-	3.18	.16	
ANTIPROTON PROTON PI+ PI- PI0	1.55	.25	
PROTON ANTINEUTRON PI+ PI- PI-	.60 +	.40	
	-	.20	
NEUTRON ANTIPROTON PI+ PI+ PI-	.95	.21	
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	1.55 +	.50	[2]
	-	.30	
PI+ PI+ PI- PI-	.11	.03	
ANTIPROTON PROTON PI+ PI+ PI- PI-	.13	.03	
PI+ PI+ PI+ PI- PI- PI-	.26	.06	
TOTAL ANNIHILATION	22.00	2.00	[3]
TOTAL INELASTIC	47.30	2.80	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[3] RESULT IS MODEL DEPENDENT.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.022	148.00 +-	20.00
.036	112.00	11.00
.053	100.00	9.10
.068	82.70	6.90
.083	78.40	6.70
.097	61.70	6.20
.112	57.10	4.90
.127	46.00	5.00
.142	32.30	4.20
.157	33.50	4.30
.172	22.60	3.60
.188	15.60	2.90
.203	16.20	3.00
.218	20.10	3.50
.234	13.30	2.60
.248	8.30	2.20
.263	7.40	2.20
.278	10.30	2.30
.334	3.00	.70
.424	.98	.30
.517	.25	.18
.601	.12	.12
.695	.25	.18
.782	.37	.19
.870	.12	.12
1.005	.25	.12
1.188	.12	.06
1.369	.12	.06
1.544	.00	.10

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [PAGE 960]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM .015 TO .285 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = C*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND T IS IN (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED VALUES
C = 194. +- 10.
A = 12.0 +- .4

....

[TABLE 3]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON →		
PI+ PI+ PI- PI- PI0	.75 +-	.11
PI+ PI+ PI- PI- MM≥2PI0	8.30	1.40
FOUR PRONG PION ANNIHILATION	9.20	1.40 [2]
PI+ PI+ PI+ PI- PI- PI- PI0	1.40	.30
PI+ PI+ PI+ PI- PI- PI- MM≥2PI0	4.90	.40
SIX PRONG PION ANNIHILATION	6.60	.50 [2]

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

....

CROSS SECTION FOR ANTIPROTON PROTON → ANTIPROTON PROTON OMEGA(783). [PAGE 973]
OMEGA(783) → PI+ PI- PI0 [1]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS [2]
5.7	+- 1	< .04

[1] AUTHORS DO NOT INDICATE HOW RESONANCE EVENTS WERE DETERMINED.
[2] ERRORS INCLUDE SYSTEMATICS.

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[TABLE 4]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION	MILLIBARNS	
ANTIPROTON PROTON →		
RHO(765)0 PI+ PI- PI0 RHO(765)0 → PI+ PI- [2]	.140 +-	.050 [1]
PI+ PI+ PI- PI- RHO(765)0 RHO(765)0 → PI+ PI- [2]	.230	.060 [1]
PI+ PI+ PI- PI- PI0 RHO(765)0 RHO(765)0 → PI+ PI- [2]	.400	.080 [1]
PI+ PI- OMEGA(783) OMEGA(783) → PI+ PI- PI0 [2]	.062	.002 [1]
PI+ PI+ PI- PI- OMEGA(783) OMEGA(783) → PI+ PI- PI0 [2]	.220	.030 [1]

[1] ERROR GIVEN EQUALS THE DIFFERENCE IN CROSS SECTIONS OBTAINED FROM TWO METHODS OF FITTING.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

....

[PAGE 989]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

REACTION	MILLIBARNS	
ANTIPROTON PROTON →		
DELTA(1238)++ ANTIPROTON PI- DELTA(1238)++ → PROTON PI+ [1]	.74 +-	.15
ANTIDELTA(1238)-- PROTON PI+ ANTIDELTA(1238)-- → ANTIPROTON PI- [1]	.74	.15
DELTA(1238)++ ANTIPROTON PI- + CHARGE CONJUGATE DELTA(1238)++ → PROTON PI+ [1]	1.48	.30 [2]
DELTA(1238)++ ANTIPROTON PI- PI0 DELTA(1238)++ → PROTON PI+ [1]	.30	.06
ANTIDELTA(1238)-- PROTON PI+ PI0 ANTIDELTA(1238)-- → ANTIPROTON PI- [1]	.30	.06
DELTA(1238)++ ANTIPROTON PI- PI0 + CHARGE CONJUGATE DELTA(1238)++ → PROTON PI+ [1]	.60	.12 [2]

[1] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIDELTA(1238)-- DELTA(1238)++. [FIGURE 5]
ANTIDELTA(1238)-- → ANTIPROTON PI- [1]
DELTA(1238)++ → PROTON PI+ [1]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C +- 1(PER CENT).

NORMALIZED TO 1.05 MB; NOT CORRECTED FOR TAILS. SEE COMMENTS IN TEXT

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [2]		NO. EVENTS
.00	.05	.7 +-	.3	6.5
.05	.10	5.4	.8	48.0
.10	.15	3.7	.6	32.3
.15	.20	2.9	.6	25.9
.20	.25	2.0	.5	18.0
.25	.30	1.9	.5	17.1
.30	.35	.9	.3	8.0
.35	.40	1.6	.4	14.0
.40	.45	.9	.3	8.0
.45	.50	.2	.2	2.1
.50	.55	.0	.1	.0
.55	.60	.1	.1	1.0
.60	.65	.2	.2	1.9
.65	.70	.0	.1	.0
.70	.75	.1	.1	.9
.75	.80	.2	.1	1.7

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIDELTA(1238)--].

[1] PARENT PARTICLE DEFINED AS FOLLOWS [MASS CUT FROM 1.130 TO 1.330 GEV].
[2] COUNTS WERE MULTIPLIED BY .1132 TO GET THESE.

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60 FURTHER EXAMINATION OF LOW-MASS PBAR PI- PI+ AND P PI- PI+ ENHANCEMENTS IN THE REACTION PBAR P → PBAR PI- P PI+ AT (2.8-3.5) GEV/C. [NUOVO CIMENTO 68A, 383 (1970)]

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ABSTRACT IT IS SHOWN THAT AN ENHANCEMENT AT 1.4 GEV IN THE PBAR PI- PI+ AND P PI- PI+ MASS SPECTRA FROM THE REACTION PBAR P → PBAR P PI+ PI- AT (2.8-3.5) GEV/C IS NOT A REFLECTION OF THE PROCESS PBAR P → NBAR*(1238) N*(1238).

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 22, 43 (1969).

BEAM IS ANTIPROTON ON PROTON AT 2.8 GEV/C.
THIS EXPERIMENT USES A DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → RESONANCE PRODUCTION DELTA(1238)++

NO DATA PUNCHED FOR THIS ARTICLE

61 MEASUREMENT OF THE POLARIZATION PARAMETER IN PI+- P, K+- P, PP, AND PBAR P ELASTIC SCATTERING AT 6 GEV/C. [PHYS. LETTERS 31B, 405 (1970)]

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ABSTRACT EXPERIMENTAL RESULTS ARE PRESENTED FOR THE POLARIZATION PARAMETER P(0) IN PI+- P, K+- P, PP, AND PBAR P ELASTIC SCATTERING AT 6 GEV/C, AND IN THE RANGE OF THE INVARIANT FOUR-MOMENTUM TRANSFER SQUARED -T FROM 0.05 TO ABOUT 2.0 (GEV/C)**2.

BEAM IS ANTIPROTON ON PROTON AT 6 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → POLARIZATION

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 6]

LABORATORY BEAM MOMENTUM = 6. GEV/C.

-T (GEV/C)**2 MIN	MAX	POLARIZATION [1,2]	+-
.05	.15	.106	.074
.15	.25	.119	.082
.25	.40	.085	.127

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

62 POLARIZATION PARAMETER IN K+- P AND PBAR P ELASTIC SCATTERING AT 10 AND 14 GEV/C. [PHYS. LETTERS 36B, 497 (1971)]

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ABSTRACT RESULTS ON POLARIZATION IN K- P, K+ P AND PBAR P FORWARD ELASTIC SCATTERING ARE PRESENTED.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 31B, 405 (1970).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 10 TO 14 GEV/C.
NO. 2 IS K- ON PROTON FROM 10 TO 14 GEV/C.
NO. 3 IS K+ ON PROTON FROM 10 TO 14 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → POLARIZATION

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 3]

LABORATORY BEAM MOMENTUM = 10. GEV/C.

-T (GEV/C)**2 MIN	MAX	POLARIZATION [1]	+-
.10	.15	-.084	.058
.15	.20	-.010	.030
.20	.25	.025	.036
.25	.30	-.073	.046
.30	.35	.033	.065
.35	.40	-.128	.084
.40	.55	-.053	.088
.55	.75	-.260	.180
.75	.90	.138	.360

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 3]

LABORATORY BEAM MOMENTUM = 14. GEV/C.

-T (GEV/C)**2 MIN	MAX	POLARIZATION [1]	+-
.10	.20	.032	.052
.20	.32	.038	.058
.32	.50	.076	.100

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

63 STUDY OF THE PBAR D + P(SPECTATOR) PBAR P PI- REACTION AT 5.5 GEV/C. [PHYS. REV. D 2, 488 (1970)]

H.BRAUN, D.EVRARD, A.FRIDMAN, J.-P.GERBER, G.MAURER, A.MICHALON, B.SCHIBY, R.STRUB, C.VOLTOLINI, P.CUEER [CENTRE DES RES. NUCLEAIRES, STRASBOURG, FRANCE]

ABSTRACT BASED ON 150,000 PHOTOGRAPHS TAKEN WITH THE 30-IN. BUBBLE CHAMBER AT THE ZGS, WE PRESENT A STUDY OF THE PBAR D + P(SPECTATOR) PBAR P PI- REACTION. IMPORTANT PRODUCTION OF ANTI-DELTA(1236)-- IS OBSERVED. THE DISTRIBUTION OF THE MOMENTUM TRANSFER BETWEEN THE INCIDENT PBAR AND THE FINAL ANTI-DELTA(1236)-- IS COMPARED WITH DATA AT OTHER ENERGIES AND ALSO WITH THE CROSSED PP + DELTA(++)N REACTION. THAT THE PEAKING OF THE MOMENTUM TRANSFER TENDS TO BE GREATER FOR THE PP + DELTA(++)N THAN FOR THE PBAR N + ANTI-DELTA(--)P REACTION AT 5.5 GEV/C CAN BE EXPLAINED BY USING A SIMPLE REGGE-POLE MODEL. FOR EVENTS PRODUCED WITHOUT RESONANCE IN THE FINAL STATE, THE LONGITUDINAL PHASE-SPACE ANALYSIS IS APPLIED TO THE DATA. FOR THESE EVENTS, AN ATTEMPT WAS ALSO MADE TO USE A DOUBLE REGGE-POLE MODEL TO DESCRIBE THE PRODUCTION. THE PRESENT VERSION OF THIS MODEL REPRODUCES THE EXPERIMENTAL DATA FAIRLY WELL. USING THE FERMI MOTION OF THE NEUTRON TARGET, WE TRY TO EXTRACT INFORMATION ABOUT THE VARIATION OF THE PBAR N + PBAR P PI- CROSS SECTION WITH C.M. ENERGY. IN CONNECTION WITH THIS PROBLEM, A DISCUSSION ON THE VALIDITY DOMAIN OF THE IMPULSE APPROXIMATION IS GIVEN.

BEAM IS ANTIPROTON ON DEUTERON AT 5.55 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION RESONANCE PRODUCTION ANTIDELTA(1238)--

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CROSS SECTION FOR ANTIPROTON NEUTRON + ANTIPROTON PROTON PI-. [PAGE 500]

CROSS SECTION INCLUDES SHIELDING CORRECTION OF +0.18 MB AND CORRECTION FOR PROTON SPECTATOR MOMENTUM < 0.1 GEV/C OF +1.09 MB

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
5.550 +- .054	1.68 +- .11

CROSS SECTION FOR ANTIPROTON NEUTRON + ANTIDELTA(1238)-- PROTON. [1] [PAGE 491]
ANTIDELTA(1238)-- + ANTIPROTON PI-

CROSS SECTION CALCULATED AS (.51 +- .04) * (1.68 +- .11) MB

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
5.550 +- .054	.86 +- .07

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON + ANTIDELTA(1238)-- PROTON. [FIGURE 6]
ANTIDELTA(1238)-- + ANTIPROTON PI- [1]

LABORATORY BEAM MOMENTUM = 5.550 +- .054 GEV/C.

NORMALIZED TO 0.86 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [2]		NO. EVENTS
.00	.05	3.10 +-	.36	76
.05	.10	3.59	.38	88
.10	.15	2.69	.33	66
.15	.20	1.96	.28	48
.20	.25	1.14	.22	28
.25	.30	1.22	.22	30
.30	.35	.69	.17	17
.35	.40	.78	.18	19
.40	.45	.29	.11	7
.45	.50	.33	.12	8
.50	.55	.33	.12	8
.55	.60	.24	.10	6
.60	.65	.12	.07	3
.65	.70	.04	.04	1
.70	.75	.08	.06	2

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIDELTA(1238)--].

[1] USED SIMPLE MASS CUT (NEGLIGIBLE BACKGROUND) [MASS CUT FROM 1.160 TO 1.320 GEV].
[2] COUNTS WERE MULTIPLIED BY .0408 TO GET THESE.

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64 INVESTIGATION OF THE PBAR D PI+ PI- FINAL STATE IN PBAR D COHERENT PRODUCTION AT 5.5 GEV/C. [PHYS. REV. D2, 1212 (1970)]

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ABSTRACT FROM 150,000 PHOTOGRAPHS TAKEN WITH THE 30-IN. ANL BUBBLE CHAMBER, WE OBTAINED A SAMPLE OF PBAR D + PBAR D PI(+) PI(-) EVENTS YIELDING A CROSS SECTI3N OF 0.22 +/- 0.02 MB. THE REACTION IS DOMINATED BY DELTABAR(--) (1236) PRODUCTION. A LOW-MASS ENHANCEMENT IN THE D PI(+) MASS SPECTRUM APPEARS AT 2.2 GEV/C-SQUARED. THIS BUMP IS INTERPRETED AS BEING DUE TO A FINAL-STATE INTERACTION, TREATED AS ELASTIC SCATTERING. WE USED THE FIRST-ORDER IMPULSE APPROXIMATION AND PI N PHASE SHIFTS WHICH GIVE A SATISFACTORY DESCRIPTION OF THE PI D ELASTIC SCATTERING DATA AT LOW ENERGY. A GOOD DESCRIPTION OF THE D PI(+) MASS SPECTRUM IS OBTAINED. A PERIPHERAL MODEL WITH A REGGEIZED PI EXCHANGE WHICH SCATTERS OFF THE DEUTERON WAS ALSO CONSIDERED. USING THIS MODEL AND PERIPHERAL PHASE SPACE, A SIMULTANEOUS FIT ON THE D PI(+) AND PBAR PI(+) PI(-) MASS DISTRIBUTIONS WAS MADE SUCCESSFULLY. THE ANGULAR DISTRIBUTION OF THE OUTGOING DEUTERON IN THE PI(+) D C.M. FRAME IS ALSO WELL DESCRIBED.

BEAM IS ANTIPROTON ON DEUTERON AT 5.55 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION ANGULAR DISTRIBUTION ANTIDELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS + ANTIDELTA(1238) RESONANCE PRODUCTION

CROSS SECTION FOR ANTIPROTON DEUTERON + ANTIPROTON DEUTERON PI+ PI-. [PAGE 1214]

CORRECTIONS MADE FOR LARGE AND SMALL DEUTERIUM MOMENTUM. RESULT IS MODEL DEPENDENT

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
5.55	.22 +- .02

[1] ERRORS ARE STATISTICAL ONLY.

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65 OBSERVATION OF THE D* EFFECT IN THE PBAR D • P PBAR PI+ PI- N REACTION AT 5.55 GEV/C. [PHYS. REV. D 3, 2572 (1971)]

H.BRAUN, D.EVRARD, A.FRIDMAN, J.-P.GERBER, A.GIVERNAUD, R.KAHN, G.MAURER, A.MICHALON, B.SCHIBY, R.STRUB, C.VOLTOLINI
[CENTRE DES RES. NUCLEAIRES, STRASBOURG, FRANCE]

ABSTRACT THIS EXPERIMENT IS BASED ON 150,000 PHOTOGRAPHS, TAKEN AT THE ZERO GRADIENT SYNCHROTRON WITH THE 30-IN. BUBBLE CHAMBER. WE PRESENT RESULTS ON A SUBSAMPLE OF P(SUB S) PBAR PI+ PI- N EVENTS IN WHICH THE PROTONS STOPPING IN THE CHAMBER DO NOT SHOW THE CHARACTERISTIC NUCLEON-SPECTATOR BEHAVIOR. THE SELECTION PROCEDURE FOR THIS SAMPLE IS DISCUSSED. A STRONG LOW-MASS P(SUB S) N PI+ ENHANCEMENT AT 2.2 GEV/C**2 IS OBSERVED. THIS BUMP IS NOT CONSIDERED AS A REAL RESONANCE AND IS INTERPRETED AS HAVING THE SAME ORIGIN AS THE 2.2-GEV/C**2 D PI ENHANCEMENT OBSERVED, FOR INSTANCE, IN THE PBAR D • PBAR D PI+ PI- REACTION AT THE SAME ENERGY.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. D 2, 488 (1970), AND PHYS. REV. D 2, 1212 (1970).

BEAM IS ANTIPROTON ON DEUTERON AT 5.55 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.
KEY WORDS • RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

66 FURTHER EVIDENCE FOR A 2PI+ 2PI- 1.7 GEV/C**2 ENHANCEMENT OBSERVED IN THE PBAR P • 3 PI+ 3 PI- PI0 REACTION AT 5.7 GEV/C. [NUC. PHYS. B30, 213 (1971)]

H.BRAUN, A.FRIDMAN, J.-P.GERBER, A.GIVERNAUD, R.KAHN, G.MAURER, A.MICHALON, B.SCHIBY, R.STRUB, C.VOLTOLINI [CENTRE DES RES. NUCLEAIRES, STRASBOURG, FRANCE]

ABSTRACT THE PRESENT WORK IS BASED ON 2347 PBAR P • 3 PI+ 3 PI- PI0 EVENTS OBTAINED BY EXPOSING THE CERN 81 CM BUBBLE CHAMBER TO A 5.7 GEV/C INCIDENT PBAR BEAM. WE PRESENT FURTHER EVIDENCE CONCERNING A 2 PI+ 2 PI- ENHANCEMENT OBSERVED AT 1.7 GEV/C**2. DESPITE A SMALL RHO0 PRODUCTION RATE, WE DETECT THE 1.7 GEV/C**2 BUMP ONLY BY SELECTING 2 PI+ 2 PI- SYSTEMS HAVING TWO DISTINCT PI+ PI- MASS COMBINATIONS IN THE RHO0 BAND. THE RELEVANCE OF THE 1.7 GEV/C**2 PEAK IS DISCUSSED.

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE CERN 80 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 100000 PICTURES ARE REPORTED ON.
KEY WORDS • ANNIHILATION PION PRODUCTION MASS SPECTRUM
COMPOUND KEY WORDS • PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

67 STUDY OF THE PBAR P • PBAR P 2PI+ 2PI- REACTION AT 5.7 GEV/C. [NUOVO CIMENTO 4A, 703 (1971)]

H.BRAUN, D.EVRARD, A.FRIDMAN, J.-P.GERBER, J.GRUNHAUS, G.MAURER, A.MICHALON, B.SCHIBY, R.STRUB, C.VOLTOLINI [CENTRE DES RES. NUCLEAIRES, STRASBOURG, FRANCE]

ABSTRACT WE PRESENT A STUDY OF THE PBAR P • PBAR P 2PI+ 2PI- REACTION AT 5.7 GEV/C FOR WHICH WE HAVE OBTAINED A CROSS SECTION OF (0.18 +- 0.05) MB. ABUNDANT DELTA AND DELTABAR PRODUCTION WAS OBSERVED. A ROUGH ESTIMATE OF THE RATE FOR DOUBLE-RESONANCE PRODUCTION, I.E., PBAR P • DELTABAR-- DELTA++ PI+ PI-, IS ALSO GIVEN. THE GENERAL FEATURES OF THE PBAR P • PBAR P 2PI+ 2PI- REACTION ARE INTERPRETED BY MEANS OF A MULTIPERIPHERAL REGGE MODEL SLIGHTLY MODIFIED TO TAKE INTO ACCOUNT THE STRONG DELTA AND DELTABAR PRODUCTION.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 167, 1268 (1968), AND PHYS. REV. 176, 1595 (1968).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE CERN 80 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 100000 PICTURES ARE REPORTED ON.
KEY WORDS • CROSS SECTION RESONANCE PRODUCTION DELTA(1238)++

CROSS SECTION FOR ANTIPROTON PROTON • ANTIPROTON PROTON PI+ PI+ PI- PI-. [PAGE 705]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	NO. EVENTS
5.7	.18 +- .05	298

[1] ERRORS INCLUDE SYSTEMATICS.

68 SEARCH FOR STRUCTURES IN THE PBAR P • NBAR N CROSS SECTION BETWEEN 1 AND 3 GEV/C. [PHYS. LETTERS 29B, 451 (1969)]

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G.BIZARD, Y.DECLAIS, J.DUCHON, J.SEGUINOT [LAB. DE PHYS. CORPUSCULAIRE, CAEN, FRANCE]
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ABSTRACT THE PBAR P • NBAR N PARTIAL CROSS SECTION HAS BEEN MEASURED IN THE REGION OF ANTIPROTON LABORATORY MOMENTA BETWEEN 1 AND 3GEV/C. THE IMPLICATIONS OF THESE RESULTS ON THE EXISTENCE OF BOSON RESONANCES DECAYING INTO N NBAR IS DISCUSSED.

BEAM IS ANTIPROTON ON PROTON FROM 1 TO 3 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS • CHARGE EXCHANGE

NO DATA PUNCHED FOR THIS ARTICLE

69 OBSERVATION OF PRODUCTION OF A XI(-) + ANTI-XI(+) PAIR. [PHYS. REV. LETTERS 8, 255 (1962)]

H.N.BROWN, B.B.CULWICK, W.B.FOWLER, M.GAILLOUD, T.E.KALOGEROPOULOS, J.K.KOPP, R.M.LEA, R.I.LOUTTIT, T.W.MORRIS, R.P.SHUTT, A.M.THORNDIKE, M.S.WEBSTER [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]
C.BALTAY, E.C.FOWLER, J.SANDWEISS, J.R.SANFORD, H.D.TAFT [YALE UNIV., NEW HAVEN, CONN., USA]

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 140, B1027 (1965).

BEAM IS ANTIPROTON ON PROTON AT 3.3 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 34000 PICTURES ARE REPORTED ON.
KEY WORDS + HYPERON PRODUCTION ANTIXI+
COMPOUND KEY WORDS + HYPERON PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

70 FOUR-PION FINAL STATE IN PBAR P ANNIHILATIONS AT 940 MEV/C. [NUC. PHYS. B27, 109 (1971)]

R.R.BURNS, P.E.CONDON, J.DONAHUE, M.A.MANDELKERN, J.SCHULTZ [UNIV. OF CALIFORNIA, IRVINE, CALIF., USA]

ABSTRACT RESULTS ARE REPORTED ON THE FOUR-PION FINAL STATE FROM ANTIPROTON ANNIHILATIONS IN HYDROGEN IN THE VICINITY OF 940 MEV/C. THE CROSS SECTION FOR PI- PI- PI+ PI+ IS FOUND TO BE 3.6 MB. ABUNDANT RESONANCE PRODUCTION IS OBSERVED, WITH FITS INDICATING THAT QUASI-TWO-BODY PRODUCTION CONSTITUTES APPROXIMATELY HALF THE FOUR-PION EVENTS. THE MODEL EMPLOYED, WHICH INCLUDES RESONANCE PRODUCTION AND BOSE SYMMETRIZATION, YIELDS EXCELLENT FITS TO MASS DISTRIBUTIONS ANC ANGULAR CORRELATIONS.

BEAM IS ANTIPROTON ON PROTON AT .943 GEV/C.
THIS EXPERIMENT USES THE BNL 30 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 220000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION ANNIHILATION MESONS

[PAGE 110]
LABORATORY BEAM MOMENTUM = .943 GEV/C (MEAN VALUE).

REACTION	MILLIBARNS [1]
ANTIPROTON PROTON +	
4 PRONGS	34.2 +- .7
PI+ PI+ PI- PI-	3.6 .4

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 1]
LABORATORY BEAM MOMENTUM = .943 GEV/C (MEAN VALUE).

REACTION	MILLIBARNS
ANTIPROTON PROTON +	
RHO(765)0 PI+ PI-	2.7 +- .3 [1,2]
RHO(765)0 + PI+ PI- [3]	
F(1260) PI+ PI-	1.4 .2 [1,2]
F(1260) + PI+ PI- [3]	
RHO(765)0 RHO(765)0	.4 .2 [1,2]
RHO(765)0 + PI+ PI- [3]	
RHO(765)0 + PI+ PI- [3]	
RHO(765)0 F(1260)	1.1 .2 [1,2]
RHO(765)0 + PI+ PI- [3]	
F(1260) + PI+ PI- [3]	
A2(1300)+ PI- + CHARGE CONJUGATE	.4 .2 [1,2]
A2(1300)+ + RHO(765)0 PI+ [3]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERROR GIVEN IS FROM SCATTER IN VARIOUS FITS.
[3] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

71 PBAR D TOPOLOGICAL CROSS SECTIONS IN THE MOMENTUM RANGE 50-920 MEV/C. [AUSTRALIAN J. PHYS. 23, 819 (1970)]

R.D.BURROWS, D.E.CARD, E.GOLD, A.G.KLEIN, C.E.MACDOWELL, J.L.OLNEY, G.I.OPAT, J.STARR, J.W.G.WIGNALL [UNIV.OF MELBOURNE, PARKVILLE, VIC., AUSTRALIA]
D.C.PEASLEE [AUSTRALIAN NAT.UNIV., CANBERRA,A.C.T.,AUSTRALIA]

ABSTRACT THE TOTAL AND TOPOLOGICAL CROSS SECTIONS ARE PRESENTED FOR EVENTS SEEN IN THE INTERACTION OF 50-920 MEV/C ANTIPROTONS WITH DEUTERIUM IN THE BNL 30 IN. BUBBLE CHAMBER.

BEAM IS ANTIPROTON ON DEUTERON FROM .05 TO .92 GEV/C.
THIS EXPERIMENT USES THE BNL 30 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS + CROSS SECTION

ANTIPROTON DEUTERON TOTAL CROSS SECTION. [TABLE 1]

THE FIRST TWO VALUES OF BEAM MOMENTUM ARE APPROXIMATE ONLY

LABORATORY BEAM MOMENTUM GEV/C		MILLIBARNS [1]	
.050	+-	2067.	+- 90.
.335		390.	15.
.404	.015	334.	12.
.450	.015	316.	7.
.504	.015	295.	7.
.560	.015	271.	6.
.605	.015	269.	7.
.650	.015	258.	8.
.705	.015	230.	10.
.762	.015	253.	10.
.813	.015	218.	11.
.866	.015	208.	10.
.920	.015	210.	9.

[1] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON DEUTERON → 0 PRONGS. [TABLE 1]

THE FIRST TWO VALUES OF BEAM MOMENTUM ARE APPROXIMATE ONLY

LABORATORY BEAM MOMENTUM GEV/C		MILLIBARNS [1]
.050	+-	57.
.335		13.
.404	.025	14.
.450	.025	19.
.504	.025	15.
.560	.025	15.
.605	.025	10.
.650	.025	10.
.705	.025	10.
.762	.025	10.
.813	.025	8.
.866	.025	8.
.920	.025	7.

[1] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON DEUTERON → 2 PRONGS. [TABLE 1]

THE FIRST TWO VALUES OF BEAM MOMENTUM ARE APPROXIMATE ONLY

LABORATORY BEAM MOMENTUM GEV/C		MILLIBARNS [1]
.050	+-	478.
.335		64.
.404	.025	50.
.450	.025	47.
.504	.025	44.
.560	.025	44.
.605	.025	42.
.650	.025	38.
.705	.025	37.
.762	.025	35.
.813	.025	32.
.866	.025	33.
.920	.025	35.

[1] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON DEUTERON → 4 PRONGS. [TABLE 1]

THE FIRST TWO VALUES OF BEAM MOMENTUM ARE APPROXIMATE ONLY

LABORATORY BEAM MOMENTUM GEV/C		MILLIBARNS [1]
.050	+-	600.
.335		82.
.404	.025	63.
.450	.025	52.
.504	.025	57.
.560	.025	51.
.605	.025	49.
.650	.025	52.
.705	.025	39.
.762	.025	48.
.813	.025	37.
.866	.025	35.
.920	.025	40.

[1] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON DEUTERON → 6 PRONGS. [TABLE 1]

THE FIRST TWO VALUES OF BEAM MOMENTUM ARE APPROXIMATE ONLY

LABORATORY BEAM MOMENTUM GEV/C		MILLIBARNS [1]
.050	+-	74.
.335		14.
.404	.025	8.
.450	.025	8.
.504	.025	8.
.560	.025	8.
.605	.025	7.
.650	.025	5.
.705	.025	6.
.762	.025	7.
.813	.025	4.
.866	.025	5.
.920	.025	5.

[1] ERRORS ARE STATISTICAL ONLY.

72 EVIDENCE FOR THE REACTION PBAR + P → SIGMABARO + LAMBDA. [PHYS. REV. LETTERS 4, 530 (1960)]

J.BUTTON, P.EBERHARD, G.R.KALBFLEISCH, J.E.LANNUTTI, G.R.LYNCH, B.C.MAGLIC, M.L.STEVENSON [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 121, 1788 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.99 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → HYPERON PRODUCTION
COMPOUND KEY WORDS → HYPERON PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

73 REACTION PBAR + P → YBAR + Y [PHYS. REV. 121, 1788 (1961)]

J.BUTTON, P.EBERHARD, G.R.KALBFLEISCH, J.E.LANNUTTI, G.R.LYNCH, B.C.MAGLIC, M.L.STEVENSON, N.H.XUONG [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT THE STUDY OF THE INTERACTION PBAR + P → ANTILAMBDA + LAMBDA, PERFORMED WITH THE 72-INCH HYDROGEN BUBBLE CHAMBER, HAS YIELDED 11 OF THESE EVENTS IN A TOTAL OF 21100 ANTIPROTON INTERACTIONS AT 1.61 BEV/C. THE CROSS SECTION FOR ANTILAMBDA + LAMBDA PRODUCTION WAS ESTIMATED AS 57 +- 18 UB. EIGHT OF THE 11 ANTILAMBDA PARTICLES WENT FORWARD IN THE C.M. SYSTEM. AT THE HIGHER MOMENTUM OF 1.99 BEV/C, ONE SINGLE-V AND ONE DOUBLE-V EVENT FITTING ANTILAMBDA + LAMBDA PRODUCTION UNAMBIGUOUSLY AND ONE SINGLE V AND ONE DOUBLE V EVENT FITTING ANTISIGMA-0 + LAMBDA OR SIGMA-0 + ANTILAMBDA WERE OBSERVED IN 4920 ANTIPROTON INTERACTIONS. THESE EVENTS YIELD AN ANTILAMBDA-LAMBDA PRODUCTION CROSS SECTION OF 55 +- 40 UB; THIS VALUE IS CONSISTENT WITH THAT PREDICTED BY THE RATIO OF PHASE SPACE ON THE BASIS OF THE 1.61 BEV/C DATA. NO CHARGED ANTISIGMA EVENTS WERE OBSERVED AT THE HIGHER MOMENTUM. THREE STAGES OF PARTICLE SEPARATION UTILIZING VELOCITY-SELECTING SPECTROMETERS WERE EMPLOYED. AT THE LOWER MOMENTUM, BACKGROUND PIONS WERE ONE-THIRD AS NUMEROUS AS ANTIPROTONS AT THE BUBBLE CHAMBER AND THE FLUX OF ANTIPROTONS WAS ABOUT ONE PER PICTURE. AT THE HIGHER MOMENTUM, THE BACKGROUND PION TO ANTIPROTON RATIO WAS 1.8, AND THE FLUX OF ANTIPROTONS WAS ONE EVERY 6 PULSES. DELTA RAYS ON INCIDENT INTERACTING TRACKS WERE USED TO DETERMINE BEAM COMPOSITION.

CLOSELY RELATED REFERENCES
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 4, 530 (1960).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.59 TO 1.63 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON FROM 1.96 TO 2.02 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 26020 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION HYPERON RESONANCE PRODUCTION LAMBDA SIGMA
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION HYPERON RESONANCE PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [PAGE 1788]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]	NO. EVENTS
1.61 +- .02	57. +- 18.	11

[1] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [PAGE 1795]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]	NO. EVENTS
1.99 +- .03	55. +- 40.	2

[1] ERRORS ARE STATISTICAL ONLY.

74 PION-PION INTERACTION IN THE REACTION PBAR + P → 2PI+ + 2PI- + NPI0 [PHYS. REV. 126, 1858 (1962)]

J.BUTTON, G.R.KALBFLEISCH, G.R.LYNCH, B.C.MAGLIC, A.H.ROSENFELD, M.L. STEVENSON [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT DEVIATIONS FROM THE EXPECTED TWO-PION EFFECTIVE MASS DISTRIBUTIONS HAVE BEEN FOUND IN THE REACTION PBAR + P → 2PI+ + 2PI- + NPI0. THESE OCCUR IN TWO REGIONS, 300 MEV AND 750 MEV, AND COULD BE EXPLAINED BY THE T=0, PION-PION INTERACTION REPORTED BY ABASHIAN, BOOTH, AND CROWE AND THE WIDELY OBSERVED RHO MESON (T=1, J=1- PION-PION RESONANCE). THE DATA IN THE 750-MEV REGION FOR PI+ PI- COMBINATIONS (Q=0) SHOW AN APPARENT DOUBLE-PEAK STRUCTURE--ONE AT 720 MEV (GAMMA = 20 MEV), THE OTHER AT 780 MEV (GAMMA = 60 MEV). HOWEVER, THE /Q/ = 1 DATA (PI+ PI0 AND PI- PI0 COMBINATIONS) ARE CONSISTENT WITH THE PREVIOUSLY OBSERVED SINGLE T=1, J=1- RESONANCE. OUR DATA GIVE M(RHO) = 767 MEV (GAMMA = 110 MEV). AS THESE PARAMETERS ALSO FIT THE Q=0 DATA, A DETAILED DISCUSSION OF THE STATISTICAL SIGNIFICANCE OF THE ONE-PEAK AND TWO-PEAK HYPOTHESES IS GIVEN. A SEARCH HAS BEEN MADE FOR POSSIBLE NEUTRAL MODES OF DECAY OF THE HEAVY MESONS, AND NO EVIDENCE HAS BEEN FOUND.

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → PION PRODUCTION MASS SPECTRUM
COMPOUND KEY WORDS → PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

75 EXPERIMENTAL STUDY OF THE POLARIZATION AND MAGNETIC MOMENT OF THE ANTIPROTON. [PHYS. REV. 127, 1297 (1962)]

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ABSTRACT ASYMMETRIES IN DOUBLE SCATTERING OF ANTIPROTONS OF 1.6 BEV/C MOMENTUM IN THE 72-IN. HYDROGEN BUBBLE CHAMBER HAVE BEEN INVESTIGATED. ANALYSIS OF 200 EVENTS IN WHICH BOTH SCATTERINGS OCCUR IN THE ANGULAR REGION 6.3 ≤ THETA(LAB) ≤ 23.6 DEG. YIELDED A POLARIZATION P = (50 -13 +8) PERCENT, AT AN AVERAGE ANGLE THETA(LAB) = 10 DEG. THE PRECESSION OF SPIN POLARIZATION VECTOR IN THE MAGNETIC FIELD OF THE BUBBLE CHAMBER BETWEEN TWO SCATTERINGS DECREASES THE UP-DOWN ASYMMETRIES BY AN AMOUNT DETERMINED BY THE MAGNETIC MOMENT OF THE PARTICLE. A METHOD FOR DETERMINATION OF THE MAGNETIC MOMENT OF THE ANTIPROTON, USING A THREE-DIMENSIONAL LIKELIHOOD FUNCTION, IS DESCRIBED AS APPLIED TO THE ABOVE SAMPLE OF EVENTS. THE VALUE OF THE ANTIPROTON MAGNETIC MOMENT WAS DETERMINED TO BE MU(PBAR) = -1.8 +- 1.2 NUCLEAR MAGNETONS.

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + POLARIZATION

NO DATA PUNCHED FOR THIS ARTICLE

76 ISOTOPIC-SPIN DEPENDENCE OF NBAR-N ANNIHILATION UP TO 5.5 GEV/C. [NUOVO CIMENTO 68A, 686 (1970)]

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ABSTRACT THE RATIO OF I = 1 TO I = 0 NBAR-N ANNIHILATION CROSS SECTIONS HAS BEEN DETERMINED AT 1.33 AND 5.5 GEV/C INCIDENT NBAR MOMENTUM USING PBAR-D EXPOSURES AT THESE MOMENTA. IN ORDER TO SEPARATE THE ANNIHILATION CROSS SECTION FROM THE PI PRODUCTION CROSS SECTION AT 5.5 GEV/C A DETAILED TOPOLOGICAL COMPARISON WAS MADE BETWEEN THE PBAR-D AND THE PBAR-P RESULTS OF BOCKMANN ET AL. THE ANNIHILATION PROCESS APPEARS TO BE STRONGLY ISOTOPIC-SPIN DEPENDENT OVER THIS MOMENTUM RANGE. THE RATIO OF CROSS SECTION (I = 1 OVER CROSS SECTION (I = 0) IS ALSO CONSISTENT WITH THE VALUE MEASURED FOR STOPPING PBAR IN DEUTERIUM.

BEAM NO. 1 IS ANTIPROTON ON DEUTERON AT 1.33 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON AT 5.5 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION PION PRODUCTION
COMPOUND KEY WORDS + PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

77 EXAMPLE OF ANTICASCADE (ANTIXI +) PARTICLE PRODUCTION IN PBAR P INTERACTIONS AT 3.0 GEV/C. [PHYS. REV. LETTERS 8, 257 (1962)]

CERN, ECOLE POLYTECHNIQUE, SACLAY, COLLABORATION [CERN, GENEVA, SWITZERLAND, AND ECOLE POLYTECHNIQUE, PARIS, FRANCE, AND CNTR. D'ETUDES NUC. SACLAY, GIF-SUR-YVETTE, FRANCE]

CLOSELY RELATED REFERENCES
SEE ALSO CERN REPORT NO. 60-22 (1960).

BEAM IS ANTIPROTON ON PROTON AT 3 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + RESONANCE PRODUCTION ANTIXI+

NO DATA PUNCHED FOR THIS ARTICLE

78 EXPERIMENTAL STUDY OF THE POLARIZATION OF ANTIPROTONS FROM LOW-ENERGY PBAR P ELASTIC SCATTERING. [PHYS. REV. D 2, 2555 (1970)]

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ABSTRACT THE POLARIZATION OF ELASTICALLY SCATTERED ANTIPROTONS IN HYDROGEN, AVERAGED WITH RESPECT TO THE ENERGY OVER THE RANGE 49.4-181.0 MEV, IS EVALUATED AS A FUNCTION OF THE C.M. SCATTERING ANGLE BETWEEN 16 AND 100 DEGREES. THE RESULT IS BASED ON AN ANALYSIS OF APPROXIMATELY 50,000 PICTURES TAKEN IN THE 81-CM SACLAY HYDROGEN BUBBLE CHAMBER, WHICH WAS EXPOSED TO A SEPARATED BEAM FROM THE CERN PROTON SYNCHROTRON. THE EVENTS USED FOR MEASURING THE POLARIZATION WERE DOUBLE ELASTIC SCATTERINGS OF ANTIPROTONS. THE RESULTING POLARIZATION APPEARS TO BE RATHER STRONG, AND DOES NOT AGREE WITH THE PREDICTIONS GIVEN BY THE CURRENT THEORETICAL MODELS.

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 30, 973 (1963).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 46, 171 (1966), AND NUOVO CIMENTO 54A, 441 (1968).

BEAM IS ANTIPROTON ON PROTON FROM .310 TO .627 GEV/C. (BEAM KINETIC ENERGY = .05 TO .19 GEV)
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 50000 PICTURES ARE REPORTED ON.
KEY WORDS + ELASTIC SCATTERING POLARIZATION

NO DATA PUNCHED FOR THIS ARTICLE

79 CROSS SECTIONS FOR THE REACTIONS PBAR P → PI+ PI- AND K+K- NEAR 2 GEV/C. [PHYS. REV. LETTERS 21, 1718 (1968)]

J.W.CHAPMAN, F.HESS, J.LYS, C.T.MURPHY, J.C.VANDER VELDE (UNIV. OF MICHIGAN, ANN ARBOR, MICH., USA)

ABSTRACT THE DIFFERENTIAL AND TOTAL CROSS SECTIONS FOR THE REACTIONS PBAR P → PI+ PI- AND PBAR P → K+K- HAVE BEEN MEASURED AT SIX LABORATORY MOMENTA, RANGING FROM 1.62 TO 2.20 GEV/C. THE PI+ PI- CROSS SECTION FALLS FROM (137 +- 16) TO (32 +- 8) MU-B OVER THIS INTERVAL WHILE THE K+K- CROSS SECTION FALLS FROM (51 +/- 10) TO (21 +/- 6) MU-B. THE CENTER-OF-MASS ANGULAR DISTRIBUTIONS FOR THE TWO CHANNELS DIFFER REMARKABLY.

BEAM IS ANTIPROTON ON PROTON FROM 1.6 TO 2.2 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION DIFFERENTIAL CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → MESONS PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1,2]		NO. EVENTS
1.62	137.	+- 16.	72
1.77	109.	14.	62
1.83	76.	12.	44
1.89	84.	11.	60
1.95	53.	10.	32
2.20	32.	8.	18

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 8 PER CENT.

CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1,2]		NO. EVENTS
1.62	51.	+- 10.	25
1.77	51.	10.	27
1.83	39.	8.	21
1.89	34.	8.	22
1.95	35.	8.	19
2.20	21.	6.	11

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 8 PER CENT.

CROSS SECTION FOR ANTIPROTON PROTON → K0 K0BAR. [PAGE 1719]

LABORATORY BEAM MOMENTUM GEV/C [1]	MICROBARNS [2,3]
1.88	5.5 +- 2.0

[1] MEAN VALUE.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 8 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI- PI+. [FIGURE 2E]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 1.6 TO 2.2 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA UB/SR	
-1.0	-.9	3.64	+- 1.90
-.9	-.8	3.64	1.16
-.8	-.7	8.69	1.79
-.7	-.6	10.01	2.25
-.6	-.5	10.02	2.20
-.5	-.4	5.00	1.40
-.4	-.3	3.47	1.29
-.3	-.2	4.19	1.41
-.2	-.1	6.35	1.43
-.1	.0	9.33	1.92
.0	.1	7.79	1.63
.1	.2	6.44	1.49
.2	.3	5.16	1.41
.3	.4	5.16	1.41
.4	.5	5.93	1.38
.5	.6	10.42	1.95
.6	.7	7.46	1.75
.7	.8	3.32	1.16
.8	.9	1.30	.74
.9	1.0	7.51	1.80

THETA IS THE ANGLE THAT THE PI- MAKES WITH THE BEAM IN THE GRAND C.M.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K- K+. [FIGURE 2F]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 1.6 TO 2.2 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA UB/SR	
-1.0	-.8	.32	+- .32
-.8	-.6	1.29	.57
-.6	-.4	1.50	.60
-.4	-.2	2.59	.67
-.2	.0	3.09	.71
.0	.2	1.98	.60
.2	.4	1.94	.59
.4	.5	3.00	.99
.5	.6	3.82	1.20
.6	.7	5.13	1.53
.7	.8	2.95	.98
.8	.9	8.50	1.80
.9	1.0	7.83	2.17

THETA IS THE ANGLE THAT THE K- MAKES WITH THE BEAM IN THE GRAND C.M.

80 RHO-OMEGA INTERFERENCE IN PBAR P → 4 PI AT 1.6 - 2.2 GEV/C. [NUC. PHYS. B24, 445 (1970)]

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ABSTRACT THE PI+ PI- MASS SPECTRUM FROM OVER 3000 EVENTS OF THE REACTION PBAR P → PI+ PI+ PI- PI- AT 1.63-2.20 GEV/C SHOWS EVIDENCE FOR RHO-OMEGA INTERFERENCE. IF WE ALLOW FOR RHO-BACKGROUND INTERFERENCE THE EVIDENCE IS WEAK IN OUR TOTAL DATA, BUT IS STRONG WHEN WE MAKE A PARTICULAR CUT ON THE MOMENTUM TRANSFER, FROM THE PROTON OR ANTIPROTON TO THE PI+ PI-. A FIT TO THE DATA WITH THIS CUT GIVES A LOWER LIMIT ON THE BRANCHING RATIO OMEGA → PI+ PI- TO OMEGA → PI+ PI- PIO OF 1.9 PERCENT (95 PERCENT CONFIDENCE LEVEL).

BEAM IS ANTIPROTON ON PROTON FROM 1.63 TO 2.20 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI-. [PAGE 445]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
1.9 +- .3	1.8 +- .1

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81 HYPERON AND ANTIHYPERON PRODUCTION IN PBAR P COLLISIONS AT 7 BEV/C. [PHYS. REV. 152, 1171 (1966)]

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ABSTRACT PRODUCTION OF HYPERONS AND ANTIHYPERONS IN THE INTERACTIONS OF 6.935 BEV/C ANTIPROTONS WITH PROTONS HAS BEEN STUDIED. A TOTAL OF 80,000 PICTURES TAKEN WITH THE BROOKHAVEN NATIONAL LABORATORY 80-IN. LIQUID-HYDROGEN BUBBLE CHAMBER HAVE BEEN ANALYZED FOR ALL POSSIBLE FINAL STATES INVOLVING THE PRODUCTION OF A HYPERON AND/OR AN ANTIHYPERON. THE TOTAL CROSS SECTION FOR EVENTS IN THIS CATEGORY IS 1.3 +- 0.1 MB. REACTIONS LEADING TO TWO-, THREE-, OR FOUR-BODY FINAL STATES INVOLVING LAMBDA OR SIGMA HYPERONS (OR THEIR ANTIPARTICLES) WERE PRODUCED HIGHLY PERIPHERALLY. THE ANGULAR DISTRIBUTION OF THE LAMBDA LAMBDABAR FINAL STATE CAN BE FITTED TO K*(888) EXCHANGE WHEN THE ABSORPTIVE EFFECT OF COMPETING CHANNELS IS TAKEN INTO ACCOUNT. RATIOS AMONG CROSS SECTIONS OF VARIOUS HYPERON-ANTIHYPERON PAIR STATES AGREE WITH PREDICTIONS FROM SU(3) SYMMETRY, ASSUMING A DOMINANT K OR K* EXCHANGE AND AN F-TYPE COUPLING. CHARGE RATIOS OF EVENTS WITH SIGMA+- AND Y*(1)(1385)+- ARE ALSO CONSISTENT WITH SINGLE-PARTICLE-EXCHANGE MODELS. WE HAVE EXAMINED THE MASS SPECTRA OF ALL POSSIBLE MASS COMBINATIONS OF ALL POSSIBLE FINAL STATES. THE Y*(1)(1385) WAS BY FAR THE MOST PROMINENT RESONANCE PRODUCED, AND PRODUCTION OF Y*(0)(1405) AND Y*(0)(1520) WAS ALSO OBSERVED. ALTHOUGH THE ENERGY AVAILABLE IN THE PRODUCTION CENTER-OF-MASS SYSTEM IS 3.86 BEV, THERE WAS NO STATISTICALLY SIGNIFICANT EVIDENCE FOR THE PRODUCTION OF ANY NEW MESON OR BARYON RESONANCE. A THOROUGH SEARCH HAS BEEN MADE FOR OMEGA- AND ANTI-OMEGA+ PARTICLES, BUT NO EVENT WAS FOUND TO BE CONSISTENT WITH THEIR PRODUCTION AND DECAY.

BEAM IS ANTIPROTON ON PROTON AT 7 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 80000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION ANGULAR DISTRIBUTION HYPERON PRODUCTION
COMPOUND KEY WORDS → HYPERON PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 6.935 GEV/C +- 2(PER CENT).

REACTION ANTIPROTON PROTON →	MICROBARNS [1]		NO. EVENTS
LAMBDA ANTILAMBDA	40. +-	6.	62
ANTILAMBDA SIGMAO + CHARGE CONJUGATE	39.	6.	38
SIGMA+ ANTISIGMA- + SIGMA- ANTISIGMA+	19.	9.	15
SIGMA+ ANTILAMBDA PI- + CHARGE CONJUGATE	105.	18.	90
SIGMA- ANTILAMBDA PI+ + CHARGE CONJUGATE	35.	8.	33
SIGMA+ ANTISIGMAO PI- + CHARGE CONJUGATE	5.	5.	1
SIGMA- ANTISIGMAO PI+ + CHARGE CONJUGATE	2.	2.	1
LAMBDA ANTILAMBDA PI+ PI-	59.	12.	59
LAMBDA ANTISIGMAO PI+ PI- + CHARGE CONJUGATE	9.	5.	19
SIGMA+ ANTISIGMA- PI+ PI- + SIGMA- ANTISIGMA+ PI+ PI-	12.	5.	14
SIGMA+ ANTILAMBDA PI+ PI- PI- + CHARGE CONJUGATE	24.	8.	16
SIGMA- ANTILAMBDA PI+ PI+ PI- + CHARGE CONJUGATE	12.	4.	15
LAMBDA ANTILAMBDA PI+ PI+ PI- PI-	8.	4.	12

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 2]
LABORATORY BEAM MOMENTUM = 6.935 GEV/C +- 2(PER CENT).

REACTION ANTIPROTON PROTON →	MICROBARNS [1]		NO. EVENTS
LAMBDA KO ANTINEUTRON + CHARGE CONJUGATE	69. +-	17.	34
LAMBDA K+ ANTIPROTON + CHARGE CONJUGATE	71.	14.	47
SIGMAO K+ ANTIPROTON + CHARGE CONJUGATE	51.	13.	21
SIGMA+ KO ANTIPROTON + CHARGE CONJUGATE	15.	8.	9
LAMBDA KO ANTIPROTON PI+ + CHARGE CONJUGATE	46.	14.	42
SIGMAO KO ANTIPROTON PI+ + CHARGE CONJUGATE	7.	5.	11
LAMBDA KO ANTINEUTRON PI+ PI- + CHARGE CONJUGATE	6.	3.	4
LAMBDA K+ ANTIPROTON PI+ PI- + CHARGE CONJUGATE	8.	3.	12

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → TOTAL HYPERON PRODUCTION. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS
6.935	+- 2	1.310 +- .105

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 7]

LABORATORY BEAM MOMENTUM = 6.935 GEV/C +- 2(PER CENT).

THE PLOTTED DATA POINTS HAVE BEEN MULTIPLIED BY THE FACTOR 50. THE CENTER-OF-MASS ANGLE HAS BEEN CONVERTED TO BE WITH RESPECT TO THE ANTILAMBDA

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-OMEGA UB/SR	ERROR
.98	1.00	944.	+- 217.
.96	.98	215.	104.
.94	.96	184.	96.
.92	.94	210.	102.
.90	.92	58.	54.
.88	.90	115.	76.
.86	.88	30.	38.
.84	.86	30.	38.
.82	.84	0.	
.80	.82	0.	
.78	.80	58.	54.
.76	.78	30.	38.
.74	.76	0.	
.72	.74	0.	
.70	.72	0.	

THETA IS THE ANGLE THAT THE ANTILAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA SIGMA0 + CHARGE CONJUGATE. [FIGURE 7]

LABORATORY BEAM MOMENTUM = 6.935 GEV/C +- 2(PER CENT).

THE PLOTTED DATA POINTS HAVE BEEN MULTIPLIED BY THE FACTOR 50. THE CENTER-OF-MASS ANGLE HAS BEEN CONVERTED TO BE WITH RESPECT TO THE ANTILAMBDA

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-OMEGA UB/SR	ERROR
.98	1.00	425.	+- 146.
.96	.98	199.	100.
.94	.96	175.	94.
.92	.94	47.	49.
.90	.92	0.	
.88	.90	24.	35.
.86	.88	24.	35.
.84	.86	24.	35.
.82	.84	0.	
.80	.82	0.	
.78	.80	0.	
.76	.78	0.	
.74	.76	24.	35.
.72	.74	0.	
.70	.72	0.	

THETA IS THE ANGLE THAT THE ANTILAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

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82 PION-PION CORRELATIONS AT LOW ENERGIES. [NUOVO CIMENTO LETTERS 1, 779 (1969)]

J.CLAYTON, P.MASON, H.MUIRHEAD, P.RENTON [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]
R.RIGOPOULOS, P.TSILIMIGRAS, A.VAYAKI-SERAFIMIDOU [NUCLEAR RES. CENTRE DEMOKRITOS, ATHENS, GREECE]

THIS IS AN ANALYSIS OF PREVIOUSLY PUBLISHED DATA.

BEAM NO. 1 IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
NO. 3 IS PI+ ON PROTON AT 5 GEV/C.
THIS EXPERIMENT USES A HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION MASS SPECTRUM

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NO DATA PUNCHED FOR THIS ARTICLE

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83 THE ANNIHILATION PROCESS P PBAR → 2 PI+ 2 PI- AT 2.5 GEV/C. [NUC. PHYS. B22, 85 (1970)]

J.CLAYTON, P.MASON, H.MUIRHEAD, D.WALDREN [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]
R.RIGOPOULOS, P.TSILIMIGRAS, A.VAYAKI-SERAFIMIDOU [NUCLEAR RES. CENTRE DEMOKRITOS, ATHENS, GREECE]

ABSTRACT ABUNDANT RESONANCE PRODUCTION WAS OBSERVED IN THIS REACTION, THE CHANNELS RHOO PI+ PI-, F PI+ PI- ACCOUNTING FOR 51 +- 3 PERCENT AND 39 +- 3 PERCENT RESPECTIVELY OF ALL 2PI+ 2PI- ANNIHILATIONS. NO EVIDENCE OF THE A2 MESON WAS FOUND. DATA ON THE POSSIBLE EXISTENCE OF THE TWO-PION DECAY MODEL OF THE S*(1070) ARE GIVEN. THE REGGEISED MULTI-PERIPHERAL MODEL OF CHAN, LOSKIEWICZ AND ALLISON HAS BEEN APPLIED TO THE REACTION, AND REASONABLE AGREEMENT BETWEEN PREDICTIONS AND EXPERIMENTAL DATA FOUND.

BEAM IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER.
KEY WORDS • ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS • ANNIHILATION CROSS SECTION MESONS PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI-. [PAGE 85]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
2.5	1.35 +- .10

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 2]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

REACTION ANTIPROTON PROTON →	MILLIBARNS [1]
RHO(765)0 PI+ PI-	.67 +- .04
RHO(765)0 → PI+ PI- [2]	
F(1260) PI+ PI-	.55 .04
F(1260) → PI+ PI- [2]	

[1] ERRORS ARE STATISTICAL ONLY.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

84 THE ANNIHILATION PROCESS P PBAR → 2 PI+ 2 PI- PIO AT 2.5 GEV/C. [NUC. PHYS. B30, 605 (1971)]

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R.RIGOPOULOS, P.TSILIMIGRAS, A.VAYAKI-SERAFIMIDOU [NUCLEAR RES. CENTRE DEMOKRITOS, ATHENS, GREECE]

ABSTRACT SUBSTANTIAL PRODUCTION OF THE RESONANCES RHO, F AND OMEGA HAS BEEN OBSERVED IN THIS REACTION. IN CONTRAST WITH THE CHANNEL P PBAR → 2PI+ 2PI-, ASSOCIATED PRODUCTION OF RESONANCES WAS FOUND TO OCCUR. THE BEHAVIOUR OF THE ASSOCIATED PRODUCTION OF OMEGA MESONS WITH OTHER RESONANCES IS SHOWN TO BE CONSISTENT WITH SOME VERY SIMPLE ASSUMPTIONS. ALTERNATIVE METHODS OF DISPLAYING DATA FOR P PBAR → PI PI OMEGA ARE DISCUSSED; IT IS SHOWN THAT THE LONGITUDINAL PHASE PLOT FOR THIS REACTION IS UNLIKE THAT OBTAINED FOR ANY PREVIOUSLY REPORTED REACTION. REASONABLE AGREEMENT FOR THE BEHAVIOUR OF THIS CHANNEL IS FOUND WITH THE MULTIPERIPHERAL MODEL OF CHAN, LOSKIEWICZ AND ALLISON.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN NUC. PHYS. B22, 85 (1970).

BEAM IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS RESONANCE PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI- PIO. [PAGE 605]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
2.5	6.0 +- .1

[1] ERRORS ARE STATISTICAL ONLY.

[PAGE 606]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

REACTION ANTIPROTON PROTON →	MILLIBARNS [1]
PI+ PI+ PI- PI- PIO PIO	7.80 +- .10 [2]
PI+ PI+ PI- PI- PIO PIO PIO	5.00 .10 [2]
PI+ PI+ PI- PI- PIO PIO PIO PIO	1.40 .10 [2]
PI+ PI+ PI- PI- PIO PIO PIO PIO PIO	.30 .15 [2]
FOUR PRONG PION ANNIHILATION	21.90 .30 [3]

[1] ERRORS ARE STATISTICAL ONLY.
[2] RESULT IS MODEL DEPENDENT.
[3] CALCULATED BY US FROM DATA IN THIS ARTICLE.

[TABLE 1]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

REACTION ANTIPROTON PROTON →	MILLIBARNS
RHO(765)0 PI+ PI- PIO	3.1 +- .5 [1]
RHO(765)0 → PI+ PI- [2]	
RHO(765)+ PI+ PI- PI- + CHARGE CONJUGATE	2.9 .5 [1]
RHO(765)+ → PI+ PIO [2]	
F(1260) PI+ PI- PIO	1.0 .3 [1]
F(1260) → PI+ PI- [2]	
OMEGA(783) PI+ PI-	1.1 .2 [1]
OMEGA(783) → PI+ PI- PIO [2]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

85 ENERGY-DEPENDENT STRUCTURE IN BACKWARD-HEMISPHERE PBAR P ELASTIC SCATTERING AND HIGH-MASS BOSONS. [PHYS. REV. LETTERS 21, 1268 (1968)]

D.CLINE, J.ENGLISH, D.D.REEDER, R.TERRELL, J.TWITTY [UNIV. OF WISCONSIN, MADISON, WISC., USA]

ABSTRACT WE HAVE OBSERVED A STRONG BACKWARD PEAK IN THE DIFFERENTIAL CROSS SECTIONS OF BACKWARD-HEMISPHERE PBAR P ELASTIC SCATTERING IN THE MOMENTUM RANGE 300-700 MEV/C. THE DIFFERENTIAL CROSS SECTION NEAR 180 DEGREES AND NEAR 90 DEGREES SHOWS ENERGY-DEPENDENT FLUCTUATIONS. A CONSISTENT INTERPRETATION OF THESE FLUCTUATIONS CAN BE MADE IN TERMS OF DIRECT-CHANNEL BOSON RESONANCES WITH MASSES AND WIDTHS (M-GAMMA, GAMMA-GAMMA), IN MEV, OF (APPROX. 1925, APPROX.10) AND (1945, APPROX. 20), AND A STATE WITH MASS GREATER THAN APPROX. 1975 MEV AND WIDTH GREATER THAN 20 MEV.

BEAM IS ANTIPROTON ON PROTON FROM .3 TO .7 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 125000 PICTURES ARE REPORTED ON.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION
COMPOUND KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .3 TO .4 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA)	D-SIGMA/D-OMEGA MB/SR [1,2]	
.015	1.539 +-	.143
-.034	1.343	.143
-.080	1.297	.147
-.134	1.095	.118
-.181	.694	.100
-.230	.571	.099
-.282	.699	.097
-.333	.573	.095
-.374	.396	.065
-.427	.243	.061
-.476	.294	.059
-.526	.239	.056
-.579	.163	.050
-.628	.115	.046
-.673	.143	.048
-.725	.058	.025
-.776	.062	.029
-.825	.032	.032
-.877	.132	.047
-.920	.160	.045
-.973	.111	.044

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 20 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .4 TO .5 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA)	D-SIGMA/D-OMEGA MB/SR [1,2]	
.015	.674 +-	.049
-.035	.546	.048
-.089	.561	.047
-.137	.472	.050
-.183	.269	.037
-.237	.269	.037
-.283	.231	.023
-.334	.154	.025
-.381	.139	.022
-.436	.077	.024
-.484	.114	.025
-.535	.130	.022
-.582	.141	.023
-.633	.117	.021
-.684	.176	.023
-.739	.216	.024
-.785	.165	.025
-.834	.216	.024
-.887	.281	.037
-.933	.165	.025
-.991	.242	.025

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 20 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .5 TO .6 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA)	D-SIGMA/D-OMEGA MB/SR [1,2]	
.023	.574 +-	.049
-.025	.475	.047
-.072	.373	.036
-.121	.226	.023
-.175	.200	.022
-.221	.200	.022
-.266	.149	.024
-.320	.098	.024
-.374	.138	.026
-.425	.112	.024
-.471	.149	.024
-.520	.174	.024
-.568	.202	.024
-.619	.149	.024
-.671	.338	.038
-.716	.426	.036
-.763	.476	.049
-.817	.524	.048
-.862	.538	.048
-.910	.423	.049
-.966	.350	.047

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 20 PER CENT.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .6 TO .7 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA)	D-SIGMA/D-OMEGA MB/SR [1,2]	
.024	.299 +-	.050
-.024	.337	.050
-.077	.173	.037
-.126	.097	.026
-.177	.146	.039
-.223	.123	.025
-.276	.123	.025
-.322	.148	.037
-.373	.211	.037
-.421	.338	.050
-.474	.386	.050
-.525	.237	.038
-.578	.299	.050
-.625	.338	.050
-.675	.324	.053
-.724	.386	.050
-.777	.502	.050
-.825	.576	.062
-.878	.424	.050
-.927	.398	.049
-.978	.223	.036

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 20 PER CENT.

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86 MEASUREMENT OF THE PROTON-ANTIPROTON TOTAL ANNIHILATION CROSS SECTION AT LOW ENERGY. [PHYS. REV. LETTERS 27, 71 (1971)]

D.CLINE, J.ENGLISH, D.D.REEDER [UNIV. OF WISCONSIN, MADISON, WISC., USA]

ABSTRACT THE PBAR P TOTAL INELASTIC CROSS SECTION HAS BEEN MEASURED IN A HYDROGEN BUBBLE CHAMBER FOR PBAR MOMENTA FROM 100 TO 550 MEV/C. BELOW 200 MEV/C THE CROSS SECTION INCREASES RAPIDLY TO SEVERAL BARNS. FROM THIS BEHAVIOR IT IS INFERRED THAT HIGH PARTIAL WAVES, PERHAPS TO L=3, ARE IMPORTANT IN THE ANNIHILATION AT THE LOWEST MOMENTA STUDIED. AN ABRUPT CHANGE IN THE MOMENTUM DEPENDENCE OF THE TOTAL ABSORPTION CROSS SECTION OCCURS AT ABOUT 350 MEV/C IN THE VICINITY OF PREVIOUSLY OBSERVED STRUCTURE IN BACKWARD ELASTIC SCATTERING.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 21, 1268 (1968).

BEAM IS ANTIPROTON ON PROTON FROM .10 TO .55 GEV/C.
THIS EXPERIMENT USES THE BNL 30 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + CROSS SECTION

....
....

CROSS SECTION FOR ANTIPROTON PROTON + 0 PRONGS. [FIGURE 1]

DATA BELOW 0.35 GEV/C HAS NOT BEEN LISTED BECAUSE IT MAY NOT BE RELIABLE; PRIVATE COMMUNICATION BY D. D. REEDER, JANUARY 1972

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLIBARNS [1,2]	
.35	.40	11.0 +-	3.0
.40	.45	12.1	3.0
.45	.50	9.9	2.4
.50	.55	15.0	4.4
.55	.60	14.0	7.0

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

....

CROSS SECTION FOR ANTIPROTON PROTON → 2 PRONGS. [FIGURE 1]

DATA BELOW 0.35 GEV/C HAS NOT BEEN LISTED BECAUSE IT MAY NOT BE RELIABLE; PRIVATE COMMUNICATION BY D. D. REEDER, JANUARY 1972

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLIBARNS [1,2]	
.35	.40	26.9 +-	4.9
.40	.45	40.6	6.7
.45	.50	38.5	7.4
.50	.55	27.1	5.8
.50	.60	27.0	12.0

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

CROSS SECTION FOR ANTIPROTON PROTON → 4 PRONGS. [FIGURE 1]

DATA BELOW 0.35 GEV/C HAS NOT BEEN LISTED BECAUSE IT MAY NOT BE RELIABLE; PRIVATE COMMUNICATION BY D. D. REEDER, JANUARY 1972

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLIBARNS [1,2]	
.35	.40	43.4 +-	5.8
.40	.45	43.4	5.8
.45	.50	43.5	4.5
.50	.55	39.5	7.7

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

CROSS SECTION FOR ANTIPROTON PROTON → 6 PRONGS. [FIGURE 1]

DATA BELOW 0.35 GEV/C HAS NOT BEEN LISTED BECAUSE IT MAY NOT BE RELIABLE; PRIVATE COMMUNICATION BY D. D. REEDER, JANUARY 1972

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLIBARNS [1,2]	
.35	.40	2.70 +-	1.50
.40	.45	1.16	1.16

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

ANTIPROTON PROTON TOTAL INELASTIC CROSS SECTION. [FIGURE 2]

DATA BELOW 0.35 GEV/C HAS NOT BEEN LISTED BECAUSE IT MAY NOT BE RELIABLE; PRIVATE COMMUNICATION BY D. D. REEDER, JANUARY 1972

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLIBARNS [1,2]	
.35	.37	109. +-	14.
.37	.39	97.	12.
.39	.41	116.	14.
.41	.43	115.	14.
.43	.45	110.	12.
.45	.47	82.	11.
.47	.49	89.	10.
.49	.51	85.	10.
.51	.53	81.	11.
.53	.55	68.	12.

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

87 ANTIPROTON-PROTON ELASTIC SCATTERING BETWEEN 63 AND 175 MEV. [NUOVO CIMENTO 54A, 441 (1968)]

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ABSTRACT THE PBAR P ELASTIC SCATTERING DIFFERENTIAL CROSS SECTIONS HAVE BEEN DETERMINED AT NINE ENERGIES BETWEEN 63 AND 175 MEV, FROM 11,000 SCATTERING EVENTS MEASURED IN A HYDROGEN BUBBLE CHAMBER. THE RESULTS ARE COMPARED WITH EXISTING THEORETICAL MODELS AND GOOD AGREEMENT IS FOUND WITH THE CALCULATIONS OF BRYAN AND PHILLIPS.

CLOSELY RELATED REFERENCES
THIS ARTICLE SUPERSEDES PART OF NUOVO CIMENTO 46A, 171 (1966).

BEAM IS ANTIPROTON ON PROTON FROM .350 TO .599 GEV/C. (BEAM KINETIC ENERGY = .063 TO .175 GEV)
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 42000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION DIFFERENTIAL CROSS SECTION ELASTIC SCATTERING

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 1]

LABORATORY BEAM ENERGY GEV		MILLIBARNS	
.0627 +-	.0133	224.5 +-	6.6
.0835	.0105	199.7	5.5
.0998	.0091	188.0	4.9
.1100	.0084	179.5	4.5
.1243	.0070	171.1	4.5
.1368	.0065	169.2	4.1
.1509	.0067	167.6	3.5
.1633	.0063	161.1	3.2
.1750	.0060	154.3	3.0

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 1]

LABORATORY BEAM ENERGY GEV		MILLIBARNS	
.0627 +-	.0133	77.6 +-	3.3
.0835	.0105	71.1	2.8
.0998	.0091	68.7	2.5
.1100	.0084	62.0	2.2
.1243	.0070	62.6	2.3
.1368	.0065	59.5	2.1
.1509	.0067	63.5	2.2
.1633	.0063	61.3	2.0
.1750	.0060	57.3	1.8

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .0627 +- .0133 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.4 +-	.3
-.925	.0	
-.875	.2	.2
-.825	.0	
-.775	.7	.4
-.725	.2	.2
-.675	.7	.4
-.625	1.1	.4
-.575	.9	.4
-.525	.2	.2
-.475	1.1	.4
-.425	.9	.4
-.375	1.1	.4
-.325	1.4	.5
-.275	1.6	.5
-.225	1.6	.5
-.175	3.2	.8
-.125	4.5	.9
-.075	2.1	.6
-.025	2.7	.7
.025	4.5	.9
.075	4.1	.9
.125	6.1	1.0
.175	3.6	.8
.225	6.1	1.0
.275	7.7	1.2
.325	7.7	1.2
.375	7.1	1.1
.425	11.1	1.4
.475	8.4	1.2
.525	9.8	1.3
.575	11.1	1.4
.625	13.6	1.6
.675	15.3	1.7
.725	15.7	1.7
.775	16.0	1.7
.825	14.7	1.6
.875	17.0	1.7
.925	18.1	1.8
.960	18.0	2.8

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .0835 +- .0105 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	+-
-.975	.2	.2
-.925	.0	
-.875	.2	.2
-.825	.2	.2
-.775	.3	.2
-.725	.3	.2
-.675	.2	.2
-.625	.2	.2
-.575	.0	
-.525	.2	.2
-.475	.2	.2
-.425	.6	.3
-.375	.8	.3
-.325	.8	.3
-.275	.9	.4
-.225	1.1	.4
-.175	1.4	.5
-.125	1.7	.5
-.075	3.5	.7
-.025	1.5	.5
.025	1.8	.5
.075	2.9	.7
.125	5.1	.9
.175	4.8	.9
.225	4.2	.8
.275	5.4	.9
.325	4.2	.8
.375	8.8	1.2
.425	6.9	1.0
.475	8.6	1.2
.525	11.5	1.3
.575	9.7	1.2
.625	10.9	1.3
.675	11.7	1.3
.725	12.6	1.4
.775	17.8	1.7
.825	18.4	1.7
.875	20.4	1.8
.925	20.5	1.8
.960	25.0	3.1

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .0998 +- .0091 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	+-
-.975	.8	.3
-.925	.3	.2
-.875	.1	.1
-.825	.1	.1
-.775	.6	.3
-.725	.3	.2
-.675	.3	.2
-.625	.0	
-.575	.3	.2
-.525	.0	
-.475	.6	.3
-.425	.4	.2
-.375	.4	.2
-.325	1.0	.4
-.275	.7	.3
-.225	1.0	.4
-.175	1.2	.4
-.125	1.4	.4
-.075	1.2	.4
-.025	1.9	.5
.025	1.9	.5
.075	2.1	.5
.125	3.6	.7
.175	1.8	.5
.225	5.0	.8
.275	4.0	.7
.325	6.0	.9
.375	6.1	.9
.425	6.4	.9
.475	8.7	1.1
.525	10.7	1.2
.575	10.9	1.2
.625	13.8	1.4
.675	11.5	1.3
.725	13.3	1.4
.775	15.1	1.4
.825	20.2	1.7
.875	21.8	1.7
.925	18.6	1.6
.960	22.9	2.8

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .1100 +- .0084 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.5 +-	.2
-.925	.1	.1
-.875	.2	.2
-.825	.5	.2
-.775	.5	.2
-.725	.1	.1
-.675	.0	
-.625	.1	.1
-.575	.1	.1
-.525	.1	.1
-.475	.1	.1
-.425	.2	.2
-.375	.2	.2
-.325	.2	.2
-.275	.6	.3
-.225	.8	.3
-.175	.7	.3
-.125	.7	.3
-.075	1.4	.4
-.025	1.8	.5
.025	1.5	.4
.075	2.1	.5
.125	3.0	.6
.175	3.4	.6
.225	3.8	.7
.275	4.5	.7
.325	4.9	.8
.375	5.9	.8
.425	6.5	.9
.475	6.8	.9
.525	8.7	1.0
.575	8.0	1.0
.625	8.9	1.0
.675	14.0	1.3
.725	10.6	1.1
.775	14.1	1.3
.825	15.5	1.4
.875	19.0	1.5
.925	20.5	1.6
.960	25.0	2.7

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .1243 +- .0070 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.9 +-	.4
-.925	.8	.3
-.875	.8	.3
-.825	.6	.3
-.775	.6	.3
-.725	.0	
-.675	.2	.2
-.625	.2	.2
-.575	.3	.2
-.525	.0	
-.475	.2	.2
-.425	.5	.3
-.375	.2	.2
-.325	.0	
-.275	.3	.2
-.225	.5	.3
-.175	.2	.2
-.125	.6	.3
-.075	1.5	.5
-.025	1.4	.5
.025	.9	.4
.075	1.5	.5
.125	2.2	.6
.175	3.1	.7
.225	2.3	.6
.275	4.9	.9
.325	5.1	.9
.375	6.9	1.0
.425	6.0	1.0
.475	7.1	1.0
.525	7.5	1.1
.575	9.1	1.2
.625	9.4	1.2
.675	11.7	1.3
.725	12.3	1.4
.775	13.8	1.5
.825	16.7	1.6
.875	18.8	1.7
.925	24.8	2.0
.960	22.2	2.9

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .1368 +- .0065 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.7 +-	.3
-.925	.8	.3
-.875	.6	.3
-.825	.3	.2
-.775	.7	.3
-.725	.6	.3
-.675	.0	
-.625	.1	.1
-.575	.0	
-.525	.1	.1
-.475	.0	
-.425	.3	.2
-.375	.4	.2
-.325	.1	.1
-.275	.1	.1
-.225	.4	.2
-.175	.0	
-.125	.7	.3
-.075	.7	.3
-.025	1.3	.4
.025	1.4	.4
.075	2.4	.6
.125	1.5	.5
.175	2.0	.5
.225	2.5	.6
.275	3.6	.7
.325	2.4	.6
.375	4.6	.8
.425	7.0	1.0
.475	6.7	1.0
.525	6.0	.9
.575	8.8	1.1
.625	8.5	1.1
.675	11.2	1.3
.725	13.3	1.4
.775	14.4	1.4
.825	15.9	1.5
.875	22.3	1.8
.925	21.6	1.7
.960	23.4	2.9

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .1509 +- .0067 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.2 +-	.2
-.925	1.0	.4
-.875	.6	.3
-.825	.4	.3
-.775	.2	.2
-.725	.4	.3
-.675	.2	.2
-.625	.2	.2
-.575	.2	.2
-.525	.0	
-.475	.0	
-.425	.0	
-.375	.0	
-.325	.2	.2
-.275	.0	
-.225	.2	.2
-.175	.8	.4
-.125	.0	
-.075	.2	.2
-.025	.2	.2
.025	.6	.3
.075	.4	.3
.125	1.2	.5
.175	1.8	.6
.225	2.2	.7
.275	3.2	.8
.325	3.4	.8
.375	3.8	.9
.425	4.6	1.0
.475	5.0	1.0
.525	8.2	1.3
.575	8.6	1.3
.625	8.8	1.3
.675	10.9	1.5
.725	14.9	1.7
.775	18.1	1.9
.825	20.5	2.0
.875	25.1	2.2
.925	20.9	2.1
.960	36.1	4.3

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .1633 +- .0063 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.2 +-	.2
-.925	.2	.2
-.875	.4	.3
-.825	.4	.3
-.775	.2	.2
-.725	.2	.2
-.675	.4	.3
-.625	.7	.4
-.575	.2	.2
-.525	.0	
-.475	.0	
-.425	.7	.4
-.375	.0	
-.325	.2	.2
-.275	.2	.2
-.225	.2	.2
-.175	.4	.3
-.125	.4	.3
-.075	.0	
-.025	.2	.2
.025	1.1	.4
.075	1.3	.5
.125	1.3	.5
.175	1.8	.6
.225	.9	.4
.275	2.5	.7
.325	3.1	.7
.375	2.7	.7
.425	4.1	.9
.475	6.7	1.1
.525	6.8	1.1
.375	7.4	1.2
.625	8.7	1.2
.675	12.1	1.5
.725	10.6	1.4
.775	16.4	1.7
.825	19.6	1.9
.875	24.8	2.1
.925	27.6	2.2
.960	28.3	3.6

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM ENERGY = .175 +- .006 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
-.975	.5 +-	.3
-.925	.5	.3
-.875	.8	.4
-.825	.2	.2
-.775	.2	.2
-.725	.5	.3
-.675	.3	.2
-.625	.3	.2
-.575	.3	.2
-.525	.3	.2
-.475	.3	.2
-.425	.0	
-.375	.0	
-.325	.3	.2
-.275	.0	
-.225	.0	
-.175	.0	
-.125	.0	
-.075	.0	
-.025	.5	.3
.025	.5	.3
.075	.8	.4
.125	.6	.3
.175	1.4	.5
.225	1.6	.5
.275	1.6	.5
.325	2.8	.7
.375	3.2	.7
.425	3.0	.7
.475	4.7	.9
.525	5.8	1.0
.575	7.3	1.1
.625	9.5	1.2
.675	10.1	1.3
.725	14.0	1.5
.775	12.3	1.4
.825	18.6	1.7
.875	23.0	1.9
.925	27.0	2.1
.960	28.0	3.3

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

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88 THE LEPTONIC ANNIHILATION MODES OF THE PROTON-ANTIPROTON SYSTEM AT 6.8 (GEV/C)**2 TIMELIKE FOUR-MOMENTUM TRANSFE.
[NUOVO CIMENTO 40A, 690 (1965)]

M.CONVERSI, T.MASSAM, T.MULLER, A.ZICHICHI [CERN, GENEVA, SWITZERLAND]

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 24, 170 (1962).

BEAM IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION   DIFFERENTIAL CROSS SECTION   ANNIHILATION   ELECTRON   MU MESON

[PAGE 699]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

REACTION	MICROBARNS
ANTIPROTON PROTON +	
POSITRON ELECTRON	<.00161 (.90 CONF LEVEL) [1]
MU+ MU-	<.00081 (.90 CONF LEVEL) [1]

[1] COMBINED CROSS SECTION FOR ANTIPROTON PROTON + ANTILEPTON LEPTON IS AN UPPER LIMIT OF 0.00054 MICROBARNS (.90 CONF LEVEL).

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + POSITRON ELECTRON. [PAGE 699]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

COS(THETA)	D-SIGMA/D-OMEGA UB/SR
0.	<.00012 (.90 CONF LEVEL)

THETA IS THE ANGLE THAT THE POSITRON MAKES WITH THE BEAM IN THE GRAND C.M.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + MU+ MU-. [PAGE 699]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

COS(THETA)	D-SIGMA/D-OMEGA UB/SR
0.	<.00006 (.90 CONF LEVEL)

THETA IS THE ANGLE THAT THE MU+ MAKES WITH THE BEAM IN THE GRAND C.M.

89 ANTIPROTON-PROTON CROSS SECTIONS AT 133,197,265, AND 333 MEV. [PHYS. REV. 112, 1303 (1958)]

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ABSTRACT . IN A SCINTILLATION-COUNTER EXPERIMENT THE INTERACTION OF ANTIPROTONS WITH PROTONS IN THE ENERGY REGION 133 TO 333 MEV HAS BEEN STUDIED. ANTIPROTONS,PRODUCED INTERNALLY IN THE BEVATRON, CHANNELED EXTERNALLY BY A SYSTEM OF MAGNETIC QUADRUPOLES AND BENDING MAGNETS, AND IDENTIFIED BY TIME OF FLIGHT, ENTERED A TARGET CONTAINING LIQUID HYDROGEN. THIS TARGET WAS COMPLETELY SURROUNDED BY A SYSTEM OF SCINTILLATION COUNTERS WHICH DETECTED BOTH SCATTERED ANTIPROTONS AND ANNIHILATION SECONDARIES. AN ELECTROSTATIC-MAGNETIC VELOCITY SPECTROMETER WAS USED IN THE EXTERNAL MAGNETIC CHANNEL TO INCREASE THE RATIO OF ANTIPROTONS TO PIONS. THE PBAR P TOTAL, ELASTIC, INELASTIC, AND CHARGE-EXCHANGE CROSS SECTIONS, AND THE ANGULAR DISTRIBUTION OF ELASTIC SCATTERING WERE MEASURED AT EACH ENERGY. THE INELASTIC CROSS SECTION IS APPROXIMATELY ONE-HALF THE TOTAL CROSS SECTION AT THESE ENERGIES. THE RESULTS ARE DISCUSSED IN CONNECTION WITH CURRENT THEORIES.

BEAM IS ANTIPROTON ON PROTON FROM .517 TO .858 GEV/C. (BEAM KINETIC ENERGY = .133 TO .333 GEV)
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION   ELASTIC SCATTERING   ANGULAR DISTRIBUTION
COMPOUND KEY WORDS + ELASTIC SCATTERING ANGULAR DISTRIBUTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 2]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.133 +-	.013	166. +-	8.
.197	.016	152.	7.
.265	.017	124.	7.
.333	.017	114.	4.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 2]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.133 +-	.013	72. +	9.
		-	11.
.197	.016	64. +	7.
		-	9.
.265	.017	50. +	6.
		-	7.
.333	.017	49. +	5.
		-	7.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 2]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]
.133 +-	.013	10. + 2. - 3.
.197	.016	11. + 2. - 4.
.265	.017	8. + 2. - 3.
.333	.017	7. + 2. - 2.

[1] ERRORS INCLUDE SYSTEMATICS.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 9A]

LABORATORY BEAM ENERGY = .133 +- .013 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES	D-SIGMA/D-OMEGA MB/SR [1]	
22.6	23.8 +-	7.3
38.5	16.8	1.8
60.7	7.0	.9
81.0	3.0	.6
90.4	2.4	.9

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 9B]

LABORATORY BEAM ENERGY = .197 +- .016 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES	D-SIGMA/D-OMEGA MB/SR [1]	
21.5	27.3 +-	5.4
36.7	16.0	1.8
60.7	5.0	.6
81.4	.9	.5
103.4	.8	.5

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 9C]

LABORATORY BEAM ENERGY = .265 +- .017 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES	D-SIGMA/D-OMEGA MB/SR [1]	
23.4	22.1 +-	5.4
41.0	9.7	1.3
62.9	3.6	.6
84.0	.7	.5
106.0	.5	.5

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 9D]

LABORATORY BEAM ENERGY = .333 +- .017 GEV.

THESE DATA WERE READ FROM A GRAPH

THETA DEGREES	D-SIGMA/D-OMEGA MB/SR [1]	
22.9	30.6 +-	3.2
41.1	8.7	.9
62.5	2.2	.4
85.5	.4	.4
109.2	.6	.3

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.

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90 STUDY OF THE STRUCTURE IN THE ANTIPROTON-PROTON TOTAL CROSS SECTION NEAR 1.3 GEV/C. [PHYS. REV. LETTERS 20, 1059 (1968)]

W.A.COOPER, L.G.HYMAN, W.MANNER, B.MUSGRAVE, L.VOYVODIC [ARGONNE NAT. LAB., ARGONNE, ILL., USA]

BEAM IS ANTIPROTON ON PROTON FROM 1.2 TO 1.6 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS • CROSS SECTION

CROSS SECTION FOR ANTIPROTON PROTON → 0 PRONGS. [FIGURE 3]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
1.23	7.51 +-	.32
1.27	7.65	.37
1.32	8.32	.34
1.37	7.41	.31
1.43	7.48	.38
1.49	7.16	.53
1.54	7.53	.25

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → 2 PRONGS. [FIGURE 3]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
1.23	65.1 +-	1.0
1.27	66.7	1.3
1.32	64.9	.8
1.37	63.0	1.0
1.43	60.9	1.1
1.49	59.0	1.4
1.54	59.8	.7
1.63	56.8	.9

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → 4 PRONGS. [FIGURE 3]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
1.23	31.1 +-	.7
1.27	30.0	.8
1.32	29.4	.5
1.37	28.8	.7
1.43	30.0	.8
1.49	27.6	.9
1.54	27.9	.5
1.63	27.7	.8

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → 6 PRONGS. [FIGURE 3]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
1.23	3.91 +-	.25
1.27	3.45	.27
1.32	4.02	.23
1.37	3.83	.27
1.43	3.71	.32
1.49	4.77	.37
1.54	4.04	.22
1.63	3.76	.27

[1] ERRORS INCLUDE SYSTEMATICS.

91 PBAR-P ELASTIC SCATTERING IN THE MOMENTUM RANGE 1.24 TO 1.62 GEV/C [NUC. PHYS. B16, 155 (1970)]

W.A.COOPER, D.HODGES, L.HYMAN, T.JACH, J.LOKEN, W.MANNER, B.MUSGRAVE, R.ROYSTON [ARGONNE NAT. LAB., ARGONNE, ILL., USA]

ABSTRACT WE HAVE MEASURED THE PBAR-P ELASTIC CROSS SECTION AT INCIDENT ANTIPROTON MOMENTA OF 1.24, 1.32, 1.54 AND 1.62 GEV/C TO BE 43.2 +- 3.5, 43.3 +- 3.0, 38.5 +- 3.0 AND 37.2 +- 3.0 MB RESPECTIVELY. THE DIFFERENTIAL CROSS SECTION IN THIS MOMENTUM RANGE IS DOMINATED BY A DIFFRACTION PEAK FOR WHICH THE SLOPE IS FOUND TO DECREASE WITH INCIDENT MOMENTUM, CONSISTENT WITH THE ESTABLISHED 'ANTI-SHRINKAGE' OF THE PBAR-P DIFFRACTION PEAK. THE DIFFERENTIAL CROSS SECTION SHOWS A WELL-DEFINED DIP AT COS THETA (C.M.) APPROX. = 0.4 FOLLOWED BY A BROAD MAXIMUM AND A SHARP BACKWARD PEAK LARGELY CONFINED TO THE INTERVAL COS THETA (C.M.) LESS THAN -0.8.

BEAM IS ANTIPROTON ON PROTON FROM 1.24 TO 1.62 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 135000 PICTURES ARE REPORTED ON.
KEY WORDS + ELASTIC SCATTERING CROSS SECTION DIFFERENTIAL CROSS SECTION

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]		NO. EVENTS
1.24	43.2 +-	3.5	380
1.32	43.3	3.0	1558
1.54	38.5	3.0	1466
1.62	37.2	3.0	2261

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.62 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
.97	48.600 +-	2.400
.95	38.700	2.700
.93	31.200	1.800
.91	25.600	1.700
.89	20.300	1.700
.87	14.500	1.000
.85	10.300	.900
.83	8.260	.750
.81	7.640	.620
.79	4.730	.600
.77	3.480	.570
.75	3.680	.590
.73	1.860	.400
.71	1.480	.360
.65	.546	.091
.55	.157	.046
.45	.194	.056
.35	.105	.047
.25	.224	.055
.15	.247	.055
.05	.134	.045

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 2]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 1.24 TO 1.62 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR	
.65	1188.0 +-	77.0
.55	455.0	56.0
.45	226.0	40.0
.35	181.0	34.0
.25	342.0	46.0
.15	353.0	50.0
.05	277.0	46.0
-.05	179.0	35.0
-.15	217.0	40.0
-.25	142.0	34.0
-.35	105.0	26.0
-.45	89.3	25.0
-.55	59.0	17.3
-.65	51.5	19.5
-.75	12.5	12.5
-.85	66.7	21.7
-.95	118.0	29.0

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

92 CROSS SECTIONS FOR ANTIPROTONS IN HYDROGEN, BERYLLIUM, CARBON, AND LEAD. [PHYS. REV. 107, 248 (1957)]

B.CORK, G.R.LAMBERTSON, O.PICCIONI, W.A.WENZEL [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT A STRONG-FOCUSING MOMENTUM CHANNEL HAS BEEN ARRANGED TO FORM A BEAM FROM ANTIPROTONS PRODUCED BY 6.0-BEV PROTONS STRIKING AN INTERNAL TARGET OF THE BEVATRON. THE CHANNEL CONSISTS OF FIVE 4-INCH-DIAMETER MAGNETIC QUADRUPOLE LENSES AND TWO DEFLECTING MAGNETS ADJUSTED TO GIVE A +-5 PERCENT MOMENTUM INTERVAL. THE ANTIPROTONS WERE SELECTED FROM A LARGE BACKGROUND OF MESONS BY A SCINTILLATION COUNTER TELESCOPE WITH A TIME-OF-FLIGHT COINCIDENCE CIRCUIT HAVING A RESOLUTION OF +- 2 * 10**-9 SECOND. THIS SYSTEM ALLOWED DETECTION OF APPROXIMATELY 400 ANTIRPOTONS PER HOUR. WITH A LIQUID HYDROGEN ATTENUATOR, THE TOTAL ANTIPROTON-PROTON CROSS SECTION AT FOUR DIFFERENT ENERGIES, 190, 300, 500, AND 700 MEV, HAS BEEN OBSERVED TO BE 135, 104, 97, AND 94 MB, RESPECTIVELY. ALSO, THE TOTAL CROSS SECTIONS FOR ANTIPROTONS INCIDENT ON BE AND C HAVE BEEN MEASURED AT TWO ENERGIES. THE INELASTIC CROSS SECTIONS FOR CARBON HAVE BEEN MEASURED BY OBSERVING THE PULSE HEIGHTS PRODUCED BY THE INTERACTIONS IN A TARGET OF LIQUID SCINTILLATOR. TO MEASURE THE INELASTIC CROSS SECTION FOR A HIGH-Z ELEMENT, LEAD WAFERS WERE IMMERSED IN THE LIQUID SCINTILLATOR, AND TO SELECT INELASTIC EVENTS THE PULSE HEIGHTS WERE MEASURED.

BEAM IS ANTIPROTON ON HYDROGEN FROM .627 TO 1.343 GEV/C. (BEAM KINETIC ENERGY = .19 TO .70 GEV)
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [FIGURE 6]

LABORATORY BEAM ENERGY GEV	MILLIBARNS	
.19	135. +-	16.
.30	104.	14.
.50	97.	4.
.70	94.	4.

93 ANTIPROTON-PROTON INTERACTION CROSS-SECTIONS AT 45,90,145, AND 245 MEV. [NUOVO CIMENTO 25, 497 (1962)]

B.CORK, O.I.DAHL, D.H.MILLER, A.G.TENNER, C.L.WANG [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT THROUGH THE USE OF THE LAWRENCE RADIATION LABORATORY 15 IN. HYDROGEN BUBBLECHAMBER, ANTIPROTON-PROTON CROSS SECTIONS HAVE BEEN MEASURED AT LOWER ENERGIES THAN HERETOFORE ACCESSIBLE. INTERACTIONS WERE STUDIED IN FOUR ENERGY INTERVALS BY INSERTION OF SUITABLE DEGRADERS IN AN ELECTROSTATICALLY SEPARATED BEAM OF 245 MEV ANTIPROTONS. APPROXIMATELY 4,000 ANTIPROTONS WERE INCIDENT IN EACH OF THE ENERGY INTERVALS (45 +- 20) MEV, (90 +- 20) MEV, (145 +- 17) MEV, AND (245 +- 20) MEV. FOR THE TOTAL CROSS SECTIONS AT THESE ENERGIES, WE FIND (281 +- 46), (185 +- 13), (163 +- 12), AND (118 +- 9) MB. THE ELASTIC-SCATTERING CROSS SECTIONS ARE (80 +- 10), (65 +- 6), (52 +- 6), AND (45 +- 5) MB, RESPECTIVELY. THE CALCULATIONS OF BALL AND FULCO ARE IN REASONABLE AGREEMENT WITH THE MEASURED DIFFERENTIAL CROSS SECTIONS. THE TOTAL CROSS SECTIONS AT 145 AND 245 MEV AGREE WITH THOSE RECENTLY MEASURED WITH COUNTERS BY COOMBES, ET AL., WHILE THE ELASTIC-SCATTERING CROSS SECTIONS ARE SYSTEMATICALLY 15 PERCENT LOWER THAN THOSE OBTAINED IN THE COUNTER MEASUREMENTS.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 112, 1303 (1958), AND PHYS. REV. 107, 248 (1957).

BEAM IS ANTIPROTON ON PROTON FROM .294 TO .721 GEV/C. (BEAM KINETIC ENERGY = .045 TO .245 GEV)
THIS EXPERIMENT USES THE LRL 15 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + CROSS SECTION DIFFERENTIAL CROSS SECTION ELASTIC SCATTERING

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 3]

LABORATORY BEAM ENERGY GEV		MILLIBARNS	
.045 +-	.020	281. +-	46.
.090	.020	185.	13.
.145	.017	163.	12.
.245	.020	118.	9.

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 3]

LABORATORY BEAM ENERGY GEV		MILLIBARNS	
.045 +-	.020	80. +-	10.
.090	.020	66.	6.
.145	.017	52.	6.
.245	.020	45.	5.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 5]

LABORATORY BEAM ENERGY = .045 +- .020 GEV.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR [1]		NO. EVENTS
.9	1.0	20.3 +-	4.5	20.3
.8	.9	15.7	4.0	15.7
.7	.8	14.4	3.8	14.4
.6	.7	13.3	3.6	13.3
.5	.6	8.1	2.8	8.1
.4	.5	10.6	3.3	10.6
.3	.4	8.9	3.0	8.9
.2	.3	2.4	1.5	2.4
.1	.2	11.3	3.4	11.3
.0	.1	3.7	1.9	3.7
-.1	.0	3.0	1.7	3.0
-.2	-.1	4.4	2.1	4.4
-.3	-.2	2.4	1.5	2.4
-.4	-.3	.4	1.0	.4
-.5	-.4	1.3	1.1	1.3
-.6	-.5	2.4	1.5	2.4
-.7	-.6	.0	1.0	.0
-.8	-.7	.0	1.0	.0
-.9	-.8	.5	1.0	.5
-1.0	-.9	.0	1.0	.0

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] COUNTS WERE MULTIPLIED BY 1. TO GET THESE.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 6]

LABORATORY BEAM ENERGY = .09 +- .02 GEV.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR [1]		NO. EVENTS
.9	1.0	16.6 +-	4.1	16.6
.8	.9	19.8	4.4	19.8
.7	.8	12.5	3.5	12.5
.6	.7	11.8	3.4	11.8
.5	.6	8.5	2.9	8.5
.4	.5	7.4	2.7	7.4
.3	.4	7.4	2.7	7.4
.2	.3	3.7	1.9	3.7
.1	.2	4.3	2.1	4.3
.0	.1	3.3	1.8	3.3
-.1	.0	1.5	1.2	1.5
-.2	-.1	2.0	1.4	2.0
-.3	-.2	.8	1.0	.8
-.4	-.3	.0	1.0	.0
-.5	-.4	.4	1.0	.4
-.6	-.5	.0	1.0	.0
-.7	-.6	.0	1.0	.0
-.8	-.7	.4	1.0	.4
-.9	-.8	.4	1.0	.4
-1.0	-.9	.9	1.0	.9

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] COUNTS WERE MULTIPLIED BY 1. TO GET THESE.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 7]

LABORATORY BEAM ENERGY = .145 +- .017 GEV.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR [1]		NO. EVENTS
.9	1.0	19.2 +-	4.4	19.2
.8	.9	16.7	4.1	16.7
.7	.8	14.6	3.8	14.6
.6	.7	9.3	3.0	9.3
.5	.6	.0	1.0	.0
.4	.5	5.0	2.2	5.0
.3	.4	2.1	1.4	2.1
.2	.3	2.5	1.6	2.5
.1	.2	.9	1.0	.9
.0	.1	1.2	1.1	1.2
-.1	.0	.5	1.0	.5
-.2	-.1	.5	1.0	.5
-.3	-.2	.0	1.0	.0
-.4	-.3	.0	1.0	.0
-.5	-.4	.0	1.0	.0
-.6	-.5	.0	1.0	.0
-.7	-.6	.0	1.0	.0
-.8	-.7	.3	1.0	.3
-.9	-.8	.3	1.0	.3
-1.0	-.9	.7	1.0	.7

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] COUNTS WERE MULTIPLIED BY 1. TO GET THESE.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 8]

LABORATORY BEAM ENERGY = .245 +- .020 GEV.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR [1]		NO. EVENTS
.9	1.0	19.0 +-	4.4	19.0
.8	.9	15.8	4.0	15.8
.7	.8	14.0	3.7	14.0
.6	.7	6.9	2.6	6.9
.5	.6	3.5	1.9	3.5
.4	.5	4.0	2.0	4.0
.3	.4	.5	1.0	.5
.2	.3	.5	1.0	.5
.1	.2	.5	1.0	.5
.0	.1	.0	1.0	.0
-.1	.0	.9	1.0	.9
-.2	-.1	.0	1.0	.0
-.3	-.2	.5	1.0	.5
-.4	-.3	.0	1.0	.0
-.5	-.4	.5	1.0	.5
-.6	-.5	.0	1.0	.0
-.7	-.6	.0	1.0	.0
-.8	-.7	.5	1.0	.5
-.9	-.8	.5	1.0	.5
-1.0	-.9	.0	1.0	.0

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] COUNTS WERE MULTIPLIED BY 1. TO GET THESE.

94 DOUBLE PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 2.7 BEV/C. [PHYS. REV. 154, 1264 (1967)]

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ABSTRACT A STUDY WAS MADE OF THE REACTION PBAR P → PBAR P PI+ PI- AT 2.7 BEV/C. THE TOTAL CROSS SECTION FOR THIS REACTION WAS DETERMINED TO BE 1.93 +/- 0.16 MB. THE DATA WERE FOUND TO BE CONSISTENT WITH 100 PER CENT N*NBAR* FORMATION, WHERE N* IS THE 1238-MEV PION-NUCLEON RESONANCE WITH T = T(Z) = J = 3/2. IT WAS OBSERVED THAT THE N* PRODUCTION IS HIGHLY PERIPHERAL; SPECIFICALLY, 50 PERCENT OF THE NBAR*'S ARE FORMED WITH COS THETA (P) > 0.8, WHERE THETA(P) IS THE ANGLE BETWEEN THE OUTGOING NBAR* AND INCOMING PBAR MOMENTA IN THE OVER-ALL CENTER-OF-MASS SYSTEM. A COMPARISON OF THE DATA WITH PREDICTIONS OF THE FORM-FACTOR AND ABSORPTION ONE-PION-EXCHANGE MODELS WAS MADE.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 15, 803 (1965), BULL. AM. PHYS. SOC. 10, 1115 (1965), AND BULL. AM. PHYS. SOC. 11, 360 (1966).

BEAM IS ANTI-PROTON ON PROTON AT 2.7 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 91000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION DELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS → DELTA(1238) RESONANCE PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-PROTON PROTON PI+ PI-. [PAGE 1267]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	NO. EVENTS
2.7	1.93 +- .16	719

[1] ERRORS INCLUDE SYSTEMATICS.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTI-DELTA(1238)-- DELTA(1238)++. [FIGURE 8]
ANTI-DELTA(1238)-- → ANTI-PROTON PI-
DELTA(1238)++ → PROTON PI+

LABORATORY BEAM MOMENTUM = 2.7 GEV/C.

NORMALIZED TO 1.93 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]		NO. EVENTS
.000	.078	.07 +-	.05	2
.078	.156	.78	.17	22
.156	.234	3.75	.36	106
.234	.312	3.86	.37	109
.312	.390	3.22	.34	91
.390	.468	2.30	.29	65
.468	.546	1.88	.26	53
.546	.624	1.45	.23	41
.624	.702	.96	.18	27
.702	.780	1.10	.20	31
.780	.858	1.06	.19	30
.858	.936	.92	.18	26
.936	1.014	.57	.14	16
1.014	1.092	.28	.10	8
1.092	1.170	.46	.13	13
1.170	1.248	.50	.13	14
1.248	1.326	.39	.12	11
1.326	1.404	.21	.09	6
1.404	1.482	.18	.08	5
1.482	1.560	.07	.05	2
1.560	1.638	.21	.09	6
1.638	1.716	.11	.06	3
1.716	1.794	.07	.05	2
1.794	1.872	.14	.07	4
1.872	1.950	.00	.04	0
1.950	2.028	.07	.05	2
2.028	2.106	.11	.06	3

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTI-DELTA(1238)--].

[1] ERRORS INCLUDE SYSTEMATICS.
[2] COUNTS WERE MULTIPLIED BY .0354 TO GET THESE.

95 ANTIPROTON-PROTON ELASTIC SCATTERING AT 4 GEV/C AND DERIVATION OF DIFFRACTION SLOPE AT INFINITE ENERGY. [PHYS. LETTERS 15, 188 (1965)]

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BEAM IS ANTIPROTON ON PROTON AT 4 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [PAGE 189]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
4.	71. +- 1.

ANTIPROTON PROTON ELASTIC CROSS SECTION. [PAGE 190]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
4.	19.75 +- .73

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [PAGE 189]

LABORATORY BEAM MOMENTUM = 4. GEV/C.

DATA ARE FIT OVER -T FROM .02 TO .27 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 257.0 +- 7.1
A = 13.0 +- .6

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 4. GEV/C.

THE NORMALIZED DATA POINTS HAVE BEEN MULTIPLIED BY THE 'OPTICAL THEOREM VALUE' OF 257. MB/(GEV/C)**2, AS GIVEN BY EQ. (1) ON PAGE 189.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2	
.020	208.00 +-	24.00
.023	158.00	11.00
.049	127.00	10.00
.068	111.00	10.00
.083	77.20	8.50
.105	56.00	4.90
.135	38.10	2.30
.164	28.00	2.50
.209	18.40	1.70
.268	7.56	.95

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.

96 CHARGE EXCHANGE AND THE REACTION ANTIPROTON + PROTON + ANTI-N + N + PI+ + PI- OF 3.0, 3.6 AND 4.0 GEV/C ANTIPROTONS. [PHYS. LETTERS 20, 554 (1966)]

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ABSTRACT THE ANGULAR DISTRIBUTION OF ANTIPROTON-PROTON CHARGE EXCHANGE, MEASURED AROUND 3.5 GEV/C, IS COMPARED TO THE PROTON-NEUTRON CHARGE EXCHANGE. WHEN THE NEUTRON AND ANTINEUTRON ARE PRODUCED TOGETHER WITH TWO ADDITIONAL CHARGED PIONS, EVIDENCE IS FOUND FOR ISOBAR FORMATION AND THEIR CASCADE DECAY.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN CERN REPORT NO. TC/64-26 (1964).

BEAM IS ANTIPROTON ON PROTON FROM 3 TO 4 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 87000 PICTURES ARE REPORTED ON.
KEY WORDS + CHARGE EXCHANGE CROSS SECTION ANGULAR DISTRIBUTION RESONANCE PRODUCTION
COMPOUND KEY WORDS + CHARGE EXCHANGE CROSS SECTION

[PAGE 555]
LABORATORY BEAM MOMENTUM = 3.5 GEV/C (MEAN VALUE).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
ANTINEUTRON NEUTRON PI+ PI-	2.0 +-	.7
ANTINEUTRON NEUTRON	2.0	.6

[1] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + ANTINEUTRON NEUTRON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 3.5 GEV/C (MEAN VALUE).

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.02	8.0 +-	3.0
.10	5.0	2.0
.22	3.0	1.4
.40	1.0	.6
.65	.7	.4

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

97 EVIDENCE FOR A NON-STRANGE MESON OF MASS 1290 MEV. [PHYS. LETTERS 17, 347 (1965)]

CH.D'ANDLAU,A.ASTIER,M.DELLA NEGRA,L.DOBRZYNSKI,S.WOJCICKI [COLLEGE DE FRANCE, PARIS, FRANCE]
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D.N.EDWARDS,J.E.A.LYS [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 50A, 701 (1967).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

98 ANTIPROTON-PROTON ANNIHILATION INTO (KKBAR + 3 PI) AND (KKBAR + 4 PI) AT 1.2 GEV/C. STUDY OF THE DO PROPERTIES. [NUC. PHYS. B5, 693 (1968)]

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ABSTRACT EXPERIMENTAL RESULTS ARE PRESENTED FOR THE FIVE- AND SIX-BODY ANNIHILATIONSPBAR P → K KBAR 3PI AND PBAR P → K KBAR 4PI OF 1.2 GEV/C ANTIPROTONS. ANALYSIS OF THESE RESULTS IN TERMS OF PRODUCTION OF K*(890), RHO, OMEGA, ETA AND D(1280) RESONANCES IS MADE. A DETAILED ANALYSIS OF THE QUANTUM NUMBERS FOR THE D-MESON IS GIVEN.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 50A, 701 (1967), AND PHYS. LETTERS 17, 367 (1965).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → MESONS PRODUCTION

[TABLE 1]

LABORATORY BEAM MOMENTUM = 1.18 +- .01 GEV/C.

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON →		
KOS K+ PI+ PI- PI- PIO + CHARGE CONJUGATE	46.0 +-	6.0
KOS K+ PI+ PI- PI- + CHARGE CONJUGATE	105.0	10.0
KOS K+ PI- MM≥2PIO + CHARGE CONJUGATE	75.0	9.0
KOS KOS PI+ PI- PIO	186.0	17.0
KOS PI+ PI- MM≥(1PIO+1KO)	198.0	15.0
KOS K+ PI- PIO + CHARGE CONJUGATE	594.0	24.0
KOS K+ PI- OMEGA(783) + CHARGE CONJUGATE	8.7	3.0
OMEGA(783) → PI+ PI- PIO [2]		
D(1285) OMEGA(783)	21.0	3.0
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		
OMEGA(783) → PI+ PI- PIO [2]		
D(1285) ETA(548)	.5	.5
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		
ETA(548) → PI+ PI- PIO [2]		
D(1285) PI+ PI-	3.2	2.0
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		
D(1285) RHO(765)0	3.2	1.5
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		
RHO(765)0 → PI+ PI- [2]		
D(1285) ETA(548)	2.6	1.1
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		
ETA(548) → NEUTRALS [2]		
D(1285) OMEGA(783)	1.7	.8
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		
OMEGA(783) → NEUTRALS [2]		
KOS KOS OMEGA(783)	82.0	5.0
OMEGA(783) → PI+ PI- PIO [2]		
KOS KOS PIO RHO(765)0 + KOS KOS RHO(765)+ PI- + CHARGE CONJUGATE	26.0	9.0
RHO(765)0 → PI+ PI- [2]		
RHO(765)+ → PI+ PIO [2]		
D(1285) RHO(765)0	4.0	2.0
D(1285) → KOS KOS PIO [2]		
RHO(765)0 → PI+ PI- [2]		
D(1285) PIO	11.2	3.0
D(1285) → KOS K+ PI- + CHARGE CONJUGATE [2]		

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

99 EVIDENCE FOR THE EXISTENCE OF MESONS DECAYING TO FOUR PIONS. [PHYS. LETTERS 24B, 309 (1967)]

J.A.DANYSZ, B.R.FRENCH, J.B.KINSON, V.SIMAK [CERN, GENEVA, SWITZERLAND]
J.CLAYTON, P.MASON, H.MUIRHEAD, P.RENTON [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT EVIDENCE IS PRESENTED FOR THE PRODUCTION IN ANTIPROTON-PROTON ANNIHILATIONS OF MESONS WITH MASSES (1717 +- 7) MEV AND (1832 +- 6) MEV WITH NARROW WIDTHS DECAYING TO FOUR CHARGED PIONS IN A NEUTRAL MODE.

BEAM NO. 1 IS ANTIPROTON ON PROTON AT 3 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
THIS EXPERIMENT USES BUBBLE CHAMBERS.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

100 ANNIHILATIONS OF 3.0 AND 3.6 GEV/C ANTIPROTONS INTO SIX OR MORE PIONS. [NUOVO CIMENTO 51A, 801 (1967)]

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ABSTRACT WE REPORT A STUDY OF THE REACTIONS PBAR P + N PI+ + N PI- + MPIO AT 3.0 GEV/C AND 3.6 GEV/C (E(C.M.S.) IS EQUAL TO 2.77 GEV AND 2.96 GEV RESPECTIVELY) WHERE N = 3, 4 OR 5 AND M = 0. THE SAMPLE CONTAINS 1988 SIX-PRONG EVENTS AT 3.0 GEV/C, 440 EIGHT-PRONG EVENTS AT 3.0 AND 3.6 GEV/C AND 10 TEN-PRONG EVENTS AT 3.0 AND 3.6 GEV/C. THE CROSS-SECTIONS FOR VARIOUS PROCESSES OBSERVED ARE COMPARED WITH THE CROSS-SECTIONS OBTAINED INOTHER EXPERIMENTS AT DIFFERENT INCIDENT ANTIPROTON MOMENTA. A MAXIMUM IN THE 7 PI ANNIHILATION CROSS-SECTION IS SEEN AT A C.M.S. ENERGY OF ABOUT 2.7GEV. APPRECIABLE PRODUCTION OF RHOO IN THE SIX-PION EVENTS AND OF RHOO+- AND OMEGAO MESONS IN THE SEVEN-PION EVENTS IS OBSERVED. IN THE SIX-PION EVENTS THE 2 PI+ PI- MASS DISTRIBUTION AND THE RHOO PI+ PI- MASS DISTRIBUTION SHOW EVIDENCE OF STRUCTURE WITH PEAKS AT (1704 +- 10) MEV AND (1834 +- 10) MEV. IN THE SEVEN-PION EVENTS SELECTED TO CONTAIN A PI+ PI- AND PI+ PI- PIO MASS COMBINATION IN THE RHOO AND OMEGAO REGIONS RESPECTIVELY, THE RHOO PI+- MASS DISTRIBUTION SHOWS PEAKS IN THE MASS REGIONS CORRESPONDING TO THE A1 AND A2 MESONS WITH MASSES OF (1054 +- 7) MEV AND (1269 +- 9) MEV RESPECTIVELY, THE WIDTH OF THE PEAK IN THE REGION OF THE A2 BEING SMALLER, (38 + - 19) MEV, THAN THAT USUALLY OBSERVED IN BUBBLE CHAMBERS BUT IS COMPATIBLE WITH THE LOWER-MASS PEAK OF THE SPLIT A2 AS OBSERVED BY LEVRAT ET AL. THE RHOO OMEGAO MASS DISTRIBUTION SHOWS TWO PEAKS AT MASSES OF (1689 +- 10) MEV AND (1848 +- 11) MEV. THE ANGULAR DISTRIBUTIONS OF PIONS ARE SLIGHTLY CCLLIMATED ALONG THE DIRECTION OF THE INCIDENT PARTICLES, THIS COLLIMATION BEING AN INCREASING FUNCTION OF PION MOMENTUM IN THE C.M.S. THE RHOO AND OMEGAO MESONS ALSO HAVE ANISOTROPIC DISTRIBUTIONS IN THE C.M.S. ASTRONG ANGULAR CORRELATION IS OBSERVED BETWEEN PAIRS OF PIONS OF OPPOSITE CHARGE. THIS CORRELATION DECREASES WITH INCREASING ENERGY OF THE C.M.S. OR WHEN THE NUMBER OF PIO PRODUCED IN THE ANNIHILATION INCREASES.

CLOSELY RELATED REFERENCES
SEE ALSO CERN REPORT NO. TC/PH65-8.

BEAM NO. 1 IS ANTIPROTON ON PROTON AT 3 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 3.6 GEV/C.
THIS EXPERIMENT USES THE CERN 80 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 146000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 3. GEV/C +- .5(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
PI+ PI+ PI+ PI- PI- PI-	1.100 +-	.070
PI+ PI+ PI+ PI- PI- PI- PIO	2.800	.100
PI+ PI+ PI+ PI- PI- PI- PIO PIO	2.600	.100 [2]
PI+ PI+ PI+ PI- PI- PI- PIO PIO PIO	.520	.060 [2]
SIX PRONG PION ANNIHILATION	7.100	.200
PI+ PI+ PI+ PI+ PI- PI- PI- PI-	.110	.020
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO	.110	.020
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO PIO	.100	.020 [2]
EIGHT PRONG PION ANNIHILATION	.320	.030
TEN PRONG PION ANNIHILATION	.006	.004

[1] ERRORS INCLUDE SYSTEMATICS.
[2] RESULT IS MODEL DEPENDENT.

[TABLE 1]
LABORATORY BEAM MOMENTUM = 3.6 GEV/C +- .5(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
PI+ PI+ PI+ PI+ PI- PI- PI- PI-	.130 +-	.020
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO	.200	.020
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO PIO	.130	.030 [2]
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO PIO PIO	.020	.030 [2]
EIGHT PRONG PION ANNIHILATION	.480	.030
TEN PRONG PION ANNIHILATION	.013	.005

[1] ERRORS INCLUDE SYSTEMATICS.
[2] RESULT IS MODEL DEPENDENT.

[TABLE 2]
LABORATORY BEAM MOMENTUM = 3. GEV/C +- .5(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
PI+ PI+ PI- PI- RHO(765)0	1.10 +-	.10
RHO(765)0 + PI+ PI- [2]		
PI+ PI+ PI- PI- OMEGA(783)	.89	.15
OMEGA(783) + PI+ PI- PIO [2]		
PI+ PI+ PI- PI- PIO RHO(765)0	.70	.24
RHO(765)0 + PI+ PI- [2]		
RHO(765)+ PI+ PI+ PI- PI- PI- + CHARGE CONJUGATE	.20	.05
RHO(765)+ + PI+ PIO [2]		

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

101 ELASTIC SCATTERING OF ANTIPROTONS ON POLARIZED PROTONS AT 1.73,2.13,2.37, AND 2.97 GEV/C. [NUC. PHYS. B6, 617 (1968)]

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ABSTRACT DIFFERENTIAL CROSS SECTION AND POLARIZATION DISTRIBUTIONS ARE PRESENTED FOR ELASTIC PBAR P SCATTERING AT INCIDENT MOMENTA OF 1.73,2.13,2.37, AND 2.97 GEV/C. THE DATA HAVE BEEN ANALYSED IN TERMS OF A 5-PARAMETER DIFFRACTION MODEL. IN TERMS OF THIS MODEL THE DIFFERENCE IN THE SHAPE OF THE DIFFERENTIAL CROSS SECTIONS FOR PBAR P AND P P ELASTIC SCATTERING IS A RESULT OF THE STRONG ABSORPTION IN THE PBAR P SYSTEM.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN HEIDELBERG CONFERENCE, 159 (1967), AND NUC. PHYS. B6, 273 (1968).

BEAM IS ANTIPROTON ON PROTON FROM 1.73 TO 2.97 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION POLARIZATION
COMPOUND KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.73 GEV/C.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2,3]	+-
.90	57.00	28.00
.89	28.00	7.00
.85	11.20	.80
.82	7.70	.60
.75	2.30	.20
.60	.14	.07
.56	.31	.05
.50	.45	.06
.41	.36	.05
.39	.47	.06
.27	.57	.06
.24	.33	.05
.14	.34	.05
.07	.23	.04
.00	.23	.04
-.10	.17	.03
-.15	.19	.04
-.27	.05	.02
-.30	.06	.02
-.42	.06	.04
-.45	.07	.03
-.57	.05	.04
-.60	.06	.03
-.73	.06	.03

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.13 GEV/C.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2,3]	+-
.90	17.00	3.50
.90	17.40	2.60
.83	7.80	.60
.71	.84	.09
.64	.56	.08
.56	.50	.06
.55	.60	.07
.44	.56	.06
.39	.50	.05
.32	.38	.05
.22	.30	.04
.20	.21	.04
.06	.19	.03
.05	.16	.03
-.09	.11	.03
-.12	.09	.03
-.25	.08	.02
-.28	.10	.03
-.41	.09	.02
-.43	.07	.03
-.56	.11	.03
-.57	.08	.04
-.69	.06	.04
-.70	.04	.03

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 2.37 GEV/C.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2,3]	
.90	20.20 +-	4.40
.89	13.90	2.00
.79	2.00	.20
.70	.74	.10
.66	.69	.10
.55	.75	.09
.38	.66	.08
.35	.46	.08
.23	.24	.06
.21	.40	.06
.09	.17	.05
.03	.12	.04
-.06	.08	.04
-.14	.13	.04
-.22	.15	.04
-.30	.15	.04
-.58	.00	.05
-.70	.01	.07

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 2.97 GEV/C.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2,3]	
.92	24.60 +-	5.20
.83	6.30	.60
.74	.82	.14
.69	.99	.12
.62	.89	.12
.53	.96	.11
.53	.86	.12
.42	.34	.06
.34	.38	.06
.29	.36	.07
.17	.17	.05
.16	.29	.06
.01	.15	.05
-.01	.19	.04
-.15	.07	.04
-.32	.04	.04
-.34	.06	.05
-.48	.04	.04
-.48	.07	.03
-.61	.07	.08
-.64	.05	.04
-.78	.03	.05
-.89	.04	.09

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

....

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.73 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.90	.27 +-	.08
.89	.12	.06
.85	.33	.04
.82	.28	.04
.75	.34	.07
.60	.66	.62
.56	.55	.17
.50	.29	.17
.41	.45	.15
.39	.11	.14
.27	.26	.12
.24	.19	.16
.14	.62	.17
.07	.33	.21
.00	.45	.19
-.10	.52	.23
-.15	.18	.21
-.27	.57	.50
-.30	-.25	.40
-.42	-.32	.65
-.45	-.33	.41
-.57	1.16	1.13
-.60	-.82	.61
-.73	.49	.71

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

....

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.13 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.90	.12 +-	.04
.90	.18	.04
.83	.18	.03
.71	.24	.10
.64	.29	.16
.56	.11	.11
.55	.02	.12
.44	.14	.12
.39	.23	.11
.32	-.01	.13
.22	.27	.13
.20	.25	.20
.06	.29	.17
.05	-.10	.21
-.09	.07	.28
-.12	-.02	.32
-.25	.03	.35
-.28	-.07	.32
-.41	.06	.28
-.43	.19	.48
-.56	-.16	.29
-.57	.69	.55
-.69	-.39	.75
-.70	-.82	.81

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

....

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 2.37 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.90	.22 +-	.04
.89	.19	.04
.79	.22	.09
.70	.19	.13
.66	-.21	.14
.55	.01	.11
.38	.29	.11
.35	.35	.18
.23	.44	.26
.21	-.15	.15
.09	.09	.30
.03	-.29	.36
-.06	-.26	.51
-.14	.09	.32
-.22	-.07	.26
-.30	.09	.31

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

....

ELASTIC POLARIZATION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 2.97 GEV/C.

COS(THETA) [1]	POLARIZATION [2,3]	
.92	.09 +-	.03
.83	.17	.05
.74	.13	.16
.69	-.09	.11
.62	.03	.15
.53	-.05	.10
.53	.17	.15
.42	.13	.21
.34	.14	.17
.29	.05	.22
.17	-.52	.38
.16	-.12	.23
.01	-.42	.38
-.01	-.09	.27
-.15	.44	.66
-.32	-2.23	2.66
-.34	-.08	1.04
-.48	-.71	1.23
-.48	.92	.62
-.61	.40	1.31
-.64	.29	1.06
-.78	1.21	3.24
-.89	.76	2.93

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE PROTON ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 15 PER CENT.

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102 EVIDENCE FOR THE EXISTENCE OF A NARROW ETAO PI+- RESONANCE AT 975 MEV, INTERPRETED AS A DECAY OF THE DELTA+- MESON, AND EVIDENCE FOR A DELTA+- PI-+ DECAY OF THE DO MESON. [PHYS. LETTERS 28B, 353 (1968)]

C.DEFOIX, P.RIVET, J.SIAUD [COLLEGE DE FRANCE, PARIS, FRANCE]
B.CONFORTO, M.WIDGOFF [CERN, GENEVA, SWITZERLAND]
F.SHIVELY [INSTITUT DE PHYSIQUE NUCLEAIRE, PARIS, FRANCE]

ABSTRACT TWO PEAKS ARE OBSERVED IN ETAO PI+- AND ETAO PI+ PI- EFFECTIVE MASS DISTRIBUTIONS NEAR 975 MEV AND 1310 MEV RESPECTIVELY, IN EVENTS FITTING THE REACTION PBAR P → 3PI+ 3PI- PIO. THE NARROW ETAO PI+- PEAK IS INTERPRETED AS A NEW EVIDENCE FOR THE EXISTENCE OF THE DELTA+- MESON. THE SECOND PEAK IS STRONGLY CORRELATED TO THE FIRST ONE AND IS INTERPRETED AS EVIDENCE FOR THE DECAY DO → DELTA+- PI-+.

CLOSELY RELATED REFERENCES
SEE ALSO NUC. PHYS. B5, 693 (1968), PHYS. LETTERS 25B, 294 (1967), AND PHYS. LETTERS 19, 438 (1965).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS → MESONS RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

103 PROTON-ANTIPROTON INTERACTIONS AT 3.6 GEV/C AND ONE PION EXCHANGE. [PHYS. LETTERS 9, 185 (1964)]

H.C.DEHNE, E.RAUBOLD, P.SOEDING, M.W.TEUCHER, G.WOLF [STAATSINST. FUR EXPERIMENTALPHYSIK,HAMBURG,GERMANY]
E.LOHRMANN [DEUTSCHES ELEKTRONEN-SYNCH., HAMBURG, GERMANY]

BEAM IS ANTIPROTON ON PROTON AT 3.6 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → PION PRODUCTION
COMPOUND KEY WORDS → PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

104 PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 3.6 GEV/C. [PHYS. REV. 136, B843 (1964)]

H.C.DEHNE,E.LOHRMANN,E.RAUBOLD,P.SODING,M.W.TEUCHER,G.WOLF [DEUTSCHES ELEKTRONEN-SYNCH., HAMBURG, GERMANY]

ABSTRACT INTERACTIONS OF ANTIPROTONS WERE STUDIED AT A MOMENTUM OF 3.6 GEV/C IN A HYDROGEN BUBBLE CHAMBER. PARTICULAR ATTENTION WAS PAID TO SINGLE AND MULTIPLE PION PRODUCTION WITHOUT ANNIHILATION. CROSS SECTIONS FOR THE VARIOUS PION-PRODUCTION CHANNELS ARE GIVEN. THE TOTAL CROSS SECTION FOR PION PRODUCTION WITHOUT ANNIHILATION AND NOT INCLUDING STRANGE-PARTICLE PRODUCTION IS 18.6(-3.3 OR +2.4) MB. SINGLE PION PRODUCTION IS FOUND TO AGREE WITH THE PREDICTIONS OF THE ONE-PION-EXCHANGE MODEL FOR SMALL VALUES OF THE FOUR-MOMENTUM TRANSFER. DOUBLE PION PRODUCTION IN THE REACTION PBAR P → P PBAR PI+ PI- AGREES WITH THE ONE-PION-EXCHANGE MODEL FOR ALL VALUES OF THE FOUR-MOMENTUM TRANSFER, IF ALL POSSIBLE DIAGRAMS ARE TAKEN INTO ACCOUNT. THE MAIN CONTRIBUTION COMES FROM EVENTS WHERE A 3/2-3/2 PION-NUCLEON ISOBAR-ANTI-ISOBAR PAIR IS PRODUCED. FOR THESE EVENTS THE TREIMAN-YANG ANGULAR DISTRIBUTION AND THE DECAY ANGULAR DISTRIBUTIONS OF THE ISOBARS ARE ALSO IN AGREEMENT WITH THE ONE-PION-EXCHANGE MODEL.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. LETTERS 5, 132 (1963).
THIS ARTICLE SUPERSEDES PHYS. LETTERS 9, 185 (1964).

BEAM IS ANTIPROTON ON PROTON AT 3.6 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 14400 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION PION PRODUCTION DELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS → PION PRODUCTION DELTA(1238) RESONANCE PRODUCTION

[TABLE 1]

LABORATORY BEAM MOMENTUM = 3.6 GEV/C.

REACTION	MILLIBARNS	
ANTIPROTON PROTON →		
ELASTIC	20.90 +-	.80 [1]
ANTIPROTON PROTON PIO	1.90	.30
ANTINEUTRON PROTON PI-	2.60	.40
ANTIPROTON NEUTRON PI+	2.20	.40
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	4.80	.60 [2]
ANTIPROTON PROTON PI+ PI-	3.80	.20
ANTIPROTON PROTON PI+ PI- PIO	.60	.10
ANTIPROTON PROTON OMEGA(783) OMEGA(783) → PI+ PI- PIO	.06	.02
ANTINEUTRON PROTON PI+ PI- PI-	.50	.30
ANTIPROTON NEUTRON PI- PI+ PI+	.60	.30
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	1.10	.40 [2]

[1] ERRORS ARE STATISTICAL ONLY.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

CROSS SECTION FOR ANTIPROTON PROTON → ANTIDELTA(1238)-- DELTA(1238)++. [PAGE B846]
ANTIDELTA(1238)-- → ANTIPROTON PI- [1]
DELTA(1238)++ → PROTON PI+ [1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
3.6	2.13 +- .13

[1] COUNTED ONLY EVENTS ABOVE BACKGROUND.

105 EXPERIMENTAL COMPARISON OF DBAR P AND PBAR D TOTAL CROSS SECTIONS. [PHYS. LETTERS 34B, 167 (1971)]

S.P.DENISOV, S.V.DONSKOV, Y.P.GORIN, A.I.PETRUKHIN, Y.D.PROKOSHKIN, R.S.SHUVALOV, D.A.STOYANOVA [INST. OF HIGH EN. PHYS., SERPUKOV, USSR]

ABSTRACT DBAR P AND PBAR D TOTAL CROSS-SECTIONS HAVE BEEN MEASURED AT 13.3 AND 6.65 GEV/C RESPECTIVELY TO CHECK CPT-INVARIANCE. THE STANDARD TRANSMISSION TECHNIQUE WAS USED. THE DIFFERENCE OF DBAR P AND PBAR D TOTAL CROSS-SECTIONS APPEARED TO BE EQUAL TO 0.2 +- 2.6 MB. IN ADDITION DBAR D AND PBAR P TOTAL CROSS-SECTIONS HAVE BEEN OBTAINED. THE EXPERIMENTAL DATA ALLOWED US TO DERIVE THE TOTAL CROSS-SECTION OF ANTINEUTRONS ON PROTONS, NEUTRONS AND DEUTERONS.

BEAM NO. 1 IS ANTIPROTON ON DEUTERON AT 6.65 GEV/C.
NO. 2 IS ANTIDEUTERON ON PROTON AT 13.3 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS • CROSS SECTION

ANTIPROTON DEUTERON TOTAL CROSS SECTION. [PAGE 168]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
6.65	109.7 +- 1.3

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON PROTON TOTAL CROSS SECTION. [PAGE 168]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
6.65	59.3 +- .6

[1] ERRORS INCLUDE SYSTEMATICS.

ANTINEUTRON PROTON TOTAL CROSS SECTION. [PAGE 168]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
6.65	59. +- 3.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON NEUTRON TOTAL CROSS SECTION. [PAGE 168]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
6.65	58.8 +- 2.4

[1] ERRORS INCLUDE SYSTEMATICS.

ANTINEUTRON DEUTERON TOTAL CROSS SECTION. [PAGE 169]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
6.65	118. +- 8.

ANTINEUTRON NEUTRON TOTAL CROSS SECTION. [PAGE 169]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
6.65	69. +- 10.

106 ENERGY DEPENDENCE OF PI-, K- AND PBAR TOTAL CROSS SECTIONS ON PROTONS IN THE MOMENTUM RANGE UP TO 65 GEV/C. [PHYS. LETTERS 36B, 528 (1971)]

S.P.DENISOV, Y.P.DMITREVSKI, S.V.DONSKOV, Y.P.GORIN, Y.M.MELNIK, A.I.PETRUKHIN, Y.D.PROKOSHKIN, V.S.SELEZNEV, R.S.SHUVALOV, D.A.STOYANOVA, L.M.VASILJEV [INST. OF HIGH EN. PHYS., SERPUKOV, USSR]

ABSTRACT PI- P, K- P AND PBAR P TOTAL CROSS SECTIONS ARE MEASURED AT MOMENTA UP TO 65 GEV/C WITH STATISTICAL ACCURACY 0.3 - 0.6 PERCENT AND SYSTEMATICAL (SCALE) ERROR APPROX. 0.4 PERCENT.

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 20 TO 60 GEV/C.
NO. 2 IS PI- ON PROTON FROM 20 TO 60 GEV/C.
NO. 3 IS K- ON PROTON FROM 20 TO 60 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS • CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1,2]
23.0	47.4 +- .3
27.5	46.3 .3
31.0	46.1 .3
33.5	45.6 .3
35.0	44.6 .3
37.5	44.7 .3
40.0	44.0 .3
42.5	44.5 .3
47.5	44.1 .3

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- .5 PER CENT.

107 TEST OF CP AND C INVARIANCES IN PBAR P ANNIHILATIONS AT 1.2 GEV/C INVOLVING STRANGE PARTICLES. [PHYS. LETTERS 22, 105 (1966)]

L.DOBRZYNSKI, N.-H.XUONG [COLLEGE DE FRANCE, PARIS, FRANCE]
L.MONTANET, M.TOMAS [CERN, GENEVA, SWITZERLAND]
J.DUBOC [INSTITUTE DU RADIUM, PARIS, FRANCE]
R.A.DONALD [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT WE HAVE FOUND NO INDICATION OF VIOLATION OF EITHER CP OR C INVAIRANCES. USING A SIMPLE MODEL, ONE CAN MAKE AN ESTIMATE OF (0.4 +- 1.0)*10**2 FOR THE RELATIVE AMPLITUDE OF CP VIOLATION AND OF (0.4 +- 1.0)*10**-2 FOR C VIOLATION. OUR DATA ARE ALSO CONSISTENT WITH A RELATIVE AMPLITUDE OF P VIOLATION OF (0.1 +- 1.0)*10**-2.

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION STRANGE PARTICLES

NO DATA PUNCHED FOR THIS ARTICLE

108 STUDY OF THE POLARIZATION OF ANTIPROTON IN PBAR P SCATTERING AT 1.18 GEV/C. [PHYS. LETTERS 23, 614 (1966)]

L.DOBRZYNSKI,C.GHESQUIERE,N.H.XUONG [COLLEGE DE FRANCE, PARIS, FRANCE]
H. TOFTE [OSLO UNIV., OSLO, NORWAY]

ABSTRACT ANALYSIS OF 2764 DOUBLE SCATTERING EVENTS OF ANTIPROTONS AT 1.08 GEV/C IN THE 81 CM SACLAY HYDROGEN BUBBLE CHAMBER YIELDS AN ASYMMETRY OF (-2.3 +/- 3) PERCENT FOR THE ANGULAR REGION 15 DEG. ≤ THETA (C.M.) ≤ 60 DEG., WITH AN AVERAGE ANGLE THETA (C.M.) = 28 DEG. THIS WOULD CORRESPOND TO AN UPPER LIMIT OF 20 PERCENT FOR THE POLARIZATION OF THE ANTIPROTON AT 95 PERCENT CONFIDENCE LIMIT.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 127, 1297 (1962), ROCHESTER CONFERENCE, 159 (1960), AND SIENNA CONFERENCE, 252 (1963).

BEAM IS ANTIPROTON ON PROTON AT 1.18 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 210000 PICTURES ARE REPORTED ON.
KEY WORDS + POLARIZATION

NO DATA PUNCHED FOR THIS ARTICLE

109 ELASTIC SCATTERING OF 2.7 GEV/C ANTIPROTONS ON PROTONS. [PHYS. LETTERS 24B, 642 (1967)]

V.DOMINGO,G.P.FISHER,L.M.LIBBY,R.SEARS [UNIV. OF COLORADO, BOULDER, COLO., USA]

ABSTRACT THE DIFFERENTIAL ELASTIC SCATTERING CROSS SECTION FOR 2.7 GEV/C ANTIPROTONS ON PROTONS HAS BEEN STUDIED USING FILM FROM THE 20 IN. BNL HYDROGEN BUBBLE CHAMBER. THE DIFFRACTION PATTERN BASED ON A TOTAL SAMPLE OF 7300 EVENTS SHOWS A SHARP FORWARD MAXIMUM, A FIRST DIFFRACTION MINIMUM, AND A SECOND MAXIMUM. THE FORWARD DIFFRACTION PEAK IS FITTED BY (D SIGMA/DT)ELASTIC = [325 +/- 6 MB / (GEV) SQUARED] EXP[-13.3 +/- 0.2 (GEV/C) INVERSELY SQUARED T] AND THE TOTAL ELASTIC CROSS SECTION IS FOUND TO BE 25.6 +/- 0.6 MB. THE FIRST AND SECOND DIFFRACTION PEAKS ARE FITTED BY THE OPTICAL MODEL FORMULA FOR A 'BLACK' DISC, D SIGMA/DT APPROX. [J(1)(2K R SIN 1/2 THETA)/(2K R SIN 1/2 THETA)] SQUARED X (1 + A COS THETA) SQUARED WHERE R = 1.2 FM AND A = -5.

CLOSELY RELATED REFERENCES
SEE ALSO SIENNA CONFERENCE 1, 252 (1963), AND PHYS. LETTERS 15, 188 (1965).

BEAM IS ANTIPROTON ON PROTON AT 2.69 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 20000 PICTURES ARE REPORTED ON.
KEY WORDS + ELASTIC SCATTERING CROSS SECTION DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.69 +- .05 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR		NO. EVENTS
.98	.99	64.300 +-	2.400	1047
.97	.98	52.000	2.100	849
.96	.97	38.200	1.700	625
.95	.96	33.000	1.600	540
.94	.95	25.700	1.400	420
.93	.94	17.900	1.100	292
.92	.93	16.200	1.100	264
.91	.92	13.600	1.000	222
.90	.91	9.910	.800	162
.88	.90	6.760	.470	221
.86	.88	3.670	.340	120
.84	.86	2.080	.260	68
.82	.84	1.220	.190	40
.80	.82	.610	.140	20
.75	.80	.310	.060	25
.70	.75	.170	.050	14
.65	.70	.270	.060	22
.60	.65	.380	.070	31
.55	.60	.320	.050	36
.50	.55	.340	.060	38
.45	.50	.350	.060	40
.40	.45	.170	.040	19
.20	.40	.113	.016	51
.00	.20	.069	.013	31
-.20	.00	.029	.009	13
-.40	-.20	.024	.008	11
-.60	-.40	.022	.007	10
-.80	-.60	.009	.005	3
-1.00	-.80	.003	.003	1

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ANTIPROTON PROTON ELASTIC CROSS SECTION. [PAGE 644]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
2.69 +- .05	25.6 +- .6

[1] ERRORS INCLUDE SYSTEMATICS.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [PAGE 644]

LABORATORY BEAM MOMENTUM = 2.69 +- .05 GEV/C.

DATA ARE FIT OVER -T FROM .018 TO .250 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND T IS IN (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED VALUES
A = 325. +- 6.
B = 13.3 +- .2

110 TWO MESON FINAL STATES IN INTERACTIONS OF 2.7 GEV/C PBAR P. [PHYS. LETTERS 25B, 486 (1967)]

V.DOMINGO, G.P.FISHER, L.M.LIBBY, R.SEARS [UNIV. OF COLORADO, BOULDER, COLO., USA]

ABSTRACT THE CROSS SECTIONS FOR PI+ PI-, K+ K-, AND KOBAR KO FINAL STATES FROM 2.7 GEV/C PBAR P INTERACTIONS ARE 28 +- 9 UB, 3 +6 -3 UB, AND < 10 UB RESPECTIVELY. ANGULAR DISTRIBUTIONS ARE PRESENTED AND DISCUSSED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 131, 1276 (1963), SIENNA CONFERENCE 1, 271 (1963), PHYS. REV. 143, 1096 (1966), AND PHYS. REV. LETTERS 19, 265 (1967).

BEAM IS ANTIPROTON ON PROTON AT 2.69 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 20000 PICTURES ARE REPORTED ON.
KEY WORDS - ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION MESONS PRODUCTION
COMPOUND KEY WORDS - ANNIHILATION CROSS SECTION MESONS PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON - PI- PI+. [PAGE 486]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]	NO. EVENTS
2.7	28. +- 9.	10

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON - K- K+. [PAGE 486]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]	NO. EVENTS
2.7	3. + 6. - 3.	2

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON - KOBAR KO. [PAGE 486]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS [1]
2.7	< 10.

[1] ERRORS INCLUDE SYSTEMATICS.

111 THE SPIN AND PARITY OF THE A2(+-) PRODUCED IN PBAR P ANNIHILATIONS. [PHYS. LETTERS 26B, 327 (1968)]

R.A.DONALD, D.N.EDWARDS, R.S.MOORE, E.J.C.READ, S.REUCROFT [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]
A.G.FRODESEN, T.JACOBSEN, S.SIRE, P.SAETRE, H.TOFTE [OSLO UNIV., OSLO, NORWAY]
A.BETTINI, S.LIMENTANI, L.PERUZZO, R.SANTANGELO, S.SANTORI [UNIV. OF PADOVA, PADOVA, ITALY]

ABSTRACT EVIDENCE SUPPORTING THE ASSIGNMENT J(P) = 2+ FOR THE A2 MESON IS OBTAINED FROM ANALYSIS OF PBAR P - PI PI PI PI WITH 1.2 GEV/C ANTIPROTONS.

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES A HYDROGEN BUBBLE CHAMBER.
KEY WORDS - ANNIHILATION RESONANCE PRODUCTION A2(1300)

NO DATA PUNCHED FOR THIS ARTICLE

112 THE FOUR-PRONG ANNIHILATION OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN. (I). FOUR-PION FINAL STATE. [NUC. PHYS. B6, 174 (1968)]

R.A.DONALD, D.N.EDWARDS, R.S.MOORE, E.J.C.READ, S.REUCROFT [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]
A.G.FRODESEN, T.JACOBSEN, S.SIRE, O.SKJEGGESTAD, P.SAETRE, H.TOFTE [OSLO UNIV., OSLO, NORWAY]
A.BETTINI, S.LIMENTANI, L.PERUZZO, R.SANTANGELO, S.SARTORI [UNIV. OF PADOVA, PADOVA, ITALY]

ABSTRACT APPROXIMATELY 17,000 FOUR-PRONG ANNIHILATIONS OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN HAVE BEEN ANALYZED. THE CROSS SECTION FOR ANNIHILATION INTO FOUR PRONGS IS 31.6 +- 1.0 MB AND THE PARTIAL CROSS SECTION FOR THE 4 PI FINAL STATE 2.9 +- 0.2 MB. THE 4 PI STATE, WHICH IS REPORTED HERE, SHOWS PRODUCTION OF RHO0, F0, A2+- MESONS AND AN ENHANCEMENT IN THE 3 PI AND/OR RHO PI SYSTEM AT THE MASS OF THE A1 MESON. THE FREQUENCIES OF VARIOUS RESONANCE CHANNELS HAVE BEEN DETERMINED. TWO-BODY INTERMEDIATE STATES ACCOUNT FOR 40-60 PERCENT OF THE 4 PI FINAL STATE. CENTRE-OF-MASS ANGULAR DISTRIBUTIONS OF THE PIONS ARE PRESENTED. A CHANGE IN THE MOMENTUM DEPENDENCE OF THE FORWARD-BACKWARD ASYMMETRY OF THE PIONS IS OBSERVED AT A PION MOMENTUM CORRESPONDING TO THE PRODUCTION OF A2+- PI+.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. LETTERS 26B, 327 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 50A, 701 (1967).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION

[PAGE 176]

LABORATORY BEAM MOMENTUM = 1.176 +- .050 GEV/C.

REACTION	MILLIBARNS
ANTIPROTON PROTON +	
4 PRONGS	31.6 +- 1.0
PI+ PI+ PI- PI-	2.9 .2

[TABLE 1]

LABORATORY BEAM MOMENTUM = 1.176 +- .050 GEV/C.

REACTION	MILLIBARNS
ANTIPROTON PROTON +	
RHO(765)0 PI+ PI-	2.00 +- .30 [1,2]
RHO(765)0 + PI+ PI- [3]	
F(1260) PI+ PI-	.87 .15 [1,2]
F(1260) + PI+ PI- [3]	
A2(1300)+ PI- + CHARGE CONJUGATE	.61 .15 [1,2]
A2(1300)+ + RHO(765)0 PI+ [3]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERROR GIVEN IS FROM SCATTER IN VARIOUS FITS.
[3] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

113 THE FOUR-PRONG ANNIHILATION OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN. (II) PI+ PI+ PI- PI- PI0 FINAL STATE. [NUC. PHYS. B11, 551 (1969)]

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T.BURAN, A.G.FRODESEN, S.SIRE, P.SAETRE [OSLO UNIV., OSLO, NORWAY]
A.BETTINI, S.LIMENTANI, L.PERUZZO, R.SANTANGELO, S.SARTORI [UNIV. OF PADOVA, PADOVA, ITALY]

ABSTRACT APPROXIMATELY 17,000 FOUR-PRONG ANNIHILATIONS OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN HAVE BEEN ANALYZED. THE PRESENT REPORT CONSIDERS THOSE EVENTS WITHONE NEUTRAL PION (5 PI). THE 5 PI EVENTS SHOW PRODUCTION OF RHO0, RHO+-, F0, OMEGA0, ETA0 MESONS, AND THE POSSIBILITY OF A RHO RHO ENHANCEMENT AT 1400 MEV/C AND/OR A RHO PI ENHANCEMENT AT 1080 MEV/C IS CONSIDERED. THE INFLUENCE OF THE BOSE-EINSTEIN CORRELATION FUNCTION OF GOLDHABER ET AL. (PHYS. REV. 120, 302 (1960)) IS INVESTIGATED. CENTER-OF-MASS ANGULAR DISTRIBUTIONS OF THE PIONS AND CENTER-OF-MASS OPENING ANGLES BETWEEN PAIRS OF PIONS ARE PRESENTED. THE PRODUCTION UPPER LIMITS AT THE 95 PERCENT CONFIDENCE LEVEL, FOR SEVERAL RESONANT STATES ARE GIVEN.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN NUC. PHYS. B6, 174 (1968).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION

[PAGE 555]

LABORATORY BEAM MOMENTUM = 1.176 +- .050 GEV/C.

REACTION	MILLIBARNS [1]
ANTIPROTON PROTON +	
PI+ PI+ PI- PI- PI0	13.6 +- 1.0
PI+ PI+ PI- PI- MM≥2PI0	14.3 1.0
PI+ PI+ PI- PI- PI0 PI0	8.9 1.5 [2]
PI+ PI+ PI- PI- PI0 PI0 PI0	5.4 1.4 [2]
FOUR PRONG PION ANNIHILATION	30.8 1.5 [3]

[1] ERRORS INCLUDE SYSTEMATICS.
[2] THIS VALUE IS MODEL DEPENDENT.
[3] CALCULATED BY US FROM DATA IN THIS ARTICLE.

[TABLE 2]

LABORATORY BEAM MOMENTUM = 1.176 +- .050 GEV/C.

REACTION	MILLIBARNS
ANTIPROTON PROTON →	
ETA(548) PI+ PI-	.15 +- .03 [1,2]
ETA(548) → PI+ PI- PIO [3]	
OMEGA(783) PI+ PI-	3.90 .30 [1,2]
OMEGA(783) → PI+ PI- PIO [3]	
F(1260) PI+ PI- PIO	.95 .09 [1,2]
F(1260) → PI+ PI- [3]	
RHO(765)+ PI+ PI- PI- + CHARGE CONJUGATE	5.40 .50 [1,2]
RHO(765)+ → PI+ PIO [3]	
RHO(765)0 PI+ PI- PIO	4.90 .90 [1,2]
RHO(765)0 → PI+ PI- [3]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERROR GIVEN IS FROM SCATTER IN VARIOUS FITS.
[3] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

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[PAGE 571]

LABORATORY BEAM MOMENTUM = 1.176 +- .050 GEV/C.

REACTION	MICROBARNS [1]
ANTIPROTON PROTON →	
B(1235)+ PI- + CHARGE CONJUGATE	< 126. (.95 CONF LEVEL)
B(1235)+ → OMEGA(783) PI+ [2]	
D(1285) PIO	< 44. (.95 CONF LEVEL)
D(1285) → RHO(765)0 PI+ PI- [2]	
E(1420) PIO	< 110. (.95 CONF LEVEL)
E(1420) → RHO(765)0 PI+ PI- [2]	
A2(1300)0 PI+ PI-	< 250. (.95 CONF LEVEL)
A2(1300)0 → RHO(765)+ PI- + CHARGE CONJUGATE [2]	
A2(1300)+ PI- PIO + CHARGE CONJUGATE	< 220. (.95 CONF LEVEL)
A2(1300)+ → RHO(765)0 PI+ [2]	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

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114 THE STRUCTURE OF THE (RHO PI) DECAY OF THE A2 MESON PRODUCED IN ANTIPROTON-PROTON ANNIHILATIONS AT 1.2 GEV/C. [NUC. PHYS. B12, 325 (1969)]

R.A.DONALD, D.N.EDWARDS, M.FOSTER, R.S.MOORE [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT A RE-ANALYSIS OF PREVIOUS DATA ON PBAR P ANNIHILATIONS OF 1.2 GEV/C SHOWS EVIDENCE OF A SPLIT STRUCTURE IN THE (RHO PI) DECAY OF THE A2 MESON. THE SHAPE IS COMPATIBLE WITH THE DIPOLE FORMULA WITH THE MASS AND WIDTH FOUND IN THE MISSING MASS SPECTROMETER EXPERIMENTS.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. LETTERS 25B, 44 (1967), AND PHYS. LETTERS 28B, 233 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUC. PHYS. B6, 174 (1968).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION RESONANCE PRODUCTION A2(1300)

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NO DATA PUNCHED FOR THIS ARTICLE

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115 EVIDENCE OF NEUTRAL F1 PRODUCTION IN PBAR P ANNIHILATIONS AT 1.1-1.2 GEV/C. [PHYS. LETTERS 34B, 343 (1971)]

J.DUBOC, M.GOLDBERG, B.MAKOWSKI, A.M.TOUCHARD [INSTITUT DE PHYSIQUE NUCLEAIRE, PARIS, FRANCE]
R.A.DONALD, D.N.EDWARDS, J.GALLETLY, N.WEST [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT FO(1) HAS BEEN OBSERVED IN THE REACTION PBAR P → KO(1) K+- PI-+ (MM), MAINLY IN THE CHANNEL PBAR P → FO(1) ETAO. THE QUANTUM NUMBERS OF THE FO(1) HAVE BEEN STUDIED. THE ONLY ASSIGNMENTS COMPATIBLE WITH EXPERIMENT ARE JPC = 1+- OR 2-+.

CLOSELY RELATED REFERENCES
SEE ALSO NUC. PHYS. B14, 195 (1969), AND NUC. PHYS. B11, 259 (1969).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 50, 701 (1967).

BEAM IS ANTIPROTON ON PROTON FROM 1.1 TO 1.2 GEV/C.
THIS EXPERIMENT USES BUBBLE CHAMBERS. A TOTAL OF 540000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION MESONS PRODUCTION

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....

NO DATA PUNCHED FOR THIS ARTICLE

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116 ANTIPROTON-NUCLEON CROSS SECTIONS FROM 0.5 TO 1.0 BEV. [PHYS. REV. 128, 869 (1962)]

T.ELIOFF,L.AGNEW,O.CHAMBERLAIN,H.M.STEINER,C.WIEGAND,T.YPSILANTIS [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT ANTIPROTON-PRODUCTION AND NUCLEON-INTERACTION CROSS SECTIONS WERE INVESTIGATED FOR ANTIPROTONS IN THE ENERGY RANGE 0.5 TO 1.0 BEV. THE ANTIPROTONS WERE DISTINGUISHED FROM OTHER PARTICLES PRODUCED AT THE BEVATRON BY A SYSTEM OF SCINTILLATION AND VELOCITY-SELECTING-CERENKOV COUNTERS. THE EXCITATION FUNCTION AND MOMENTUM DISTRIBUTION WERE RECORDED FOR ANTIPROTON PRODUCTION IN CARBON AND COMPARED WITH STATISTICAL MODEL EXPECTATIONS. THE ANTIPROTONS WERE DIRECTED BY A SYSTEM OF BENDING AND FOCUSING MAGNETS TO A LIQUID HYDROGEN TARGET. AN ARRAY OF PLASTIC SCINTILLATION COUNTERS,WHICH ALMOST COMPLETELY SURROUNDED THE HYDROGEN TARGET, WAS USED TO DETERMINE THE PBAR-P TOTAL, ELASTIC, INELASTIC, AND CHARGE-EXCHANGE CROSS SECTIONS. NEAR 500 MEV THE TOTAL PBAR-P CROSS SECTION IS ABOUT 120 MB, AND IT SLOWLY DECREASES TO 100 MB NEAR 1 BEV. THE INELASTIC CROSS SECTION, WHICH IS PRINCIPALLY DUE TO THE ANNIHILATION PROCESS, REPRESENTS NEARLY 2/3 OF THE TOTAL CROSS SECTION. THE ELASTIC-SCATTERING DISTRIBUTION IS HIGHLY PEAKED IN THE FORWARD DIRECTION AND CAN BE FITTED BY AN OPTICAL MODEL. THE TOTAL AND PARTIAL CROSS SECTIONS WERE ALSO DETERMINED FOR THE COLLISIONS OF ANTIPROTONS WITH DEUTERONS. THE PBAR-D TOTAL AND INELASTIC CROSS SECTIONS WERE FOUND TO BE APPROXIMATELY 1.8 TIMES THE PBAR-P CROSS SECTIONS. CORRECTIONS WERE MADE FOR THE SHIELDING OF NUCLEONS WITHIN THE DEUTERON IN ORDER TO ASCERTAIN THE PBAR-N INTERACTION. THE RESULTS INDICATE THAT THE PBAR-P AND PBAR-N CROSS SECTIONS ARE VERY NEARLY EQUAL IN THIS ENERGY REGION, AND THAT THEY SATISFY THE INEQUALITIES REQUIRED BY CHARGE INDEPENDENCE.

CLOSELY RELATED REFERENCES
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 3, 285 (1959).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.135 TO 1.773 GEV/C. (BEAM KINETIC ENERGY = .534 TO 1.068 GEV)
NO. 2 IS ANTIPROTON ON DEUTERON FROM 1.135 TO 1.773 GEV/C. (BEAM KINETIC ENERGY = .534 TO 1.068 GEV)
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION ELASTIC SCATTERING CHARGE EXCHANGE ANNIHILATION

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 3]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534	+- .025	118.	+- 6.
.700	.033	116.	5.
.816	.037	108.	5.
.948	.042	96.	3.
1.068	.046	96.	3.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 3]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534	+- .025	42.	+- 5.
.700	.033	42.	4.
.816	.037	38.	4.
.948	.042	33.	3.
1.068	.046	30.	2.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON PROTON TOTAL INELASTIC CROSS SECTION. [TABLE 3]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534	+- .025	76.0	+- 3.2
.700	.033	73.2	3.3
.816	.037	70.1	3.2
.948	.042	62.8	2.2
1.068	.046	65.7	2.3

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + ANTINEUTRON NEUTRON. [TABLE 3]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534	+- .025	6.0	+- 1.3
.700	.033	7.2	1.5
.816	.037	7.1	1.2
.948	.042	6.8	1.0
1.068	.046	5.7	1.1

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 11]

LABORATORY BEAM ENERGY = .534 +- .025 GEV.

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]	
16.	41.0	+- 8.0
26.	19.0	2.5
36.	7.0	2.0

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 12]

LABORATORY BEAM ENERGY = .700 +- .033 GEV.

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
16.	42. +- 10.
26.	18. 3.
36.	4. 1.

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 12]

LABORATORY BEAM ENERGY = .816 +- .037 GEV.

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
16.	32.0 +- 6.0
18.	36.0 9.0
28.	12.0 1.0
38.	5.0 .5

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 13]

LABORATORY BEAM ENERGY = .948 +- .042 GEV.

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
12.	43.0 +- 7.0
18.	31.0 3.0
28.	11.0 1.5
39.	4.0 .5

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 13]

LABORATORY BEAM ENERGY = 1.068 +- .046 GEV.

THETA DEGREES [1]	D-SIGMA/D-OMEGA MB/SR [2]
13.	36.0 +- 10.0
19.	28.0 4.0
30.	12.0 1.0
42.	2.0 .5

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON DEUTERON TOTAL CROSS SECTION. [TABLE 5]

LABORATORY BEAM ENERGY GEV	MILLIBARNS [1]
.534 +- .025	210. +- 5.
.700 .033	189. 5.
.816 .037	196. 6.
.948 .042	178. 5.
1.068 .046	184. 3.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON DEUTERON ELASTIC CROSS SECTION. [TABLE 5]

'TOTAL' ELASTIC ANTIPROTON DEUTERON SCATTERING

LABORATORY BEAM ENERGY GEV	MILLIBARNS [1]
.534 +- .025	80. +- 6.
.700 .033	67. 5.
.816 .037	78. 5.
.948 .042	71. 5.
1.068 .046	68. 4.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON DEUTERON TOTAL INELASTIC CROSS SECTION. [TABLE 5]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534 +-	.025	129.3 +-	5.2
.700	.033	122.4	4.2
.816	.037	118.5	4.2
.948	.042	106.4	4.1
1.068	.046	114.6	5.1

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON DEUTERON → ANTINEUTRON NEUTRON (NEUTRON SPECTATOR). [TABLE 5]

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534 +-	.025	3.3 +-	1.3
.700	.033	5.4	1.4
.816	.037	6.5	1.5
.948	.042	4.4	1.1
1.068	.046	5.6	1.0

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON NEUTRON TOTAL CROSS SECTION. [TABLE 6]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534 +-	.025	119. +-	8.
.700	.033	96.	7.
.816	.037	112.	8.
.948	.042	102.	6.
1.068	.046	109.	4.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON NEUTRON ELASTIC CROSS SECTION. [TABLE 6]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534 +-	.025	40. +-	10.
.700	.033	25.	8.
.816	.037	44.	9.
.948	.042	39.	7.
1.068	.046	42.	6.

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON NEUTRON TOTAL INELASTIC CROSS SECTION. [TABLE 6]

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM ENERGY GEV		MILLIBARNS [1]	
.534 +-	.025	79. +-	6.
.700	.033	71.	5.
.816	.037	68.	5.
.948	.042	63.	4.
1.068	.046	67.	5.

[1] ERRORS INCLUDE SYSTEMATICS.

117 ELASTIC SCATTERING AND POLARIZATION IN 3.0 AND 3.6 GEV/C ANTIPROTON-PROTON COLLISIONS. [PHYS. LETTERS 5, 132 (1963)]

B.ESCOUBES,A.FEDRIGHINI,Y.GOLDSCHMIDT-CLERMONT,M.GUINEA-MOORHEAD,T.HOFMOKL, R.LEWISCH,D.R.O.MORRISON,M.SCHNEEBERGER,S.DE UNAMUNO [CERN, GENEVA, SWITZERLAND]
H.C.DEHNE, E.LOHRMANN,E.RAUBOLD,P.SODING,M.W.TEUCHER,G.WOLF [DEUTSCHES ELEKTRONEN-SYNCH., HAMBURG, GERMANY, AND UNIV. HAMBURG, HAMBURG, GERMANY]

BEAM IS ANTIPROTON ON PROTON FROM 3.0 TO 3.6 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 57500 PICTURES ARE REPORTED ON.
KEY WORDS → ELASTIC SCATTERING CROSS SECTION POLARIZATION

ANTIPROTON PROTON TOTAL CROSS SECTION. [PAGE 133]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
3.0	79.9 +-	1.7
3.6	76.3	1.8

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 3. GEV/C.

-T (GEV/C)**2	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.035	200.30 +-	31.60
.046	231.10	33.50
.057	221.60	30.80
.072	124.30	15.20
.093	75.00	11.20
.114	53.30	9.40
.145	39.20	5.70
.186	25.00	4.50
.310	5.16	.90
.520	1.17	.40
.730	.56	.08
.830	.69	.09
1.130	.47	.08
1.340	.26	.05
1.550	.12	.04
1.750	.17	.04
1.960	.11	.03
2.170	.14	.04
2.370	.06	.03
2.580	.06	.03
2.790	.02	.02
3.310	.02	.01
4.030	.01	.01

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 3.6 GEV/C.

-T (GEV/C)**2	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.03	204.1 +-	18.6
.05	148.0	12.1
.07	125.2	10.9
.09	84.0	8.9
.11	65.0	7.8

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

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118 PRODUCTION OF ANTI-ISOBAR, ISOBAR PAIRS IN ANTI-PROTON, PROTON COLLISIONS. [PHYS. REV. LETTERS 9, 351 (1962)]

T.FERBEL,J.SANDWEISS,H.D.TAFT [YALE UNIV., NEW HAVEN, CONN., USA]
M.GAILLOUD,T.E.KALOGEROPOULOS,T.W.MORRIS [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]
R.M.LEA [CITY COLLEGE OF NEW YORK, NEW YORK, N. Y., USA]

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 138, B1528 (1965), AND PHYS. REV. 137, B1250 (1965).

BEAM IS ANTIPROTON ON PROTON AT 3.25 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + DELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS + DELTA(1238) RESONANCE PRODUCTION

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....

NO DATA PUNCHED FOR THIS ARTICLE

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119 SINGLE PION PRODUCTION AND MULTIPLE PION ANNIHILATIONS IN PBAR-P INTERACTIONS AT 7 GEV/C. [NUOVO CIMENTO 38, 12 (1965)]

T.FERBEL,A.FIRESTONE,J.JOHNSON,J.SANDWEISS,H.D.TAFT [YALE UNIV., NEW HAVEN, CONN., USA, AND BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT A PRELIMINARY STUDY OF SINGLE PION PRODUCTION WITH NO ANNIHILATION AND MULTIPLE PION ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 7 GEV/C INDICATES THAT THE SINGLE PION PRODUCTION CROSS SECTION IS 5.6 +/- 1.2 MB, AND THE MULTIPION ANNIHILATION CROSS SECTION IS APPROX. 24 MB. ALTHOUGH THERE IS STRONG EVIDENCE FOR RESONANCE PRODUCTION IN THE ONE PION PRODUCTION CHANNELS, THESE STATES DO NOT APPEAR TO BE DOMINATED BY ANY SINGLE RESONANCE. RESONANCE PRODUCTION IN THE ANNIHILATION CHANNELS IS SMALL COMPARED TO RATES OBSERVED AT LOWER ENERGIES.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 173, 1307 (1968).

BEAM IS ANTIPROTON ON PROTON FROM 6.80 TO 7.08 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 70000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION ANNIHILATION PION PRODUCTION
COMPOUND KEY WORDS + PION PRODUCTION

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....

NO DATA PUNCHED FOR THIS ARTICLE

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120 MULTIPLE PION PRODUCTION (WITHOUT ANNIHILATION) IN PBAR-P COLLISIONS AT 7 GEV/C. [NUOVO CIMENTO 38, 19 (1965)]

T.FERBEL,A.FIRESTONE,J.JOHNSON,J.SANDWEISS,H.D.TAFT [YALE UNIV., NEW HAVEN, CONN., USA, AND BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT PRELIMINARY RESULTS OF AN INVESTIGATION OF MULTIPLE PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON COLLISIONS AT 7 GEV/C EXHIBIT HIGHLY PERIPHERAL CHARACTERISTICS. THE EXPERIMENTAL DISTRIBUTIONS IN THE REACTION PBAR + P + PBAR + P + PI+ + PI- ARE CONSISTENT WITH A ONE-PION-EXCHANGE MECHANISM PARTICULARLY FOR LOW FOUR-MOMENTUM TRANSFERS. THE CROSS-SECTION FOR MULTIPION PRODUCTION WITHOUT ANNIHILATION IS APPROX. 20 MB.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 173, 1307 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN NUOVO CIMENTO 38, 12 (1965).

BEAM IS ANTIPROTON ON PROTON FROM 6.80 TO 7.08 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 70000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION PION PRODUCTION
COMPOUND KEY WORDS + PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

121 ELASTIC SCATTERING AND CROSS SECTIONS IN ANTIPROTON-PROTON INTERACTIONS AT 3.3 AND 3.7 BEV/C. [PHYS. REV. 137, B1250 (1965)]

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M.GAILLOUD,T.W.MORRIS [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]
A.H.BACHMAN,P.BAUMEL,R.M.LEA [CITY COLLEGE OF NEW YORK, NEW YORK, N. Y., USA]

ABSTRACT THE ELASTIC, THE PION-PRODUCTION, AND THE MULTIPION-ANNIHILATION CROSS SECTIONS FOR ANTIPROTON-PROTON INTERACTIONS AT 3.28 AND 3.66 BEV/C INCIDENT ANTIPROTON MOMENTA HAVE BEEN MEASURED. A COMPARISON OF THE ELASTIC INTERACTIONS AT 3.28 BEV/C WITH A PURELY-ABSORBING DISC OPTICAL MODEL GAVE A BEST VALUE FOR THE RADIUS OF THE INTERACTION OF 1.3 F. THE REAL PART OF THE FORWARD SCATTERING AMPLITUDE HAS BEEN FOUND TO BE LESS THAN 20 PER CENT OF THE IMAGINARY PART. A STUDY OF THE ASYMMETRIES IN DOUBLE ELASTIC SCATTERS YIELDED A VALUE FOR A POLARIZING POWER OF THE HYDROGEN CONSISTENT WITH ZERO WHEN AVERAGED OVER PRODUCTION ANGLES.

CLOSELY RELATED REFERENCES
PART OF THIS ARTICLE SUPERSEDED BY PHYS. REV. 143, 1096 (1966).

BEAM IS ANTIPROTON ON PROTON FROM 3.28 TO 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION ELASTIC SCATTERING ANNIHILATION PION PRODUCTION
COMPOUND KEY WORDS + PION PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 3.28 GEV/C +- 2(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
0 PRONGS	4.00 +-	.40
2 PRONGS	41.50	1.30
4 PRONGS	22.90	.90
6 PRONGS	6.60	.40
8 PRONGS	.44	.10
TOTAL	75.40	2.00
ELASTIC	21.90	1.10
TOTAL PION ANNIHILATION	30.90	3.00
TOTAL ANNIHILATION	33.80	3.00 [2]

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

[TABLE 1]
LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 2(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
0 PRONGS	4.5 +-	.4
2 PRONGS	37.3	1.3
4 PRONGS	21.6	.9
6 PRONGS	7.7	.4
8 PRONGS	.6	.1
TOTAL	71.7	2.0

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 2]
LABORATORY BEAM MOMENTUM = 3.28 GEV/C +- 2(PER CENT).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
ANTIPROTON PROTON PIO	2.30 +-	.50
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	4.00	.60
ANTIPROTON PROTON PI+ PI-	3.43	.23
ANTIPROTON PROTON PI+ PI- PIO	.30	.10
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	.30	.10
ANTIPROTON PROTON PI+ PI+ PI- PI-	> .01	

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 2]
LABORATORY BEAM MOMENTUM = 3.66 GEV/C +- 2(PER CENT).

REACTION	MILLIBARNS [1]
ANTIPROTON PROTON →	
ANTIPROTON PROTON PI+ PI-	3.67 +- .30
ANTIPROTON PROTON PI+ PI- PIO	.50 .10
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	.40 .10

[1] ERRORS INCLUDE SYSTEMATICS.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 5]

LABORATORY BEAM MOMENTUM = 3.28 GEV/C +- 2(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-OMEGA MB/SR [1]	
.88	.90	2.430 +-	.590
.86	.88	1.820	.500
.82	.86	.630	.199
.74	.82	.242	.090
.66	.74	.242	.090
.58	.66	.242	.090
.50	.58	.411	.110
.42	.50	.134	.067

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS INCLUDE SYSTEMATICS.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 6]

LABORATORY BEAM MOMENTUM = 3.28 GEV/C +- 2(PER CENT).

THE NORMALIZED DATA POINTS HAVE BEEN MULTIPLIED BY THE VALUE 283. MB/(GEV/C)**2, AS GIVEN IN FIGURE 6.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.98	.99	186.0 +-	14.0
.97	.98	129.0	11.0
.96	.97	105.0	9.0
.95	.96	74.1	8.3
.94	.95	53.1	7.0
.93	.94	49.0	7.1
.92	.93	30.3	5.5
.91	.92	23.5	4.7
.90	.91	16.1	3.8

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS INCLUDE SYSTEMATICS.

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [PAGE 6]

LABORATORY BEAM MOMENTUM = 3.28 GEV/C +- 2(PER CENT).

DATA ARE FIT OVER -T FROM .00 TO .25 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-COS(THETA) = A*EXP(B*T)
WHERE D-SIGMA/D-COS(THETA) IS IN UB AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 283. +- 20.
B = 12.8 +- .8

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122 PION PRODUCTION AND THE ONE-PARTICLE-EXCHANGE MECHANISM IN ANTIPROTON-PROTON INTERACTIONS AT 3-4 BEV/C. [PHYS. REV. 138, B1528 (1965)]

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ABSTRACT A STUDY OF ANTIPROTON-PROTON COLLISIONS AT 3-4 BEV/C INDICATES THAT ABOUT 25 PER CENT (19MB) OF THE TOTAL INTERACTION CROSS SECTION CAN BE ATTRIBUTED TO PION PRODUCTION WITHOUT ANNIHILATION. THE TWO OUTSTANDING CHARACTERISTICS OF THE PION-PRODUCTION CHANNELS ARE THE STRONG FORWARD PEAKING OF THE ANTIBARYONS IN THE CENTER-OF-MASS SYSTEM, AND THE PROMINENCE OF THE WELL-KNOWN T = J = 3/2 PION-NUCLEON RESONANCE N*(1238) AND OF ITS ANTIPARTICLE IN THE FINAL STATES. THE CROSS SECTION FOR THE REACTION PBAR + P → PBAR + P + PI+ + PI- IS 3.43 +- 0.23 MB AT 3.28 BEV/C AND 3.67 +- 0.30 MB AT 3.66 BEV/C. THIS REACTION, WHICH IS THE MAJOR CHANNEL CONTRIBUTING TO THE PION-PRODUCTION CROSS SECTION, IS FOUND TO BE CONSISTENT WITH A ONE-PION-EXCHANGE MECHANISM. IN PARTICULAR, THE THEORY OF SELLERI AND FERRARI GIVES A GOOD FIT TO MANY ASPECTS OF THE DATA. HOWEVER, A DETAILED ANALYSIS INDICATES THAT PION PRODUCTION IN PROTON-ANTIPROTON COLLISIONS IS NOT TOTALLY CONSISTENT WITH A SIMPLE ONE-PION-EXCHANGE MECHANISM.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 137, B1250 (1965).
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 9, 351 (1962).

BEAM IS ANTIPROTON ON PROTON FROM 3.28 TO 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS → PION PRODUCTION DELTA(1238) RESONANCE PRODUCTION
COMPOUND KEY WORDS → PION PRODUCTION DELTA(1238) RESONANCE PRODUCTION

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NO DATA PUNCHED FOR THIS ARTICLE

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123 PION PRODUCTION IN ANTIPROTON-PROTON ANNIHILATIONS AT 3.3 AND 3.7 BEV/C. [PHYS. REV. 143, 1096 (1966)]

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ABSTRACT A STUDY OF ANTIPROTON-PROTON COLLISIONS AT 3.3 AND 3.7 GEV/C INDICATES THAT(41 +- 4) PER CENT OF THE TOTAL INTERACTION CROSS SECTION CAN BE ATTRIBUTED TO ANNIHILATION INTO PIONS. THE AVERAGE PION MULTIPLICITY IS 6.5 +- 0.5. THE POSITIVELY CHARGED PIONS AND DIPIONS TEND TO BE EMITTED BACKWARD, WHILE THE NEGATIVELY CHARGED PIONS AND DIPIONS TEND TO BE EMITTED FORWARD IN THE CENTER-OF-MASS SYSTEM. ALTHOUGH THERE IS A SUBSTANTIAL AMOUNT OF RESONANCE PRODUCTION, ESPECIALLY OF RHO AND OF OMEGA MESONS, THERE IS NO CLEAR EVIDENCE FOR DOUBLE OR ASSOCIATED RESONANCE PRODUCTION IN THESE FINAL STATES. A SEARCH FOR NEW RESCNANCES AS WELL AS FOR SOME OF THE RECENTLY DISCOVERED MESONS PROVED UNSUCCESSFUL.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 138, B1528 (1965).
THIS ARTICLE SUPERSEDES PART OF PHYS. REV. 137, B1250 (1965).

BEAM IS ANTIPROTON ON PROTON FROM 3.28 TO 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS • ANNIHILATION CROSS SECTION RESONANCE PRODUCTION PION PRODUCTION
COMPOUND KEY WORDS • ANNIHILATION CROSS SECTION PION PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 3.28 +- .02 GEV/C.

REACTION	MILLIBARNS	
ANTIPROTON PROTON •		
PI+ PI-	< .025	
PI- PI+ PIO	.500 +-	.200
PI- PI+ MM≥2PIO	6.700	2.200
TWO PRONG PION ANNIHILATION	7.200	2.200 [1]
PI+ PI+ PI- PI-	.800	.100
PI- PI- PI+ PI+ PIO	4.500	.600
PI- PI- PI+ PI+ MM≥2PIO	12.000	1.200
FOUR PRONG PION ANNIHILATION	17.300	1.400 [1]
PI- PI- PI- PI+ PI+ PI+	.900	.100
PI- PI- PI- PI+ PI+ PI+ PIO	2.700	.300
PI- PI- PI- PI+ PI+ PI+ MM≥2PIO	2.400	.500
SIX PRONG PION ANNIHILATION	6.000	.600 [1]
PI- PI- PI- PI- PI+ PI+ PI+ PI+	.100	.030
PI- PI- PI- PI- PI+ PI+ PI+ PI+ PIO	.250	.060
PI- PI- PI- PI- PI+ PI+ PI+ PI+ MM≥2PIO	.100	[2]
EIGHT PRONG PION ANNIHILATION	.450	.070 [1]

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] VALUE IS APPROXIMATE ONLY.

[TABLE 6]
LABORATORY BEAM MOMENTUM = 3.28 +- .02 GEV/C.

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON •		
PIO RHO(765)0	< .05	
RHO(765)0 • PI+ PI- [2]		
RHO(765)+ PI- + CHARGE CONJUGATE	< .05	
RHO(765)+ • PI+ PIO [2]		
PI- PI+ RHO(765)0	.20 +-	.10
RHO(765)0 • PI+ PI- [2]		
PI- PI+ F(1260)	.10	.10
F(1260) • PI+ PI- [2]		
PI- PI+ PIO RHO(765)0	1.30	.30
RHO(765)0 • PI+ PI- [2]		
RHO(765)+ PI+ PI- PI- + CHARGE CONJUGATE	1.00	.30
RHO(765)+ • PI+ PIO [2]		
PI- PI+ PIO F(1260)	.60	.30
F(1260) • PI+ PI- [2]		
PI- PI+ OMEGA(783)	.40	.10
OMEGA(783) • PI+ PI- PIO [2]		
PI- PI+ ETA(548)	< .03	
ETA(548) • PI+ PI- PIO [2]		
PI- PI- PI+ PI+ RHO(765)0	.90	.30
RHO(765)0 • PI+ PI- [2]		
PI- PI- PI+ PI+ F(1260)	.20	.10
F(1260) • PI+ PI- [2]		
PI- PI- PI+ PI+ PIO RHO(765)0	.50	.20
RHO(765)0 • PI+ PI- [2]		
RHO(765)+ PI+ PI+ PI- PI- PI- + CHARGE CONJUGATE	.20	.20
RHO(765)+ • PI+ PIO [2]		
PI- PI- PI+ PI+ OMEGA(783)	.80	.20
OMEGA(783) • PI+ PI- PIO [2]		
PI- PI- PI+ PI+ ETA(548)	< .20	
ETA(548) • PI+ PI- PIO [2]		

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

[TABLE 7]
LABORATORY BEAM MOMENTUM = 3.28 +- .02 GEV/C.

REACTION	MILLIBARNS	
ANTIPROTON PROTON •		
PI+ PI+ PI- PI- PIO PIO	5.5 +-	.7 [1,2]
PI+ PI+ PI- PI- PIO PIO PIO	3.4	.6 [1,2]
PI+ PI+ PI- PI- PIO PIO PIO PIO	2.3	.6 [1,2]
PI+ PI+ PI- PI- PIO PIO PIO PIO PIO	.8	.4 [1,2]
PI+ PI+ PI+ PI- PI- PI- PIO PIO	1.4	.3 [1,2]
PI+ PI+ PI+ PI- PI- PI- PIO PIO PIO	.8	.2 [1,2]
PI+ PI+ PI+ PI- PI- PI- PIO PIO PIO PIO	.2	.1 [1,2]

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] RESULT IS MODEL DEPENDENT.

124 PION PRODUCTION AND ELASTIC SCATTERING IN ANTIPROTON-PROTON COLLISIONS AT 6.94 BEV/C. [PHYS. REV. 173, 1307 (1968)]

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ABSTRACT *WE HAVE STUDIED NONSTRANGE PBAR P INTERACTIONS OBSERVED IN 7000 PICTURES OF THE 80-IN.* BROOKHAVEN NATIONAL LABORATORY HYDROGEN BUBBLE CHAMBER EXPOSED TO AN ANTIPROTON BEAM WITH A MOMENTUM OF 6.94 BEV/C. THE TOTAL CROSS SECTION WAS MEASURED TO BE 57.8 +- 2.8 MB, AND THE ELASTIC INTERACTION CROSS SECTION 14.2 +- 1.2 MB. THE ELASTIC DIFFERENTIAL CROSS SECTION FOR FOUR-MOMENTUM TRANSFERS (-T) ≤ 0.3 (BEV/C)**2 IS WELL DESCRIBED BY THE EXPONENTIAL FORM DSIG/DT = DSIG/DT (T=0)*EXP (B * T) WHERE B = 13.1 +- 1.1 (BEV/C)**-2. THE SINGLE-PION PRODUCTION CROSS SECTION IS 4.0 +- 0.9 MB. THIS CHANNEL PROCEEDS 70 PERCENT THROUGH RESONANCE FORMATION. N*(1238) ISOBAR AND ANTI-ISOBAR FORMATION DOMINATES PION PRODUCTION IN FOUR- AND SIX-PRONGED EVENTS; THE DOUBLE-ISOBAR FORMATION CROSS SECTION IN THE FINAL STATE P PI+ PBAR PI- IS 1.35 +- 0.2 MB. ISOBAR PRODUCTION WAS OBSERVED TO BE CONSISTENT WITH THE PREDICTIONS OF A DOMINANT ONE-PARTICLE-EXCHANGE PROCESS. THE PION-ANNIHILATION PROCESS, WHICH HAS A CROSS SECTION OF 25 +- 5 MB, SHOWS SUBSTANTIAL PION RESONANCE FORMATION.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 152, 1171 (1966).
THIS ARTICLE SUPERSEDES NUOVO CIMENTO 38, 12 (1965), AND NUOVO CIMENTO 38, 19 (1965).

BEAM IS ANTIPROTON ON PROTON AT 6.94 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 7000 PICTURES ARE REPORTED ON.
KEY WORDS + CROSS SECTION ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION DELTA(1238) RESONANCE PRODUCTION PION PRODUCTION
COMPOUND KEY WORDS + DELTA(1238) RESONANCE PRODUCTION PION PRODUCTION

[TABLE 1]
LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1.5(PER CENT).

REACTION	MILLIBARNS	
ANTIPROTON PROTON +		
0 PRONGS	1.4 +-	.3
2 PRONGS	32.6	2.0
4 PRONGS	16.6	1.5
6 PRONGS	6.9	.8
8 PRONGS	1.2	.5
TOTAL	58.7	2.8

ANTIPROTON PROTON ELASTIC CROSS SECTION. [PAGE 1308]

LABORATORY BEAM MOMENTUM GEV/C PER CENT	MILLIBARNS
6.94 +- 1.5	14.2 +- 1.2

[TABLE 2]
LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1.5(PER CENT).

REACTION	MILLIBARNS	
ANTIPROTON PROTON +		
ANTIPROTON PROTON PIO	1.3 +-	.3
PROTON PI- ANTINEUTRON	1.1	.3
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	2.2	.6 [1]

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

[TABLE 3]
LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1.5(PER CENT).

REACTION	MILLIBARNS	
ANTIPROTON PROTON +		
ANTIPROTON PROTON PI+ PI-	2.70 +-	.30
ANTIPROTON PROTON PI+ PI+ PI- PI-	.26	.04
ANTIPROTON PROTON PI+ PI- PIO	1.30	.30
ANTIPROTON PROTON PI+ PI+ PI- PI- PIO	.14	.03
ANTIDELTA(1238)-- DELTA(1238)++	1.35	.20
ANTIDELTA(1238)-- + ANTIPROTON PI-		
DELTA(1238)++ + PROTON PI+		
DELTA(1238)++ ANTIPROTON PI- + CHARGE CONJUGATE	.54	.30
DELTA(1238)++ + PROTON PI+		
DELTA(1238)++ ANTIPROTON PI- PI- PI+ + CHARGE CONJUGATE	.21	.06
DELTA(1238)++ + PROTON PI+		
DELTA(1238)++ ANTIPROTON PI- PIO + CHARGE CONJUGATE	.44	.20
DELTA(1238)++ + PROTON PI+		
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	< 1.60	
ANTIPROTON NEUTRON PI+ PI+ PI+ PI- PI- + CHARGE CONJUGATE	< 2.00	

[TABLE 4]

LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1.5(PER CENT).

REACTION ANTIPROTON PROTON →	MILLIBARNS	
PI+ PI-	< .012	
PI+ PI+ PI- PI-	.054 +-	.020
PI+ PI+ PI+ PI- PI- PI-	.216	.035
PI+ PI- PI0	< .290	
PI+ PI+ PI- PI- PI0	.420	.100
PI+ PI+ PI+ PI- PI- PI- PI0	1.200	.100
PI+ PI- MM≥2PI0	10.000	1.000
PI+ PI+ PI- PI- MM≥2PI0	10.500	1.500
PI+ PI+ PI+ PI- PI- PI- MM≥2PI0	3.900	.500
TWO PRONG PION ANNIHILATION	10.000	1.000 [1]
FOUR PRONG PION ANNIHILATION	11.000	1.500 [1]
SIX PRONG PION ANNIHILATION	5.300	.500 [1]
RHO(765)0 PI0 RHO(765)0 → PI+ PI-	< .025	
RHO(765)0 PI+ PI- PI0 RHO(765)0 → PI+ PI-	.070	.030
RHO(765)+ PI+ PI- PI- + CHARGE CONJUGATE RHO(765)+ → PI+ PI0	.210	.090
OMEGA(783) PI+ PI- OMEGA(783) → PI+ PI- PI0	< .040	
RHO(765)0 PI+ PI+ PI- PI- RHO(765)0 → PI+ PI-	.090	.030
RHO(765)0 PI+ PI+ PI- PI- PI0 RHO(765)0 → PI+ PI-	.400	.070
RHO(765)+ PI+ PI+ PI- PI- PI- + CHARGE CONJUGATE RHO(765)+ → PI+ PI0	.100	.030
OMEGA(783) PI+ PI+ PI- PI- OMEGA(783) → PI+ PI- PI0	.100	.030

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

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[TABLE 5]

LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1.5(PER CENT).

REACTION ANTIPROTON PROTON →	MILLIBARNS
ANTIPROTON PROTON ANTIPROTON PROTON	< .015
TOTAL PION ANNIHILATION	25.000 +- 5.000

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIDELTA(1238)-- DELTA(1238)++. [FIGURE 8]
ANTIDELTA(1238)-- → ANTIPROTON PI- [1]
DELTA(1238)++ → PROTON PI+ [1]

LABORATORY BEAM MOMENTUM = 6.94 GEV/C +- 1.5(PER CENT).

NORMALIZED TO 1.35 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [2]		NO. EVENTS
.02	.04	3.2 +-	1.2	7
.04	.06	9.6	2.1	21
.06	.08	10.5	2.2	23
.08	.10	10.9	2.2	24
.10	.12	2.3	1.0	5
.12	.14	3.6	1.3	8
.14	.16	3.2	1.2	7
.16	.18	3.6	1.3	8
.18	.20	1.4	.8	3
.20	.22	3.6	1.3	8
.22	.24	1.4	.8	3
.24	.26	1.4	.8	3
.26	.28	2.3	1.0	5
.28	.30	2.3	1.0	5
.30	.32	.9	.6	2
.32	.34	.0	.5	0
.34	.36	1.4	.8	3
.36	.38	.5	.5	1
.38	.40	.0	.5	0
.40	.42	.5	.5	1
.42	.44	.0	.5	0
.44	.46	.0	.5	0
.46	.48	.9	.6	2
.48	.50	.0	.5	0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIDELTA(1238)--].

[1] USED SIMPLE MASS CUT (NEGLIGIBLE BACKGROUND) [MASS CUT FROM 1.100 TO 1.400 GEV].
[2] COUNTS WERE MULTIPLIED BY .456 TO GET THESE.

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125 PRODUCTION OF LOW-MASS P PI+ PI- AND PBAR PI+ PI- STATES IN THE REACTION PBAR P → PBAR P PI+ PI- AT 3-4 GEV/C. [PHYS. REV. LETTERS 22, 1141 (1969)]

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ABSTRACT WE DISCUSS LOW-MASS ENHANCEMENTS OBSERVED IN THE P PI+ PI- AND IN THE PBAR PI+ PI- SYSTEMS PRODUCED IN THE REACTION PBAR P → PBAR P PI+ PI- AT 3-4 GEV/C. WE CONCLUDE THAT THESE ENHANCEMENTS NEAR THE MASS OF THE N(1470), AT OUR ENERGY, ARE ASSOCIATED WITH THE DELTA(1236)++ ANTI-DELTA(1236)-- CHANNEL.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 16, 855 (1966), PHYS. REV. LETTERS 19, 397 (1967), PHYS. REV. LETTERS 21, 697 (1968), PHYS. REV. LETTERS 17, 884 (1966), PHYS. REV. LETTERS 21, 1368 (1968), AND PHYS. REV. LETTERS 21, 1839 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 138, B1528 (1965).

BEAM IS ANTIPROTON ON PROTON FROM 3.28 TO 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS → RESONANCE PRODUCTION DELTA(1238)++

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NO DATA PUNCHED FOR THIS ARTICLE

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126 HYPERON PRODUCTION IN INTERACTIONS OF 2.7 GEV/C ANTIPROTONS ON PROTONS. [PHYS. REV. 161, 1335 (1967)]

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ABSTRACT WE HAVE MEASURED THE CROSS SECTIONS FOR HYPERON PRODUCTION IN 2.7 GEV/C PBAR P INTERACTIONS. THE VALUES OBTAINED ARE
XSEC(LAMBDABAR LAMBDA) = 113 +- 15 MU-B, XSEC(SIGMABARO LAMBDA) + XSEC(LAMBDABAR SIGMAO) = 66 +- 13 MU-B,
XSEC(SIGMABARO SIGMAO) < 15 MU-B, XSEC(XIBARO XIO) = ≤ 2.8 MU-B (90 PERCENT CONFIDENCE)
XSEC(SIGMABAR- SIGMA+) = 30.7 +- 9.4 MU-B, XSEC(SIGMABAR+ SIGMA-) = 1.0 +- 5.4 MU-B (LARGE ERROR RESULTING FROM SUBTRACTION),
XSEC(XIBAR+ XI-) = ≤ 1.8 MU-B (90 PERCENT CONFIDENCE), XSEC(LAMBDABAR LAMBDA PIO) = 65 +- 25 MU-B,
XSEC(SIGMABAR- LAMBDA PI+ + C.C.) = 25.9 +- 10.1 MU-B, XSEC(SIGMABAR- SIGMAO PI+ + C.C.) = 2.9 +- 2.9 MU-B (ONE EVENT),
XSEC(SIGMABAR+ LAMBDA PI- + C.C.) = 6.6 +- 3.9 MU-B, XSEC(SIGMABAR+ SIGMAO PI- + C.C.) = 3.7 +- 2.6 MU-B,
XSEC(SIGMABAR- SIGMA+ PIO) = ≤ 3.6 MU-B (90 PERCENT CONFIDENCE), XSEC(LAMBDABAR LAMBDA PI+ PI-) = 3 +- 2 MU-B, AND
XSEC(LAMBDA K+ PBAR) = 2.3 +- 2.3 MU-B (ONE EVENT). THE RATIOS OF THE CROSS SECTIONS FOR THE TWO-BODY FINAL STATES HAVE BEEN COMPARED WITH PREDICTIONS OF SU(3) AND ARE IN GOOD AGREEMENT WITH THE PROCESS BEING DOMINATED BY THE EXCHANGE OF AN ANTISYMMETRIC OCTET IN THE T CHANNEL. THE ANGULAR DISTRIBUTIONS OF LAMBDABAR LAMBDA, SIGMABAR- SIGMA+, AND LAMBDABAR LAMBDA PIO FINAL STATES CLEARLY SHOW THE PERIPHERAL NATURE OF THESE INTERACTIONS. THE DIFFERENTIAL CROSS SECTION DATA FOR THE INTERACTION PBAR P → LAMBDABAR LAMBDA HAVE BEEN COMPARED WITH PARAMETRIC EQUATIONS AND THREE ABSORPTION MODELS. GOOD FITS TO THE DATA HAVE BEEN ACHIEVED WITH EACH OF THESE EQUATIONS OR MODELS.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 121, 1788 (1961), NUOVO CIMENTO 35, 735 (1965), PHYS. REV. 140, B1027 (1965), PHYS. LETTERS 17, 166 (1965), AND PHYS. REV. 152, 1171 (1966).

BEAM IS ANTIPROTON ON PROTON AT 2.7 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 91000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION DIFFERENTIAL CROSS SECTION ANGULAR DISTRIBUTION HYPERON RESONANCE PRODUCTION
COMPOUND KEY WORDS → HYPERON RESONANCE PRODUCTION

[TABLE 2]

LABORATORY BEAM MOMENTUM = 2.70 +- .07 GEV/C.

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON →		
ANTILAMBDA LAMBDA	113.0 +- 15.0	
ANTILAMBDA SIGMAO + CHARGE CONJUGATE	66.0	13.0
ANTISIGMAO SIGMAO	< 15.0	
ANTIXIO XIO	< 2.8 (.90 CONF LEVEL)	
ANTISIGMA- SIGMA+	30.7	9.4
ANTISIGMA+ SIGMA-	1.0	5.4
ANTIXI+ XI-	< 1.8 (.90 CONF LEVEL)	
ANTILAMBDA LAMBDA PIO	65.0	25.0
SIGMA+ ANTILAMBDA PI- + CHARGE CONJUGATE	25.9	10.1
SIGMA+ ANTISIGMAO PI- + CHARGE CONJUGATE	2.9	2.9
SIGMA- ANTILAMBDA PI+ + CHARGE CONJUGATE	6.6	3.9
SIGMA- ANTISIGMAO PI+ + CHARGE CONJUGATE	3.7	2.6
ANTISIGMA- SIGMA+ PIO	< 3.6 (.90 CONF LEVEL)	
LAMBDA K+ ANTIPROTON	2.3	2.3
ANTILAMBDA LAMBDA PI+ PI-	3.0	2.0

[1] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 2]

LABORATORY BEAM MOMENTUM = 2.70 +- .07 GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 [1]	D-SIGMA/D-T UB/(GEV/C)**2 [2]	
.07	667.0 +-	132.0
.14	410.0	109.0
.21	185.0	121.0
.28	104.0	52.0
.35	25.3	25.3
.42	22.5	22.5
.49	69.4	37.6
.56	12.1	12.1
.63	24.6	24.6
.70	24.2	24.2
.77	23.5	23.5
.84	12.0	12.0
.91	12.1	12.1
.98	34.0	34.0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.

127 ANTIPROTON-PROTON ANNIHILATION INTERACTIONS AT 2.7 GEV/C PRODUCING 8 OR MORE PIONS. [NUC. PHYS. B16, 450 (1970)]

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ABSTRACT WE HAVE STUDIED 8- AND 10-PRONGED EVENTS FROM 2.7 GEV/C PBAR P INTERACTIONS. WE HAVE MEASURED MULTIPION CROSS SECTIONS, INVARIANT-MASS DISTRIBUTIONS AND ANGULAR DISTRIBUTIONS. WITH THE EXCEPTION OF PION-PION ANGULAR CORRELATIONS, ALL OF OUR DATA ARE CONSISTENT WITH THE SIMPLE STATISTICAL MODEL (LORENTZ-INVARIANT PHASE SPACE). THE PION-PION ANGULAR CORRELATIONS ARE SIGNIFICANTLY DIFFERENT FROM PHASE SPACE FOR DIFFERENT DIPION CHARGE COMBINATIONS. PIONS HAVING LIKE CHARGES TEND TO HAVE THE SAME DIRECTION. ONE MIGHT EXPECT THAT BOSE-EINSTEIN STATISTICS IS RESPONSIBLE FOR THE ANGULAR CORRELATION BUT THE LACK OF SIGNIFICANT CORRELATION BETWEEN THE PION MOMENTA AND THE OPENING ANGLE PUTS IT IN DOUBT.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 161, 1335 (1967), PHYS. LETTERS 24B, 642 (1967), PHYS. LETTERS 25B, 486 (1967), AND PHYS. REV. 154, 1264 (1967).

BEAM IS ANTIPROTON ON PROTON AT 2.7 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 47200 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION

[PAGE 451]

LABORATORY BEAM MOMENTUM = 2.70 +- .07 GEV/C.

REACTION	MICROBARNS	NO. EVENTS
ANTIPROTON PROTON →		
PI+ PI+ PI+ PI+ PI- PI- PI- PI-	65.0 +- 11.0	38
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI0	87.0 12.0	51
PI+ PI+ PI+ PI+ PI- PI- PI- PI- MM≥2PI0	17.0 6.0	10
EIGHT PRONG PION ANNIHILATION	169.0 17.0 [1]	
PI+ PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI- PI0	1.7 1.7	1
PI+ PI+ PI+ PI+ PI+ PI- PI- PI- PI- PI-	< 4.0 (.90 CONF LEVEL)	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

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128 ANTIPROTON AND KAON ELASTIC SCATTERING AT HIGH ENERGIES. [PHYS. REV. LETTERS 11, 503 (1963)]

K.J.FOLEY,S.J.LINDENBAUM,W.A.LOVE,S.OZAKI,J.J.RUSSELL,L.C.L.YUAN [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

BEAM NO. 1 IS K+ ON PROTON FROM 6.8 TO 14.8 GEV/C.
NO. 2 IS K- ON PROTON FROM 7.2 TO 9.0 GEV/C.
NO. 3 IS ANTIPROTON ON PROTON FROM 7.2 TO 12.0 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → ELASTIC SCATTERING CROSS SECTION
COMPOUND KEY WORDS → ELASTIC SCATTERING CROSS SECTION

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
7.2	13.79 +- 1.00
8.9	13.89 .35
10.0	14.60 3.30
12.0	11.59 .41

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 7.2 GEV/C.

T-VALUES ARE GOOD TO 1 PER CENT, NOT 11 PER CENT AS STATED ON PAGE 504; PRIVATE COMMUNICATION BY K.J.FOLEY, 1970

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]
.026	131.00 +- 20.00
.037	84.00 18.00
.052	113.00 18.00
.070	72.00 14.00
.089	39.00 11.10
.109	47.90 8.20
.272	4.95 .44
.349	2.01 .25
.434	.42 .12
.524	.24 .09

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 8.9 GEV/C.

T-VALUES ARE GOOD TO 1 PER CENT, NOT 11 PER CENT AS STATED ON PAGE 504; PRIVATE COMMUNICATION BY K.J.FOLEY, 1970

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]
.024	127.00 +- 6.30
.038	114.00 5.20
.058	83.90 3.90
.082	57.00 3.10
.110	43.90 2.80
.138	32.60 2.20
.172	20.50 1.60
.264	5.23 .42
.338	2.48 .24
.422	.77 .13
.508	.28 .08
.602	.09 .04

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 10. GEV/C.

T-VALUES ARE GOOD TO 1 PER CENT, NOT 11 PER CENT AS STATED ON PAGE 504; PRIVATE COMMUNICATION BY K.J.FOLEY, 1970

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.030	122.	+- 31.
.049	75.	23.
.074	82.	18.
.105	56.	15.
.140	27.	12.
.176	19.	10.

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 12. GEV/C.

T-VALUES ARE GOOD TO 1 PER CENT, NOT 11 PER CENT AS STATED ON PAGE 504; PRIVATE COMMUNICATION BY K.J.FOLEY, 1970

-T (GEV/C)**2 [1]	D-SIGMA/D-T MB/(GEV/C)**2 [2]	
.043	80.900	+- 4.200
.070	62.100	3.300
.105	38.100	2.300
.149	24.900	1.800
.198	12.200	1.300
.249	7.150	.950
.268	4.090	.440
.343	1.960	.270
.428	.583	.132
.517	.190	.091

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] MEAN VALUES.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [FIGURE 1]

LABORATORY BEAM MOMENTUM = 7.2 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .60 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 143. +- 13.
B = 13.15 +- .47

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [FIGURE 1]

LABORATORY BEAM MOMENTUM = 8.9 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .60 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 154. +- 5.
B = 12.84 +- .21

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [FIGURE 1]

LABORATORY BEAM MOMENTUM = 10. GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .60 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 159. +- 42.
B = 11.8 +- 2.9

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [FIGURE 1]

LABORATORY BEAM MOMENTUM = 12. GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .60 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 147. +- 6.
B = 12.66 +- .29

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

129 ELASTIC SCATTERING OF PROTONS, ANTIPROTONS, NEGATIVE PIONS, AND NEGATIVE KAONS AT HIGH ENERGIES. [PHYS. REV. LETTERS 15, 45 (1965)]

K.J.FOLEY,R.S.GILMORE,S.J.LINDENBAUM,W.A.LOVE,S.OZAKI,E.H.WILLEN,R.YAMADA, L.C.L.YUAN [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 10, 376 (1963), NUCLEAR INSTRUMENTS AND METHODS 30, 45 (1964), PHYS. REV. LETTERS 11, 425 (1963), AND PHYS. REV. LETTERS 11, 503 (1963).

BEAM NO. 1 IS PROTON ON PROTON FROM 10.94 TO 24.63 GEV/C.
NO. 2 IS PI- ON PROTON FROM 14.84 TO 25.34 GEV/C.
NO. 3 IS ANTIPROTON ON PROTON FROM 11.80 TO 15.91 GEV/C.
NO. 4 IS K- ON PROTON FROM 11.88 TO 15.91 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS • ELASTIC SCATTERING CROSS SECTION
COMPOUND KEY WORDS • ELASTIC SCATTERING CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 11.8 GEV/C.

-T (GEV/C)**2	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	
.199	10.610 +-	.870
.261	4.440	.490
.331	1.788	.278
.408	.866	.195
.490	.349	.123

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 15.91 GEV/C.

-T (GEV/C)**2	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	
.219	6.140 +-	.700
.287	3.700	.480
.364	1.893	.307
.450	.727	.183

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [TABLE 1]

LABORATORY BEAM MOMENTUM = 11.8 GEV/C.

DATA ARE FIT OVER -T FROM .2 TO .5 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 119. +- 25.
B = 12.33 +- .79

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [TABLE 1]

LABORATORY BEAM MOMENTUM = 15.91 GEV/C.

DATA ARE FIT OVER -T FROM .20 TO .45 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 44. +- 13.
B = 8.78 +- 1.00

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

130 HIGH-ENERGY, SMALL-ANGLE, PP AND PBAR P SCATTERING, AND PP TOTAL CROSS SECTIONS. [PHYS. REV. LETTERS 19, 857 (1967)]

K.J.FOLEY,R.S.JONES,S.J.LINDENBAUM,W.A.LOVE,S.OZAKI,E.D.PLATNER, C.A.QUARLES,E.H.WILLEN [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 7, 185 (1961), PHYS. REV. 138, B913 (1965), AND PHYS. LETTERS 8, 285 (1964).

BEAM NO. 1 IS PROTON ON PROTON FROM 7.82 TO 26.00 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 11.9 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS • ELASTIC SCATTERING

NO DATA PUNCHED FOR THIS ARTICLE

131 SCATTERING OF ANTINEUTRONS BY PROTONS. [PHYS. REV. 184, 1413 (1969)]

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ABSTRACT THE TOTAL AND ELASTIC CROSS SECTIONS FOR ANTINEUTRONS ON PROTONS HAVE BEEN MEASURED FOR ANTINEUTRON MOMENTA FROM 0.5 TO 2.5 GEV/C. THE RESULTS ARE IN AGREEMENT WITH PREVIOUS PBAR P DATA AT THESE MOMENTA.

BEAM IS ANTINEUTRON ON PROTON FROM .3 TO 2.5 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS * CROSS SECTION

ANTINEUTRON PROTON TOTAL CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]		NO. EVENTS
.80 + .20 - .30	104. +- 42.		6
1.27 + .23 - .27	86.	31.	8
1.75 + .25 - .25	121.	28.	21
2.25 + .25 - .25	81.	21.	19

[1] ERRORS ARE STATISTICAL ONLY.

ANTINEUTRON PROTON ELASTIC CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
.80 + .20 - .30	72. +- 36.	
1.27 + .23 - .27	46.	23.
1.75 + .25 - .25	74.	22.
2.25 + .25 - .25	24.	12.

[1] ERRORS ARE STATISTICAL ONLY.

132 ANTIPROTON-PROTON ANNIHILATION INTO KAONS AND PIONS IN THE MOMENTUM REGION 3 TO 4 GEV/C. [NUOVO CIMENTO 52A, 438 (1967)]

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ABSTRACT A TOTAL OF 1121 UNAMBIGUOUSLY IDENTIFIED EVENTS OF THE TYPE PBAR P * KBAR K N PI (N = 1 TO 5) AT MOMENTUM 3.0, 3.6, AND 4.0 HAVE BEEN ANALYSED, AND PARTIAL CROSS SECTION FOR THE VARIOUS CHANNELS ARE GIVEN. THE TOTAL CROSS SECTIONS FOR ANNIHILATION INTO TWO KAONS WITH PIONS IS ESTIMATED TO BE (5.1 +- 0.4) MB OR 14 PERCENT OF ALL ANNIHILATIONS. THE AMOUNTS OF RESONANT K*(890),RHO, OMEGA AND ASSOCIATED K*K* PRODUCTION IN THE VARIOUS CHANNELS ARE DETERMINED. EVIDENCE FOR THE E-MESON, A K K PI RESONANCE AT 1700 MEV, AND A K*PI RESONANCE AT 1265 MEV IS PRESENTED. STUDY OF 955 UNFITTED EVENTS CONTAINING TWO CHARGED PARTICLES, A K(1)0 AND ≥ 2 NEUTRAL SECONDARIES GIVES RISE TO A FOUR-STANDARD-DEVIATION PEAK IN A STRANGENESS-ZERO MASS SPECTRUM AT (1820 +- 12) MEV WITH A WIDTH (GAMMA) OF (50 +- 23) MEV. THE ANGULAR DISTRIBUTIONS FAVOUR A PERIPHERAL RATHER THAN A STATISTICAL OR CORE-CORE MODEL OF THE ANNIHILATION PROCESS. THE POSSIBLE USEFULNESS OF WEIGHTING THE VARIOUS COMBINATIONS IN ACCORD WITH THIS OBSERVATION, TO ACCENTUATE ENHANCEMENTS IN THE INVARIANT-MASS DISTRIBUTION, IS DISCUSSED. A METHOD OF SEPARATING EACH ANNIHILATION INTO ITS MOST LIKELY TWO-BODY FINAL-STATE CONFIGURATION BASED ON MAXIMIZING THE FOUR-MOMENTUM TRANSFER (U) IN THE CROSS CHANNEL IS PRESENTED AS WELL AS SOME EXAMPLES OF THE ENHANCEMENTS IN MASS SPECTRA OBTAINED USING THIS METHOD.

BEAM IS ANTIPROTON ON PROTON FROM 3 TO 4 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.
KEY WORDS * ANNIHILATION CROSS SECTION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS * ANNIHILATION CROSS SECTION MESONS RESONANCE PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON * TOTAL KAON ANNIHILATION. [TABLE 3]

RESULT IS MODEL DEPENDENT

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
3.	5.1 +- .4

[1] ERRORS INCLUDE SYSTEMATICS.

133 ANTIPROTON-PROTON ANNIHILATION INTO SIX CHARGED PIONS AND RESONANCE PRODUCTION IN THE PBAR P → 3 PI+ 3 PI- PIO CHANNEL AT 5.7 GEV/C. [PHYS. REV. 167, 1268 (1968)]

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ABSTRACT BASED ON 3586 SIX-PRONGED EVENTS, THIS WORK PRESENTS RESULTS ON PBAR P ANNIHILATION INTO SIX AND SEVEN PIONS AT 5.7 GEV/C. THE PRODUCTION OF RHO, OMEGA, A1 AND A2 RESONANCES IN THE PBAR P → 3 PI+ 3 PI- PIO CHANNEL WAS OBSERVED. CROSS SECTIONS FOR THE PRODUCTION OF THE RHO AND OMEGA RESONANCES ARE GIVEN. THE PARTIAL CROSS SECTIONS FOR PBAR P → RHO 0 2 PI+ 2 PI- PIO AND PBAR P → OMEGA 2 PI+ 2 PI- ARE COMPARED WITH OTHER EXPERIMENTAL DATA. THAT THE PBAR P → OMEGA 2 PI+ 2 PI- CROSS SECTION IS SMALL AT 5.7 GEV/C SHOWS THAT THIS REACTION CONTRIBUTES IN A RATHER IMPORTANT MANNER TO THE PEAK OBSERVED IN THE PBAR P → 3 PI+ 3 PI- PIO CROSS SECTION AT AN INCIDENT PBAR MOMENTUM OF 3 GEV/C. OUR DATA SHOW SOME INDICATION OF BUMPS IN THE (RHO 0, PI 0), (RHO 0, RHO 0) MASS FOR SEVEN-PIONS ANNIHILATION WHERE RHO 0 IS DEFINED AS A (PI+ PI-) SYSTEM HAVING A MASS COMBINATION IN THE RHO 0 BAND. AS YET THE STATISTICS DO NOT ALLOW US TO DRAW A DEFINITE CONCLUSION ABOUT THESE EFFECTS. BY COMPARISON WITH OTHER EXPERIMENTAL DATA, IT SEEMS THAT THE ISOTROPY OF THE PION ANGULAR DISTRIBUTION IN THE C.M. SYSTEM INCREASES WITH THE NUMBER OF OUTGOING PIONS.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 176, 1595 (1968).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE CERN 80 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 60000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION RESONANCE PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION

[TABLE 1]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON →		
PI+ PI+ PI+ PI- PI- PI-	.31 +-	.03
PI+ PI+ PI+ PI- PI- PI- PIO	1.09	.07
6 PRONGS	6.21	.10

[1] ERRORS ARE STATISTICAL ONLY.

[TABLE 2]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON →		
RHO(765)0 PI+ PI+ PI- PI- PIO	.240 +-	.060
RHO(765)0 → PI+ PI-		
RHO(765)0 RHO(765)0 PI+ PI- PIO	.020	.010
RHO(765)0 → PI+ PI-		
RHO(765)0 → PI+ PI-		
OMEGA(783) PI+ PI+ PI- PI-	.043	.015
OMEGA(783) → PI+ PI- PIO		

[1] ERRORS ARE STATISTICAL ONLY.

134 ANGULAR CORRELATIONS AND DISTRIBUTIONS IN PBAR P ANNIHILATION INTO EIGHT AND NINE PIONS AT 5.7 GEV/C. [PHYS. REV. 176, 1595 (1968)]

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ABSTRACT APPRECIABLE ANGULAR CORRELATIONS BETWEEN PIONS HAVE BEEN OBSERVED FOR BOTH PBAR + P → 4PI+ + 4PI- AND PBAR + P → 4PI+ + 4PI- + PIO REACTIONS. DEVIATION BETWEEN THE ANGULAR CORRELATION PREDICTED BY THE PHASE-SPACE CALCULATIONS AND OUR EXPERIMENTAL VALUES SEEMS TO OCCUR FOR DEFINITE-MOMENTUM CONFIGURATIONS OF THE PRODUCED PIONS. THE SECONDARIES ARE NOT EMITTED IN A JET STRUCTURE, I.E., THE TRANSVERSE AND C.M. LONGITUDINAL MOMENTUM OF THE PIONS ARE IN SATISFACTORY AGREEMENT WITH PHASE PREDICTIONS. BY COMPARING THE RESULTS OF THIS EXPERIMENT WITH OTHER PBAR P DATA, SOME SYSTEMATICS SEEM TO EMERGE FOR THE ANGULAR DISTRIBUTION OF SECONDARY PIONS.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 167, 1268 (1968).

BEAM IS ANTIPROTON ON PROTON AT 5.7 GEV/C.
THIS EXPERIMENT USES THE CERN 80 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 87000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION PION PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION

[PAGE 1595]

LABORATORY BEAM MOMENTUM = 5.7 GEV/C.

REACTION	MILLIBARNS	
ANTIPROTON PROTON →		
PI+ PI+ PI+ PI+ PI- PI- PI- PI-	.12 +-	.01
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO	.25	.02
8 PRONGS	.96	.03

135 THE FOUR PRONG ANNIHILATION OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN. (III) K+ K- PI+ PI- AND K+ K- PI+ PI- PIO FINAL STATES.
[NUC. PHYS. B10, 307 (1969)]

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R.S.MOORE, S.REUCROFT [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT FROM APPROXIMATELY 12,000 FOUR-PRONG ANNIHILATIONS OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN ABOUT 200 EVENTS INVOLVING TWO CHARGED KAONS WERE SELECTED MAINLY ON THE BASIS OF IONIZATION. THE CROSS SECTIONS FOR THE K+ K- PI+ PI- AND K+ K- PI+ PI- PIO FINAL STATES ARE 260 +- 40 MU-B AND 290 + 40, - 60 MU-B, RESPECTIVELY. THE AMOUNTS OF RESONANCES PRODUCED HAVE BEEN ESTIMATED. THE FOUR-BODY FINAL STATE IS DOMINATED BY K*(890) PRODUCTION, WHEREAS THE FIVE-BODY FINAL STATE SHOWS AN ABUNDANT PRODUCTION OF K*(890), OMEGA(783) AND PHI(1019).

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN NUC. PHYS. B6, 174 (1968).

BEAM IS ANTIPROTON ON PROTON AT 1.2 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION CROSS SECTION MESONS RESONANCE PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION MESONS RESONANCE PRODUCTION

[PAGE 309]

LABORATORY BEAM MOMENTUM = 1.2 GEV/C.

REACTION ANTIPROTON PROTON +	MICROBARNS
K+ K- PI+ PI-	260. +- 40.
K+ K- PI+ PI- PIO	290. + 40. - 60.

136 TOTAL CROSS SECTIONS OF PROTONS, ANTIPROTONS, AND PI AND K MESONS ON HYDROGEN AND DEUTERIUM IN THE MOMENTUM RANGE 6-22 GEV/C. [PHYS. REV. 138, B913 (1965)]

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ABSTRACT THE TOTAL CROSS SECTIONS SIGMA(T) OF P, ANTI-P, CHARGED PI AND CHARGED K ON HYDROGEN AND DEUTERIUM HAVE BEEN MEASURED BETWEEN 6 AND 22 GEV/C AT INTERVALS OF 2 GEV/C TO AN ACCURACY GREATER THAN PREVIOUSLY REPORTED. THE METHOD UTILIZED WAS A CONVENTIONAL GOOD-GEOMETRY TRANSMISSION EXPERIMENT WITH SCINTILLATION COUNTERS SUBTENDING VARIOUS SOLID ANGLES AT TARGETS OF LIQUID H(2) AND D(2). WITH THE INCREASE IN STATISTICAL ACCURACY OF THE DATA, IT WAS FOUND THAT A PREVIOUSLY ADOPTED PROCEDURE OF LINEARLY EXTRAPOLATING TO ZERO SOLID ANGLE THE PARTIAL CROSS SECTIONS MEASURED AT FINITE SOLID ANGLES WAS NOT A SUFFICIENTLY ACCURATE PROCEDURE FROM WHICH TO DEDUCE SIGMA(T). THE PARTICLE-NEUTRON CROSS SECTIONS ARE DERIVED BY APPLYING THE GLAUBER SCREENING CORRECTION TO THE DIFFERENCE BETWEEN THE PARTICLE-DEUTERON AND PARTICLE-PROTON CROSS SECTIONS. THE TOTAL CROSS SECTIONS OF PI+D AND PI-D ARE EQUAL AT ALL MEASURED MOMENTA, WHICH CONFIRMS THE VALIDITY OF CHARGE SYMMETRY UP TO 20 GEV/C. RESULTS ARE PRESENTED SHOWING THE VARIATION OF CROSS SECTIONS WITH MOMENTUM; EVIDENCE IS PRESENTED FOR A SMALL BUT SIGNIFICANT DECREASE IN PP TOTAL CROSS SECTIONS AND PN TOTAL CROSS SECTIONS IN THE MOMENTUM REGION ABOVE 12 GEV/C.

BEAM NO. 1 IS PI+ ON PROTON FROM 6 TO 20 GEV/C.
NO. 2 IS PI- ON PROTON FROM 6 TO 20 GEV/C.
NO. 3 IS PI+ ON DEUTERON FROM 6 TO 20 GEV/C.
NO. 4 IS PI- ON DEUTERON FROM 6 TO 20 GEV/C.
NO. 5 IS K+ ON DEUTERON FROM 6 TO 20 GEV/C.
NO. 6 IS K+ ON PROTON FROM 6 TO 20 GEV/C.
NO. 7 IS K- ON DEUTERON FROM 6 TO 18 GEV/C.
NO. 8 IS K- ON PROTON FROM 6 TO 20 GEV/C.
NO. 9 IS PROTON ON DEUTERON FROM 6 TO 22 GEV/C.
NO. 10 IS PROTON ON PROTON FROM 6 TO 22 GEV/C.
NO. 11 IS ANTIPROTON ON DEUTERON FROM 6 TO 18 GEV/C.
NO. 12 IS ANTIPROTON ON PROTON FROM 6 TO 18 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION

ANTIPROTON DEUTERON TOTAL CROSS SECTION. [TABLE 4]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS	
6.	+- 1.75	106.9	+- 1.3
8.	1.75	102.7	1.3
12.	1.75	96.1	1.3
14.	1.75	95.0	1.4
16.	1.75	93.2	1.6
18.	1.75	87.2	6.1

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 4]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS	
6.	+- 1.75	59.3	+- 1.1
8.	1.75	56.4	.8
12.	1.75	51.7	.8
14.	1.75	50.7	.9
16.	1.75	49.2	.8
18.	1.75	50.3	3.6

ANTIPROTON NEUTRON TOTAL CROSS SECTION. [TABLE 4]

THIS CROSS SECTION IS IDENTICAL TO THE I=1 ANTIPROTON NUCLEON TOTAL CROSS SECTION

GLAUBER CORRECTIONS APPLIED

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MILLIBARNS	
6.	+- 1.75	59.5	+- 4.0
8.	1.75	57.3	3.9
12.	1.75	53.8	3.7
14.	1.75	53.4	3.7
16.	1.75	52.7	3.7
18.	1.75	44.4	9.0

137 THE SPIN AND PARITY OF THE D(0)-MESON. [NUOVO CIMENTO LETTERS 1, 627 (1971)]

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R.A.DONALD, D.N.EDWARDS, N.WEST [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

BEAM IS ANTIPROTON ON PROTON AT 1.1 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER. A TOTAL OF 240000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION MESONS PRODUCTION
COMPOUND KEY WORDS + MESONS PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

138 EVIDENCE FOR THE EXISTENCE OF A NARROW PBAR N BOUND STATE. [PHYS. REV. LETTERS 26, 1491 (1971)]

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ABSTRACT A METHOD OF SEARCH FOR AN NBAR N BOUND STATE IS POINTED OUT AND EVIDENCE IS PRESENTED FOR THE EXISTENCE OF A PBAR N BOUND STATE. IT IS PRODUCED IN PBAR D ANNIHILATIONS AT REST AND HAS BEEN OBSERVED DECAYING INTO FOUR AND SIX PIONS. THE BINDING ENERGY IS 83.3 +- 1.4 MEV AND THE WIDTH = 8 MEV AT THE 95 PERCENT CONFIDENCE LEVEL.

BEAM IS ANTIPROTON ON DEUTERON FROM .1 TO .8 GEV/C.
THIS EXPERIMENT USES THE BNL 30 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS + RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

139 ANTIPROTON-PROTON ANNIHILATION INTO ELECTRON-POSITRON PAIRS AND GAMMA-RAY PAIRS. [PHYS. REV. 184, 1415 (1969)]

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ABSTRACT EXPERIMENTAL LIMITS HAVE BEEN SET ON THE CROSS SECTIONS FOR PBAR + P + E+ + E- FOR ANTIPROTONS WITH INCIDENT MOMENTA OF 1.47 AND 2.40 GEV/C. THESE RESULTS IMPLY UPPER LIMITS ON THE MAGNITUDE OF THE PROTON FORM FACTORS FOR TIMELIKE FOUR-MOMENTUM TRANSFER OF 5.1 AND 6.6 (GEV/C)**2. THE REACTION PBAR + P + GAMMA + GAMMA HAS BEEN STUDIED AT THE SAME INCIDENT MOMENTA. THIS PROCESS HAS APPARENTLY BEEN OBSERVED FOR INCIDENT ANTIPROTON MOMENTUM OF 1.47 GEV/C, WHILE AN UPPER LIMIT FOR THE TWO-PHOTON ANNIHILATION CROSS SECTION IS FOUND AT 2.40 GEV/C INCIDENT MOMENTUM.

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 40A, 690 (1965).

BEAM IS ANTIPROTON ON PROTON FROM 1.47 TO 2.40 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS + ANNIHILATION CROSS SECTION ELECTRON GAMMA RAY
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION

DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON + POSITRON ELECTRON. [TABLE 4]

COS(THETA) = 0. (MEAN VALUE). THETA IS THE ANGLE THAT THE POSITRON MAKES WITH THE BEAM IN THE GRAND C.M.

LABORATORY BEAM MOMENTUM GEV/C	D-SIGMA/D-OMEGA UB/SR
1.47	< .00018
2.40	< .00004

DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON + GAMMA RAY GAMMA RAY. [TABLE 4]

COS(THETA) = 0. (MEAN VALUE). THETA IS THE ANGLE THAT THE GAMMA RAY MAKES WITH THE BEAM IN THE GRAND C.M.

LABORATORY BEAM MOMENTUM GEV/C	D-SIGMA/D-OMEGA UB/SR
1.47	.16 + .19 - .08

DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON + GAMMA RAY GAMMA RAY. [TABLE 4]

COS(THETA) = 0. (MEAN VALUE). THETA IS THE ANGLE THAT THE GAMMA RAY MAKES WITH THE BEAM IN THE GRAND C.M.

LABORATORY BEAM MOMENTUM GEV/C	D-SIGMA/D-OMEGA UB/SR
2.4	< .08

140 CHARGE-EXCHANGE PRODUCTION OF ANTINEUTRONS AND THEIR ANNIHILATION IN HYDROGEN. [PHYS. REV. 127, 617 (1962)]

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ABSTRACT THE CHARGE EXCHANGE OF ANTIPROTONS INTO ANTINEUTRONS AND THE SUBSEQUENT ANNIHILATION OF ANTINEUTRONS HAVE BEEN STUDIED IN THE 72-IN. LIQUID HYDROGEN BUBBLE CHAMBER. THE ANTIPROTONS WERE PRODUCED INTERNALLY IN THE BEVATRON; CHANNELED EXTERNALLY BY COLLIMATION, QUADRUPOLE FOCUSING MAGNETS, AND BENDING MAGNETS; AND SEPARATED FROM OTHER NEGATIVELY CHARGED PARTICLES BY A SYSTEM OF THREE VELOCITY SPECTROMETERS. ANALYSIS OF THE DATA FOR A RUN WITH AN ANTIPROTON MOMENTUM OF 1.61 BEV/C HAS BEEN COMPLETED. THREE CHARGE EXCHANGE REACTIONS HAVE BEEN STUDIED. (A) PBAR + P → NBAR + N, (B) PBAR + P → NBAR + N + PIO, AND (C) PBAR + P → NBAR + P + PI-. THE CROSS SECTION FOR REACTION (A) PLUS REACTION (B) WAS FOUND TO BE STRONGLY PEAKED FORWARD WITH A VALUE FOR THE ANGULAR DIFFERENTIAL CROSS SECTION AT ZERO DEGREES FO 4.6 +- 0.5 MB/SR. THE TOTAL CROSS SECTION FOR THESE TWO REACTIONS WAS FOUND TO BE 7.82 +- 0.55 MB. THE TOTAL CROSS SECTION FOR REACTION (C) WAS FOUND TO BE 0.99 +- 0.24 MB; THE STATISTICAL MODEL WOULD PREDICT THE CROSS SECTION FOR (B) TO BE ABOUT THE SAME AS (C). OF THE ANTINEUTRONS PRODUCED IN REACTIONS (A) PLUS (B), 122 WERE ANNIHILATED IN THE BUBBLE CHAMBER; THE RESULTING ANNIHILATION CROSS SECTION WAS FOUND TO BE 45.2 +- 5.4 MB. THE KINETIC ENERGY OF THESE ANTINEUTRONS WAS DISTRIBUTED SUCH THAT 80 PERCENT OF THEM HAD ENERGIES BETWEEN 800 AND 1000 MEV. THE AVERAGE CHARGED-PION MULTIPLICITY IN THE ANTINEUTRON ANNIHILATIONS WAS FOUND TO BE 3.5 +- 0.3. THE RATIO OF THE NUMBER OF ANTINEUTRON ANNIHILATIONS CONTAINING FIVE CHARGED PIONS TO THE NUMBER CONTAINING THREE CHARGED PIONS, AND THE MOMENTUM DISTRIBUTION OF THE PIONS, HAVE BEEN COMPARED WITH PREDICTIONS OF A STATISTICAL MODEL. REASONABLE AGREEMENT WAS OBTAINED FOR VOLUME FIVE TIMES THAT OF A SPHERE WITH A RADIUS OF ONE-PION COMPTON WAVE LENGTH. THE CENTER-OF-MASS ANGULAR DISTRIBUTION OF THE PIONS IN THE ANTINEUTRON ANNIHILATIONS WAS FOUND TO BE, WITHIN STATISTICS, AN ISOTROPIC DISTRIBUTION. THREE EVENTS WERE FOUND THAT FITTED K-ZERO-MESON PRODUCTION IN ANTINEUTRON ANNIHILATION.

CLOSELY RELATED REFERENCES
SEE ALSO REV. MOD. PHYS. 33, 395 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.6 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 46000 PICTURES ARE REPORTED ON.
KEY WORDS → CHARGE EXCHANGE ANNIHILATION PION PRODUCTION
COMPOUND KEY WORDS → PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

141 TWO-PRONG INELASTIC INTERACTIONS OF 3.0 GEV/C ANTIPROTONS IN HYDROGEN WITH ONE-PION PRODUCTION. [NUKLEONIKA 9, 121 (1964)]

T.HOFMOKL [CERN, GENEVA, SWITZERLAND]

BEAM IS ANTIPROTON ON PROTON AT 3 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 4400 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION

[PAGE 113]
LABORATORY BEAM MOMENTUM = 3.000 +- .045 GEV/C.

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON →		
ANTIPROTON PROTON PIO	2.41 +-	.29
ANTIPROTON NEUTRON PI+	2.07	.27
PROTON ANTINEUTRON PI-	1.96	.26
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	4.03	.38 [2]

[1] ERRORS ARE STATISTICAL ONLY.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

142 TWO- AND THREE-PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 2.4 AND 2.9 GEV/C. [PHYS. REV. D 1, 2483 (1970)]

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ABSTRACT A STUDY WAS MADE OF THE REACTION PBAR P → PBAR P PI+ PI+. THE CROSS SECTION FOR THIS REACTION IS 1.50 +- 0.07 MB AT 2.4 GEV/C AND 2.57 +- 0.10 MB AT 2.9 GEV/C. THE DATA AT BOTH MOMENTA ARE CONSISTENT WITH NEARLY 100 PERCENT ANTI-DELTA(--) DELTA(++) DOUBLE-RESONANCE PRODUCTION. THE REACTION IS PERIPHERAL AT BOTH MOMENTA, THE DISTRIBUTION OF THE C.M. SCATTERING ANGLE BETWEEN THE INCOMING PBAR AND THE OUTGOING PBAR PI- SYSTEM BEING PEAKED AT SMALL ANGLES. THE RHO(1,1) SPIN-DENSITY MATRIX ELEMENT HAS STRONG DEPENDENCE ON DELTA**2, THE SQUARE OF THE FOUR-MOMENTUM TRANSFER FROM THE INCOMING PBAR TO THE OUTGOING PBAR PI- SYSTEM. THE JOINT SPIN-DENSITY MATRIX ELEMENTS INDICATE NO CORRELATION BETWEEN THE ANTI-DELTA(--) AND DELTA(++) PRODUCTION AT EITHER MOMENTUM. CALCULATIONS USING THE DOUBLE-ISOBAR ONE-PION-EXCHANGE MODEL WITH FORM FACTORS ARE COMPARED TO THE DATA. THE REACTIONS PBAR P → PBAR P PI+ PI- PIO, PBAR N PI+ PI+ PI-, AND NBAR P PI- PI- PI+ HAVE CROSS SECTIONS OF 10 +- 5, 14 +- 10, AND 17 +- 10 MU-B, RESPECTIVELY, AT 2.4 GEV/C. THE CORRESPONDING VALUES AT 2.9 GEV/C ARE 124 +- 40, 143 +- 70, AND 127 +- 70 MU-B.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN BULL. AM. PHYS. SOC. 14, 181 (1969), AND PHYS. REV. D 1, 48 (1970).

BEAM IS ANTI-PROTON ON PROTON FROM 2.4 TO 2.9 GEV/C.
THIS EXPERIMENT USES THE BNL 31 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION ANGULAR DISTRIBUTION RESONANCE PRODUCTION DELTA(1238)++

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-PROTON PROTON PI+ PI-. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
2.375 +- .075	1.50 +- .07
2.885 .080	2.57 .10

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-PROTON PROTON PI+ PI- PIO. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS
2.375 +- .075	10. +- 5.
2.885 .080	124. 40.

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-PROTON NEUTRON PI+ PI+ PI-. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS
2.375 +- .075	14. +- 10.
2.885 .080	143. 70.

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-NEUTRON PROTON PI- PI- PI+. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS
2.375 +- .075	17. +- 10.
2.885 .080	127. 70.

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-PROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE. [1] [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS
2.375 +- .075	31. +- 14.
2.885 .080	270. 100.

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-DELTA(1238)-- DELTA(1238)++. [1] [TABLE 3]
ANTI-DELTA(1238)-- → ANTI-PROTON PI- [2]
DELTA(1238)++ → PROTON PI+ [2]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
2.375 +- .075	1.35 +- .15

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED FOR MASS AND/OR WIDTH (MASS = 1.221 GEV; WIDTH = .120 GEV), AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

CROSS SECTION FOR ANTIPROTON PROTON → ANTI-DELTA(1238)-- DELTA(1238)++. [1] [TABLE 3]
ANTI-DELTA(1238)-- → ANTI-PROTON PI- [2]
DELTA(1238)++ → PROTON PI+ [2]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
2.885 +- .080	2.44 +- .13

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] FITTED FOR MASS AND/OR WIDTH (MASS = 1.231 GEV; WIDTH = .120 GEV), AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTI-DELTA(1238)-- DELTA(1238)++. [FIGURE 6A]
ANTI-DELTA(1238)-- → ANTI-PROTON PI-
DELTA(1238)++ → PROTON PI+

LABORATORY BEAM MOMENTUM = 2.375 +- .075 GEV/C.

NORMALIZED TO 1.35 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]		NO. EVENTS
.00	.06	.00 +-	.03	0
.06	.12	.33	.09	13
.12	.18	1.30	.18	51
.18	.24	2.07	.23	81
.24	.30	2.65	.26	104
.30	.36	2.07	.23	81
.36	.42	1.84	.22	72
.42	.48	1.56	.20	61
.48	.54	1.58	.20	62
.54	.60	1.27	.18	50
.60	.66	.92	.15	36
.66	.72	.89	.15	35
.72	.78	.71	.13	28
.78	.84	.89	.15	35
.84	.90	.54	.12	21
.90	.96	.59	.12	23
.96	1.02	.56	.12	22
1.02	1.08	.38	.10	15
1.08	1.14	.36	.10	14
1.14	1.20	.54	.12	21
1.20	1.26	.25	.08	10
1.26	1.32	.28	.08	11
1.32	1.38	.36	.10	14
1.38	1.44	.13	.06	5
1.44	1.50	.10	.05	4
1.50	1.56	.15	.06	6
1.56	1.62	.13	.06	5
1.62	1.68	.05	.04	2
1.68	1.74	.03	.03	1
1.74	1.80	.00	.03	0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTI-DELTA(1238)--].

[1] COUNTS WERE MULTIPLIED BY .0255 TO GET THESE.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTI-DELTA(1238)-- DELTA(1238)++. [FIGURE 6B]
ANTI-DELTA(1238)-- → ANTI-PROTON PI-
DELTA(1238)++ → PROTON PI+

LABORATORY BEAM MOMENTUM = 2.885 +- .080 GEV/C.

NORMALIZED TO 2.44 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]		NO. EVENTS
.00	.06	.00 +-	.04	0
.06	.12	1.32	.23	32
.12	.18	5.03	.46	122
.18	.24	5.36	.47	130
.24	.30	4.53	.43	110
.30	.36	3.34	.37	81
.36	.42	3.79	.40	92
.42	.48	2.27	.31	55
.48	.54	2.22	.30	54
.54	.60	1.98	.29	48
.60	.66	1.28	.23	31
.66	.72	.95	.20	23
.72	.78	1.24	.23	30
.78	.84	.91	.19	22
.84	.90	.82	.18	20
.90	.96	.66	.16	16
.96	1.02	1.24	.23	30
1.02	1.08	.41	.13	10
1.08	1.14	.41	.13	10
1.14	1.20	.37	.12	9
1.20	1.26	.29	.11	7
1.26	1.32	.37	.12	9
1.32	1.38	.33	.12	8
1.38	1.44	.33	.12	8
1.44	1.50	.16	.08	4
1.50	1.56	.12	.07	3
1.56	1.62	.25	.10	6
1.62	1.68	.12	.07	3
1.68	1.74	.29	.11	7
1.74	1.80	.25	.10	6

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTI-DELTA(1238)--].

[1] COUNTS WERE MULTIPLIED BY .0412 TO GET THESE.

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143 FORMATION OF A MESONIC STATE IN THE PBAR P INTERACTION AT 1.32 GEV/C. [PHYS. LETTERS 29B, 259 (1969)]

G.KALBFLEISCH, R.STRAND, V.VANDERBURG [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT IN A BUBBLE CHAMBER EXPERIMENT, THE REACTION PBAR P → RHO0 RHO0 PI0 IS FOUND, ONLY AT 1.33 +/- 0.02 GEV/C, WITH A CROSS SECTION OF 0.5 +/- 0.1 MB. THIS EFFECT IS ATTRIBUTED TO THE FORMATION OF AN I(G) = 1- STATE, PI(2190) → RHO0 RHO0 PI0.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 20, 1059 (1968), AND BULL. AM. PHYS. SOC. 13, 1441 (1968).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 18, 1209 (1967).

BEAM IS ANTIPROTON ON PROTON FROM 1.11 TO 1.52 GEV/C.
THIS EXPERIMENT USES THE BNL 31 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 64000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [FIGURE 1A]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	112.1 +- 2.4
1.33	106.5 1.5
1.52	98.8 1.5

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → 0 PRONGS. [FIGURE 1A]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	7.69 +- .21
1.33	7.41 .13
1.52	6.70 .18

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → 4 PRONGS. [FIGURE 1A]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	32.4 +- .3
1.33	31.0 .2
1.52	28.7 .3

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → 6 PRONGS. [FIGURE 1A]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	4.31 +- .10
1.33	4.31 .05
1.52	4.45 .09

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI-. [FIGURE 1B]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	3.67 +- .21
1.33	3.00 .12
1.52	2.49 .19

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI- PI0. [FIGURE 1B]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	13.32 +- .37
1.33	12.39 .22
1.52	10.04 .28

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI+ PI- PI- MM≥2PI0. [FIGURE 1B]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	15.67 +- .28
1.33	15.52 .22
1.52	16.26 .29

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → FOUR PRONG PION ANNIHILATION. [1] [FIGURE 1B]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [2]
1.11	32.7 +- .5
1.33	30.9 .3
1.52	28.8 .5

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → OMEGA(783) PI+ PI-. [FIGURE 1C]
OMEGA(783) → PI+ PI- PI0

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	2.33 +- .25
1.33	2.31 .12
1.52	1.88 .23

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → RHO(765)0 PI+ PI- PI0. [FIGURE 1C]
RHO(765)0 → PI+ PI-

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	3.91 +- .59
1.33	3.41 .36
1.52	2.21 .53

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → RHO(765)+ PI+ PI- PI- + CHARGE CONJUGATE. [FIGURE 1C]
RHO(765)+ → PI+ PI0

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	6.15 +- .91
1.33	7.28 .57
1.52	7.61 .80

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → RHO(765)0 RHO(765)0 PI0. [PAGE 261]
RHO(765)0 → PI+ PI-
RHO(765)0 → PI+ PI-

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.33 +- .02	.5 +- .1

[1] ERRORS INCLUDE SYSTEMATICS.

144 PBAR P ELASTIC SCATTERING IN THE T-MESON REGION. [NUC. PHYS. B30, 466 (1971)]

G.R.KALBFLEISCH, R.C.STRAND, V.VANDERBURG [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT WE HAVE MADE IMPROVED MEASUREMENTS OF 43.8 +- 0.8, 41.3 +- 0.4 AND 39.3 +- 0.8 MB FOR THE PBAR P ELASTIC CROSS SECTIONS AT 1.11, 1.33, AND 1.52 GEV/C LABORATORY MOMENTA RESPECTIVELY. SHARP FORWARD PEAKS IN THE DIFFERENTIAL CROSS SECTIONS WITH BROAD SECONDARY MAXIMA AGREE WITH PREVIOUS OBSERVATIONS (PHYS. REV. 112, 1303 (58), PHYS. REV. LETTERS 3, 285 (59), PHYS. REV. 131, 1276 (63), AND NUCL. PHYS. B16, 155 (70)). THE FORWARD DIFFERENTIAL CROSS SECTIONS ARE (11 +- 3) PERCENT ABOVE THE OPTICAL POINT IN AGREEMENT WITH REAL AMPLITUDES EXTENDED FROM LOWER MOMENTA USING DISPERSION RELATIONS (PHYS. LETTERS 8, 285 (64)). THE ELASTIC CROSS SECTION DO NOT SHOW ANY STRUCTURE IN THE S-CHANNEL. BACKWARD DIFFERENTIAL CROSS SECTIONS SHOW THE ONSET OF A SO-CALLED THIRD DIFFRACTION PEAK, BUT NO EVIDENCE FOR OTHER STRUCTURE IN AGREEMENT WITH EARLIER EXPERIMENTS (NUCL. PHYS. B16, 155 (70) AND PHYS. REV. LETTERS 23, 506 (69)).

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 18, 1209 (1967), PHYS. REV. D 1, 1917 (1970), AND PHYS. LETTERS 29B, 259 (1969).

BEAM IS ANTIPROTON ON PROTON FROM 1.11 TO 1.52 GEV/C.
THIS EXPERIMENT USES THE BNL 31 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 64000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION ELASTIC SCATTERING

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	43.8 +- .8
1.33	41.3 .4
1.52	39.3 .8

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON PROTON TOTAL CROSS SECTION. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]
1.11	112.6 +- 2.0
1.31	109.6 2.0
1.33	108.4 3.0
1.35	106.7 2.0
1.52	99.7 1.5

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 2A]

LABORATORY BEAM MOMENTUM = 1.11 GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]		NO. EVENTS
.01	.02	543. +-	23.	543
.02	.03	494.	22.	494
.03	.04	409.	20.	409
.04	.05	309.	18.	309
.05	.06	281.	17.	281
.06	.07	281.	17.	281
.07	.08	212.	15.	212
.08	.09	202.	14.	202
.09	.10	121.	11.	121
.10	.11	115.	11.	115
.11	.12	87.	9.	87
.12	.13	91.	10.	91
.13	.14	87.	9.	87
.14	.15	69.	8.	69
.15	.16	57.	8.	57
.16	.17	47.	7.	47
.17	.18	49.	7.	49
.18	.19	24.	5.	24
.19	.20	31.	6.	31
.20	.21	26.	5.	26
.21	.22	12.	3.	12
.22	.23	10.	3.	10
.23	.24	7.	3.	7
.24	.25	10.	3.	10
.25	.26	7.	3.	7
.26	.27	3.	2.	3
.27	.28	6.	2.	6
.28	.29	2.	1.	2
.29	.30	2.	1.	2
.30	.31	0.	1.	0
.31	.32	0.	1.	0
.32	.33	8.	3.	8
.33	.34	0.	1.	0
.34	.35	2.	1.	2
.35	.36	3.	2.	3
.36	.37	2.	1.	2
.37	.38	3.	2.	3
.38	.39	3.	2.	3
.39	.40	2.	1.	2
.40	.41	2.	1.	2
.41	.42	3.	2.	3
.42	.43	3.	2.	3
.43	.44	6.	2.	6
.44	.45	1.	1.	1
.45	.46	2.	1.	2
.46	.47	5.	2.	5
.47	.48	2.	1.	2
.48	.49	3.	2.	3
.49	.50	1.	1.	1
.50	.51	0.	1.	0
.51	.52	1.	1.	1
.52	.53	5.	2.	5
.53	.54	3.	2.	3
.54	.55	3.	2.	3
.55	.56	1.	1.	1
.56	.57	3.	2.	3
.57	.58	8.	3.	8
.58	.59	3.	2.	3
.59	.60	0.	1.	0
.60	.61	1.	1.	1
.61	.62	1.	1.	1
.62	.63	1.	1.	1
.63	.64	2.	1.	2
.64	.65	2.	1.	2
.65	.66	2.	1.	2
.66	.67	1.	1.	1
.67	.68	2.	1.	2
.68	.69	2.	1.	2
.69	.70	1.	1.	1

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] COUNTS WERE MULTIPLIED BY 1. TO GET THESE.

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 28]

LABORATORY BEAM MOMENTUM = 1.33 GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]		NO. EVENTS
.02	.03	461.6 +-	13.9	1099
.03	.04	365.0	12.4	869
.04	.05	332.2	11.8	791
.05	.06	262.5	10.5	625
.06	.07	239.0	10.0	569
.07	.08	228.1	9.8	543
.08	.09	180.2	8.7	429
.09	.10	142.4	7.7	339
.10	.11	107.5	6.7	256
.11	.12	112.6	6.9	268
.12	.13	93.2	6.3	222
.13	.14	73.9	5.6	176
.14	.15	67.2	5.3	160
.15	.16	61.3	5.1	146
.16	.17	39.9	4.1	95
.17	.18	44.1	4.3	105
.18	.19	26.5	3.3	63
.19	.20	20.6	2.9	49
.20	.21	18.1	2.8	43
.21	.22	20.6	2.9	49
.22	.23	15.5	2.6	37
.23	.24	10.9	2.1	26
.24	.25	9.2	2.0	22
.25	.26	7.6	1.8	18
.26	.27	11.8	2.2	28
.27	.28	3.8	1.3	9
.28	.29	4.2	1.3	10
.29	.30	5.5	1.5	13
.30	.31	2.5	1.0	6
.31	.32	.8	.6	2
.32	.33	1.3	.7	3
.33	.34	.8	.6	2
.34	.35	2.5	1.0	6
.35	.36	.8	.6	2
.36	.37	1.7	.8	4
.37	.38	.8	.6	2
.38	.39	.4	.4	1
.39	.40	1.7	.8	4
.40	.41	3.4	1.2	8
.41	.42	.0	.4	0
.42	.43	.4	.4	1
.43	.44	1.3	.7	3
.44	.45	1.7	.8	4
.45	.46	1.7	.8	4
.46	.47	1.3	.7	3
.47	.48	2.5	1.0	6
.48	.49	2.9	1.1	7
.49	.50	1.3	.7	3
.50	.51	.8	.6	2
.51	.52	1.7	.8	4
.52	.53	1.7	.8	4
.53	.54	3.4	1.2	8
.54	.55	1.3	.7	3
.55	.56	.8	.6	2
.56	.57	2.9	1.1	7
.57	.58	.8	.6	2
.58	.59	2.9	1.1	7
.59	.60	5.5	1.5	13
.60	.61	1.7	.8	4
.61	.62	1.7	.8	4
.62	.63	2.9	1.1	7
.63	.64	2.5	1.0	6
.64	.65	4.2	1.3	10
.65	.66	2.9	1.1	7
.66	.67	2.5	1.0	6
.67	.68	1.3	.7	3
.68	.69	1.3	.7	3
.69	.70	2.5	1.0	6

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] COUNTS WERE MULTIPLIED BY .42 TO GET THESE.

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 2C]

LABORATORY BEAM MOMENTUM = 1.52 GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	+-	NO. EVENTS
.02	.03	387.9	18.7	431
.03	.04	336.6	17.4	374
.04	.05	279.0	15.8	310
.05	.06	231.3	14.4	257
.06	.07	210.6	13.8	234
.07	.08	174.6	12.5	194
.08	.09	120.6	10.4	134
.09	.10	137.7	11.1	153
.10	.11	90.9	9.0	101
.11	.12	90.9	9.0	101
.12	.13	82.8	8.6	92
.13	.14	72.0	8.0	80
.14	.15	78.3	8.4	87
.15	.16	54.0	7.0	60
.16	.17	32.4	5.4	36
.17	.18	46.8	6.5	52
.18	.19	27.9	5.0	31
.19	.20	27.0	4.9	30
.20	.21	21.6	4.4	24
.21	.22	27.9	5.0	31
.22	.23	17.1	3.9	19
.23	.24	16.2	3.8	18
.24	.25	9.9	3.0	11
.25	.26	5.4	2.2	6
.26	.27	2.7	1.6	3
.27	.28	5.4	2.2	6
.28	.29	3.6	1.8	4
.29	.30	2.7	1.6	3
.30	.31	7.2	2.5	8
.31	.32	.9	.9	1
.32	.33	.9	.9	1
.33	.34	.9	.9	1
.34	.35	.9	.9	1
.35	.36	.0	.9	0
.36	.37	2.7	1.6	3
.37	.38	.9	.9	1
.38	.39	.9	.9	1
.39	.40	.0	.9	0
.40	.41	.0	.9	0
.41	.42	.0	.9	0
.42	.43	.9	.9	1
.43	.44	.0	.9	0
.44	.45	.9	.9	1
.45	.46	2.7	1.6	3
.46	.47	2.7	1.6	3
.47	.48	.9	.9	1
.48	.49	3.6	1.8	4
.49	.50	3.6	1.8	4
.50	.51	.0	.9	0
.51	.52	2.7	1.6	3
.52	.53	2.7	1.6	3
.53	.54	.0	.9	0
.54	.55	.9	.9	1
.55	.56	.9	.9	1
.56	.57	.9	.9	1
.57	.58	3.6	1.8	4
.58	.59	.9	.9	1
.59	.60	.9	.9	1
.60	.61	.0	.9	0
.61	.62	.9	.9	1
.62	.63	3.6	1.8	4
.63	.64	3.6	1.8	4
.64	.65	.9	.9	1
.65	.66	.0	.9	0
.66	.67	.9	.9	1
.67	.68	.9	.9	1
.68	.69	2.7	1.6	3
.69	.70	2.7	1.6	3

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] COUNTS WERE MULTIPLIED BY .9 TO GET THESE.

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145 LARGE-ANGLE PBAR P ELASTIC SCATTERING AT 3.66 GEV/C. [PHYS. REV. LETTERS 19, 265 (1967)]

W.M.KATZ, B.FORMAN, T.FERBEL [UNIV. OF ROCHESTER, ROCHESTER, N. Y., USA]

ABSTRACT THE PBAR P ELASTIC-SCATTERING DIFFERENTIAL CROSS SECTION SHOWS A MINIMUM AT T APPROX. 0.5 (GEV/C)**2 AND A SECONDARY MAXIMUM AT T APPROX. 0.9 (GEV/C)**2. THE TOTAL CROSS SECTION FOR THE ANNIHILATION PROCESS PBAR + P * PI- + PI+ IS 6.6 +- 3.5 MU-B; THE CROSS SECTION FOR PBAR + P * K- + K+ IS LESS THAN 2.2 MU-B.

CLOSELY RELATED REFERENCES
ERRATUM PHYS. REV. LETTERS 22, 88 (1969).
SEE ALSO PHYS. REV. LETTERS 17, 720 (1966), BULL. AM. PHYS. SOC. 12, 470 (1967), PHYS. REV. 131, 1276 (1963), PHYS. REV. 137, B1250 (1965), PHYS. LETTERS 15, 188 (1965), CERN REPORT NO. 9831, TH486 (1964), BOLOGNA CONFERENCE 1, 263 (1963), PHYS. REV. 131, 1287 (1963), UCRL 10129 (1962), PHYS. REV. 137, B1250 (1965), PHYS. REV. LETTERS 21, 175 (1967), PHYS. REV. 173, 1307 (1968), AND PHYS. LETTERS 24, 642.

BEAM IS ANTIPROTON ON PROTON AT 3.66 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 50000 PICTURES ARE REPORTED ON.
KEY WORDS * ANNIHILATION CROSS SECTION ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION
COMPOUND KEY WORDS * ANNIHILATION CROSS SECTION ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

[PAGE 265]

LABORATORY BEAM MOMENTUM = 3.66 +- .08 GEV/C.

REACTION	MICROBARNS [1]	NO. EVENTS
ANTIPROTON PROTON *		
PI+ PI-	6.6 +- 3.5	3
K+ K-	< 2.2	

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 3.66 +- .08 GEV/C.

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2]		NO. EVENTS
.90	1430.0	+ 4500.0 / - 390.0	164
.86	334.0	+ 230.0 / - 72.0	38
.82	175.0	+ 82.0 / - 39.0	20
.78	140.0	+ 35.0 / - 35.0	16
.74	254.0	+ 47.0 / - 47.0	29
.70	306.0	+ 52.0 / - 52.0	35
.66	254.0	+ 47.0 / - 47.0	29
.62	288.0	+ 50.0 / - 50.0	33
.58	210.0	+ 43.0 / - 43.0	24
.54	87.5	+ 28.0 / - 28.0	10
.50	70.0	+ 25.0 / - 25.0	8
.44	43.8	+ 14.0 / - 14.0	10
.36	21.9	+ 9.0 / - 9.0	5
.26	11.4	+ 6.0 / - 6.0	4
.10	15.8	+ 5.0 / - 5.0	9
-.10	8.8	+ 4.0 / - 4.0	5
-.40	3.5	+ 1.8 / - 1.8	4
-.80	1.8	+ 1.3 / - 1.3	2

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

146 INTERPRETATION OF THE P PI+ PI- AND PBAR PI+ PI- MASS SPECTRA IN THE REACTION PBAR P * PBAR P PI+ PI- AT 2.7 AND 2.9 GEV/C. [PHYS. REV. D 1, 48 (1970)]

W.J.KERNAN, H.B.CRAWLEY, R.A.JESPERSEN, R.A.LEACOCK [IOWA STATE UNIV., AMES, IOWA, USA]

ABSTRACT THE REACTION PBAR P * PBAR P PI+ PI- HAS BEEN STUDIED FOR P PI+ PI- AND PBAR PI+ PI- ENHANCEMENTS USING 719 EVENTS AT 2.7 GEV/C AND 1015 EVENTS AT 2.9 GEV/C. WE FIND THAT THE P PI+ PI- AND PBAR PI+ PI- MASS SPECTRA CAN BE ADEQUATELY EXPLAINED BY ASSUMING THAT THE REACTION PROCEEDS 100 PERCENT THROUGH THE ANTI-DELTA(1236)-- DELTA(1236)++ CHANNEL, AND THAT IT IS NOT NECESSARY TO ASSUME THE PRODUCTION OF P PI+ PI- OR PBAR PI+ PI- RESONANCES IN THIS REACTION AT THESE ENERGIES.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 154, 1264 (1967).

BEAM IS ANTIPROTON ON PROTON FROM 2.7 TO 2.9 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 43500 PICTURES ARE REPORTED ON.
KEY WORDS * RESONANCE PRODUCTION DELTA(1238)++

NO DATA PUNCHED FOR THIS ARTICLE

147 PBAR-P ELASTIC SCATTERING AT 6.9 GEV/C. [PHYS. REV. LETTERS 21, 175 (1968)]

T.KITAGAKI, K.TAKAHASHI, S.TANAKA, T.SATO, A.YAMAGUCHI, K.HASEGAWA, R.SUGAWARA, K.TAMAI [PHYSICS DEPT., TOHOKU UNIV., SENDAI, JAPAN]

ABSTRACT THE PBAR-P ELASTIC SCATTERING AT 6.9 GEV/C WAS STUDIED BY THE ANALYSIS OF ANTIPROTON FILM TAKEN BY THE BROOKHAVEN NATIONAL LABORATORY 80-IN. HYDROGEN BUBBLE CHAMBER. THE CROSS SECTION OF THE ELASTIC SCATTERING WAS 14.7 +- 1.5 MB. THE ANGULAR DISTRIBUTION SHOWED A DIP IN THE REGION OF -T APPROX. = 0.6 (GEV/C)**2 AND A SECONDARY MAXIMUM AT -T APPROX. 0.8 (GEV/C)**2.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 173, 1307 (1968), PHYS. REV. LETTERS 11, 503 (1963), AND PHYS. REV. 181, 1794 (1969).

BEAM IS ANTIPROTON ON PROTON AT 6.9 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 15000 PICTURES ARE REPORTED ON.
KEY WORDS + ELASTIC SCATTERING CROSS SECTION DIFFERENTIAL CROSS SECTION
COMPOUND KEY WORDS + ELASTIC SCATTERING CROSS SECTION

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [1] [PAGE 175]

LABORATORY BEAM MOMENTUM = 6.9 GEV/C +- .5(PER CENT).

DATA ARE FIT OVER -T FROM .05 TO .40 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
NUMBER OF EVENTS = 340.
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND T IS IN (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED VALUES
A = 211. +- 32.
B = 14.3 +- 1.5

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

[TABLE 1]
LABORATORY BEAM MOMENTUM = 6.9 GEV/C +- .5(PER CENT).

REACTION	MILLIBARNS [1]		NO. EVENTS
ANTIPROTON PROTON +			
0 PRONGS	2.50 +-	.25	123
2 PRONGS	32.30	1.60	1357
4 PRONGS	18.70	1.00	922
6 PRONGS	7.60	.50	377
8 PRONGS	2.00	.22	96
TOTAL	63.10	2.90	2875

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 6.9 GEV/C +- .5(PER CENT).

DATA SUPPLIED BY AUTHORS IN TABULAR FORM

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.05	.10	100.50 +-	7.30
.10	.20	35.00	3.00
.20	.30	5.90	.49
.30	.40	1.60	.26
.40	.50	.33	.12
.50	.70	.02	.02
.70	.90	.10	.05
.90	1.10	.04	.03
1.10	1.70	.01	.01

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.

148 SPIN CORRELATIONS IN PBAR P + LAMBDABAR LAMBDA AT 2.19 GEV/C. [PHYS. REV. 186, 1392 (1969)]

N.KWAK, G.H.MALL, J.E.MANWEILER, M.L.NICHOLAS, M.S.REDEKER, T.A.STRINGER, R.STUMP [UNIV. OF KANSAS, LAWRENCE, KANSAS, USA]

ABSTRACT LARGE SPIN CORRELATIONS BETWEEN LAMBDA AND LAMBDABAR HYPERONS HAVE BEEN OBSERVED IN THE REACTION PBAR P + LAMBDABAR LAMBDA, AND THEY ARE VERY SIMILAR TO THE ONES OBTAINED BY BADIER, ET AL., AT 2.5 GEV/C. THE CORRELATION ALONG THE HYPERON FLIGHT DIRECTION IN THE C.M. SYSTEM IS FOUND TO BE -0.96 +- 0.44, WHICH SUGGESTS THAT THE HYPERONS ARE STRONGLY IN THE SPIN TRIPLET STATE. WE HAVE MADE AN ANALYSIS OF THE DIFFERENTIAL CROSS SECTION AND SPIN CORRELATIONS IN TERMS OF THE O(3,1) MODEL. THE RESULT APPEARS TO BE VERY ENCOURAGING.

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 35, 735 (1965), PHYS. REV. 140, B1027 (1965), AND PHYS. LETTERS 25B, 152 (1967).

BEAM IS ANTIPROTON ON PROTON AT 2.19 GEV/C.
THIS EXPERIMENT USES THE BNL 31 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 100000 PICTURES ARE REPORTED ON.
KEY WORDS + ANNIHILATION CROSS SECTION DIFFERENTIAL CROSS SECTION LAMBDA PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION LAMBDA PRODUCTION

[PAGE 1392]
LABORATORY BEAM MOMENTUM = 2.19 GEV/C.

REACTION	MICROBARNS [1]		NO. EVENTS
ANTIPROTON PROTON +			
ANTILAMBDA LAMBDA	126.3 +-	12.6	88
ANTILAMBDA SIGMA0 + CHARGE CONJUGATE	59.8	8.4	46

[1] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 1A]

LABORATORY BEAM MOMENTUM = 2.19 GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2 [1]	
.04	.08	660. +-	40.
.10	.15	430.	70.
.20	.28	230.	50.
.28	.38	85.	35.
.42	.48	54.	26.
.48	.58	30.	21.
.62	.68	43.	24.
.70	.80	14.	14.
.88	1.00	14.	14.
1.20	1.28	16.	16.
1.66	1.80	16.	16.

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

[1] ERRORS ARE STATISTICAL ONLY.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA SIGMA0 + CHARGE CONJUGATE. [FIGURE 1B]

LABORATORY BEAM MOMENTUM = 2.19 GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2 [1]	
.1	.2	220. +-	60.
.2	.3	170.	60.
.3	.4	15.	15.
.4	.5	34.	24.
.5	.6	38.	19.
.6	.7	14.	14.
.7	.8	12.	12.
.8	.9	13.	13.
.9	1.0	28.	20.
1.1	1.2	30.	21.
1.2	1.3	13.	13.
1.6	1.7	13.	13.

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

[1] ERRORS ARE STATISTICAL ONLY.

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149 ANTIPROTON-PROTON AND PROTON-PROTON TOTAL CROSS SECTIONS FROM 4 TO 20 BEV/C [PHYS. REV. LETTERS 7, 185 (1961)]

S.J.LINDENBAUM,W.A.LOVE,J.A.NIEDERER,S.OZAKI,J.J.RUSSELL,L.C.L.YUAN [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

BEAM IS ANTIPROTON ON PROTON FROM 4 TO 20 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → CROSS SECTION

....
....

ANTIPROTON PROTON TOTAL CROSS SECTION. [FIGURE 3]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
4.0	65.3 +-	1.5
5.0	62.8	2.0
6.0	63.4	1.2
6.9	60.3	1.5
8.0	60.5	1.5
9.3	59.5	1.8
10.0	56.0	1.6
11.3	54.4	1.8
12.3	53.8	1.6
13.3	51.5	2.2
14.3	52.6	1.8
16.3	49.4	1.6
17.3	51.5	2.1
18.3	49.9	2.2
20.3	46.7	3.7

[1] ERRORS INCLUDE SYSTEMATICS.

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150 ANALYSIS OF THE I=0(K KBAR PI) RESONANCES PRODUCED IN PBAR P ANNIHILATIONS AT 0.7 GEV/C. THE D, E AND F' MESONS.
[NUC. PHYS. B14, 63 (1969)]

B.LOERSTAD, C.D'ANDLAU, A.ASTIER, J.COHEN-GANOUNA, M.DELLA-NEGRA [COLLEGE DE FRANCE, PARIS, FRANCE]
M.AGUILAR-BENITEZ, J.BARLOW, L.D.JACOBS, P.MALECKI, L.MONTANET [CERN, GENEVA, SWITZERLAND]

ABSTRACT THE D, E AND F' MESONS ARE OBSERVED IN PBAR P ANNIHILATIONS AT 0.7 GEV/C. THE QUANTUM NUMBERS OF THE D AND E ARE ANALYZED. A LIMIT IS GIVEN FOR THE F' → K K/K(0)1 K(0)1 BRANCHING RATIO.

BEAM IS ANTIPROTON ON PROTON AT .7 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 360000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION MESONS RESONANCE PRODUCTION MASS SPECTRUM
COMPOUND KEY WORDS → MESONS RESONANCE PRODUCTION

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....

NO DATA PUNCHED FOR THIS ARTICLE

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151 SOME LOW ENERGY PROTON-ANTIPROTON CROSS SECTIONS. [PHYS. LETTERS 3, 334 (1963)]

J.G.LOKEN, M.DERRICK [OXFORD UNIV., OXFORD, ENGLAND]

BEAM IS ANTIPROTON ON PROTON FROM .168 TO .396 GEV/C. (BEAM KINETIC ENERGY = .015 TO .080 GEV)
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION CHARGE EXCHANGE ANNIHILATION

CROSS SECTION FOR ANTIPROTON PROTON → TOTAL ANNIHILATION. [TABLE 2]

LABORATORY BEAM ENERGY GEV MIN	MAX	MILLIBARNS	
.025	.040	192. +-	34.
.040	.055	155.	27.
.055	.080	118.	26.

CROSS SECTION FOR ANTIPROTON PROTON → 0 PRONGS. [TABLE 2]

LABORATORY BEAM ENERGY GEV MIN	MAX	MILLIBARNS	
.025	.040	27.8 +-	3.4
.040	.055	18.5	2.4
.055	.080	15.6	2.5

CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 2]

LABORATORY BEAM ENERGY GEV MIN	MAX	MILLIBARNS	
.015	.025	25.0 +-	10.0
.025	.040	21.1	3.6
.040	.055	13.1	2.6
.055	.080	11.5	2.7

152 FINAL STATES OF THE ANTIPROTON-PROTON SYSTEM. [REV. MOD. PHYS. 33, 395 (1961)]

G.R.LYNCH [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

CLOSELY RELATED REFERENCES
PART OF THIS ARTICLE SUPERSEDED BY PHYS. REV. 131, 1276 (1963), AND PHYS. REV. 131, 1287 (1963).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. 121, 1788 (1961).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.59 TO 1.63 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON FROM 1.96 TO 2.02 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION ANNIHILATION MESONS PRODUCTION
COMPOUND KEY WORDS → MESONS PRODUCTION

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 5]

LABORATORY BEAM MOMENTUM = 1.61 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB [1,2]		NO. EVENTS
-1.0	-.8	.0 +-	25.9	0
-.8	-.6	25.9	25.9	1
-.6	-.4	.0	25.9	0
-.4	-.2	25.9	25.9	1
-.2	.0	25.9	25.9	1
.0	.2	25.9	25.9	1
.2	.4	25.9	25.9	1
.4	.6	25.9	25.9	1
.6	.8	77.7	44.9	3
.8	1.0	51.8	36.6	2

THETA IS THE ANGLE THAT THE ANTILAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS ARE STATISTICAL ONLY.
[2] COUNTS WERE MULTIPLIED BY 25.9 TO GET THESE.

153 INTERACTIONS OF 1.61-BEV/C ANTIPROTONS IN HYDROGEN INVOLVING TWO OUTGOING CHARGED PARTICLES. [PHYS. REV. 131, 1276 (1963)]

G.R.LYNCH,R.E.FOULKS,G.R.KALBFLEISCH,S.LIMENTANI,J.B.SHAFER,M.L.STEVENSON, N.XUONG [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA, AND UNIV. OF CALIFORNIA, BERKELEY, CALIF., USA]

ABSTRACT INTERACTIONS OF 1.61-BEV/C ANTIPROTONS IN HYDROGEN YIELDING TWO CHARGED PARTICLES HAVE BEEN STUDIED, WITH PARTICULAR ATTENTION TO ELASTIC SCATTERING, SINGLE-PION PRODUCTION, AND ANNIHILATION INTO THREE OR MORE PIONS. EFFECTS OF MISINTERPRETATION OF EVENTS ARE ESTIMATED BY MONTE CARLO CALCULATIONS. NINE PARTIAL CROSS SECTIONS HAVE BEEN MEASURED. THE ELASTIC-SCATTERING DATA SHOW A SECONDARY DIFFRACTION PEAK AT ABOUT 82 DEGREES IN THE CENTER-OF-MASS SYSTEM. SINGLE PION PRODUCTION IS FOUND TO BE CONSISTENT WITH CHARGE-CONJUGATION INVARIANCE. IN THE SINGLE PION EVENTS (PBAR + P → NBAR + N + PI) THE PREDOMINANCE OF LOW-MOMENTUM TRANSFER EXCEEDS THAT PREDICTED BY THE SINGLE PION EXCHANGE FORMULA OF CHEW AND LOW. NO TWO-PION RESONANCES HAVE BEEN OBSERVED ANYWHERE IN THE DATA.

CLOSELY RELATED REFERENCES
SEE ALSO REV. MOD. PHYS. 33, 395 (1961), AND PHYS. REV. 124, 575 (1961).
THIS ARTICLE SUPERSEDES PART OF PHYS. REV. 124, 575 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION ANNIHILATION ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION PION PRODUCTION
COMPOUND KEY WORDS → PION PRODUCTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 2]

LABORATORY BEAM MOMENTUM = 1.61 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR [2]	
.75	2.500 +-	.300
.70	1.500	.200
.55	.140	.050
.45	.160	.040
.35	.220	.060
.25	.150	.040
.15	.440	.100
.05	.260	.090
-.05	.085	.030
-.15	.100	.035
-.25	.063	.035
-.35	.036	.030
-.45	.017	.025
-.55	.036	.030
-.65	.050	.025
-.75	.055	.025
-.85	.032	.035
-.95	.063	.040

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

....

[PAGE 1286]

LABORATORY BEAM MOMENTUM = 1.61 GEV/C (MEAN VALUE).

REACTION	MILLIBARNS [1]	
ANTIPROTON PROTON +		
ELASTIC	31.10 +-	2.00
ANTIPROTON PROTON PI0	1.85	.22
ANTINEUTRON PROTON PI-	1.19	.16
ANTIPROTON NEUTRON PI+	1.00	.16
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	2.19	.23 [2]
PI+ PI- PI0	1.58	.25

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

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154 TWO-MESON ANNIHILATIONS OF 1.61-BEV/C ANTIPROTONS IN HYDROGEN. [PHYS. REV. 131, 1287 (1963)]

G.R.LYNCH, P.EBERHARD, G.R.KALBFLEISCH, J.E.LANNUTTI, B.C.MAGLIC, J.B.SHAFER, M.L.STEVENSON, N.H.XUONG [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT PROTON-ANTIPROTON ANNIHILATIONS AT 1.61 BEV/C WITH ONLY TWO MESONS IN THE FINAL STATE HAVE BEEN EXAMINED IN THE 72-IN. BUBBLE CHAMBER. THE PARTIAL CROSS SECTIONS MEASURED ARE
PBAR + P + PI- + PI+, 119 +- 30 MU-B;
PBAR + P + K- + K+, 55 +- 18 MU-B.
THE K- DISTRIBUTION IN PBAR + P + K- + K+ IS PEAKED STRONGLY FORWARD, WITH 7 OF THE 11 K- MESONS PRODUCED IN THE FORWARDMOST TENTH OF THE TOTAL SOLID ANGLE. THE PI- EVENTS SHOW NO SUCH EFFECT, WITH ONLY 2 OF THE 22 PI- MESONS BEING PRODUCED IN THE SAME FORWARD INTERVAL. CAREFUL STUDY OF POSSIBLE CONTAMINATION OF THESE EVENTS INDICATES THAT ALMOST ALL OF THEM ARE GENUINE TWO-MESON ANNIHILATION.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 131, 1276 (1963).
THIS ARTICLE SUPERSEDES PART OF REV. MOD. PHYS. 33, 395 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION MESONS PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION MESONS PRODUCTION

....
....

[PAGE 1289]

LABORATORY BEAM MOMENTUM = 1.61 GEV/C.

REACTION	MICROBARNS [1]	
ANTIPROTON PROTON +		
PI+ PI-	119. +-	30.
K+ K-	55.	18.

[1] ERRORS INCLUDE SYSTEMATICS.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + PI- PI+. [FIGURE 4]

LABORATORY BEAM MOMENTUM = 1.61 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-COS(THETA) UB [1,2]		NO. EVENTS
.8	1.0	54.10 +-	38.25	2
.6	.8	54.10	38.25	2
.4	.6	27.05	27.05	1
.2	.4	27.05	27.05	1
.0	.2	81.15	46.85	3
-.2	.0	54.10	38.25	2
-.4	-.2	.00	27.05	0
-.6	-.4	54.10	38.25	2
-.8	-.6	108.20	54.10	4
-1.0	-.8	135.25	60.49	5

THETA IS THE ANGLE THAT THE PI- MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS INCLUDE SYSTEMATICS.
[2] COUNTS WERE MULTIPLIED BY 27.05 TO GET THESE.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON + K- K+. [FIGURE 4]

LABORATORY BEAM MOMENTUM = 1.61 GEV/C.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MIN	MAX	D-SIGMA/D-COS(THETA) UB [1,2]		NO. EVENTS
.8	1.0	175. +-	66.	7
.6	.8	0.	25.	0
.4	.6	25.	25.	1
.2	.4	0.	25.	0
.0	.2	25.	25.	1
-.2	.0	25.	25.	1
-.4	-.2	25.	25.	1
-.6	-.4	0.	25.	0
-.8	-.6	0.	25.	0
-1.0	-.8	0.	25.	0

THETA IS THE ANGLE THAT THE K- MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ERRORS INCLUDE SYSTEMATICS.
[2] COUNTS WERE MULTIPLIED BY 25. TO GET THESE.

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155 SEARCH FOR RESONANCE FORMATION IN ANTIPROTON-PROTON ELASTIC SCATTERING FROM 1.6 TO 2.2 GEV/C. [PHYS. REV. LETTERS 21, 1116 (1968)]

J.LYS, J.W.CHAPMAN, D.G.FALCONER, C.T.MURPHY, J.C.VANDER VELDE [UNIV. OF MICHIGAN, ANN ARBOR, MICH., USA]

ABSTRACT WE HAVE MEASURED THE ANTIPROTON-PROTON ELASTIC DIFFERENTIAL CROSS SECTION IN THE CENTER-OF-MASS ANGULAR RANGE COS THETA = -0.985 TO +0.40 AT SIX MOMENTA BETWEEN 1.6 AND 2.2 GEV/C IN A BUBBLE CHAMBER EXPERIMENT. WE USE THE DATA TO LOOK FOR EVIDENCE OF DIRECT CHANNEL BOSON RESONANCES.

BEAM IS ANTIPROTON ON PROTON FROM 1.62 TO 2.20 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION
COMPOUND KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1A]

LABORATORY BEAM MOMENTUM = 2.2 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MAX	MIN	D-SIGMA/D-OMEGA UB/SR [1,2]		NO. EVENTS
.400	.300	320.32 +-	30.27	112
.300	.200	194.48	23.58	68
.200	.100	125.84	18.97	44
.100	.000	97.24	16.68	34
.000	-.100	85.80	15.66	30
-.100	-.200	68.64	14.01	24
-.200	-.300	48.62	11.79	17
-.300	-.400	68.64	14.01	24
-.400	-.500	45.76	11.44	16
-.500	-.600	51.48	12.13	18
-.600	-.700	28.60	9.04	10
-.700	-.800	34.32	9.91	12
-.800	-.900	14.30	6.40	5
-.900	-.985	28.60	9.04	10

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.
[2] COUNTS WERE MULTIPLIED BY 2.86 TO GET THESE.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1B]

LABORATORY BEAM MOMENTUM = 1.95 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MAX	MIN	D-SIGMA/D-OMEGA UB/SR [1,2]		NO. EVENTS
.400	.300	334.62 +-	30.94	117
.300	.200	271.70	27.88	95
.200	.100	188.76	23.23	66
.100	.000	125.84	18.97	44
.000	-.100	82.94	15.40	29
-.100	-.200	60.06	13.11	21
-.200	-.300	51.48	12.13	18
-.300	-.400	45.76	11.44	16
-.400	-.500	34.32	9.91	12
-.500	-.600	48.62	11.79	17
-.600	-.700	31.46	9.49	11
-.700	-.800	34.32	9.91	12
-.800	-.900	34.32	9.91	12
-.900	-.985	34.32	9.91	12

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.
[2] COUNTS WERE MULTIPLIED BY 2.86 TO GET THESE.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1C]

LABORATORY BEAM MOMENTUM = 1.89 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MAX	MIN	D-SIGMA/D-OMEGA UB/SR [1,2]	+-	NO. EVENTS
.400	.300	322.5	28.4	129
.300	.200	347.5	29.5	139
.200	.100	215.0	23.2	86
.100	.000	147.5	19.2	59
.000	-.100	80.0	14.1	32
-.100	-.200	60.0	12.2	24
-.200	-.300	32.5	9.0	13
-.300	-.400	37.5	9.7	15
-.400	-.500	47.5	10.9	19
-.500	-.600	37.5	9.7	15
-.600	-.700	30.0	8.7	12
-.700	-.800	42.5	10.3	17
-.800	-.900	30.0	8.7	12
-.900	-.985	67.5	13.0	27

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.
[2] COUNTS WERE MULTIPLIED BY 2.5 TO GET THESE.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1D]

LABORATORY BEAM MOMENTUM = 1.83 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MAX	MIN	D-SIGMA/D-OMEGA UB/SR [1,2]	+-	NO. EVENTS
.400	.300	318.	31.	106
.300	.200	282.	29.	94
.200	.100	216.	25.	72
.100	.000	165.	22.	55
.000	-.100	78.	15.	26
-.100	-.200	78.	15.	26
-.200	-.300	54.	13.	18
-.300	-.400	63.	14.	21
-.400	-.500	39.	11.	13
-.500	-.600	42.	11.	14
-.600	-.700	42.	11.	14
-.700	-.800	39.	11.	13
-.800	-.900	36.	10.	12
-.900	-.985	90.	16.	30

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.
[2] COUNTS WERE MULTIPLIED BY 3. TO GET THESE.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1E]

LABORATORY BEAM MOMENTUM = 1.77 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MAX	MIN	D-SIGMA/D-OMEGA UB/SR [1,2]	+-	NO. EVENTS
.400	.300	336.	32.	112
.300	.200	381.	34.	127
.200	.100	237.	27.	79
.100	.000	180.	23.	60
.000	-.100	102.	17.	34
-.100	-.200	66.	14.	22
-.200	-.300	45.	12.	15
-.300	-.400	72.	15.	24
-.400	-.500	39.	11.	13
-.500	-.600	45.	12.	15
-.600	-.700	39.	11.	13
-.700	-.800	42.	11.	14
-.800	-.900	33.	10.	11
-.900	-.985	114.	18.	38

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.
[2] COUNTS WERE MULTIPLIED BY 3. TO GET THESE.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [FIGURE 1F]

LABORATORY BEAM MOMENTUM = 1.62 GEV/C +- 1(PER CENT).

THESE DATA WERE READ FROM A GRAPH

COS(THETA) MAX	MIN	D-SIGMA/D-OMEGA UB/SR [1,2]	+-	NO. EVENTS
.400	.300	317.40	33.09	92
.300	.200	313.95	32.91	91
.200	.100	286.35	31.43	83
.100	.000	189.75	25.59	55
.000	-.100	127.65	20.99	37
-.100	-.200	51.75	13.36	15
-.200	-.300	37.95	11.44	11
-.300	-.400	75.90	16.18	22
-.400	-.500	37.95	11.44	11
-.500	-.600	48.30	12.91	14
-.600	-.700	55.20	13.80	16
-.700	-.800	51.75	13.36	15
-.800	-.900	82.80	16.90	24
-.900	-.985	86.25	17.25	25

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] ADD POSSIBLE SYSTEMATIC ERROR OF +- 3 PER CENT.
[2] COUNTS WERE MULTIPLIED BY 3.45 TO GET THESE.

****
****

156 SEARCH FOR DOUBLY CHARGED MESONS IN PBAR P ANNIHILATIONS INTO PIONS NEAR 1.9 GEV/C. [PHYS. REV. D 2, 2525 (1970)]

J.LYS, J.W.CHAPMAN (UNIV. OF MICHIGAN, ANN ARBOR, MICH., USA)

ABSTRACT WE HAVE SEARCHED FOR EVIDENCE OF DOUBLY CHARGED MESONS IN 45,000 EVENTS OF THE TYPE PBAR P → PI+ PI+ PI- PI- + N PIO, N ≥ 0, AT INCIDENT ANTIPROTON MOMENTA 1.6 - 2.2 GEV/C. WE FIND NO EVIDENCE FOR SUCH MESONS, AND GIVE UPPER LIMITS FOR PRODUCTION CROSS SECTIONS.

BEAM IS ANTIPROTON ON PROTON AT 1.9 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.
KEY WORDS → MESONS PRODUCTION MASS SPECTRUM
COMPOUND KEY WORDS → MESONS PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

157 ANTIPROTON-DEUTERON ELASTIC SCATTERING BETWEEN 1.60 AND 2.00 GEV/C. [PHYS. REV. LETTERS 27, 344 (1971)]

Z.M.MA, G.A.SMITH (MICHIGAN STATE UNIV., EAST LANSING, MICH., USA)

ABSTRACT WE HAVE STUDIED ANTIPROTON-DEUTERON ELASTIC SCATTERING BETWEEN 1.60 AND 2.00 GEV/C INCIDENT MOMENTA. THE DIFFERENTIAL CROSS SECTIONS MAY BE CHARACTERIZED BY A VERY STEEP FORWARD PEAK (WITH B ABOUT 43 GEV**-2) AND A PROMINENT BREAK NEAR -T ABOUT 0.2 GEV**2. THE RESULTS ARE USED TO TEST THE VALIDITY OF GLAUBER'S MULTIPLE-SCATTERING THEORY. WITHIN THE EXPERIMENTAL RANGE OF MEASUREMENTS (-T BETWEEN 0.028 AND 0.46 GEV**2), THE THEORY PROVIDES A GOOD QUALITATIVE DESCRIPTION OF THE DATA.

CLOSELY RELATED REFERENCES
ERRATUM PHYS. REV. LETTERS 27, 1550 (1971).

BEAM IS ANTIPROTON ON DEUTERON FROM 1.6 TO 2.0 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 125000 PICTURES ARE REPORTED ON.
KEY WORDS → ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION
COMPOUND KEY WORDS → ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.6 GEV/C.

'COHERENT' ELASTIC ANTIPROTON DEUTERON SCATTERING

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.028	.036	402.00 +-	16.00
.036	.044	302.00	14.00
.044	.052	191.00	10.00
.052	.060	143.00	8.00
.060	.068	98.40	6.70
.068	.076	74.70	5.80
.076	.084	47.80	4.20
.084	.092	34.50	3.00
.092	.100	26.40	2.80
.100	.140	10.60	.80
.140	.180	1.95	.33
.180	.220	1.03	.24
.220	.260	1.68	.30
.260	.300	1.68	.30
.300	.340	1.14	.25
.340	.380	1.36	.27
.380	.420	.98	.23
.420	.460	.54	.17

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.75 GEV/C.

'COHERENT' ELASTIC ANTIPROTON DEUTERON SCATTERING

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.028	.036	351.00 +-	17.00
.036	.044	269.00	14.00
.044	.052	181.00	11.00
.052	.060	121.00	8.00
.060	.068	89.00	7.40
.068	.076	69.80	6.40
.076	.084	60.90	5.50
.084	.092	35.00	3.70
.092	.100	27.90	3.30
.100	.140	11.00	.90
.140	.180	1.99	.44
.180	.220	.95	.27
.220	.260	1.51	.35
.260	.300	1.27	.32
.300	.340	1.11	.30
.340	.380	.56	.21
.380	.420	.64	.22
.420	.460	1.03	.29

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.85 GEV/C.

'COHERENT' ELASTIC ANTIPROTON DEUTERON SCATTERING

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.028	.036	382.00 +-	18.00
.036	.044	246.00	13.00
.044	.052	152.00	11.00
.052	.060	110.00	8.00
.060	.068	89.00	7.10
.068	.076	65.00	6.20
.076	.084	49.80	5.00
.084	.092	34.50	3.70
.092	.100	22.00	3.00
.100	.140	11.40	1.00
.140	.180	2.43	.44
.180	.220	1.41	.33
.220	.260	1.10	.29
.260	.300	1.10	.29
.300	.340	.86	.26
.340	.380	1.18	.30
.380	.420	.94	.27
.420	.460	.71	.24

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2. GEV/C.

'COHERENT' ELASTIC ANTIPROTON DEUTERON SCATTERING

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]	
.028	.036	348.00 +-	21.00
.036	.044	252.00	17.00
.044	.052	174.00	13.00
.052	.060	110.00	10.00
.060	.068	75.00	8.20
.068	.076	62.50	7.40
.076	.084	34.80	5.30
.084	.092	38.90	5.20
.092	.100	20.70	3.60
.100	.140	11.60	1.30
.140	.180	2.07	.53
.180	.220	1.10	.39
.220	.260	1.24	.41
.260	.300	1.10	.39
.300	.340	1.24	.41
.340	.380	.83	.34
.380	.420	.41	.23
.420	.460	.41	.23

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS INCLUDE SYSTEMATICS.

ANTIPROTON DEUTERON ELASTIC CROSS SECTION. [TABLE 2]

'COHERENT' ELASTIC ANTIPROTON DEUTERON SCATTERING

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
1.60	37.9 +-	1.6
1.75	37.3	2.7
1.85	32.7	2.5
2.00	32.4	3.2

[1] ERRORS INCLUDE SYSTEMATICS.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 1.6 GEV/C.

DATA ARE FIT OVER -T FROM .028 TO .100 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)

WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.

FITTED VALUES

A = 1.63 +- .10

B = 43.6 +- 1.1

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 1.75 GEV/C.

DATA ARE FIT OVER -T FROM .028 TO .100 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.66 +- .10
B = 42.7 +- 1.2

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 1.85 GEV/C.

DATA ARE FIT OVER -T FROM .028 TO .100 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.38 +- .10
B = 43.0 +- 1.3

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON DEUTERON. [TABLE 2]

LABORATORY BEAM MOMENTUM = 2. GEV/C.

DATA ARE FIT OVER -T FROM .028 TO .100 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.36 +- .12
B = 42.7 +- 2.5

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158 CHARGE ASYMMETRIES IN THE ANGULAR DISTRIBUTION OF PI AND K MESONS FROM ANTIPROTON ANNIHILATIONS IN FLIGHT. [PHYS. REV. LETTERS 7, 137 (1961)]

B.C.MAGLIC, G.R.KALBFLEISCH, M.L.STEVENSON [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 121, 1788 (1961).

BEAM NO. 1 IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 1.99 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
GENERAL COMMENTS ON THIS ARTICLE
1 ALL OF EVENTS OF THE TYPE PBAR P → N PI ARE AT 1.61 GEV/C, WHEREAS 86 PERCENT OF THE PBAR P → K KBAR N PI EVENTS IS AT 1.61 GEV/C AND THE REMAINING 14 PERCENT IS AT 1.99 GEV/C.
KEY WORDS → ANNIHILATION ANGULAR DISTRIBUTION MESONS PRODUCTION
COMPOUND KEY WORDS → MESONS PRODUCTION

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....

NO DATA PUNCHED FOR THIS ARTICLE

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159 EVIDENCE FOR A T=0 THREE-PION RESONANCE. [PHYS. REV. LETTERS 7, 178 (1961)]

B.C.MAGLIC, L.W.ALVAREZ, A.H.ROSENFELD, M.L.STEVENSON [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 125, 687 (1962).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → RESONANCE PRODUCTION

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....

NO DATA PUNCHED FOR THIS ARTICLE

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160 A STUDY OF THE REACTION P PBAR → P PBAR PI+ PI- AT AN ANTIPROTON MOMENTUM OF 2.5 GEV/C. [NUC. PHYS. B30, 617 (1971)]

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ABSTRACT A STUDY OF 802 EVENTS OF THE TYPE P PBAR → P PBAR PI+ PI- AT AN INCIDENT PBAR MOMENTUM OF 2.5 GEV/C, OBTAINED IN THE CERN 2 M HYDROGEN BUBBLE CHAMBER, HAS BEEN MADE. THERE IS ABUNDANT ASSOCIATED DELTA ANTI-DELTA ISOBAR PRODUCTION OF A PERIPHERAL NATURE, WHICH CANNOT BE ADEQUATELY DESCRIBED BY A ONE-PION-EXCHANGE (OPE) MODEL ALONE. HOWEVER, AFTER ALLOWING FOR THE EFFECT OF AN ENHANCEMENT AT A DELTA-PI MASS OF 1370 MEV/C**2 IN ABOUT 43 PERCENT OF THE EVENTS, THE REMAINING EVENTS WERE SATISFACTORILY DESCRIBED BY THE OPE MODEL WITH ABSORPTION. IT IS SHOWN THAT THIS ENHANCEMENT MAY BE INTERPRETED AS EITHER A RESONANCE OR AN S-WAVE SCATTERING EFFECT. A DISCUSSION IS GIVEN EXPLAINING WHY THIS CONCLUSION IS NOT IN AGREEMENT WITH THE WORK OF OTHER GROUPS WHO STUDIED THE SAME REACTION AT NEARBY ENERGIES.

BEAM IS ANTIPROTON ON PROTON AT 2.5 GEV/C.
THIS EXPERIMENT USES THE CERN 2M HYDROGEN BUBBLE CHAMBER.
KEY WORDS → CROSS SECTION ANGULAR DISTRIBUTION RESONANCE PRODUCTION DELTA(1238)++

[TABLE 1]

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

REACTION	MILLIBARNS		NO. EVENTS
ANTIPROTON PROTON →			
PROTON ANTIPROTON PI+ PI-	1.370 +-	.070	802
PROTON ANTIPROTON PI+ PI- PI0	.010	.005	6
ANTIPROTON NEUTRON PI+ PI+ PI-	.010	.005	6
PROTON ANTINEUTRON PI+ PI- PI-	.002	.002	1
ANTIPROTON NEUTRON PI+ PI+ PI- + CHARGE CONJUGATE	.012	.005 [1]	

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

CROSS SECTION FOR ANTIPROTON PROTON → ANTIDELTA(1238)-- DELTA(1238)++. [1] [TABLE 2]
ANTIDELTA(1238)-- → ANTIPROTON PI-
DELTA(1238)++ → PROTON PI+

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [2]
2.5	1.23 +- .07

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.
[2] ERRORS ARE STATISTICAL ONLY.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTIDELTA(1238)-- DELTA(1238)++. [FIGURE 4]
ANTIDELTA(1238)-- → ANTIPROTON PI-
DELTA(1238)++ → PROTON PI+

LABORATORY BEAM MOMENTUM = 2.5 GEV/C.

NORMALIZED TO 1.23 MB

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1]		NO. EVENTS
.05	.10	.22 +-	.08	7.2
.10	.15	.91	.17	29.3
.15	.20	1.65	.23	53.3
.20	.25	2.45	.28	79.0
.25	.30	2.80	.29	90.4
.30	.35	2.14	.26	69.0
.35	.40	1.34	.20	43.3
.40	.45	1.70	.23	55.0
.45	.50	1.31	.20	42.3
.50	.55	1.50	.22	48.3
.55	.60	1.31	.20	42.3
.60	.65	.54	.13	17.5
.65	.70	.72	.15	23.3
.70	.75	.63	.14	20.4
.75	.80	.63	.14	20.4
.80	.85	.85	.16	27.4
.85	.90	.60	.14	19.4
.90	.95	.38	.11	12.3
.95	1.00	.41	.11	13.1
1.00	1.05	.25	.09	8.1
1.05	1.10	.47	.12	15.2
1.10	1.15	.44	.12	14.1
1.15	1.20	.29	.09	9.2
1.20	1.25	.16	.07	5.1
1.25	1.30	.13	.06	4.1
1.30	1.35	.25	.09	8.0
1.35	1.40	.10	.06	3.3
1.40	1.45	.13	.06	4.1
1.45	1.50	.16	.07	5.1
1.50	1.55	.04	.03	1.2
1.55	1.60	.07	.04	2.1
1.60	1.65	.07	.04	2.1
1.65	1.70	.04	.03	1.2
1.70	1.75	.00	.03	.0
1.75	1.80	.07	.05	2.2
1.80	1.85	.04	.03	1.2
1.85	1.90	.13	.06	4.2
1.90	1.95	.03	.03	1.1
1.95	2.00	.07	.05	2.2
2.00	2.05	.04	.03	1.2
2.05	2.10	.00	.03	.0
2.10	2.15	.04	.03	1.2
2.15	2.20	.00	.03	.0
2.20	2.25	.00	.03	.0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTIDELTA(1238)--].

[1] COUNTS WERE MULTIPLIED BY .031 TO GET THESE.

161 STUDY OF Y YBAR PRODUCTION IN TWO, THREE, AND FOUR BODY FINAL STATES BY 3.0, 3.6 AND 4.0 GEV/C ANTIPROTONS IN HYDROGEN.
[NUOVO CIMENTO 35, 735 (1965)]

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ABSTRACT WE PRESENT THE RESULTS ON HYPERON-ANTIHYPERON PRODUCTION BY 3.0, 3.6 AND 4.0 GEV/C ANTIPROTONS IN HYDROGEN. WE USED ABOUT 300,000 PICTURES TAKEN IN AN ANTIPROTON BEAM FROM THE CERN PROTON SYNCHROTRON WITH THE 81 CM SACLAY HYDROGEN BUBBLE CHAMBER. A SYSTEMATIC STUDY WAS MADE OF INTERACTIONS LEADING TO A HYPERON AND AN ANTIHYPERON WITH OR WITHOUT ADDITIONAL PIONS IN THE FINAL STATES. THE ANALYSIS INDICATES THAT THE CROSS SECTIONS FOR EACH OF THESE PROCESSES ARE OF THE ORDER OF FEW TENS OF MICROBARNS OR LESS AND THAT, WHEREAS FOR THE TWO-BODY FINAL STATES THE CROSS SECTIONS DECREASE WHEN THE ANTIPROTON MOMENTUM INCREASES FROM 3.0 TO 4.0 GEV/C, THE CROSS SECTIONS FOR 3 AND 4 BODY FINAL STATES REMAIN CONSTANT. FOR MOST OF THESE EVENTS THE ANGULAR DISTRIBUTIONS SHOW A STRONG FORWARD PEAKING OF THE ANTIHYPERON IN THE C.M.S OF THE INTERACTION. THIS SUGGESTS THAT A PERIPHERAL TYPE MECHANISM IS PREDOMINANT IN THESE PROCESSES . ABOUT HALF OF THE EVENTS OF THE TYPE PBAR P + Y YBAR PI OR PBAR P + Y YBAR PI PI PROCEED VIA THE FORMATION OF HYPERON OR ANTIHYPERON RESONANCES. THE YBAR(1)*(1385), YBAR(0)*(1405), YBAR(0)*(1520) RESONANCES AND THEIR CHARGE CONJUGATES ARE PRODUCED WITH MASSES, WIDTHS AND DECAY BRANCHING RATIOS CONSISTENT WITH THE VALUES FOUND IN OTHER EXPERIMENTS. THE CROSS SECTIONS FOR THE REACTIONS PBAR P + LAMBDA YBAR OR LAMBDA YBAR* ARE CONSISTENTLY LARGER BY A FACTOR VARYING FROM 2 TO 6 THAN THOSE CORRESPONDING TO THE REACTIONS PBAR P + SIGMAO YBAR OR SIGMAO YBAR*.

BEAM IS ANTIPROTON ON PROTON FROM 3 TO 4 GEV/C.
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER. A TOTAL OF 300000 PICTURES ARE REPORTED ON.

KEY WORDS + ANNIHILATION CROSS SECTION ANGULAR DISTRIBUTION HYPERON PRODUCTION
COMPOUND KEY WORDS + ANNIHILATION CROSS SECTION HYPERON PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON + LAMBDA ANTILAMBDA. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	117.	+- 18.
3.6	.5	77.	20.
4.0	.5	39.	12.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + ANTILAMBDA SIGMAO + CHARGE CONJUGATE. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	102.	+- 17.
3.6	.5	67.	19.
4.0	.5	46.	13.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + SIGMAO ANTISIGMAO. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]
3.0	+- .5	< 18.
3.6	.5	< 22.
4.0	.5	< 17.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + SIGMA+ ANTISIGMA-. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	36.	+- 6.
3.6	.5	30.	8.
4.0	.5	24.	6.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + SIGMA- ANTISIGMA+. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	10.	+- 4.
3.6	.5	14.	6.
4.0	.5	10.	5.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + XI- ANTIXI+. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.	+- .5	2.	+- 1.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON + XI- ANTIXI+. [TABLE 2]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]
3.6	+- .5	< 1.
4.0	.5	< 1.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA+ ANTILAMBDA PI− + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	61.	+− 10.
3.6	.5	68.	12.
4.0	.5	46.	9.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA− ANTILAMBDA PI+ + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	25.	+− 7.
3.6	.5	37.	9.
4.0	.5	24.	7.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA+ ANTISIGMA0 PI− + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	8.	+− 4.
3.6	.5	13.	5.
4.0	.5	24.	7.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA− ANTISIGMA0 PI+ + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	14.	+− 6.
3.6	.5	5.	3.
4.0	.5	16.	6.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → LAMBDA ANTILAMBDA PI0. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	50.	+− 10.
3.6	.5	62.	16.
4.0	.5	60.	14.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → LAMBDA ANTILAMBDA MM≥2PI0. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	17.	+− 7.
3.6	.5	16.	9.
4.0	.5	30.	11.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA+ ANTISIGMA− PI0. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	3.6	+− 1.5
3.6	.5	4.6	2.0
4.0	.5	8.0	3.0

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → LAMBDA K0 ANTINEUTRON + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	30.	+− 11.
3.6	.5	42.	18.
4.0	.5	61.	20.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → LAMBDA K+ ANTIPROTON + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+− .5	23.	+− 8.
3.6	.5	17.	6.
4.0	.5	42.	14.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA+ ANTILAMBDA PI- PI0 + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	2.	+- 2.
3.6	.5	20.	12.
4.0	.5	11.	4.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → SIGMA- ANTILAMBDA PI+ PI0 + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	2.	+- 2.
3.6	.5	20.	12.
4.0	.5	11.	4.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → LAMBDA ANTILAMBDA PI+ PI-. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	22.	+- 9.
3.6	.5	54.	16.
4.0	.5	46.	9.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → ANTISIGMA0 LAMBDA PI+ PI- + CHARGE CONJUGATE. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
3.0	+- .5	22.	+- 9.
3.6	.5	54.	16.
4.0	.5	46.	9.

[1] ERRORS INCLUDE SYSTEMATICS.

CROSS SECTION FOR ANTIPROTON PROTON → LAMBDA ANTILAMBDA PI+ PI- PI0. [TABLE 3]

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
4.	+- .5	1.5	+- 1.5

[1] ERRORS INCLUDE SYSTEMATICS.

[TABLE 6]

LABORATORY BEAM MOMENTUM = 3. GEV/C +- .5(PER CENT).

REACTION ANTIPROTON PROTON →	MICROBARNS [1]	
LAMBDA ANTIY*(1405) + CHARGE CONJUGATE ANTIY*(1405) → ANTISIGMA+ PI- + ANTISIGMA- PI+ [2]	24.0 +-	8.0
LAMBDA ANTIY*(1520) + CHARGE CONJUGATE ANTIY*(1520) → ANTISIGMA+ PI- + ANTISIGMA- PI+ [2]	40.0	10.0
LAMBDA ANTI-Y*(1385)0 + CHARGE CONJUGATE ANTI-Y*(1385)0 → ANTILAMBDA PI0 [2]	20.0	6.0
SIGMA0 ANTIY*(1405) + CHARGE CONJUGATE ANTIY*(1405) → ANTISIGMA- PI+ + ANTISIGMA+ PI- [2]	9.0	3.0
SIGMA0 ANTIY*(1520) + CHARGE CONJUGATE ANTIY*(1520) → ANTISIGMA+ PI- + ANTISIGMA- PI+ [2]	6.5	2.5
SIGMA0 ANTI-Y*(1385)0 + CHARGE CONJUGATE ANTI-Y*(1385)0 → ANTILAMBDA PI0 [2]	< 5.0	
SIGMA+ ANTIY*(1385)- + CHARGE CONJUGATE ANTIY*(1385)- → ANTILAMBDA PI- [2]	21.0	4.0
SIGMA- ANTIY*(1385)+ + CHARGE CONJUGATE ANTIY*(1385)+ → ANTILAMBDA PI+ [2]	2.0	2.0
Y*(1385)+ ANTIY*(1385)- Y*(1385)+ → LAMBDA PI+ [2] ANTIY*(1385)- → ANTILAMBDA PI- [2]	8.0	3.0
Y*(1385)- ANTIY*(1385)+ Y*(1385)- → LAMBDA PI- [2] ANTIY*(1385)+ → ANTILAMBDA PI+ [2]	5.0	2.0

[1] ERRORS INCLUDE SYSTEMATICS.
[2] FITTED DISTRIBUTION WITH FIXED MASS AND WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTISIGMA- SIGMA+. [1A]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 3. TO 4. GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2 [1]	+-	NO. EVENTS
.10	.15	187.50	34.23	30
.15	.20	87.50	23.39	14
.20	.30	50.00	17.68	8
.30	.40	37.50	15.31	6
.40	.50	12.50	8.84	2
.50	.60	25.00	12.50	4
.60	.70	31.25	13.98	5
.70	.80	18.75	10.83	3
.80	.90	31.25	13.98	5
.90	1.00	18.75	10.83	3
1.00	1.10	18.75	10.83	3
1.10	1.20	37.50	15.31	6
1.20	1.30	.00	6.25	0
1.30	1.40	6.25	6.25	1
1.40	1.50	6.25	6.25	1
1.50	1.60	12.50	8.84	2
1.60	1.70	.00	6.25	0
1.70	1.80	.00	6.25	0
1.80	1.90	.00	6.25	0
1.90	2.00	6.25	6.25	1
2.00	2.10	.00	6.25	0
2.10	2.20	.00	6.25	0
2.20	2.30	12.50	8.84	2
2.30	2.40	.00	6.25	0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTISIGMA-].

[1] COUNTS WERE MULTIPLIED BY 6.25 TO GET THESE.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTISIGMA+ SIGMA-. [FIGURE 1B]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 3. TO 4. GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2 [1]	+-	NO. EVENTS
.10	.15	.00	7.59	0
.15	.20	30.36	15.18	4
.20	.30	22.77	13.15	3
.30	.40	37.95	16.97	5
.40	.50	37.95	16.97	5
.50	.60	7.59	7.59	1
.60	.70	15.18	10.73	2
.70	.80	7.59	7.59	1
.80	.90	.00	7.59	0
.90	1.00	.00	7.59	0
1.00	1.10	7.59	7.59	1
1.10	1.20	15.18	10.73	2
1.20	1.30	7.59	7.59	1
1.30	1.40	15.18	10.73	2
1.40	1.50	7.59	7.59	1
1.50	1.60	.00	7.59	0
1.60	1.70	.00	7.59	0
1.70	1.80	.00	7.59	0
1.80	1.90	.00	7.59	0
1.90	2.00	.00	7.59	0
2.00	2.10	7.59	7.59	1
2.10	2.20	.00	7.59	0
2.20	2.30	.00	7.59	0
2.30	2.40	.00	7.59	0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTISIGMA+].

[1] COUNTS WERE MULTIPLIED BY 7.59 TO GET THESE.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA SIGMA0 + CHARGE CONJUGATE. [FIGURE 4B]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 3. TO 4. GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2 [1]	+-	NO. EVENTS
.05	.10	312.22	85.29	13.4
.10	.15	298.24	83.36	12.8
.15	.20	321.54	86.56	13.8
.20	.30	58.25	36.84	2.5
.30	.40	46.60	32.95	2.0
.40	.50	11.65	23.30	.5
.50	.60	23.30	23.30	1.0
.60	.70	23.30	23.30	1.0
.70	.80	32.62	27.57	1.4
.80	.90	9.32	23.30	.4
.90	1.00	23.30	23.30	1.0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

[1] COUNTS WERE MULTIPLIED BY 23.3 TO GET THESE.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTILAMBDA LAMBDA. [FIGURE 4C]

DATA ARE AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 3. TO 4. GEV/C.

THESE DATA WERE READ FROM A GRAPH

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T UB/(GEV/C)**2 [1]		NO. EVENTS
.1	.2	496.0 +-	110.9	20.0
.2	.3	74.4	43.0	3.0
.3	.4	37.2	30.4	1.5
.4	.5	74.4	43.0	3.0
.5	.6	24.8	24.8	1.0
.6	.7	24.8	24.8	1.0
.7	.8	.0	24.8	.0
.8	.9	37.2	30.4	1.5
.9	1.0	.0	24.8	.0
1.0	1.1	.0	24.8	.0
1.1	1.2	.0	24.8	.0
1.2	1.3	.0	24.8	.0
1.3	1.4	.0	24.8	.0
1.4	1.5	.0	24.8	.0
1.5	1.6	.0	24.8	.0

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTILAMBDA].

[1] COUNTS WERE MULTIPLIED BY 24.8 TO GET THESE.

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162 DETAILED STRUCTURE OF THE REACTIONS IN PBAR P → PI+ PI- AND PBAR P → K+ K- FROM 0.7 TO 2.4 GEV/C. [PHYS. REV. LETTERS 23, 603 (1969)]

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ABSTRACT DIFFERENTIAL CROSS SECTIONS FOR THE REACTIONS PBAR P → PI+ PI- AND PBAR P → K+ K- HAVE BEEN MEASURED IN THE ANGULAR REGION FOR ABSOLUTE VALUES OF COS THETA (C.M.) BETWEEN 0.65 AND 1.0 AT 13 MOMENTA BETWEEN 0.7 AND 2.4 GEV/C. THESE CROSS SECTIONS HAVE BEEN COMBINED WITH THOSE OF FONG, ET AL., FOR /COS THETA (C.M.)/ APPROX. LESS THAN 0.70 TO GIVE COMPLETE FOLDED ANGULAR DISTRIBUTIONS. THE DATA ARE CONSISTENT WITH RESONANCES IN THE J = 3 AND J = 5 STATES.

BEAM IS ANTIPROTON ON PROTON FROM .7 TO 2.4 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS → ANNIHILATION CROSS SECTION DIFFERENTIAL CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = .7 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.64	49. +-	17.
.72	64.	15.
.79	63.	13.
.85	109.	18.
.91	114.	24.
.94	165.	36.
.97	202.	38.
.99	163.	36.

THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

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DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = .99 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.62	27. +-	8.
.67	39.	7.
.73	53.	7.
.79	70.	7.
.85	94.	7.
.91	110.	9.
.95	157.	15.
.99	136.	15.

THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

....

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.45 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.64	20.7 +-	3.1
.71	31.1	3.4
.77	24.5	2.6
.83	23.6	2.2
.90	28.1	3.1
.92	21.3	4.2
.96	35.5	4.3
.99	53.8	6.0

THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.72 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.64	21.9 +-	3.5
.71	20.7	3.1
.78	11.3	2.1
.83	5.2	1.3
.89	4.0	1.2
.94	7.7	2.4
.97	17.2	4.0
.99	30.2	4.1

THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.99 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.64	13.9 +-	2.4
.72	11.0	1.7
.79	5.1	1.4
.85	2.6	.8
.91	12.9	2.2
.96	17.8	2.4
.99	25.8	3.2

THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 2.4 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.71	3.4 +-	1.2
.77	1.1	.9
.83	2.3	.9
.88	5.8	1.9
.91	11.9	2.4
.96	7.0	1.6
.99	8.7	1.7

THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = .7 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.64	43. +-	24.
.72	20.	8.
.78	56.	15.
.84	65.	15.
.90	117.	26.
.97	79.	37.
.99	70.	24.

THETA IS THE ANGLE THAT THE K+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = .99 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.63	13.7 +-	4.9
.66	10.1	3.4
.73	16.2	4.3
.79	22.1	4.5
.85	21.0	3.9
.92	28.2	4.1
.97	40.0	11.4
.99	45.4	9.2

THETA IS THE ANGLE THAT THE K+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.45 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.66	9.3 +-	2.0
.75	5.1	1.5
.82	10.4	2.0
.89	14.4	2.4
.95	17.4	2.8
.99	21.4	4.5

THETA IS THE ANGLE THAT THE K+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.72 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.68	6.3 +-	1.7
.77	9.8	2.3
.83	12.3	2.3
.89	11.8	2.8
.95	8.2	1.9
.99	11.3	3.2

THETA IS THE ANGLE THAT THE K+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 1.99 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.66	4.7 +-	1.3
.77	4.9	1.1
.87	4.3	1.2
.92	8.9	2.4
.96	6.8	2.0
.99	10.1	2.5

THETA IS THE ANGLE THAT THE K+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 1]

LABORATORY BEAM MOMENTUM = 2.4 GEV/C +- 1(PER CENT).

DATA FOLDED ABOUT 90 DEGREES IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

COS(THETA) [1]	D-SIGMA/D-OMEGA UB/SR [2,3]	
.79	2.32 +-	.76
.89	6.26	1.79
.95	4.80	1.23
.99	5.97	1.85

THETA IS THE ANGLE THAT THE K+ MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF +- 10 PER CENT.

CROSS SECTION FOR ANTIPROTON PROTON → PI+ PI-. [FIGURE 2]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
.70 +-	1	294.0 +-	11.0
.99	1	296.0	5.0
1.45	1	137.0	4.0
1.72	1	77.2	2.0
1.99	1	59.3	1.6
2.40	1	24.8	1.4

[1] ERRORS ARE STATISTICAL ONLY.

CROSS SECTION FOR ANTIPROTON PROTON → K+ K-. [FIGURE 2]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	PER CENT	MICROBARNS [1]	
.70 +-	1	129.0 +-	14.0
.99	1	87.0	4.6
1.45	1	45.6	2.5
1.72	1	36.8	2.1
1.99	1	23.1	1.6
2.40	1	10.5	1.2

[1] ERRORS ARE STATISTICAL ONLY.

163 I=1 ENHANCEMENT NEAR 2360 MEV OBSERVED IN NBAR N KAON ANNIHILATION CROSS SECTIONS. [PHYS. REV. LETTERS 24, 1257 (1970)]

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ABSTRACT A SIGNIFICANT ISOSPIN-1 ENHANCEMENT IN THE CROSS SECTIONS FOR PBAR P (PBAR N) → K*(890) KBAR PI PI (KBAR* K PI PI) IS OBSERVED AT A MASS OF 2360 +- 25 MEV WITH A WIDTH GAMMA LESS THAN 60 MEV. THIS MASS AND WIDTH ARE CONSISTENT WITH THE U MESON AND AN ENHANCEMENT REPORTED IN A RECENT BROOKHAVEN NATIONAL LABORATORY BACKWARD PI- P MISSING-MASS EXPERIMENT. WHEREAS WE AGREE WITH THE BROOKHAVEN NATIONAL LABORATORY NBAR N TOTAL CROSS SECTION MEASUREMENTS ON THE PI(1)*(2350) POSITION, OUR WIDTH IS CLEARLY INCONSISTENT WITH THEIR VALUE OF 140 MEV.

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.51 TO 1.95 GEV/C.
NO. 2 IS ANTIPROTON ON DEUTERON FROM 1.6 TO 2.0 GEV/C.
THIS EXPERIMENT USES A HYDROGEN BUBBLE CHAMBER AND A DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION MESONS RESONANCE PRODUCTION DELTA(1238)++
COMPOUND KEY WORDS → MESONS RESONANCE PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

164 ELASTIC SCATTERING OF PI-, K- AND PBAR FROM PROTONS AT 9.8 AND 13.6 GEV/C [PHYS. LETTERS 28B, 61 (1968)]

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A.ASHMORE, C.J.S.DAMERELL, W.R.FRISKEN, R.RUBINSTEIN [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT MEASUREMENTS HAVE BEEN MADE OF THE DIFFERENTIAL CROSS SECTION FOR PI- P ELASTIC SCATTERING AT 9.8 GEV/C IN THE ANGULAR RANGE 25-120 DEGREES C.M.S. TOGETHER WITH EXISTING DATA, AN ALMOST COMPLETE ANGULAR DISTRIBUTION HAS NOW BEEN OBTAINED AT THIS MOMENTUM. MEASUREMENTS HAVE ALSO BEEN MADE OVER MORE RESTRICTED ANGULAR RANGES FOR 9.7 GEV/C K- P AND PBAR P ELASTIC SCATTERING AND 13.6 GEV/C PI- P AND K- P ELASTIC SCATTERING.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 181, 1794 (1969).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 21, 387 (1968).

BEAM NO. 1 IS K- ON PROTON FROM 9.7 TO 13.6 GEV/C.
NO. 2 IS PI- ON PROTON FROM 9.7 TO 13.6 GEV/C.
NO. 3 IS ANTIPROTON ON PROTON AT 9.7 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + ELASTIC SCATTERING

NO DATA PUNCHED FOR THIS ARTICLE

165 HIGH-ENERGY ELASTIC SCATTERING OF PI+-, K-, AND PBAR ON HYDROGEN AT C.M. ANGLES FROM 22 DEGREES TO 180 DEGREES. [PHYS. REV. 181, 1794 (1969)]

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ABSTRACT ELASTIC PI+- P, K- P, AND PBAR P SCATTERING CROSS SECTIONS HAVE BEEN MEASURED USING THREE DIFFERENT EXPERIMENTAL ARRANGEMENTS COVERING THE C.M. ANGULAR REGIONS ABOUT 20-120 DEGREES, ABOUT 135-169 DEGREES, AND ABOUT 165-180 DEGREES AT INCIDENT MOMENTA FROM 6 TO 17 GEV/C. IN THE REGION 130-180 DEGREES, ONLY PI+- P SCATTERING WAS MEASURED. IN THE ANGULAR REGION NEAR 180 DEGREES, THE ENERGY DEPENDENCES AND SHAPES OF THE PI- P BACKWARD PEAKS WERE DETERMINED UP TO CROSSED-MOMENTUM TRANSFERS OF U APPROXIMATELY -2 (GEV/C)**2. AT ALL ENERGIES, THE PI+ P BACKWARD PEAK HAD A SHARP DIP AT U = -0.13 (GEV/C)**2, WITH NO SIMILAR EFFECT IN THE PI- P CASE. NEARLY COMPLETE ANGULAR DISTRIBUTIONS OF PI- P ELASTIC SCATTERING FROM 20 TO 180 DEGREES HAVE BEEN OBTAINED AT 6 AND 10 GEV/C. THESE RESULTS AT 6 AND 10 GEV/C AS WELL AS AT 8 GEV/C REVEAL A SHARP DIP IN PI- P SCATTERING AT T=-3 (GEV/C)**2. SEVERAL STRUCTURES IN THE FORM OF DIPS OR SHOULDERS WERE SEEN IN THE PBAR P ANGULAR DISTRIBUTIONS ALSO, WITH LESS PRONOUNCED STRUCTURE OBSERVED IN K- P SCATTERING. AT FIXED MOMENTUM TRANSFER, ALL CROSS SECTIONS WHEN EXPRESSED AS D(SIGMA)/D(T) APPEAR TO BE DECREASING WITH INCREASING ENERGY.

CLOSELY RELATED REFERENCES
THIS ARTICLE SUPERSEDES PART OF PHYS. REV. LETTERS 21, 387 (1968), AND PHYS. LETTERS 28B, 61 (1968).

BEAM NO. 1 IS ANTIPROTON ON PROTON AT 5.8 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON AT 5.9 GEV/C.
NO. 3 IS ANTIPROTON ON PROTON AT 9.71 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS + ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 5.8 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	+- PER CENT
.539	.610	.13600	17
.610	.684	.19000	14
.684	.762	.18700	13
.762	.843	.16700	14
.843	.927	.15400	12
.927	1.014	.15500	12
1.014	1.104	.09470	13
1.104	1.196	.07330	13
1.196	1.291	.06840	12
1.291	1.388	.03190	17
1.388	1.588	.02270	14
1.588	1.794	.01450	17
1.794	2.006	.00889	21
2.006	2.222	.00867	22
2.222	2.440	.00879	24
2.440	2.660	.00470	36
2.660	2.991	.00499	38

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 5.9 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	+- PER CENT
2.421	2.760	.00422	28
2.760	3.099	.00516	22
3.099	3.548	.00135	28
3.548	3.988	.00046	53
3.988	4.413	.00009	100
4.413	5.017	.00012	100
5.017	5.485	.00023	58
5.485	6.001	.00012	100

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 9.71 GEV/C.

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2 [1,2]	PER CENT
.690	.829	.09350 +-	30
.829	.979	.04980	21
.979	1.139	.02820	24
1.139	1.487	.00591	40
1.487	1.868	.00253	48
1.868	2.277	.00132	49
2.277	2.709	.00109	50
2.709	3.388	.00058	50
3.388	4.804	.00006	100
4.804	6.215	.00007	100

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

[1] ERRORS ARE STATISTICAL ONLY.
[2] ADD POSSIBLE SYSTEMATIC ERROR OF +- 5 PER CENT.

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166 ANTIPROTON-PROTON ELASTIC SCATTERING FROM 1.51 - 2.90 GEV/C. [NUC. PHYS. B32, 29 (1971)]

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ABSTRACT IN A BUBBLE CHAMBER EXPERIMENT, WE HAVE MEASURED PBAR P ELASTIC SCATTERING AT NINE MOMENTA IN THE RANGE 1.51 - 2.90 GEV/C. THE EXTRAPOLATION OF THE SMALL ANGLE REGION TO T = 0 IS DISCUSSED AND COMPARED WITH RESULTS OF OTHER EXPERIMENTS. THE DIFFERENTIAL CROSS SECTIONS ARE FITTED TO AN ADAPTATION OF THE FRAHN-VENTER OPTICAL MODEL AND ALSO COMPARED TO REGGE-POLE MODEL PREDICTIONS.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 24, 1257 (1970).

BEAM NO. 1 IS ANTIPROTON ON PROTON FROM 1.51 TO 1.95 GEV/C.
NO. 2 IS ANTIPROTON ON PROTON FROM 2.15 TO 2.90 GEV/C.
THIS EXPERIMENT USES THE BNL 31 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 276000 PICTURES ARE REPORTED ON.
KEY WORDS - CROSS SECTION DIFFERENTIAL CROSS SECTION ELASTIC SCATTERING

....

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS [1]	
1.51	39.4 +-	1.3
1.65	38.1	1.2
1.80	36.1	1.2
1.95	35.4	1.2
2.15	30.8	1.2
2.45	27.4	1.1
2.60	25.9	1.0
2.75	25.6	1.0
2.90	24.5	1.0

[1] ERRORS INCLUDE SYSTEMATICS.

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.51 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 620. +- 25.
A = 16.3 +- .4

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.65 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPPOTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 584. +- 23.
A = 15.9 +- .4

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.8 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 551. +- 22.
A = 15.7 +- .4

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 1.95 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 526. +- 23.
A = 15.3 +- .4

....

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.15 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 420. +- 24.
A = 14.5 +- .5

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.45 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 370. +- 21.
A = 14.1 +- .5

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.6 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 328. +- 19.
A = 13.1 +- .5

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.75 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 340. +- 21.
A = 13.6 +- .6

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

LABORATORY BEAM MOMENTUM = 2.9 GEV/C.

DATA ARE FIT OVER -T FROM .03 TO .20 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].
FITTED FORMULA IS D-SIGMA/D-T = B*EXP(A*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
B = 329. +- 21.
A = 14.1 +- .6

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.1]

LABORATORY BEAM MOMENTUM = 1.51 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	+-
.96	1.00	31.30	.70
.92	.96	34.50	.80
.88	.92	21.60	.60
.84	.88	13.10	.50
.80	.84	8.10	.40
.76	.80	4.38	.27
.72	.76	2.97	.23
.68	.72	1.64	.17
.64	.68	.97	.13
.60	.64	.41	.08
.56	.60	.17	.05
.52	.56	.12	.05
.48	.52	.19	.06
.44	.48	.19	.06
.40	.44	.28	.07
.36	.40	.29	.07
.32	.36	.28	.07
.28	.32	.26	.07
.24	.28	.35	.08
.20	.24	.40	.08
.16	.20	.38	.08
.12	.16	.26	.07
.08	.12	.35	.08
.04	.08	.26	.07
.00	.04	.19	.06
-.08	.00	.12	.03
-.16	-.08	.13	.03
-.24	-.16	.08	.03
-.32	-.24	.09	.03
-.40	-.32	.12	.03
-.56	-.40	.06	.02
-.72	-.56	.06	.02
-.88	-.72	.05	.01
-1.00	-.88	.09	.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.1]

LABORATORY BEAM MOMENTUM = 1.65 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	+-
.96	1.00	35.30	.70
.92	.96	33.50	.70
.88	.92	22.10	.60
.84	.88	12.20	.40
.80	.84	6.90	.30
.76	.80	3.26	.22
.72	.76	2.35	.19
.68	.72	1.26	.14
.64	.68	.39	.08
.60	.64	.29	.07
.56	.60	.20	.06
.52	.56	.23	.06
.48	.52	.25	.06
.44	.48	.26	.06
.40	.44	.25	.06
.36	.40	.31	.07
.32	.36	.40	.08
.28	.32	.32	.07
.24	.28	.46	.08
.20	.24	.25	.06
.16	.20	.25	.06
.12	.16	.19	.05
.08	.12	.17	.05
.04	.08	.12	.04
.00	.04	.14	.05
-.08	.00	.09	.03
-.16	-.08	.08	.03
-.32	-.16	.05	.01
-.40	-.32	.07	.02
-.56	-.40	.05	.01
-.72	-.56	.07	.02
-.88	-.72	.05	.01
-1.00	-.88	.05	.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.1]

LABORATORY BEAM MOMENTUM = 1.8 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	+-
.96	1.00	38.70	.80
.92	.96	33.70	.80
.88	.92	18.50	.40
.84	.88	9.70	.40
.80	.84	4.90	.30
.76	.80	2.58	.21
.72	.76	1.00	.13
.68	.72	.55	.10
.64	.68	.28	.07
.60	.64	.24	.06
.56	.60	.33	.08
.52	.56	.34	.08
.48	.52	.33	.08
.44	.48	.38	.08
.40	.44	.19	.06
.36	.40	.31	.07
.32	.36	.36	.08
.28	.32	.29	.07
.24	.28	.33	.08
.20	.24	.28	.07
.16	.20	.34	.08
.12	.16	.14	.04
.08	.12	.22	.06
.00	.08	.12	.03
.08	.00	.12	.03
-.24	-.08	.05	.01
-.40	-.24	.04	.01
-.56	-.40	.03	.01
-.72	-.56	.07	.02
-.88	-.72	.08	.02
-1.00	-.88	.04	.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.2]

LABORATORY BEAM MOMENTUM = 1.95 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	+-
.96	1.00	42.10	.90
.92	.96	32.90	.80
.88	.92	17.30	.60
.84	.88	8.70	.40
.80	.84	3.76	.28
.76	.80	2.09	.21
.72	.76	.68	.12
.68	.72	.27	.07
.64	.68	.34	.09
.60	.64	.27	.07
.56	.60	.25	.07
.52	.56	.34	.08
.48	.52	.27	.07
.44	.48	.34	.08
.40	.44	.42	.09
.36	.40	.42	.09
.32	.36	.40	.09
.28	.32	.27	.07
.24	.28	.27	.07
.20	.24	.27	.07
.16	.20	.25	.07
.08	.16	.07	.03
.00	.08	.13	.04
-.16	.00	.06	.02
-.40	-.16	.06	.01
-.56	-.40	.05	.02
-1.00	-.56	.04	.01

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.2]

LABORATORY BEAM MOMENTUM = 2.15 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	
.96	1.00	33.90 +-	.90
.92	.96	28.80	.90
.88	.92	12.70	.60
.84	.88	6.00	.40
.80	.84	2.30	.24
.76	.80	1.06	.17
.72	.76	.54	.12
.64	.72	.12	.04
.60	.64	.26	.08
.56	.60	.31	.09
.52	.56	.41	.10
.48	.52	.28	.08
.44	.48	.39	.10
.40	.44	.49	.11
.36	.40	.28	.08
.32	.36	.34	.09
.24	.32	.18	.05
.16	.24	.15	.04
.08	.16	.17	.05
-.08	.08	.08	.02
-.24	-.08	.06	.02
-.40	-.24	.06	.02
-.56	-.40	.06	.02
-.88	-.56	.05	.01
-1.00	-.88	.07	.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.2]

LABORATORY BEAM MOMENTUM = 2.45 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	
.96	1.00	34.90 +-	.90
.92	.96	26.30	.80
.88	.92	10.50	.50
.84	.88	3.96	.31
.80	.84	1.39	.18
.76	.80	.50	.08
.72	.76	.17	.06
.68	.72	.24	.08
.64	.68	.28	.08
.60	.64	.50	.08
.56	.60	.33	.09
.52	.56	.42	.10
.48	.52	.54	.11
.40	.48	.38	.07
.32	.40	.19	.05
.24	.32	.23	.05
.08	.24	.09	.02
-.08	.08	.08	.02
-.24	-.08	.08	.02
-.72	-.24	.04	.01
-1.00	-.72	.07	.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.3]

LABORATORY BEAM MOMENTUM = 2.6 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	
.96	1.00	35.60 +-	.90
.92	.96	24.10	.70
.88	.92	9.50	.50
.84	.88	3.36	.27
.80	.84	1.16	.16
.76	.80	.31	.08
.72	.76	.15	.06
.68	.72	.31	.08
.64	.68	.46	.10
.60	.64	.29	.08
.56	.60	.35	.09
.52	.56	.42	.10
.44	.52	.33	.06
.36	.44	.21	.05
.28	.36	.23	.05
.20	.28	.11	.03
.08	.20	.06	.02
-.16	.08	.03	.01
-.40	-.16	.03	.01
-.72	-.40	.03	.01
-.88	-.72	.05	.02
-1.00	-.88	.07	.02

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.3]

LABORATORY BEAM MOMENTUM = 2.75 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	
.96	1.00	38.200 +-	1.000
.92	.96	23.600	.800
.88	.92	8.000	.500
.84	.88	2.940	.290
.80	.84	.770	.150
.72	.80	.160	.150
.68	.72	.410	.110
.64	.68	.380	.110
.60	.64	.650	.140
.56	.60	.620	.140
.52	.56	.270	.090
.48	.52	.240	.080
.40	.48	.130	.040
.24	.40	.100	.030
.12	.24	.140	.040
-.24	.12	.040	.010
-.72	-.24	.010	.005
-1.00	-.72	.040	.010

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

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ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 2.3]

LABORATORY BEAM MOMENTUM = 2.9 GEV/C.

COS(THETA) MIN	MAX	D-SIGMA/D-OMEGA MB/SR	
.96	1.00	37.800 +-	1.000
.92	.96	20.600	.800
.88	.92	7.100	.500
.84	.88	1.880	.240
.80	.84	.570	.130
.76	.80	.330	.100
.72	.76	.390	.110
.68	.72	.180	.070
.64	.68	.360	.100
.60	.64	.330	.100
.52	.60	.180	.050
.44	.52	.210	.060
.32	.44	.120	.030
.16	.32	.070	.020
-.16	.16	.030	.010
-.56	-.16	.010	.005
-1.00	-.56	.020	.007

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

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167 PBAR P CHARGE EXCHANGE AT HIGH ENERGY (OUR TRANSLATION OF PBAR P LADUNGSAUSTAUSCH BEI HOHEN ENERGIEN) (HELVETICA PHYSICA ACTA 41, 451 (1968))

E.E.POLGAR [EIDENOSSISCHE TECH. HOCH., ZURICH, SWITZERLAND, AND CERN, GENEVA, SWITZERLAND]

ABSTRACT THE CHARGE EXCHANGE REACTION PBAR P → NBAR N HAS BEEN INVESTIGATED WITH A LARGE MAGNET SPARK CHAMBER. THE EXPERIMENTAL PROCEDURE AND THE ANALYSIS ARE DESCRIBED. THE RESULTS OBTAINED ON THE TOTAL AND DIFFERENTIAL CROSS SECTION AT 5, 6, 7 AND 9 GEV/C ARE PRESENTED. COMPARISON IS MADE WITH OTHER CHARGE EXCHANGE PROCESSES. THEORETICAL MODELS ARE DISCUSSED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 119, 2068 (1960), PHYS. REV. 127, 617 (1962), AND PHYS. LETTERS 20, 554 (1966).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 22, 537 (1966), AND PHYS. LETTERS 23, 160 (1966).

BEAM IS ANTIPROTON ON PROTON FROM 5 TO 9 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
KEY WORDS → CHARGE EXCHANGE

....
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FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 6]

LABORATORY BEAM MOMENTUM = 5. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM 0. TO 1. (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 2.69 +- .40
B = 4.43 +- .17

....

FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 6]

LABORATORY BEAM MOMENTUM = 6. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM 0. TO 1. (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 2.65 +- .40
B = 4.72 +- .19

....

FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 6]

LABORATORY BEAM MOMENTUM = 7. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM 0. TO 1. (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.66 +- .25
B = 4.50 +- .22

....

FIT TO DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON → ANTINEUTRON NEUTRON. [TABLE 6]

LABORATORY BEAM MOMENTUM = 9. GEV/C +- 1(PER CENT).

DATA ARE FIT OVER -T FROM 0. TO 1. (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [ANTINEUTRON].
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 1.15 +- .17
B = 4.22 +- .18

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168 PBAR N ELASTIC SCATTERING FROM -T = 0.15 TO 1.0 (GEV/C)**2 AT 3.5 GEV/C. [PHYS. REV. LETTERS 24, 1251 (1970)]

B.G.REYNOLDS, K.E.WEAVER, J.M.BISHOP, D.O.HUWE, J.A.MALKO [OHIO UNIV., ATHENS, OHIO, USA]

ABSTRACT WE HAVE MEASURED THE PBAR N DIFFERENTIAL ELASTIC CROSS SECTION IN THE 4-MOMENTUM-TRANSFER REGION OF -T = 0.15 TO 1.0 (GEV/C)**2 USING NEUTRON SCATTERS OBTAINED IN A PBAR D BUBBLE CHAMBER EXPERIMENT AT 3.5 GEV/C. THE PBAR N ELASTIC CROSS SECTION IS SIMILAR TO THE PBAR P CROSS SECTION AT THIS ENERGY TO THE EXTENT THAT BOTH CROSS SECTIONS EXHIBIT A DIFFRACTION PEAK AND A DIP AT -T APPROX. = 0.45 FOLLOWED BY A SECONDARY PEAK. A COMPARISON OF PBAR N AND PBAR P ELASTIC SCATTERING INDICATES A CROSSING OF THE TWO CROSS SECTIONS NEAR THE REGION OF THE DIP. THE RESULTS OF THIS EXPERIMENT SUGGEST THE PRESENCE OF AN I=1, T-CHANNEL EXCHANGE IN NBAR N SCATTERING.

CLOSELY RELATED REFERENCES
SEE ALSO NUC. PHYS. B12, 5 (1969), PHYS. REV. LETTERS 19, 265 (1967), PHYS. REV. 137, B1250 (1965), PHYS. LETTERS 5, 132 (1963), PHYS. REV. LETTERS 17, 720 (1966), AND PHYS. LETTERS 24B, 642 (1967).
DATA SUPERSEDED BY PHYS. REV. D2, 1767 (1970).

BEAM IS ANTIPROTON ON DEUTERON AT 3.5 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER.
KEY WORDS → ELASTIC SCATTERING

NO DATA PUNCHED FOR THIS ARTICLE

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169 ANTIPROTON-NEUTRON ELASTIC SCATTERING AT 3.5 GEV/C. [PHYS. REV. D 2, 1767 (1970)]

B.G.REYNOLDS, K.E.WEAVER, J.M.BISHOP, D.O.HUWE, J.A.MALKO [OHIO UNIV., ATHENS, OHIO, USA]

ABSTRACT WE HAVE MEASURED THE PBAR N DIFFERENTIAL ELASTIC CROSS SECTION FOR -T ≥ 0.15 (GEV/C)**2. WE COMPARE OUR DATA WITH EXISTING DATA FROM PBAR P AND N P ELASTIC SCATTERING EXPERIMENTS IN THIS ENERGY REGION. OUR DATA SHOW A DIP IN THE CROSS SECTION AT -T APPROX. = 0.45 (GEV/C)**2 AND A SECONDARY MAXIMUM AT -T APPROX. = 0.7 (GEV/C)**2. WE SEE NO EVIDENCE FOR BACKWARD PEAKING IN PBAR N ELASTIC SCATTERING AT THIS ENERGY. EVIDENCE IS PRESENTED FOR I = 1, T-CHANNEL EXCHANGE IN NBAR N SCATTERING.

CLOSELY RELATED REFERENCES
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 24, 1251 (1970).

BEAM IS ANTIPROTON ON DEUTERON AT 3.5 GEV/C.
THIS EXPERIMENT USES THE ANL-MURA 30 IN. DEUTERIUM BUBBLE CHAMBER. A TOTAL OF 92000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION DIFFERENTIAL CROSS SECTION ELASTIC SCATTERING

[PAGE 1773]

LABORATORY BEAM MOMENTUM = 3.5 +- .1 GEV/C.

REACTION	MILLIBARNS
ANTIPROTON NEUTRON →	
TOTAL	68.3 +- 3.1 [1]
ELASTIC	20.6 2.0 [1]

[1] GLAUBER CORRECTIONS APPLIED.

FIT TO ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON. [PAGE 1773]

LABORATORY BEAM MOMENTUM = 3.5 +- .1 GEV/C.

DATA ARE FIT OVER -T FROM .15 TO .40 (GEV/C)**2. T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

GLAUBER CORRECTIONS APPLIED
FITTED FORMULA IS D-SIGMA/D-T = A*EXP(B*T)
WHERE D-SIGMA/D-T IS IN MB/(GEV/C)**2 AND -T IS IN (GEV/C)**2.
FITTED VALUES
A = 239.3 +- 21.0
B = 11.8 +- .4

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON NEUTRON. [TABLE 4]

LABORATORY BEAM MOMENTUM = 3.5 +- .1 GEV/C.

GLAUBER CORRECTIONS APPLIED

-T (GEV/C)**2 MIN	MAX	D-SIGMA/D-T MB/(GEV/C)**2	
.15	.20	30.200 +-	3.300
.20	.25	19.900	2.400
.25	.30	7.600	1.200
.30	.40	2.400	.500
.40	.50	1.000	.300
.50	.60	1.100	.300
.60	.80	.900	.200
.80	1.00	.900	.200
1.00	1.20	.600	.100
1.20	1.40	.400	.100
1.40	2.00	.200	.050
2.00	3.00	.100	.030
3.00	4.00	.040	.010
4.00	5.40	.019	.009

T IS THE SQUARE OF THE INVARIANT MOMENTUM TRANSFER BETWEEN THE [INCOMING ANTIPROTON] AND THE [OUTGOING ANTIPROTON].

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170 PBAR P ANNIHILATIONS TO K AND PI MESONS AT 2.7 GEV/C. [PHYS. REV. 188, 2081 (1969)]

L.S.SCHROEDER, W.J.KERNAN [IOWA STATE UNIV., AMES, IOWA, USA]
G.P.FISHER, A.J.EIDE, J.VON KROGH, L.M.LIBBY, R.SEARS [UNIV. OF COLORADO, BOULDER, COLO., USA]

ABSTRACT WE REPORT RESULTS ON THE REACTIONS PBAR + P → K + KBAR + N PI (N = 1,2,...)AT 2.7 GEV/C. THE CROSS SECTION FOR THIS PROCESS IS ESTIMATED TO BE 4.1 +- 0.6 MB. COMPARISON OF 2.7 GEV/C PARTIAL CROSS SECTIONS WITH DATA AT 3.0 AND 3.7 GEV/C INDICATES THAT THESE PARTIAL CROSS SECTIONS EITHER ARE RELATIVELY CONSTANT OR SLOWLY DECREASE WITH ENERGY. K*(890) PRODUCTION IS OBSERVED IN ALL THE FOUR-, FIVE-, AND SIX-BODY FINAL STATES. THE PRODUCTION OF RHO0 AND OMEGA0 IS ALSO OBSERVED. THE K KBAR MASS SPECTRA SHOW ENHANCEMENTS NEAR THRESHOLD AS HAS BEEN SEEN IN OTHER PBAR P EXPERIMENTS. THE PRESENT DATA CANNOT DISTINGUISH BETWEEN A RESONANCE OR S-WAVE SCATTERING-LENGTH INTERPRETATION OF THESE ENHANCEMENTS. NO SIGNIFICANT EVIDENCE FOR RESONANCES DECAYING INTO K PI PI OR K KBAR PI WAS OBSERVED.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 15, 803 (1965), PHYS. REV. 154, 1264 (1967), PHYS. LETTERS 24B, 642 (1967), PHYS. REV. 161, 1335 (1967), AND PHYS. LETTERS 25B, 486 (1967).

BEAM IS ANTIPROTON ON PROTON AT 2.7 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 91000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION MASS SPECTRUM
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION MESONS PRODUCTION

CROSS SECTION FOR ANTIPROTON PROTON → TOTAL KAON ANNIHILATION. [TABLE 2]

RESULT IS MODEL DEPENDENT

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
2.70 +- .07	4.1 +- .6

[TABLE 3]

LABORATORY BEAM MOMENTUM = 2.70 +- .07 GEV/C.

REACTION	MICROBARNS	NO. EVENTS
ANTIPROTON PROTON →		
KOS K+ PI- + CHARGE CONJUGATE	32. +- 13.	15
KOS K+ PI- PIO + CHARGE CONJUGATE	175. + 40. - 20.	47
KOS KO PI+ PI-	200. + 45. - 30.	53
KOS KOS PI+ PI-	36. 16.	16
KOS KOS PI+ PI- PIO	69. 21.	35
KOS K+ PI+ PI- PI- + CHARGE CONJUGATE	151. 26.	70
KOS K+ PI+ PI- PI- PIO + CHARGE CONJUGATE	182. + 32. - 27.	74
KOS KO PI+ PI+ PI- PI-	70. + 24. - 16.	20

CROSS SECTION FOR ANTIPROTON PROTON → KOS K+ PI- OMEGA(783) + CHARGE CONJUGATE. [1] [TABLE 4]
OMEGA(783) → PI+ PI- PIO

LABORATORY BEAM MOMENTUM GEV/C	MICROBARNS
2.70 +- .07	55. +- 18.

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

171 SINGLE PION PRODUCTION IN PBAR P INTERACTIONS AT 2.7 GEV/C [PHYS. LETTERS 29B, 700 (1969)]

R.SEARS,R.SOCASH,L.M.LIBBY [UNIV. OF COLORADO, BOULDER, COLO., USA]

ABSTRACT SINGLE PION PRODUCTION IS ANALYSED IN UNPOLARIZED PBAR P INTERACTIONS AT 2.7 GEV/C. CROSS SECTIONS FOR CHANNELS P P PIO, P N PI+, AND N P PI- ARE 2.67 +- 0.09 MB, 2.65 +- 0.09 MB AND 2.7 +- 0.09 MB, RESPECTIVELY. A COMPUTATION ASSUMING ONE PION EXCHANGE DOES NOT REPRODUCE THE OBSERVED MASS DISTRIBUTIONS.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 18, 1156 (1967).

BEAM IS ANTIPROTON ON PROTON AT 2.7 GEV/C.
THIS EXPERIMENT USES THE BNL 20 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 100000 PICTURES ARE REPORTED ON.
KEY WORDS → CROSS SECTION PION PRODUCTION
COMPOUND KEY WORDS → PION PRODUCTION

[PAGE 700]

LABORATORY BEAM MOMENTUM = 2.7 GEV/C.

REACTION	MILLIBARNS [1]	NO. EVENTS
ANTIPROTON PROTON →		
ANTIPROTON PROTON PIO	2.67 +- .09	904
ANTIPROTON NEUTRON PI+	2.65 .09	832
ANTINEUTRON PROTON PI-	2.72 .09	882
ANTIPROTON NEUTRON PI+ + CHARGE CONJUGATE	5.37 .13 [2]	

[1] ERRORS INCLUDE SYSTEMATICS.
[2] CALCULATED BY US FROM DATA IN THIS ARTICLE.

172 LOW ENERGY ANTIPROTON-PROTON ELASTIC SCATTERING. [NUC. PHYS. B19, 501 (1970)]

D.SPENCER, D.N.EDWARDS [LIVERPOOL UNIV., LIVERPOOL, ENGLAND]

ABSTRACT DIFFERENTIAL CROSS SECTIONS FOR THE ELASTIC SCATTERING OF ANTIPROTONS ON PROTONS BELOW 70 MEV ARE PRESENTED AND COMPARED WITH THE PREDICTIONS OF VARIOUS MODELS.

BEAM IS ANTIPROTON ON PROTON FROM .195 TO .369 GEV/C. (BEAM KINETIC ENERGY = .02 TO .07 GEV)
THIS EXPERIMENT USES THE SACLAY 81 CM HYDROGEN BUBBLE CHAMBER.
KEY WORDS + CROSS SECTION DIFFERENTIAL CROSS SECTION ELASTIC SCATTERING

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM ENERGY FROM .015 TO .025 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
-.95	2.3 +-	.7
-.85	2.4	.7
-.75	1.7	.6
-.65	3.5	.9
-.55	1.6	.6
-.45	3.4	.9
-.35	6.3	1.2
-.25	7.2	1.2
-.15	7.8	1.4
-.05	5.4	1.2
.05	12.0	1.7
.15	11.9	1.7
.25	11.1	1.7
.35	13.6	1.9
.45	6.6	1.3
.55	12.1	2.6
.65	14.9	2.9
.75	14.7	3.1
.85	16.9	3.6

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM ENERGY FROM .025 TO .035 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
-.95	2.8 +-	.6
-.85	1.2	.4
-.75	1.5	.5
-.65	2.1	.6
-.55	1.8	.5
-.45	2.1	.6
-.35	2.9	.7
-.25	3.4	.7
-.15	4.1	.8
-.05	5.4	.9
.05	6.5	1.0
.15	6.4	1.0
.25	8.4	1.2
.35	6.4	1.0
.45	9.3	1.3
.55	10.4	1.3
.65	9.3	1.3
.75	9.3	1.3
.85	10.7	1.5
.92	13.8	3.0

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM ENERGY FROM .035 TO .045 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
-.95	1.5 +-	.4
-.85	.7	.3
-.75	1.5	.4
-.65	1.1	.4
-.55	1.1	.4
-.45	2.5	.6
-.35	1.9	.5
-.25	2.8	.6
-.15	3.2	.7
-.05	3.3	.7
.05	4.8	.8
.15	5.4	.9
.25	8.0	1.0
.35	8.4	1.1
.45	9.6	1.2
.55	9.1	1.1
.65	11.6	1.3
.75	12.2	1.3
.85	14.7	1.6
.92	18.0	2.9

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM ENERGY FROM .045 TO .055 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
-.95	1.6 +-	.5
-.85	.8	.3
-.75	.9	.3
-.65	1.2	.4
-.55	.9	.3
-.45	2.1	.5
-.35	2.2	.5
-.25	2.4	.6
-.15	1.8	.5
-.05	3.2	.7
.05	3.9	.7
.15	4.4	.8
.25	6.0	.9
.35	7.8	1.0
.45	9.3	1.2
.55	12.0	1.3
.65	12.2	1.3
.75	14.1	1.5
.85	13.9	1.5
.92	13.3	2.5

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM ENERGY FROM .055 TO .065 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
-.95	2.1 +-	.6
-.85	2.1	.6
-.75	.4	.3
-.65	1.1	.5
-.55	.6	.3
-.45	2.1	.6
-.35	1.0	.4
-.25	1.6	.6
-.15	2.0	.6
-.05	2.4	.7
.05	2.2	.7
.15	4.0	.9
.25	6.9	1.2
.35	4.9	1.0
.45	8.3	1.3
.55	9.7	1.4
.65	16.0	1.9
.75	14.2	1.8
.85	14.3	1.9
.92	18.0	3.6

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

....

ELASTIC DIFFERENTIAL CROSS SECTION FOR ANTIPROTON PROTON. [TABLE 1]

DATA ARE AVERAGED OVER LABORATORY BEAM ENERGY FROM .065 TO .075 GEV.

COS(THETA) [1]	D-SIGMA/D-OMEGA MB/SR	
-.95	1.7 +-	1.0
-.85	2.2	1.1
-.75	.6	.6
-.65	1.1	.8
-.55	.6	.6
-.45	.0	
-.35	.6	.6
-.25	.6	.6
-.15	2.9	1.3
-.05	2.9	1.3
.05	3.0	1.3
.15	2.4	1.2
.25	7.8	2.2
.35	4.3	1.6
.45	6.2	2.0
.55	4.4	1.7
.65	13.6	3.0
.75	13.5	3.0
.85	17.6	3.6
.92	21.1	6.7

THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

[1] MEAN VALUES.

....

ANTIPROTON PROTON ELASTIC CROSS SECTION. [TABLE 1]

LABORATORY BEAM ENERGY GEV		MILLIBARNS	
.020 +-	.005	100.8 +-	5.3
.030	.005	72.8	3.4
.040	.005	73.7	2.7
.050	.005	73.0	2.8
.060	.005	71.0	3.5
.070	.005	65.2	5.6

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CROSS SECTION FOR ANTIPROTON PROTON → TOTAL ANNIHILATION. [TABLE 1]

LABORATORY BEAM ENERGY GEV		MILLIBARNS	
.020 +-	.005	200. +-	30.
.030	.005	184.	22.
.040	.005	142.	18.

****
****

173 SPIN AND PARITY OF THE OMEGA MESON. [PHYS. REV. 125, 687 (1962)]

M.L.STEVENSON,L.W.ALVAREZ,B.C.MAGLIC,A.H.ROSENFELD [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT THE SPIN AND PARITY OF THE OMEGA MESON HAVE BEEN DETERMINED TO BE 1- BY A QUANTITATIVE COMPARISON OF THE DENSITY OF POINTS ON THE DALITZ PLOT WITH THE PREDICTED DENSITY OF POINTS. THE SIMPLEST MATRIX ELEMENT FOR THE J=1- MESON (WHICH PREDICTS MAXIMUM DENSITY OF POINTS AT THE CENTER OF THE DALITZ PLOT AND ZERO DENSITY ON THE BOUNDARY) FITS THE DATA REMARKABLY WELL. ON THE OTHER HAND, THE SIMPLEST MATRIX ELEMENTS FOR 1+ AND 0- MESONS (BOTH OF WHICH PREDICT ZERO DENSITY AT THE CENTER OF THE PLOT) DO NOT FIT AT ALL. A QUANTITATIVE TREATMENT FOR HIGHER J VALUES HAS NOT BEEN ATTEMPTED. HOWEVER,THE SIMPLEST MATRIX ELEMENTS FOR J=2+ AND 2- ALSO VANISH AT THE CENTER OF THE DALITZ PLOT, AND ARE AGAIN INCONSISTENT WITH THE DATA.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 7, 327 (1961).
THIS ARTICLE SUPERSEDES PHYS. REV. LETTERS 7, 178 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + RESONANCE PRODUCTION MASS SPECTRUM

NO DATA PUNCHED FOR THIS ARTICLE

174 TOTAL CROSS SECTIONS FOR P, P-BAR, CHARGED K, AND CHARGED PI ON HYDROGEN BETWEEN 3 AND 10 GEV/C. [PHYS. REV. LETTERS 5, 333 (1960)]

G.VONDARDEL,D.H.FRISCH,R.MERMOD,R.H.MILBURN,P.A.PIROUE,M.VIVARGENT,G.WEBER, K.WINTER [CERN, GENEVA, SWITZERLAND]

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. LETTERS 7, 127 (1961).

BEAM NO. 1 IS K+ ON PROTON FROM 3 TO 10 GEV/C.
NO. 2 IS PROTON ON PROTON FROM 3 TO 10 GEV/C.
NO. 3 IS ANTIPROTON ON PROTON FROM 3 TO 10 GEV/C.
NO. 4 IS K- ON PROTON FROM 3 TO 10 GEV/C.
NO. 5 IS PI+ ON PROTON FROM 3 TO 10 GEV/C.
NO. 6 IS PI- ON PROTON FROM 3 TO 10 GEV/C.
THIS EXPERIMENT USES COUNTERS.
KEY WORDS + CROSS SECTION

ANTIPROTON PROTON TOTAL CROSS SECTION. [FIGURE 3]

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS	
5.00	67.1 +-	2.5
6.00	60.7	2.0
7.00	63.1	2.2
10.00	46.3	2.0
10.26	52.4	2.6
10.74	52.9	1.0

175 EVIDENCE CONFIRMING THE T=0 THREE-PION RESONANCE. [PHYS. REV. LETTERS 7, 327 (1961)]

N.H.XUONG, G.R.LYNCH [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 128, 1849 (1962).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 7, 178 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + CROSS SECTION OMEGA(783) PRODUCTION
COMPOUND KEY WORDS + OMEGA(783) PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

176 ANTIPROTON-PROTON INELASTIC INTERACTIONS AT 1.61 BEV/C AND THEIR USE FOR A TEST OF CHARGE-CONJUGATION INVARIANCE IN STRONG INTERACTIONS. [PHYS. REV. 124, 575 (1961)]

N.XUONG, G.R.LYNCH, C.K.HINRICHS [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT THE REACTIONS PBAR P + PBAR P PIO, PBAR N PI+ AND P NBAR PI- HAVE BEEN INVESTIGATED FOR ANTIPROTONS OF 1.61 BEV/C. THE CROSS SECTIONS ARE MEASURED AND FOUND TO BE 1.6 +- 0.3 MB,1.15 +- 0.3 MB, AND 0.96 +- 0.22 MB, RESPECTIVELY. THE COMBINED INELASTIC (NONANNIHILATION) CROSS SECTION IS ESTIMATED TO BE 5.3 MB, AND THE ANNIHILATION CROSS SECTION 51 +- 3 MB. THE ANGULAR AND ENERGY DISTRIBUTIONS ARE PRESENTED. IN ALL CASES THE ANTINUCLEONS ARE PEAKED FORWARD AND THE NUCLEONS BACKWARD IN THE CENTER-OF-MASS SYSTEM. THESE EVENTS CAN BE USED TO CHECK CHARGE-CONJUGATION INVARIANCE IN STRONG INTERACTIONS.

CLOSELY RELATED REFERENCES
DATA SUPERSEDED BY PHYS. REV. 131, 1276 (1963).
THIS ARTICLE SUPERSEDES REV. MOD. PHYS. 33, 395 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS + ANNIHILATION PION PRODUCTION
COMPOUND KEY WORDS + PION PRODUCTION

NO DATA PUNCHED FOR THIS ARTICLE

177 SEARCH FOR MULTIPION RESONANCES IN THE REACTION PBAR + P → 3PI+ + 3PI- + N PIO. [PHYS. REV. 128, 1849 (1962)]

N.H.XUONG,G.R.LYNCH [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT WE REPORT HERE THE STUDY OF THE REACTION PBAR + P → 3PI+ + 3PI- + N PIO AT 1.61 BEV/C (E(C.M.)=2.290 BEV), WITH THE AIM OF DETECTING MULTIPION RESONANCES IN THE FINAL STATES. THE EXPERIMENT WAS PERFORMED IN THE LAWRENCE RADIATION LABORATORY'S 72-IN LIQUID-HYDROGEN BUBBLE CHAMBER. THE TOTAL NUMBER OF SIX-PRONG EVENTS IN THE SAMPLE IS 715. THE EVENTS WERE MEASURED WITH THE FRANCKENSTEIN MEASURING PROJECTOR. THE EVENTS WERE ANALYZED BY USING THE PANG, KICK, AND EXAMIN PROGRAMS WITH IBM 704, 709, AND 7090 COMPUTERS. THE CROSS SECTIONS OF VARIOUS PROCESSES ARE FOUND TO BE SIGMA(PBAR + P → 3 PI+ + 3 PI-) = 1.16 +- 0.1 MB, SIGMA(PBAR + P → 3PI+ + 3PI- + PIO) = 1.8 +- 0.25 MB, SIGMA(PBAR + P → 3PI+ + 3PI- + 2PIO) = 1.05 +- 0.25 MB. THE ANGULAR DISTRIBUTIONS ARE SYMMETRICAL FOR ALL THREE TYPES OF EVENTS. THE EXISTENCE OF THE OMEGA MESON (T=0 THREE-PION RESONANCE AT 780 MEV) IS FURTHER CONFIRMED. WITH THE HYPOTHESIS OF G-PARITY CONSERVATION IN THE DECAY PROCESS (STRONG DECAY), THE SPIN AND PARITY OF THE OMEGA MESON IS CONFIRMED AS 1- BY THE DALITZ-PLOT METHOD. EVEN WITH THE HYPOTHESIS OF G-PARITY NONCONSERVATION IN THE DECAY PROCESS (ELECTROMAGNETIC DECAY), THE 1- SPIN-PARITY ASSIGNMENT IS STILL STRONGLY SUGGESTED BY THE SMALL VALUES OF THE RATIOS OF R[(OMEGA → 4 PI) / (OMEGA → PI+ PI- PIO)] AND R[(OMEGA → NEUTRAL) / (OMEGA → PI+ + PI- + PIO)]. WE DO NOT OBSERVE ANY T=0 3-PION RESONANCE AT 550 MEV (ETA MESON). THE NEUTRAL FOUR-PION EFFECTIVE MASS M4 DISTRIBUTION SHOWS A SUGGESTIVE PEAK AT 1.04 BEV. THE DISTRIBUTION OF THE TWO-PION EFFECTIVE MASS M2 OF THE PBAR + P → 3PI+ + 3PI- EVENTS SHOWS A BIG DIFFERENCE BETWEEN /Q/=2 (FOR LIKE-PION PAIRS) AND Q=0 (FOR UNLIKE PION PAIRS) AT THE LOW-VALUE REGION OF M2. AT THIS REGION THE M2 DISTRIBUTION OF LIKE-PION PAIRS LIES ABOVE THAT FROM PHASE-SPACE CALCULATIONS, AND THE ONE OF UNLIKE-PION PAIRS IS WELL BELOW. WE TENTATIVELY ATTRIBUTE THIS EFFECT TO THE BOSE-EINSTEIN EFFECT ON THE PIONS. THE RATIO R[(RHO+- → PI+- + ETA FOLLOWED BY ETA → PI+ PI- PIO) / (RHO+- → PI+- PIO)] IS DETERMINED TO BE 1.2 +- 2.0 PERCENT. THIS SMALL RATIO AGREES WITH 0-+ ASSIGNMENT FOR SPIN, PARITY AND G PARITY OF THE ETA MESON, BUT CANNOT RULE OUT THE 1- POSSIBILITY. UPPER LIMITS OF SOME OTHER DECAY RATES OF RHO AND OMEGA MESONS ARE PRESENTED.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 131, 1276 (1963), REV. MOD. PHYS. 33, 395 (1961), AND PHYS. REV. 124, 575 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION OMEGA(783)
COMPOUND KEY WORDS → ANNIHILATION CROSS SECTION PION PRODUCTION

[TABLE 3]
LABORATORY BEAM MOMENTUM = 1.61 GEV/C.

REACTION	MILLIBARNS		
ANTIPROTON PROTON →			
TOTAL KAON ANNIHILATION	5.260 +-	.400	[1]
PI+ PI- MM≥2PIO	14.100	3.000	
PI+ PI+ PI- PI-	1.400	.300	
PI+ PI+ PI- PI- PIO	10.400	1.000	
PI+ PI+ PI- PI- MM≥2PIO	12.000	1.500	
FOUR PRONG PION ANNIHILATION	23.800	1.800	[1]
PI+ PI+ PI+ PI- PI- PI-	1.160	.100	
PI+ PI+ PI+ PI- PI- PI- PIO	1.800	.250	
PI+ PI+ PI+ PI- PI- PI- PIO PIO	1.050	.250	
PI+ PI+ PI+ PI+ PI- PI- PI- PI-	.025	.010	
PI+ PI+ PI+ PI+ PI- PI- PI- PI- PIO	.006	.006	
EIGHT PRONG PION ANNIHILATION	.031	.012	[1]

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

CROSS SECTION FOR ANTIPROTON PROTON → OMEGA(783) PI+ PI+ PI- PI-, [PAGE 1857]
OMEGA(783) → PI+ PI- PIO [1]

LABORATORY BEAM MOMENTUM GEV/C	MILLIBARNS
1.61	.60 +- .15

[1] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.

178 SEARCH FOR A FOUR-PION RESONANCE, AND SOME DECAY MODES OF THE RHO AND OMEGA MESONS. [NUOVO CIMENTO 25, 923 (1962)]

N.H.XUONG,G.R.LYNCH [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA, AND UNIV. OF CALIFORNIA, BERKELEY, CALIF., USA]

ABSTRACT A SEARCH FOR FOUR-PION RESONANCES AMONG SIX-PRONG ANNIHILATIONS OF 1.61 GEV/C ANTIPROTONS IN THE BERKELEY 72 IN. HYDROGEN BUBBLE CHAMBER HAS BEEN MADE. NO FOUR-BODY DECAYS OF THE RHO OR OMEGA MESONS HAVE BEEN OBSERVED AND UPPER LIMITS FOR THESE DECAYS ARE QUOTED. THE FRACTION OF THE CHARGED RHO MESONS WHICH DECAY VIA RHO+- → ETA + PI+- IS DETERMINED TO BE (1.2+2) PERCENT, IN AGREEMENT WITH A POSITIVE G PARITY ASSIGNMENT FOR THE ETA. THE NEUTRAL FOUR-PION EFFECTIVE MASS DISTRIBUTION SHOWS A SUGGESTIVE, BUT INCONCLUSIVE PEAK AT 1.04 GEV.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. 121, 1788 (1961).

BEAM IS ANTIPROTON ON PROTON AT 1.61 GEV/C.
THIS EXPERIMENT USES THE LRL 72 IN. HYDROGEN BUBBLE CHAMBER.
KEY WORDS → MASS SPECTRUM

NO DATA PUNCHED FOR THIS ARTICLE

179 KAONIC ANNIHILATIONS OF ANTIPROTONS IN HYDROGEN AT 7 BEV/C [PHYS. REV. 158, 1275 (1967)]

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Y.OREN M.S. WEBSTER [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT RESULTS ARE REPORTED FROM AN ANALYSIS OF 80,000 PICTURES OF 6.935-BEV/C ANTIPROTONS IN HYDROGEN LEADING TO FINAL STATES OF THE FORM K01 + K01 + M PI, M = 0,1,2.... ASSUMING EQUAL PROBABILITY FOR THE VARIOUS K KBAR CHARGED STATES, WE FIND THE CROSS SECTION FOR THE REACTION PBAR + P → K + KBAR + M PI TO BE 2.5 +- 0.5 MB. A COMPILATION OF ANNIHILATION CROSS SECTIONS INDICATES THAT THE KAONIC-ANNIHILATION FINAL STATES CONSTITUTE APPROXIMATELY 10 PERCENT OF ALL ANNIHILATIONS FROM ABOUT 1.6-7 BEV/C. THE PRODUCTION OF K*(1400) HAS BEEN OBSERVED, ALTHOUGH THE FORMATION OF OTHER RESONANCES SUCH AS K*(890), OMEGA, AND RHO IS LESS COPIOUS AT 7 BEV/C THAN AT 3.7 BEV/C. A K01 K01 ENHANCEMENT NEAR THRESHOLD IS OBSERVED SIMILAR TO THAT OBSERVED AT LOWER-ENERGY ANNIHILATION REACTIONS.

CLOSELY RELATED REFERENCES
SEE ALSO NUOVO CIMENTO 38, 13 (1965), AND PHYS. REV. 152, 1171 (1966).

BEAM IS ANTIPROTON ON PROTON AT 6.935 GEV/C.
THIS EXPERIMENT USES THE BNL 80 IN. HYDROGEN BUBBLE CHAMBER. A TOTAL OF 80000 PICTURES ARE REPORTED ON.
KEY WORDS → ANNIHILATION CROSS SECTION KAON PRODUCTION K*(1420)
COMPOUND KEY WORDS • ANNIHILATION CROSS SECTION KAON PRODUCTION

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....

[TABLE 2]
LABORATORY BEAM MOMENTUM = 6.935 GEV/C +- 1(PER CENT).

REACTION	MILLIBARNS
ANTIPROTON PROTON →	
TOTAL KAON ANNIHILATION	2.50 +- .50 [1]
KO KOBAR	< .02

[1] RESULT CALCULATED WITH THE ASSUMPTION THAT K+ K-, K+ KOBAR, KO K-, AND KO KOBAR ARE PRODUCED WITH EQUAL PROBABILITY.

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180 PBAR P BACKWARD ELASTIC SCATTERING FROM 0.7 TO 2.16 GEV/C [PHYS. REV. LETTERS 23, 506 (1969)]

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ABSTRACT ELASTIC SCATTERING OF PBAR ON P HAS BEEN STUDIED FOR COS-THETA (C.M.) BETWEEN -0.88 AND -1.0 AND P(LAB)PBAR BETWEEN 0.70 AND 2.16 GEV/C. THE MOMENTUM DEPENDENCE OF THE CROSS SECTION SHOWS A SHARP DIP AT 0.9 GEV/C AND A BROAD PEAKING AROUND 1.4 GEV/C. THE POSSIBILITY OF THE PEAK RESULTING FROM DIRECT FORMATION OF BOSON RESONANCES HAS BEEN STUDIED. ALTERNATIVELY, A DIFFRACTION MODEL AGREES QUALITATIVELY WITH OUR DATA AND OTHER ELASTIC DATA AT DIFFERENT ANGLES.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 17, 720 (1966), PHYS. REV. LETTERS 21, 1116 (1968), AND PHYS. REV. LETTERS 20, 1059 (1968).

BEAM IS ANTIPROTON ON PROTON FROM .703 TO 2.370 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS.
GENERAL COMMENTS ON THIS ARTICLE
1 DATA OBTAINED FROM J. K. YOH, THESIS, CALIF. INSTITUTE OF TECH., 1969
KEY WORDS → ELASTIC SCATTERING DIFFERENTIAL CROSS SECTION

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ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. [FIGURE 2]

COS(THETA) = -.99 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR [2]	
.703	225.3 +-	43.1
.812	87.1	25.4
.873	73.3	16.4
.935	44.8	16.9
.987	83.9	14.7
1.115	102.9	15.5
1.338	146.6	19.9
1.447	179.2	21.1
1.590	136.9	16.0
1.610	153.5	17.2
1.716	137.0	15.5
1.797	91.4	11.4
1.844	101.1	11.9
2.032	58.4	7.6
2.155	49.3	6.4
2.370	30.3	5.7

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

....

ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. [FIGURE 2]

COS(THETA) = -.97 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR [2]	
.703	329.3 +-	57.9
.812	112.8	31.4
.873	89.2	17.5
.935	49.3	19.9
.987	68.1	14.7
1.115	101.9	14.2
1.338	137.0	17.4
1.447	134.8	15.4
1.590	140.9	13.7
1.610	113.5	11.3
1.716	112.4	10.5
1.797	90.8	10.1
1.844	92.1	9.4
2.032	38.0	6.0
2.155	28.8	5.4
2.370	17.4	5.5

[1] MEAN VALUES.
[2] ERRORS INCLUDE SYSTEMATICS.

....

ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. (FIGURE 2)

COS(THETA) = -.95 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR	
.703	361.1 +-	68.4
.812	149.1	39.0
.873	86.0	22.3
.935	78.2	24.7
.987	55.5	16.3
1.115	90.7	14.6
1.338	97.3	16.4
1.447	113.1	15.2
1.590	93.4	13.1
1.610	108.3	12.2
1.716	106.5	10.5
1.797	67.5	10.1
1.844	63.2	8.5
2.032	34.1	5.9
2.155	26.4	5.2
2.370	14.4	4.9

[1] MEAN VALUES.

....

ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. (FIGURE 2)

COS(THETA) = -.93 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR	
.703	279.3 +-	70.8
.812	179.1	46.1
.873	145.8	30.1
.935	86.4	31.1
.987	55.4	16.4
1.115	101.6	16.9
1.338	109.1	18.5
1.447	97.5	15.1
1.590	80.1	14.7
1.610	81.2	11.3
1.716	79.0	10.2
1.797	80.6	12.0
1.844	92.3	10.4
2.032	41.0	6.8
2.155	12.6	5.2
2.370	7.9	4.6

[1] MEAN VALUES.

....

ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. (FIGURE 2)

COS(THETA) = -.91 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR	
.703	284.5 +-	89.3
.812	211.8	52.7
.873	123.0	29.8
.935	40.7	32.3
.987	105.3	25.0
1.115	46.1	12.3
1.338	101.7	19.9
1.447	73.2	15.1
1.590	76.1	16.4
1.610	86.7	13.2
1.716	75.9	11.3
1.797	58.8	11.4
1.844	67.6	10.4
2.032	31.6	7.6
2.155	22.5	6.1
2.370	9.2	6.5

[1] MEAN VALUES.

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ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. (FIGURE 2)

COS(THETA) = -.89 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR	
.812	182.4 +-	52.1
.873	85.4	26.8
.935	.0	
.987	47.2	21.4
1.115	74.0	17.8
1.338	73.8	23.3
1.447	68.4	19.9
1.590	.0	
1.610	84.6	14.6
1.716	90.7	12.5
1.797	70.0	12.5
1.844	48.6	9.7
2.032	28.3	6.8
2.155	16.2	6.6
2.370	12.2	7.3

[1] MEAN VALUES.

....

ELASTIC DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON. [FIGURE 2]

COS(THETA) = -.87 (MEAN VALUE). THETA IS THE ANGLE THAT THE ANTIPROTON MAKES WITH THE BEAM IN THE GRAND C.M.

DATA OBTAINED FROM YOH THESIS, TABLE 4.1

LABORATORY BEAM MOMENTUM GEV/C [1]	D-SIGMA/D-OMEGA UB/SR	
1.797	33.8 +-	14.7
1.844	47.3	11.2
2.032	19.7	6.7
2.155	13.4	7.5
2.370	18.2	7.4

[1] MEAN VALUES.

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181 PBAR P ANNIHILATION INTO PI+ RHO AT SMALL ANGLES BETWEEN 1 AND 2 GEV/C. [PHYS. REV. LETTERS 26, 922 (1971)]

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ABSTRACT WE HAVE STUDIED THE PROCESS PBAR P INTO PI+ X- USING WIRE SPARK CHAMBERS. THE DATA COVER THE ANGULAR RANGE OF COS THETA (PBAR, PI+*) BETWEEN 0.96 AND 1.0 AT SEVERAL INCIDENT MOMENTA BETWEEN 1 AND 2 GEV/C. THE REACTION PBAR P → PI+ RHO- WAS OBSERVED WITH (D SIGMA/D OMEGA)* OF THE ORDER OF 100 MU-B/SR AT SEVERAL MOMENTA.

CLOSELY RELATED REFERENCES
SEE ALSO PHYS. REV. LETTERS 23, 607 (1969).
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 23, 603 (1969), PHYS. REV. LETTERS 23, 506 (1969), AND PHYS. REV. LETTERS 21, 1282 (1968).

BEAM IS ANTIPROTON ON PROTON FROM 1.0 TO 2.1 GEV/C.
THIS EXPERIMENT USES SPARK CHAMBERS AND COUNTERS.
KEY WORDS → ANNIHILATION DIFFERENTIAL CROSS SECTION MESONS PRODUCTION
COMPOUND KEY WORDS → ANNIHILATION DIFFERENTIAL CROSS SECTION MESONS PRODUCTION
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DIFFERENTIAL CROSS SECTION AT FIXED ANGLE FOR ANTIPROTON PROTON → PI+ RHO(765)-. [FIGURE 2]
RHO(765)- → PI- PI0 [1]

COS(THETA) = .99 (MEAN VALUE). THETA IS THE ANGLE THAT THE PI+ MAKES WITH THE BEAM IN THE GRAND C.M.

THESE DATA WERE READ FROM A GRAPH

LABORATORY BEAM MOMENTUM GEV/C	D-SIGMA/D-OMEGA UB/SR [2,3]	
.8759	28.35 +-	28.35
.9675	46.02	21.35
1.1169	51.53	28.17
1.3313	119.94	21.19
1.4470	95.17	17.78
1.6060	81.57	13.91
1.7193	68.00	14.08
1.7964	34.78	10.61
1.8422	33.99	9.72
2.0301	13.96	6.81

[1] FITTED FOR MASS AND/OR WIDTH, AND THEN TOOK ONLY EVENTS ABOVE (FITTED) BACKGROUND.
[2] ERRORS ARE STATISTICAL ONLY.
[3] ADD POSSIBLE SYSTEMATIC ERROR OF + 30 - 50 PER CENT.

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Section IV.

INDICES

With all of the information for each article stored in a computer-searchable fashion, one could generate numerous types of indices; several that we have found most useful are included in this section.

A. MOMENTUM INDICES — Here we list all of our $\bar{p}p$ and $\bar{p}d$ articles ordered according to increasing beam momentum. If a particular paper reports results at more than one energy, that paper is listed once for each momentum value reported. The reference number in the last column is the article number in Section III.

B. KEYWORDS CLASSIFICATION — As stated in Section III, each article is assigned certain KEYWORDS. These words (or phrases) are intended to indicate the contents of the article. As our list of KEYWORDS has grown, we generally have not yet gone back to older articles and inserted the appropriate new words. Thus references may be missing from some of the categories.

C. REFERENCES — The list of all article references in Section III is presented here alphabetically by first author and chronlogically within the same first author. Each article has the same reference number as in Section III.

D. REFERENCE TITLES — The full title and journal reference of each article is given here in the same order as the reference list by author.

E. REVIEW ARTICLES — A list of several recent review articles is included for completeness. In addition to providing valuable comments on much of the data in this compilation, these articles often discuss other topics which we have not included.

Momentum Index ($\bar{p}p$)

BEAM MOMENTUM	1ST AUTHOR	JOURNAL	VOLUME,PAGE	INSTITUTIONS	DETECTOR	YEAR PUBLISHED	REF.NR.
.150	BENVENUTI	PRL	27 283	WISC	HBC	71	48
.195	SPENCER	NP	B19 501	LIVP	HBC	70	172
.195	LOKEN	PL	3 334	OXF	HBC	63	151
.239	SPENCER	NP	B19 501	LIVP	HBC	70	172
.249	LOKEN	PL	3 334	OXF	HBC	63	151
.250	BENVENUTI	PRL	27 283	WISC	HBC	71	48
.277	SPENCER	NP	B19 501	LIVP	HBC	70	172
.294	CORK	NC	25 497	LRL	HBC	62	93
.302	LOKEN	PL	3 334	OXF	HBC	63	151
.310	SPENCER	NP	B19 501	LIVP	HBC	70	172
.310	CESCHIA	PR	D 2 2555	TRST	HBC	70	78
.334	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.341	SPENCER	NP	B19 501	LIVP	HBC	70	172
.349	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.350	CLINE	PRL	21 1268	WISC	HBC	68	85
.350	BENVENUTI	PRL	27 283	WISC	HBC	71	48
.360	CLINE	PRL	27 71	WISC	HBC	71	86
.362	LOKEN	PL	3 334	OXF	HBC	63	151
.369	SPENCER	NP	B19 501	LIVP	HBC	70	172
.372	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.375	CLINE	PRL	27 71	WISC	HBC	71	86
.380	CLINE	PRL	27 71	WISC	HBC	71	86
.384	BIZZARRI	NCL	1 749	ROMA TRST	HBC	69	55
.400	CLINE	PRL	27 71	WISC	HBC	71	86
.403	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.405	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.420	CLINE	PRL	27 71	WISC	HBC	71	86
.421	CORK	NC	25 497	LRL	HBC	62	93
.425	CLINE	PRL	27 71	WISC	HBC	71	86
.428	BIZZARI	NC	54A 456	ROMA TRST	HBC	68	54
.429	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.440	CLINE	PRL	27 71	WISC	HBC	71	86
.440	BIZZARRI	NCL	1 749	ROMA TRST	HBC	69	55
.444	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.450	CLINE	PRL	21 1268	WISC	HBC	68	85
.450	BENVENUTI	PRL	27 283	WISC	HBC	71	48
.452	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.460	CLINE	PRL	27 71	WISC	HBC	71	86
.467	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.472	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.475	CLINE	PRL	27 71	WISC	HBC	71	86
.480	CLINE	PRL	27 71	WISC	HBC	71	86
.491	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.499	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.500	CLINE	PRL	27 71	WISC	HBC	71	86
.502	BIZZARRI	NCL	1 749	ROMA TRST	HBC	69	55
.508	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.517	COOMBES	PR	112 1303	LRL	CNTR	58	89
.520	CLINE	PRL	27 71	WISC	HBC	71	86
.524	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.525	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.525	CLINE	PRL	27 71	WISC	HBC	71	86
.539	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.540	CLINE	PRL	27 71	WISC	HBC	71	86
.541	CORK	NC	25 497	LRL	HBC	62	93
.549	BIZZARI	NC	54A 456	ROMA TRST	HBC	68	54
.550	CLINE	PRL	27 71	WISC	HBC	71	86
.550	CLINE	PRL	21 1268	WISC	HBC	68	85
.550	BENVENUTI	PRL	27 283	WISC	HBC	71	48
.553	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.553	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.567	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.575	CLINE	PRL	27 71	WISC	HBC	71	86
.575	AMALDI	NC	34 825	CERN	CNTR	64	18
.577	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.579	BIZZARRI	NCL	1 749	ROMA TRST	HBC	69	55
.580	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.592	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.599	CONFORTO	NC	54A 441	CERN ROMA TRST	HBC	68	87
.604	AMALDI	NC	46A 171	CERN ROMA TRST	HBC	66	19
.627	CESCHIA	PR	D 2 2555	TRST	HBC	70	78
.629	AMALDI	NC	34 825	CERN	CNTR	64	18
.639	COOMBES	PR	112 1303	LRL	CNTR	58	89
.650	CLINE	PRL	21 1268	WISC	HBC	68	85
.650	BENVENUTI	PRL	27 283	WISC	HBC	71	48
.681	AMALDI	NC	34 825	CERN	CNTR	64	18
.700	NICHOLSON	PRL	23 603	CALT ROCH BNL	CNTR	69	162
.700	LOERSTAD	NP	B14 63	CDEF CERN	HBC	69	150
.700	AGUILAR-BE	NP	B14 195	CERN CDEF	HBC	69	7
.700	AGUILAR-BE	PL	29B 379	CERN CDEF	HBC	69	6
.700	AGUILAR-BE	PL	29B 241	CERN CDEF	HBC	69	5
.700	AGUILAR-BE	PL	29B 62	CERN CDEF LIVP	HBCS	69	4

.703	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
.721	CORK	NC	25	497	LRL	HBC	62	93
.733	AMALDI	NC	34	825	CERN	CNTR	64	18
.750	BENVENUTI	PRL	27	283	WISC	HBC	71	48
.753	COOMBES	PR	112	1303	LRL	CNTR	58	89
.785	AMALDI	NC	34	825	CERN	CNTR	64	18
.812	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
.837	AMALDI	NC	34	825	CERN	CNTR	64	18
.858	COOMBES	PR	112	1303	LRL	CNTR	58	89
.867	AMALDI	NC	34	825	CERN	CNTR	64	18
.873	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
.876	YOH	PRL	26	922	CALT BNL ROCH	SPRK	71	181
.888	AMALDI	NC	34	825	CERN	CNTR	64	18
.935	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
.943	BURNS	NP	B27	109	IRVN	HBC	71	70
.968	YOH	PRL	26	922	CALT BNL ROCH	SPRK	71	181
.972	AMALDI	NC	34	825	CERN	CNTR	64	18
.987	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
.990	NICHOLSON	PRL	23	603	CALT ROCH BNL	CNTR	69	162
1.000	BRICMAN	PL	29B	451	CERN CAEN SACL	CNTR	69	68
1.000	BARISH	PRL	17	720	CALT BNL SLAC	CNTR	66	45
1.000	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.000	ABRAMS	PRL	18	1209	BNL	CNTR	67	1
1.050	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.074	AMALDI	NC	34	825	CERN	CNTR	64	18
1.100	GOLDBERG	NCL	1	627	IPNP LIVP	HBC	71	137
1.100	DUBOC	PL	34B	343	IPNP LIVP	HBCS	71	115
1.100	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.110	KALBFLEISC	NP	B30	466	BNL	HBC	71	144
1.110	KALBFLEISC	PL	29B	259	BNL	HBC	69	143
1.115	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
1.117	YOH	PRL	26	922	CALT BNL ROCH	SPRK	71	181
1.125	BARISH	PRL	17	720	CALT BNL SLAC	CNTR	66	45
1.135	ELIOFF	PR	128	869	LRL	CNTR	62	116
1.150	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.176	DONALD	NP	B11	551	LIVP OSLO PADO	HBC	69	113
1.176	DONALD	NP	B6	174	LIVP OSLO PADO	HBC	68	112
1.178	AMALDI	NC	34	825	CERN	CNTR	64	18
1.180	DOBRZYNSKI	PL	23	614	CDEF OSLO	HBC	66	108
1.180	D'ANDLAU	NP	B5	693	CDEF CERN IPNP LIVP	HBC	68	98
1.180	BARLOW	NC	50A	701	CERN CDEF IRAD LIVP	HBC	67	46
1.200	FRODESEN	NP	B10	307	OSLO LIVP	HBC	69	135
1.200	DUBOC	PL	34B	343	IPNP LIVP	HBCS	71	115
1.200	DONALD	NP	B12	325	LIVP	HBC	69	114
1.200	DONALD	PL	26B	327	LIVP OSLO PADO	HBC	68	111
1.200	DOBRZYNSKI	PL	22	105	CDEF CERN IRAD LIVP	HBC	66	107
1.200	DEFOIX	PL	28B	353	CDEF CERN IPNP	HBC	68	102
1.200	D'ANDLAU	PL	17	347	CDEF CERN IRAD LIVP	HBC	65	97
1.200	CLAYTON	NCL	1	779	LIVP ATEN	HBC	69	82
1.200	ASTIER	PL	25B	294	CDEF CERN IRAD	HBC	67	25
1.200	AGUILAR-BE	PL	29B	241	CERN CDEF	HBC	69	5
1.200	AGUILAR-BE	PL	29B	62	CERN CDEF LIVP	HBCS	69	4
1.200	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.230	COOPER	PRL	20	1059	ANL	HBC	68	90
1.230	BACON	NP	B32	66	RHEL LIVP	HBC	71	36
1.240	COOPER	NP	B16	155	ANL	HBC	70	91
1.250	BARISH	PRL	17	720	CALT BNL SLAC	CNTR	66	45
1.250	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.260	ALLISON	PRL	24	618	ANL	HBC	70	17
1.270	COOPER	PRL	20	1059	ANL	HBC	68	90
1.300	BACON	NP	B32	66	RHEL LIVP	HBC	71	36
1.300	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.310	KALBFLEISC	NP	B30	466	BNL	HBC	71	144
1.320	COOPER	NP	B16	155	ANL	HBC	70	91
1.320	COOPER	PRL	20	1059	ANL	HBC	68	90
1.330	KALBFLEISC	NP	B30	466	BNL	HBC	71	144
1.330	KALBFLEISC	PL	29B	259	BNL	HBC	69	143
1.331	YOH	PRL	26	922	CALT BNL ROCH	SPRK	71	181
1.338	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
1.343	ELIOFF	PR	128	869	LRL	CNTR	62	116
1.345	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.350	KALBFLEISC	NP	B30	466	BNL	HBC	71	144
1.360	BACON	NP	B32	66	RHEL LIVP	HBC	71	36
1.370	COOPER	PRL	20	1059	ANL	HBC	68	90
1.375	BARISH	PRL	17	720	CALT BNL SLAC	CNTR	66	45
1.380	AMALDI	NC	34	825	CERN	CNTR	64	18
1.400	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.430	COOPER	NP	B16	155	ANL	HBC	70	91
1.430	COOPER	PRL	20	1059	ANL	HBC	68	90
1.430	BACON	NP	B32	66	RHEL LIVP	HBC	71	36
1.447	YOH	PRL	26	922	CALT BNL ROCH	SPRK	71	181
1.447	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180
1.450	NICHOLSON	PRL	23	603	CALT ROCH BNL	CNTR	69	162
1.450	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.470	HARTILL	PR	184	1415	CALT NAL SLAC	SPRK	69	139
1.482	ELIOFF	PR	128	869	LRL	CNTR	62	116
1.490	COOPER	PRL	20	1059	ANL	HBC	68	90
1.490	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.500	BARISH	PRL	17	720	CALT BNL SLAC	CNTR	66	45
1.510	PARKER	NP	B32	29	MICH	HBC	71	166
1.510	OH	PRL	24	1257	MICH	HBC,	70	163
1.520	KALBFLEISC	NP	B30	466	BNL	HBC	71	144
1.520	KALBFLEISC	PL	29B	259	BNL	HBC	69	143
1.540	COOPER	NP	B16	155	ANL	HBC	70	91
1.540	COOPER	PRL	20	1059	ANL	HBC	68	90
1.550	ABRAMS	PR	D1	1917	BNL	CNTR	70	2
1.590	YOH	PRL	23	506	CALT BNL ROCH	SPRK	69	180

1.600	HINRICHS	PR	127 617	LRL BERK	HBC	62	140
1.600	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.606	YOH	PRL	26 922	CALT BNL ROCH	SPRK	71	181
1.610	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
1.610	XUONG	NC	25 923	LRL BERK	HBC	62	178
1.610	XUONG	PR	128 1849	LRL	HBC	62	177
1.610	XUONG	PR	124 575	LRL	HBC	61	176
1.610	XUONG	PRL	7 327	LRL	HBC	61	175
1.610	STEVENSON	PR	125 687	LRL	HBC	62	173
1.610	MAGLIC	PRL	7 178	LRL	HBC	61	159
1.610	MAGLIC	PRL	7 137	LRL	HBC	61	158
1.610	LYNCH	PR	131 1287	LRL	HBC	63	154
1.610	LYNCH	PR	131 1276	LRL BERK	HBC	63	153
1.610	LYNCH	RMP	33 395	LRL	HBC	61	152
1.610	BUTTON	PR	127 1297	LRL	HBC	62	75
1.610	BUTTON	PR	126 1858	LRL	HBC	62	74
1.610	BUTTON	PR	121 1788	LRL	HBC	61	73
1.620	LYS	PRL	21 1116	ANNA	HBC	68	155
1.620	COOPER	NP	B16 155	ANL	HBC	70	91
1.620	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.630	COOPER	PRL	20 1059	ANL	HBC	68	90
1.636	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.650	PARKER	NP	B32 29	MICH	HBC	71	166
1.650	ALLISON	PRL	24 618	ANL	HBC	70	17
1.650	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.683	AMALDI	NC	34 825	CERN	CNTR	64	18
1.696	ARMENTEROS	PR	119 2068	LRL BERK	CNTR	60	21
1.700	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.716	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
1.719	YOH	PRL	26 922	CALT BNL ROCH	SPRK	71	181
1.720	NICHOLSON	PRL	23 603	CALT ROCH BNL	CNTR	69	162
1.730	DAUM	NP	B6 617	CERN	CNTR	68	101
1.750	BARISH	PRL	17 720	CALT BNL SLAC	CNTR	66	45
1.750	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.770	LYS	PRL	21 1116	ANNA	HBC	68	155
1.770	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.773	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.796	YOH	PRL	26 922	CALT BNL ROCH	SPRK	71	181
1.797	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
1.800	PARKER	NP	B32 29	MICH	HBC	71	166
1.800	ATWOOD	PR	D 2 2519	CALT BNL ROCH	SPRK	70	30
1.806	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.830	LYS	PRL	21 1116	ANNA	HBC	68	155
1.830	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.842	YOH	PRL	26 922	CALT BNL ROCH	SPRK	71	181
1.844	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
1.850	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.875	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.880	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.884	AMALDI	NC	34 825	CERN	CNTR	64	18
1.890	LYS	PRL	21 1116	ANNA	HBC	68	155
1.890	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.900	LYS	PR	D 2 2525	ANNA	HBC	70	156
1.900	CHAPMAN	NP	B24 445	ANNA	HBC	70	80
1.900	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.900	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.925	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.950	PARKER	NP	B32 29	MICH	HBC	71	166
1.950	OH	PRL	24 1257	MICH	HBC,	70	163
1.950	LYS	PRL	21 1116	ANNA	HBC	68	155
1.950	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
1.950	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.977	ARMENTEROS	PR	119 2068	LRL BERK	CNTR	60	21
1.990	NICHOLSON	PRL	23 603	CALT ROCH BNL	CNTR	69	162
1.990	MAGLIC	PRL	7 137	LRL	HBC	61	158
1.990	BUTTON	PR	121 1788	LRL	HBC	61	73
1.990	BUTTON	PRL	4 530	LRL	HBC	60	72
2.000	BARISH	PRL	17 720	CALT BNL SLAC	CNTR	66	45
2.000	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.030	YOH	PRL	26 922	CALT BNL ROCH	SPRK	71	181
2.032	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
2.050	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.082	AMALDI	NC	34 825	CERN	CNTR	64	18
2.095	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.130	DAUM	NP	B6 617	CERN	CNTR	68	101
2.150	PARKER	NP	B32 29	MICH	HBC	71	166
2.150	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.155	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
2.190	KWAK	PR	186 1392	KANS	HBC	69	148
2.200	LYS	PRL	21 1116	ANNA	HBC	68	155
2.200	CHAPMAN	PRL	21 1718	ANNA	HBC	68	79
2.200	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.250	BARISH	PRL	17 720	CALT BNL SLAC	CNTR	66	45
2.250	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.285	AMALDI	NC	34 825	CERN	CNTR	64	18
2.300	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.350	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.370	YOH	PRL	23 506	CALT BNL ROCH	SPRK	69	180
2.370	DAUM	NP	B6 617	CERN	CNTR	68	101
2.375	JESPERSON	PR	D 1 2483	AMES	HBC	70	142
2.400	NICHOLSON	PRL	23 603	CALT ROCH BNL	CNTR	69	162
2.400	HARTILL	PR	184 1415	CALT NAL SLAC	SPRK	69	139
2.400	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.434	BADIER	PL	25B 152	EPOL	HBC	67	37
2.450	PARKER	NP	B32 29	MICH	HBC	71	166
2.450	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.485	AMALDI	NC	34 825	CERN	CNTR	64	18

2.500	MASON	NP	B30 617	LIVP ATEN	HBC	71	160
2.500	DANYSZ	PL	24B 309	CERN LIVP	HBCS	67	99
2.500	CONVERSI	NC	40A 690	CERN	CNTR	65	88
2.500	CLAYTON	NP	B30 605	LIVP ATEN	HBC	71	84
2.500	CLAYTON	NP	B22 85	LIVP ATEN	HBC	70	83
2.500	CLAYTON	NCL	1 779	LIVP ATEN	HBC	69	82
2.500	BARISH	PRL	17 720	CALT BNL SLAC	CNTR	66	45
2.500	BADIER	NP	B22 512	EPOL IPNP	HBC	70	38
2.500	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.550	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.600	PARKER	NP	B32 29	MICH	HBC	71	166
2.600	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.650	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.686	AMALDI	NC	34 825	CERN	CNTR	64	18
2.690	DOMINGO	PL	24B 642	COLO	HBC	67	109
2.700	SEARS	PL	29B 700	COLO	HBC	69	171
2.700	SCHROEDER	PR	188 2081	AMES COLO	HBC	69	170
2.700	KERNAN	PR	D 1 48	AMES	HBC	70	146
2.700	FISHER	NP	B16 450	COLO	HBC	70	127
2.700	FISHER	PR	161 1335	COLO AMES	HBC	67	126
2.700	DOMINGO	PL	25B 486	COLO	HBC	67	110
2.700	CRAWLEY	PR	154 1264	AMES	HBC	67	94
2.700	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.750	PARKER	NP	B32 29	MICH	HBC	71	166
2.750	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.784	ARMENTEROS	PR	119 2068	LRL BERK	CNTR	60	21
2.800	BOMSE	NC	68A 383	VAND	DBC	70	60
2.800	BACON	PR	D 2 463	VAND	DBC	70	35
2.800	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.850	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.885	JESPERSON	PR	D 1 2483	AMES	HBC	70	142
2.886	AMALDI	NC	34 825	CERN	CNTR	64	18
2.900	PARKER	NP	B32 29	MICH	HBC	71	166
2.900	KERNAN	PR	D 1 48	AMES	HBC	70	146
2.900	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.940	AMALDI	NC	34 825	CERN	CNTR	64	18
2.950	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.970	DAUM	NP	B6 617	CERN	CNTR	68	101
3.000	MUSGRAVE	NC	35 735	BIRM CERN EPOL LOIC	HBC	65	161
3.000	HOFMOKL	NUKE	9 121	CERN	HBC	64	141
3.000	FRENCH	NC	52A 438	CERN BIRM	HBC	67	132
3.000	ESCOUBES	PL	5 132	CERN DESY HAMB	HBC	63	117
3.000	DANYSZ	NC	51A 801	CERN	HBC	67	100
3.000	DANYSZ	PL	24B 309	CERN LIVP	HBCS	67	99
3.000	CERN	PRL	8 257	CERN EPOL SACL	HBC	62	77
3.000	BRICMAN	PL	29B 451	CERN CAEN SACL	CNTR	69	68
3.000	BOECK	PL	12 65	CERN EPOL LOIC	HBC	64	56
3.000	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.050	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.068	AMALDI	NC	34 825	CERN	CNTR	64	18
3.100	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.150	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.200	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.240	AMALDI	NC	34 825	CERN	CNTR	64	18
3.250	FERBEL	PRL	9 351	YALE BNL CCNY	HBC	62	118
3.250	BALTAY	PRL	11 346	YALE BNL	HBC	63	42
3.250	BALTAY	PRL	11 32	YALE BNL	HBC	63	40
3.250	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.280	FERBEL	PRL	22 1141	ROCH	HBC	69	125
3.280	FERBEL	PR	143 1096	YALE BNL CCNY	HBC	66	123
3.280	FERBEL	PR	138B1528	YALE BNL CCNY	HBC	65	122
3.280	FERBEL	PR	137B1250	YALE BNL CCNY	HBC	65	121
3.280	BALTAY	PR	140B1027	YALE BNL	HBC	65	43
3.300	BROWN	PRL	8 `255	BNL YALE	HBC	62	69
3.300	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.300	ABRAMS	PRL	18 1209	BNL	CNTR	67	1
3.500	MUSGRAVE	NC	35 735	BIRM CERN EPOL LOIC	HBC	65	161
3.500	CZYZEWSKI	PL	20 554	CERN	HBC	66	96
3.540	AMALDI	NC	34 825	CERN	CNTR	64	18
3.550	BAKER	NP	B12 5	CERN SACL	SPRK	69	39
3.590	ATHERTON	NP	B18 221	CERN IPNP	HBC	70	28
3.600	MUSGRAVE	NC	35 735	BIRM CERN EPOL LOIC	HBC	65	161
3.600	ESCOUBES	PL	5 132	CERN DESY HAMB	HBC	63	117
3.600	DEHNE	PR	136 B843	DESY	HBC	64	104
3.600	DEHNE	PL	9 185	PSEH DESY	HBC	64	103
3.600	DANYSZ	NC	51A 801	CERN	HBC	67	100
3.660	KATZ	PRL	19 265	ROCH	HBC	67	145
3.660	FERBEL	PRL	22 1141	ROCH	HBC	69	125
3.660	FERBEL	PR	138B1528	YALE BNL CCNY	HBC	65	122
3.660	FERBEL	PR	137B1250	YALE BNL CCNY	HBC	65	121
3.660	BALTAY	PR	142 932	YALE BNL	HBC	66	44
3.660	BALTAY	PR	140B1027	YALE BNL	HBC	65	43
3.690	BALTAY	PRL	11 346	YALE BNL	HBC	63	42
3.690	BALTAY	PRL	11 165	YALE BNL	HBC	63	41
3.690	BALTAY	PRL	11 32	YALE BNL	HBC	63	40
3.860	AMALDI	NC	34 825	CERN	CNTR	64	18
4.000	MUSGRAVE	NC	35 735	BIRM CERN EPOL LOIC	HBC	65	161
4.000	LINDENBAUM	PRL	7 185	BNL	CNTR	61	149
4.000	CZYZEWSKI	PL	15 188	CERN	HBC	65	95
4.015	AMALDI	NC	34 825	CERN	CNTR	64	18
4.300	AMALDI	NC	34 825	CERN	CNTR	64	18
4.700	AMALDI	NC	34 825	CERN	CNTR	64	18
5.000	VON DARDEL	PRL	5 333	CERN	CNTR	60	174
5.000	LINDENBAUM	PRL	7 185	BNL	CNTR	61	149
5.000	ASTBURY	PL	23 160	CERN ETHZ	SPRK	66	24
5.000	ASTBURY	PL	22 537	CERN ETHZ	SPRK	66	23
5.350	AMALDI	NC	34 825	CERN	CNTR	64	18

5.700	FRIDMAN	PR	176	1595	STRB HEID STRB	HBC	68	134
5.700	FRIDMAN	PR	167	1268	STRB HEID STRB	HBC	68	133
5.700	BRAUN	NC	4A	703	STRB	HBC	71	67
5.700	BRAUN	NP	B30	213	STRB	HBC	71	66
5.700	BOECKMANN	NC	42A	954	BONN DESY MILA	HBC	66	59
5.700	BOECKMANN	PL	15	356	BONN DESY MILA	HBC	65	58
5.700	BOECK	PL	17	166	CERN SACL	HBC	65	57
5.700	ATHERTON	NP	B29	477	CERN	HBC	71	29
5.700	ATHERTON	NP	B16	416	CERN PRAG	HBCS	70	27
5.700	ATHERTON	PL	30B	494	CERN	HBC	69	26
5.700	ALLES-BORE	NC	50A	776	CERN BONN	HBC	67	16
5.700	ALLES-BORE	NC	48A	360	CERN	HBC	67	15
5.700	ALLES-BORE	NC	47A	232	CERN	HBC	67	14
5.700	ALLES-BORE	NC	46A	438	CERN	HBC	66	13
5.700	ACCENSI	PL	20	557	CERN	HBC	66	3
5.800	OWEN	PR	181	1794	CORN BNL	SPRK	69	165
5.800	ASHMORE	PRL	21	387	BNL CORN	SPRK	68	22
5.900	OWEN	PR	181	1794	CORN BNL	SPRK	69	165
6.000	VON DARDEL	PRL	5	333	CERN	CNTR	60	174
6.000	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
6.000	GALBRAITH	PR	138	B913	BNL CORN	CNTR	65	136
6.000	BORGHINI	PL	31B	405	CERN ORSA PISA	CNTR	70	61
6.000	BIRNBAUM	PRL	23	433	CARN BNL	CNTR	69	51
6.000	ASTBURY	PL	23	160	CERN ETHZ	SPRK	66	24
6.800	FERBEL	NC	38	19	YALE BNL	HBC	65	120
6.800	FERBEL	NC	38	12	YALE BNL	HBC	65	119
6.900	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
6.900	KITAGAKI	PRL	21	175	TOHO	HBC	68	147
6.935	YEH	PR	158	1275	YALE BNL	HBC	67	179
6.935	CHIEN	PR	152	1171	YALE BNL	HBC	66	81
6.940	FERBEL	PR	173	1307	YALE BNL	HBC	68	124
6.940	BAR-NIR	NP	B20	45	TELA	HBC	70	47
6.940	ALEXANDER	NP	B23	557	TELA	HBC	70	10
6.940	ALEXANDER	PRL	25	63	TELA	HBC	70	9
7.000	VON DARDEL	PRL	5	333	CERN	CNTR	60	174
7.000	ASTBURY	PL	23	160	CERN ETHZ	SPRK	66	24
7.080	FERBEL	NC	38	19	YALE BNL	HBC	65	120
7.080	FERBEL	NC	38	12	YALE BNL	HBC	65	119
7.200	FOLEY	PRL	11	503	BNL	CNTR	63	128
7.900	ASHMORE	PRL	21	387	BNL CORN	SPRK	68	22
8.000	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
8.000	GALBRAITH	PR	138	B913	BNL CORN	CNTR	65	136
8.000	BIRNBAUM	PL	31B	36	CARN BNL	CNTR	70	53
8.000	BIRNBAUM	PRL	23	663	CARN BNL	CNTR	69	52
8.000	BIRNBAUM	PRL	23	433	CARN BNL	CNTR	69	51
8.900	FOLEY	PRL	11	503	BNL	CNTR	63	128
9.000	ASTBURY	PL	23	160	CERN ETHZ	SPRK	66	24
9.000	ASTBURY	PL	22	537	CERN ETHZ	SPRK	66	23
9.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
9.700	OREAR	PL	28B	61	CORN BNL	CNTR	68	164
9.710	OWEN	PR	181	1794	CORN BNL	SPRK	69	165
10.000	VON DARDEL	PRL	5	333	CERN	CNTR	60	174
10.000	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
10.000	FOLEY	PRL	11	503	BNL	CNTR	63	128
10.000	BORGHINI	PL	36B	497	CERN ORSA PISA	CNTR	71	62
10.260	VON DARDEL	PRL	5	333	CERN	CNTR	60	174
10.740	VON DARDEL	PRL	5	333	CERN	CNTR	60	174
11.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
11.800	FOLEY	PRL	15	45	BNL	CNTR	65	129
11.900	FOLEY	PRL	19	857	BNL	CNTR	67	130
12.000	GALBRAITH	PR	138	B913	BNL CORN	CNTR	65	136
12.000	FOLEY	PRL	11	503	BNL	CNTR	63	128
12.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
13.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
14.000	GALBRAITH	PR	138	B913	BNL CORN	CNTR	65	136
14.000	BORGHINI	PL	36B	497	CERN ORSA PISA	CNTR	71	62
14.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
15.910	FOLEY	PRL	15	45	BNL	CNTR	65	129
16.000	GALBRAITH	PR	138	B913	BNL CORN	CNTR	65	136
16.000	BIRNBAUM	PL	31B	36	CARN BNL	CNTR	70	53
16.000	BIRNBAUM	PRL	23	663	CARN BNL	CNTR	69	52
16.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
17.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
18.000	GALBRAITH	PR	138	B913	BNL CORN	CNTR	65	136
18.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
20.000	ALLABY	SJNP	12	295	CERN SERP	CNTR	71	12
20.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11
20.300	LINDENBAUM	PRL	7	185	BNL	CNTR	61	149
23.000	DENISOV	PL	36B	528	SERP	CNTR	71	106
25.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11
27.500	DENISOV	PL	36B	528	SERP	CNTR	71	106
30.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11
31.000	DENISOV	PL	36B	528	SERP	CNTR	71	106
33.500	DENISOV	PL	36B	528	SERP	CNTR	71	106
35.000	DENISOV	PL	36B	528	SERP	CNTR	71	106
35.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11
37.500	DENISOV	PL	36B	528	SERP	CNTR	71	106
40.000	DENISOV	PL	36B	528	SERP	CNTR	71	106
40.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11
42.500	DENISOV	PL	36B	528	SERP	CNTR	71	106
45.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11
47.500	DENISOV	PL	36B	528	SERP	CNTR	71	106
50.000	ALLABY	PL	30B	500	CERN SERP	CNTR	69	11

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BEAM MOMENTUM	1ST AUTHOR	JOURNAL	VOLUME,PAGE	INSTITUTIONS	DETECTOR	YEAR PUBLISHED	REF.NR.
.050	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.100	GRAY	PRL	26 1491	SYR	DBC	71	138
.335	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.404	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.450	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.504	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.560	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.605	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.650	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.705	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.762	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.800	GRAY	PRL	26 1491	SYR	DBC	71	138
.813	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.866	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
.920	BURROWS	AUJP	23 819	MELB AUNA	DBC	70	71
1.000	BETTINI	NC	1 A 333	PADO LRL PISA TORI	DBC	71	50
1.000	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.000	ABRAMS	PRL	18 1209	BNL	CNTR	67	1
1.050	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.100	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.135	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.150	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.200	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.250	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.300	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.330	CAMERINI	NC	68A 686	WISC	DBC	70	76
1.343	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.345	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.400	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.440	BERRYHILL	PRL	21 770	WISC	DBC	68	49
1.450	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.482	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.490	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.550	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.600	OH	PRL	24 1257	MICH	HBC,	70	163
1.600	MA	PRL	27 344	MICH	DBC	71	157
1.600	BETTINI	NC	1 A 333	PADO LRL PISA TORI	DBC	71	50
1.600	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.636	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.650	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.700	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.750	MA	PRL	27 344	MICH	DBC	71	157
1.750	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.773	ELIOFF	PR	128 869	LRL	CNTR	62	116
1.806	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.850	MA	PRL	27 344	MICH	DBC	71	157
1.850	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.875	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.900	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.925	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
1.950	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
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2.050	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.095	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.150	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.200	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.250	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.300	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.350	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.400	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.450	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.500	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.550	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.600	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.650	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
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2.900	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
2.950	ABRAMS	PR	D1 1917	BNL	CNTR	70	2

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3.050	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
3.100	ABRAMS	PR	D1 1917	BNL	CNTR	70	2
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[9] HEAVY-BOSON PRODUCTION IN PBAR P MULTIPION ANNIHILATION AT 6.94 GEV/C [PHYS. REV. LETTERS 25, 63 (1970)]

[10] GENERAL FEATURES OF PBAR P ANNIHILATION INTO SIX CHARGED PIONS AT 6.94 GEV/C INCIDENT MOMENTUM. [NUC. PHYS. B23, 557 (1970)]

[11] TOTAL CROSS SECTIONS OF PI-, K-, AND PBAR ON PROTONS AND DEUTERONS IN THE MOMENTUM RANGE 20-65 GEV/C [PHYS. LETTERS 30B, 500 (1969)]

[12] TOTAL INTERACTION CROSS SECTIONS AND ABSORPTION CROSS SECTIONS OF PI- AND K- MESONS AND ANTIPROTONS IN THE MOMENTUM REGION FROM 20 TO 65 BEV/C. [SOVIET JNP 12, 295 (1971)]

[13] OBSERVATION OF SPIN ALIGNMENT OF RESONANCES PRODUCED IN THE 3-BODY REACTIONS PBAR P → PBAR P OMEGAO AND PBAR P → NBAR*-- N*++ PIO AT 5.7 GEV/C. [NUOVO CIMENTO 46A, 438 (1966)]

[14] PRODUCTION OF N*(1518) AND N*(1688) ISOBARS IN PBAR P INTERACTIONS AT 5.7 GEV/C. DETERMINATION OF THEIR WIDTHS AND DECAY BRANCHING RATIOS. [NUOVO CIMENTO 47A, 232 (1967)]

[15] THE REACTION P PBAR → N*(3,3) ANTI N*(3,3) AT 5.7 GEV/C. [NUOVO CIMENTO 48A, 360 (1967)]

[16] ANTIPROTON-PROTON ANNIHILATIONS INTO FIVE PIONS AT 5.7 GEV/C. [NUOVO CIMENTO 50A, 776 (1967)]

[17] OBSERVATION OF RHO-OMEGA INTERFERENCE IN ANTIPROTON ANNIHILATIONS. [PHYS. REV. LETTERS 24, 618 (1970)]

[18] ANTI-PROTON PROTON TOTAL CROSS SECTIONS BETWEEN 0.575 AND 5.35 GEV/C. [NUOVO CIMENTO 34, 825 (1964)]

[19] ANTIPROTON-PROTON ELASTIC AND INELASTIC TOTAL CROSS-SECTIONS BETWEEN 57 AND 178 MEV. [NUOVO CIMENTO 46A, 171 (1966)]

[20] COHERENT PBAR D INTERACTIONS AND RELATED DISSOCIATION REACTIONS AT 7.0 GEV/C. [NUC. PHYS. B29, 327 (1971)]

[21] ANTIPROTON-PROTON CROSS SECTIONS AT 1.0, 1.25, AND 2.0 BEV [PHYS. REV. 119, 2068 (1960)]

[22] HIGH-ENERGY PI- P, K- P, AND PBAR P ELASTIC SCATTERING [PHYS. REV. LETTERS 21, 387 (1968)]

[23] THE CHARGE EXCHANGE ANTI-PROTON,PROTON → ANTI-NEUTRON,NEUTRON AT 5, 6, 7 AND 9 GEV/C. [PHYS. LETTERS 22, 537 (1966)]

[24] FURTHER RESULTS ON THE CHARGE EXCHANGE ANTI-PROTON,PROTON → ANTI-NEUTRON,NEUTRON AT 5, 6, 7, AND 9 GEV/C. [PHYS. LETTERS 23, 160 (1966)]

[25] FURTHER STUDY OF THE I=1 K KBAR STRUCTURE NEAR THRESHOLD. [PHYS. LETTERS 25B, 294 (1967)]

[26] TWO-BODY HYPERON PRODUCTION BY 5.7 GEV/C ANTIPROTONS ON PROTONS. [PHYS. LETTERS 30B, 494 (1969)]

[27] ANTIPROTON-PROTON ANNIHILATIONS INTO PI- AND K-MESONS AT 5.7 GEV/C. [NUC. PHYS. B16, 416 (1970)]

[28] GENERAL CHARACTERISTICS OF THE ANNIHILATION REACTION PBAR P → 3PI+ 3PI- (PIO) AT 3.6 GEV/C. [NUC. PHYS. B18, 221 (1970)]

[29] Y*(1385) PRODUCTION IN PBAR REACTIONS AT 5.7 GEV/C. [NUC. PHYS. B29, 477 (1971)]

[30] MEASUREMENT OF ANTIPROTON-PROTON FORWARD CHARGE-EXCHANGE SCATTERING. [PHYS. REV. D 2, 2519 (1970)]

[31] OBSERVATION OF THE REACTION PBAR + D → LAMBDA + SIGMA- + XIBAR+. [PHYS. REV. 134, B1339 (1964)]

[32] ANTI-ISOBAR PRODUCTION IN ANTI-PROTON, N INTERACTIONS [PHYS. REV. 139, B1420 (1965)]

[33] COMPARISON OF ISOBAR PRODUCTION IN PP AND ANTI-PROTON N INTERACTIONS AT 2.8 GEV/C . [PHYS. REV. 162, 1320 (1967)]

[34] EVIDENCE FOR PRODUCTION OF AN N*(1400) AND NBAR*(1400) IN THE REACTION PBAR P (N) → PBAR P PI+ PI- (N) AT 2.8 GEV/C. [PHYS. REV. LETTERS 22, 43 (1969)]

[35] DOUBLE-PION PRODUCTION REACTIONS IN PBAR N COLLISIONS AT 2.8 GEV/C. [PHYS. REV. D 2, 463 (1970)]

[36] NON-ANNIHILATION CHANNELS IN PBAR P INTERACTIONS NEAR CENTRE OF MASS ENERGY 2200 MEV. [NUC. PHYS. B32, 66 (1971)]

[37] REACTIONS PBAR P → LAMBDA-BAR LAMBDA AT 2.5 GEV/C [PHYS. LETTERS 25B, 152 (1967)]

[38] STUDY OF PBAR P ANNIHILATION AT 2.5 GEV/C WITH PRODUCTION OF TWO KAONS IN FINAL STATE. [NUC. PHYS. B22, 512 (1970)]

[39] ANTIPROTON-PROTON ELASTIC SCATTERING AT 3.55 GEV/C. [NUC. PHYS. B12, 5 (1969)]

[40] PRODUCTION OF HYPERON RESONANCES IN LAMBDA O + ANTILAMBDA O + PI+ PI- FINAL STATES. [PHYS. REV. LETTERS 11, 32 (1963)]

[41] OBSERVATION OF THE PRODUCTION OF AN ANTI-XI-ZERO PARTICLE. [PHYS. REV. LETTERS 11, 165 (1963)]

[42] INVESTIGATION OF Y* AND ANTI-Y* PRODUCTION IN REACTIONS OF THE TYPE ANTIPROTON + P → Y + ANTI-Y + PI. [PHYS. REV. LETTERS 11, 346 (1963)]

[43] ANTIHYPERON PRODUCTION IN ANTIPROTON-PROTON REACTIONS AT 3.7 BEV/C. [PHYS. REV. 140, B1027 (1965)]

[44] STUDY OF ANTIPROTON-PROTON ANNIHILATIONS INTO K AND PI MESONS AT 3.7 BEV/C. [PHYS. REV. 142, 932 (1966)]

[45] PBAR P ELASTIC SCATTERING FOR INCIDENT MOMENTA BETWEEN 1.0 AND 2.50 BEV/C [PHYS. REV. LETTERS 17, 720 (1966)]

[46] EXPERIMENTAL RESULTS ON PBAR P ANNIHILATIONS AT 1.2 GEV/C WITH PRODUCTION OF AT LEAST ONE K01 MESON. [NUOVO CIMENTO 50A, 701 (1967)]

[47] ANTIPROTON-PROTON ANNIHILATION AT 6.94 GEV/C LEADING TO 8 AND MORE PIONS. [NUC. PHYS. B20, 45 (1970)]

[48] EXPERIMENTAL EVIDENCE FOR A HIGH-MASS VECTOR MESON. [PHYS. REV. LETTERS 27, 283 (1971)]

[49] COMPARISON OF THE DIP-BUMP STRUCTURE IN PBAR-P AND PBAR-N ELASTIC SCATTERING. [PHYS. REV. LETTERS 21, 770 (1968)]

[50] THE ANNIHILATION PBAR N → PI+ PI- PI- BETWEEN 1.0 AND 1.6 GEV/C AND ITS COMPARISON WITH THE VENEZIANO MODEL. [NUOVO CIMENTO 1 A, 333 (1971)]

[51] PBAR P ANNIHILATION INTO BOSON PAIRS AT 6 AND 8 GEV/C. [PHYS. REV. LETTERS 23, 433 (1969)]

[52] PBAR-P ELASTIC SCATTERING AT 8 AND 16 GEV/C [PHYS. REV. LETTERS 23, 663 (1969)]

[53] UPPER LIMITS ON RARE TWO-BODY PROCESSES IN K- P AND PBAR P SCATTERING AT HIGH ENERGIES. [PHYS. LETTERS 31B, 36 (1970)]

[54] ANTIPROTON-PROTON CHARGE-EXCHANGE DIFFERENTIAL CROSS-SECTIONS BETWEEN 50 AND 180 MEV. [NUOVO CIMENTO 54A, 456 (1968)]

[55] LOW-ENERGY PBAR P ANNIHILATION INTO PI+ PI- AND K+ K-. [NUOVO CIMENTO LETTERS 1, 749 (1969)]

[56] EVIDENCE FOR A (K PI PI) RESONANCE WITH T(Z) = +-3/2 AT 1270 MEV. [PHYS. LETTERS 12, 65 (1964)]

[57] A SEARCH FOR HEAVY HYPERON RESONANCES PRODUCED BY 5.7 GEV/C ANTIPROTONS IN HYDROGEN. [PHYS. LETTERS 17, 166 (1965)]

[58] INVESTIGATION OF THE REACTION PROTON ANTIPROTON → N*(3,3) ANTI-N*(3,3) AT 5.7 GEV/C AND 3.6 GEV/C. [PHYS. LETTERS 15, 356 (1965)]

[59] ELASTIC SCATTERING, PION PRODUCTION, AND ANNIHILATION INTO PIONS IN ANTIPROTON-PROTON INTERACTIONS AT 5.7 GEV/C. [NUOVO CIMENTO 42A, 954 (1966)]

[60] FURTHER EXAMINATION OF LOW-MASS PBAR PI- PI+ AND P PI- PI+ ENHANCEMENTS IN THE REACTION PBAR P → PBAR PI- P PI+ AT (2.8-3.5) GEV/C. [NUOVO CIMENTO 68A, 383 (1970)]
[61] MEASUREMENT OF THE POLARIZATION PARAMETER IN PI+- P, K+- P, PP, AND PBAR P ELASTIC SCATTERING AT 6 GEV/C. [PHYS. LETTERS 31B, 405 (1970)]
[62] POLARIZATION PARAMETER IN K+- P AND PBAR P ELASTIC SCATTERING AT 10 AND 14 GEV/C. [PHYS. LETTERS 36B, 497 (1971)]
[63] STUDY OF THE PBAR D → P(SPECTATOR) PBAR P PI- REACTION AT 5.5 GEV/C. [PHYS. REV. D 2, 488 (1970)]
[64] INVESTIGATION OF THE PBAR D PI+ PI- FINAL STATE IN PBAR D COHERENT PRODUCTION AT 5.5 GEV/C. [PHYS. REV. D2, 1212 (1970)]
[65] OBSERVATION OF THE D* EFFECT IN THE PBAR D → P PBAR PI+ PI- N REACTION AT 5.55 GEV/C. [PHYS. REV. D 3, 2572 (1971)]
[66] FURTHER EVIDENCE FOR A 2PI+ 2PI- 1.7 GEV/C**2 ENHANCEMENT OBSERVED IN THE PBAR P → 3 PI+ 3 PI- PIO REACTION AT 5.7 GEV/C. [NUC. PHYS. B30, 213 (1971)]
[67] STUDY OF THE PBAR P → PBAR P 2PI+ 2PI- REACTION AT 5.7 GEV/C. [NUOVO CIMENTO 4A, 703 (1971)]
[68] SEARCH FOR STRUCTURES IN THE PBAR P → NBAR N CROSS SECTION BETWEEN 1 AND 3 GEV/C. [PHYS. LETTERS 29B, 451 (1969)]
[69] OBSERVATION OF PRODUCTION OF A XI(-) + ANTI-XI(+) PAIR. [PHYS. REV. LETTERS 8, 255 (1962)]
[70] FOUR-PION FINAL STATE IN PBAR P ANNIHILATIONS AT 940 MEV/C. [NUC. PHYS. B27, 109 (1971)]
[71] PBAR D TOPOLOGICAL CROSS SECTIONS IN THE MOMENTUM RANGE 50-920 MEV/C. [AUSTRALIAN J. PHYS. 23, 819 (1970)]
[72] EVIDENCE FOR THE REACTION PBAR + P → SIGMABARO + LAMBDA. [PHYS. REV. LETTERS 4, 530 (1960)]
[73] REACTION PBAR + P → YBAR + Y [PHYS. REV. 121, 1788 (1961)]
[74] PION-PION INTERACTION IN THE REACTION PBAR + P → 2PI+ + 2PI- + NPIO [PHYS. REV. 126, 1858 (1962)]
[75] EXPERIMENTAL STUDY OF THE POLARIZATION AND MAGNETIC MOMENT OF THE ANTIPROTON. [PHYS. REV. 127, 1297 (1962)]
[76] ISOTOPIC-SPIN DEPENDENCE OF NBAR-N ANNIHILATION UP TO 5.5 GEV/C. [NUOVO CIMENTO 68A, 686 (1970)]
[77] EXAMPLE OF ANTICASCADE (ANTIXI +) PARTICLE PRODUCTION IN PBAR P INTERACTIONS AT 3.0 GEV/C. [PHYS. REV. LETTERS 8, 257 (1962)]
[78] EXPERIMENTAL STUDY OF THE POLARIZATION OF ANTIPROTONS FROM LOW-ENERGY PBAR P ELASTIC SCATTERING. [PHYS. REV. D 2, 2555 (1970)]
[79] CROSS SECTIONS FOR THE REACTIONS PBAR P → PI+ PI- AND K+K- NEAR 2 GEV/C. [PHYS. REV. LETTERS 21, 1718 (1968)]
[80] RHO-OMEGA INTERFERENCE IN PBAR P → 4 PI AT 1.6 - 2.2 GEV/C. [NUC. PHYS. B24, 445 (1970)]
[81] HYPERON AND ANTIHYPERON PRODUCTION IN PBAR P COLLISIONS AT 7 BEV/C. [PHYS. REV. 152, 1171 (1966)]
[82] PION-PION CORRELATIONS AT LOW ENERGIES. [NUOVO CIMENTO LETTERS 1, 779 (1969)]
[83] THE ANNIHILATION PROCESS P PBAR → 2 PI+ 2 PI- AT 2.5 GEV/C. [NUC. PHYS. B22, 85 (1970)]
[84] THE ANNIHILATION PROCESS P PBAR → 2 PI+ 2 PI- PIO AT 2.5 GEV/C. [NUC. PHYS. B30, 605 (1971)]
[85] ENERGY-DEPENDENT STRUCTURE IN BACKWARD-HEMISPHERE PBAR P ELASTIC SCATTERING AND HIGH-MASS BOSONS. [PHYS. REV. LETTERS 21, 1268 (1968)]
[86] MEASUREMENT OF THE PROTON-ANTIPROTON TOTAL ANNIHILATION CROSS SECTION AT LOW ENERGY. [PHYS. REV. LETTERS 27, 71 (1971)]
[87] ANTIPROTON-PROTON ELASTIC SCATTERING BETWEEN 63 AND 175 MEV. [NUOVO CIMENTO 54A, 441 (1968)]
[88] THE LEPTONIC ANNIHILATION MODES OF THE PROTON-ANTIPROTON SYSTEM AT 6.8 (GEV/C)**2 TIMELIKE FOUR-MOMENTUM TRANSFER. [NUOVO CIMENTO 40A, 690 (1965)]
[89] ANTIPROTON-PROTON CROSS SECTIONS AT 133,197,265, AND 333 MEV. [PHYS. REV. 112, 1303 (1958)]
[90] STUDY OF THE STRUCTURE IN THE ANTIPROTON-PROTON TOTAL CROSS SECTION NEAR 1.3 GEV/C. [PHYS. REV. LETTERS 20, 1059 (1968)]
[91] PBAR-P ELASTIC SCATTERING IN THE MOMENTUM RANGE 1.24 TO 1.62 GEV/C [NUC. PHYS. B16, 155 (1970)]
[92] CROSS SECTIONS FOR ANTIPROTONS IN HYDROGEN, BERYLLIUM, CARBON, AND LEAD. [PHYS. REV. 107, 248 (1957)]
[93] ANTIPROTON-PROTON INTERACTION CROSS-SECTIONS AT 45,90,145, AND 245 MEV. [NUOVO CIMENTO 25, 497 (1962)]
[94] DOUBLE PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 2.7 BEV/C. [PHYS. REV. 154, 1264 (1967)]
[95] ANTIPROTON-PROTON ELASTIC SCATTERING AT 4 GEV/C AND DERIVATION OF DIFFRACTION SLOPE AT INFINITE ENERGY. [PHYS. LETTERS 15, 188 (1965)]
[96] CHARGE EXCHANGE AND THE REACTION ANTIPROTON + PROTON → ANTI-N + N + PI+ + PI- OF 3.0, 3.6 AND 4.0 GEV/C ANTIPROTONS. [PHYS. LETTERS 20, 554 (1966)]
[97] EVIDENCE FOR A NON-STRANGE MESON OF MASS 1290 MEV. [PHYS. LETTERS 17, 347 (1965)]
[98] ANTIPROTON-PROTON ANNIHILATION INTO (KKBAR + 3 PI) AND (KKBAR + 4 PI) AT 1.2 GEV/C. STUDY OF THE DO PROPERTIES. [NUC. PHYS. B5, 693 (1968)]
[99] EVIDENCE FOR THE EXISTENCE OF MESONS DECAYING TO FOUR PIONS. [PHYS. LETTERS 24B, 309 (1967)]
[100] ANNIHILATIONS OF 3.0 AND 3.6 GEV/C ANTIPROTONS INTO SIX OR MORE PIONS. [NUOVO CIMENTO 51A, 801 (1967)]
[101] ELASTIC SCATTERING OF ANTIPROTONS ON POLARIZED PROTONS AT 1.73,2.13,2.37, AND 2.97 GEV/C. [NUC. PHYS. B6, 617 (1968)]
[102] EVIDENCE FOR THE EXISTENCE OF A NARROW ETAO PI+- RESONANCE AT 975 MEV, INTERPRETED AS A DECAY OF THE DELTA+- MESON, AND EVIDENCE FOR A DELTA+- PI-+ DECAY OF THE DO MESON. [PHYS. LETTERS 28B, 353 (1968)]
[103] PROTON-ANTIPROTON INTERACTIONS AT 3.6 GEV/C AND ONE PION EXCHANGE. [PHYS. LETTERS 9, 185 (1964)]
[104] PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 3.6 GEV/C. [PHYS. REV. 136, B843 (1964)]
[105] EXPERIMENTAL COMPARISON OF DBAR P AND PBAR D TOTAL CROSS SECTIONS. [PHYS. LETTERS 34B, 167 (1971)]
[106] ENERGY DEPENDENCE OF PI-, K- AND PBAR TOTAL CROSS SECTIONS ON PROTONS IN THE MOMENTUM RANGE UP TO 65 GEV/C. [PHYS. LETTERS 36B, 528 (1971)]
[107] TEST OF CP AND C INVARIANCES IN PBAR P ANNIHILATIONS AT 1.2 GEV/C INVOLVING STRANGE PARTICLES. [PHYS. LETTERS 22, 105 (1966)]
[108] STUDY OF THE POLARIZATION OF ANTIPROTON IN PBAR P SCATTERING AT 1.18 GEV/C. [PHYS. LETTERS 23, 614 (1966)]
[109] ELASTIC SCATTERING OF 2.7 GEV/C ANTIPROTONS ON PROTONS. [PHYS. LETTERS 24B, 642 (1967)]
[110] TWO MESON FINAL STATES IN INTERACTIONS OF 2.7 GEV/C PBAR P. [PHYS. LETTERS 25B, 486 (1967)]
[111] THE SPIN AND PARITY OF THE A2(+-) PRODUCED IN PBAR P ANNIHILATIONS. [PHYS. LETTERS 26B, 327 (1968)]
[112] THE FOUR-PRONG ANNIHILATION OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN. (I). FOUR-PION FINAL STATE. [NUC. PHYS. B6, 174 (1968)]
[113] THE FOUR-PRONG ANNIHILATION OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN. (II) PI+ PI+ PI- PI- PIO FINAL STATE. [NUC. PHYS. B11, 551 (1969)]
[114] THE STRUCTURE OF THE (RHO PI) DECAY OF THE A2 MESON PRODUCED IN ANTIPROTON-PROTON ANNIHILATIONS AT 1.2 GEV/C. [NUC. PHYS. B12, 325 (1969)]
[115] EVIDENCE OF NEUTRAL F1 PRODUCTION IN PBAR P ANNIHILATIONS AT 1.1-1.2 GEV/C. [PHYS. LETTERS 34B, 343 (1971)]
[116] ANTIPROTON-NUCLEON CROSS SECTIONS FROM 0.5 TO 1.0 BEV. [PHYS. REV. 128, 869 (1962)]
[117] ELASTIC SCATTERING AND POLARIZATION IN 3.0 AND 3.6 GEV/C ANTIPROTON-PROTON COLLISIONS. [PHYS. LETTERS 5, 132 (1963)]
[118] PRODUCTION OF ANTI-ISOBAR, ISOBAR PAIRS IN ANTI-PROTON, PROTON COLLISIONS. [PHYS. REV. LETTERS 9, 351 (1962)]
[119] SINGLE PION PRODUCTION AND MULTIPLE PION ANNIHILATIONS IN PBAR-P INTERACTIONS AT 7 GEV/C. [NUOVO CIMENTO 38, 12 (1965)]
[120] MULTIPLE PION PRODUCTION (WITHOUT ANNIHILATION) IN PBAR-P COLLISIONS AT 7 GEV/C. [NUOVO CIMENTO 38, 19 (1965)]

[121] ELASTIC SCATTERING AND CROSS SECTIONS IN ANTIPROTON-PROTON INTERACTIONS AT 3.3 AND 3.7 BEV/C. [PHYS. REV. 137, B1250 (1965)]
[122] PION PRODUCTION AND THE ONE-PARTICLE-EXCHANGE MECHANISM IN ANTIPROTON-PROTON INTERACTIONS AT 3-4 BEV/C. [PHYS. REV. 138, B1528 (1965)]
[123] PION PRODUCTION IN ANTIPROTON-PROTON ANNIHILATIONS AT 3.3 AND 3.7 BEV/C. [PHYS. REV. 143, 1096 (1966)]
[124] PION PRODUCTION AND ELASTIC SCATTERING IN ANTIPROTON-PROTON COLLISIONS AT 6.94 BEV/C. [PHYS. REV. 173, 1307 (1968)]
[125] PRODUCTION OF LOW-MASS P PI+ PI- AND PBAR PI+ PI- STATES IN THE REACTION PBAR P → PBAR P PI+ PI- AT 3-4 GEV/C. [PHYS. REV. LETTERS 22, 1141 (1969)]
[126] HYPERON PRODUCTION IN INTERACTIONS OF 2.7 GEV/C ANTIPROTONS ON PROTONS. [PHYS. REV. 161, 1335 (1967)]
[127] ANTIPROTON-PROTON ANNIHILATION INTERACTIONS AT 2.7 GEV/C PRODUCING 8 OR MORE PIONS. [NUC. PHYS. B16, 450 (1970)]
[128] ANTIPROTON AND KAON ELASTIC SCATTERING AT HIGH ENERGIES. [PHYS. REV. LETTERS 11, 503 (1963)]
[129] ELASTIC SCATTERING OF PROTONS, ANTIPROTONS, NEGATIVE PIONS, AND NEGATIVE KAONS AT HIGH ENERGIES. [PHYS. REV. LETTERS 15, 45 (1965)]
[130] HIGH-ENERGY, SMALL-ANGLE, PP AND PBAR P SCATTERING, AND PP TOTAL CROSS SECTIONS. [PHYS. REV. LETTERS 19, 857 (1967)]
[131] SCATTERING OF ANTINEUTRONS BY PROTONS. [PHYS. REV. 184, 1413 (1969)]
[132] ANTIPROTON-PROTON ANNIHILATION INTO KAONS AND PIONS IN THE MOMENTUM REGION 3 TO 4 GEV/C. [NUOVO CIMENTO 52A, 438 (1967)]
[133] ANTIPROTON-PROTON ANNIHILATION INTO SIX CHARGED PIONS AND RESONANCE PRODUCTION IN THE PBAR P → 3 PI+ 3 PI- PIO CHANNEL AT 5.7 GEV/C. [PHYS. REV. 167, 1268 (1968)]
[134] ANGULAR CORRELATIONS AND DISTRIBUTIONS IN PBAR P ANNIHILATION INTO EIGHT AND NINE PIONS AT 5.7 GEV/C. [PHYS. REV. 176, 1595 (1968)]
[135] THE FOUR PRONG ANNIHILATION OF 1.2 GEV/C ANTIPROTONS IN HYDROGEN. (III) K+ K- PI+ PI- AND K+ K- PI+ PI- PIO FINAL STATES. [NUC. PHYS. B10, 307 (1969)]
[136] TOTAL CROSS SECTIONS OF PROTONS, ANTIPROTONS, AND PI AND K MESONS ON HYDROGEN AND DEUTERIUM IN THE MOMENTUM RANGE 6-22 GEV/C. [PHYS. REV. 138, B913 (1965)]
[137] THE SPIN AND PARITY OF THE D(O)-MESON. [NUOVO CIMENTO LETTERS 1, 627 (1971)]
[138] EVIDENCE FOR THE EXISTENCE OF A NARROW PBAR N BOUND STATE. [PHYS. REV. LETTERS 26, 1491 (1971)]
[139] ANTIPROTON-PROTON ANNIHILATION INTO ELECTRON-POSITRON PAIRS AND GAMMA-RAY PAIRS. [PHYS. REV. 184, 1415 (1969)]
[140] CHARGE-EXCHANGE PRODUCTION OF ANTINEUTRONS AND THEIR ANNIHILATION IN HYDROGEN. [PHYS. REV. 127, 617 (1962)]
[141] TWO-PRONG INELASTIC INTERACTIONS OF 3.0 GEV/C ANTIPROTONS IN HYDROGEN WITH ONE-PION PRODUCTION. [NUKLEONIKA 9, 121 (1964)]
[142] TWO- AND THREE-PION PRODUCTION WITHOUT ANNIHILATION IN ANTIPROTON-PROTON INTERACTIONS AT 2.4 AND 2.9 GEV/C. [PHYS. REV. D 1, 2483 (1970)]
[143] FORMATION OF A MESONIC STATE IN THE PBAR P INTERACTION AT 1.32 GEV/C. [PHYS. LETTERS 29B, 259 (1969)]
[144] PBAR P ELASTIC SCATTERING IN THE T-MESON REGION. [NUC. PHYS. B30, 466 (1971)]
[145] LARGE-ANGLE PBAR P ELASTIC SCATTERING AT 3.66 GEV/C. [PHYS. REV. LETTERS 19, 265 (1967)]
[146] INTERPRETATION OF THE P PI+ PI- AND PBAR PI+ PI- MASS SPECTRA IN THE REACTION PBAR P → PBAR P PI+ PI- AT 2.7 AND 2.9 GEV/C. [PHYS. REV. D 1, 48 (1970)]
[147] PBAR-P ELASTIC SCATTERING AT 6.9 GEV/C. [PHYS. REV. LETTERS 21, 175 (1968)]
[148] SPIN CORRELATIONS IN PBAR P → LAMBDABAR LAMBDA AT 2.19 GEV/C. [PHYS. REV. 186, 1392 (1969)]
[149] ANTIPROTON-PROTON AND PROTON-PROTON TOTAL CROSS SECTIONS FROM 4 TO 20 BEV/C [PHYS. REV. LETTERS 7, 185 (1961)]
[150] ANALYSIS OF THE I=0(K KBAR PI) RESONANCES PRODUCED IN PBAR P ANNIHILATIONS AT 0.7 GEV/C. THE D, E AND F' MESONS. [NUC. PHYS. B14, 63 (1969)]
[151] SOME LOW ENERGY PROTON-ANTIPROTON CROSS SECTIONS. [PHYS. LETTERS 3, 334 (1963)]
[152] FINAL STATES OF THE ANTIPROTON-PROTON SYSTEM. [REV. MOD. PHYS. 33, 395 (1961)]
[153] INTERACTIONS OF 1.61-BEV/C ANTIPROTONS IN HYDROGEN INVOLVING TWO OUTGOING CHARGED PARTICLES. [PHYS. REV. 131, 1276 (1963)]
[154] TWO-MESON ANNIHILATIONS OF 1.61-BEV/C ANTIPROTONS IN HYDROGEN. [PHYS. REV. 131, 1287 (1963)]
[155] SEARCH FOR RESONANCE FORMATION IN ANTIPROTON-PROTON ELASTIC SCATTERING FROM 1.6 TO 2.2 GEV/C. [PHYS. REV. LETTERS 21, 1116 (1968)]
[156] SEARCH FOR DOUBLY CHARGED MESONS IN PBAR P ANNIHILATIONS INTO PIONS NEAR 1.9 GEV/C. [PHYS. REV. D 2, 2525 (1970)]
[157] ANTIPROTON-DEUTERON ELASTIC SCATTERING BETWEEN 1.60 AND 2.00 GEV/C. [PHYS. REV. LETTERS 27, 344 (1971)]
[158] CHARGE ASYMMETRIES IN THE ANGULAR DISTRIBUTION OF PI AND K MESONS FROM ANTIPROTON ANNIHILATIONS IN FLIGHT. [PHYS. REV. LETTERS 7, 137 (1961)]
[159] EVIDENCE FOR A T=0 THREE-PION RESONANCE. [PHYS. REV. LETTERS 7, 178 (1961)]
[160] A STUDY OF THE REACTION P PBAR → P PBAR PI+ PI- AT AN ANTIPROTON MOMENTUM OF 2.5 GEV/C. [NUC. PHYS. B30, 617 (1971)]
[161] STUDY OF Y YBAR PRODUCTION IN TWO, THREE, AND FOUR BODY FINAL STATES BY 3.0, 3.6 AND 4.0 GEV/C ANTIPROTONS IN HYDROGEN. [NUOVO CIMENTO 35, 735 (1965)]
[162] DETAILED STRUCTURE OF THE REACTIONS IN PBAR P → PI+ PI- AND PBAR P → K+ K- FROM 0.7 TO 2.4 GEV/C. [PHYS. REV. LETTERS 23, 603 (1969)]
[163] I=1 ENHANCEMENT NEAR 2360 MEV OBSERVED IN NBAR N KAON ANNIHILATION CROSS SECTIONS. [PHYS. REV. LETTERS 24, 1257 (1970)]
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$\bar{p}p$ Symposium at Chexbres, March 27-29, 1972, edited by L. Montanet; to be published at CERN.

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