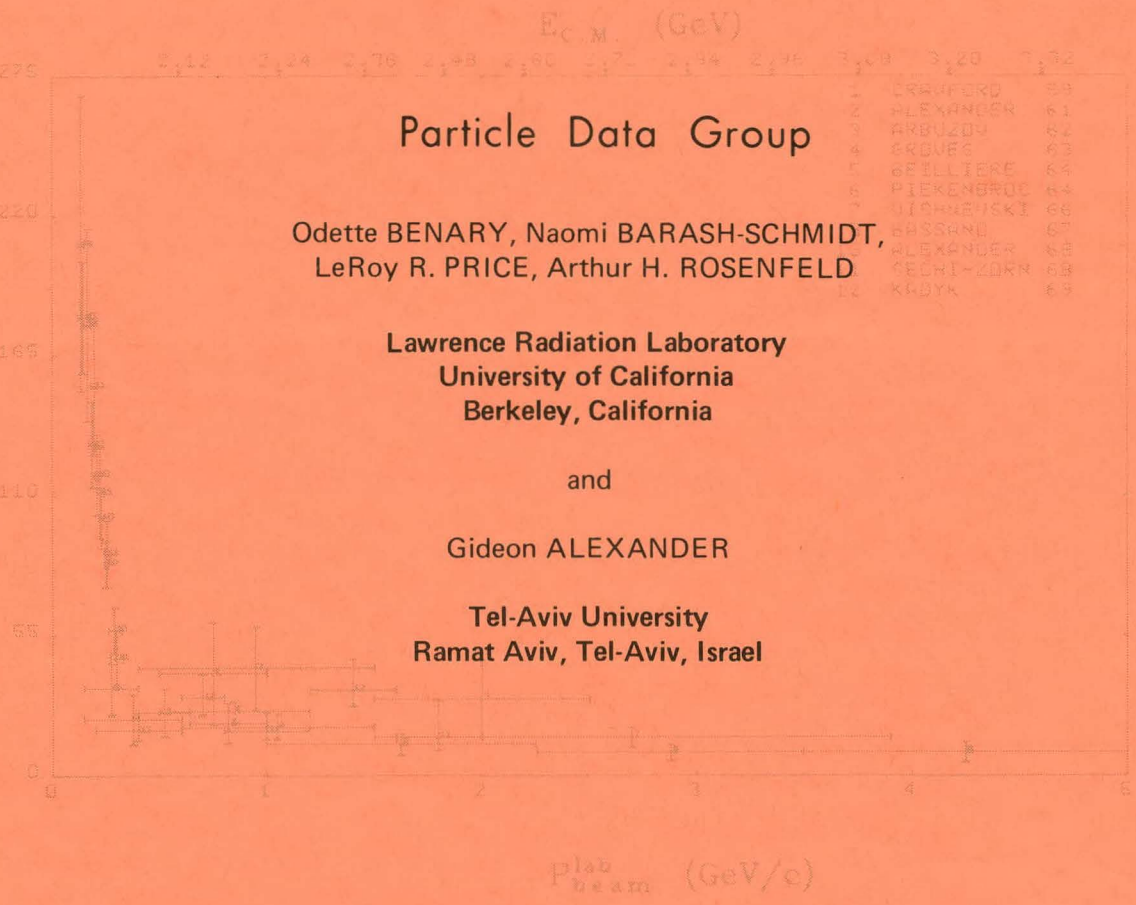
UCRL-20000 YN
January 1970

MASTER

A COMPILATION OF YN REACTIONS



Particle Data Group

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Printed in the USA at Lawrence Radiation Laboratory, Berkeley,
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DISCLAIMER

Kinematics

Λp

P(LAB) (MEV/C)	T(LAB) (MEV)	INV MASS (MEV)	P(CMS) (MEV/C)
0	0	2054	0
20	0	2054	9
40	1	2054	18
60	2	2055	27
80	3	2055	37
100	4	2056	46
120	6	2057	55
140	9	2058	64
160	11	2059	73
180	14	2060	82
200	18	2062	91
220	21	2064	100
240	26	2065	109
260	30	2067	118
280	35	2070	127
300	40	2072	136
320	45	2074	145
340	51	2077	154
360	57	2080	162
380	63	2082	171
400	70	2085	180
420	76	2088	189
440	84	2092	197
460	91	2095	206
480	99	2099	215
500	107	2102	223
520	115	2106	232
540	124	2110	240
560	133	2114	249
580	142	2118	257
600	151	2122	265
620	161	2126	274
640	171	2130	282
660	181	2135	290
680	191	2139	298
700	201	2144	306
720	212	2149	314
740	223	2153	322
760	234	2158	330
780	246	2163	338
800	257	2168	346
820	269	2173	354
840	281	2178	362
860	293	2184	370
880	305	2189	377
900	318	2194	385
920	330	2200	392
940	343	2205	400
960	356	2211	407
980	369	2216	415
1000	383	2222	422
1020	396	2227	430
1040	410	2233	437
1060	423	2239	444
1080	437	2245	451
1100	451	2251	459
1120	465	2256	466
1140	479	2262	473
1160	494	2268	480
1180	508	2274	487
1200	523	2280	494
1220	538	2286	501
1240	552	2292	508
1260	567	2298	514
1280	582	2305	521
1300	597	2311	528
1320	613	2317	535
1340	628	2323	541
1360	643	2329	548
1380	659	2336	554
1400	675	2342	561
1420	690	2348	567
1440	706	2354	574
1460	722	2361	580
1480	738	2367	587
1500	754	2373	593
1520	770	2380	599
1540	786	2386	606
1560	802	2392	612
1580	819	2399	618
1600	835	2405	624
1620	851	2412	630
1640	868	2418	636
1660	884	2424	642
1680	901	2431	648
1700	918	2437	654
1720	935	2444	660
1740	951	2450	666
1760	968	2457	672
1780	985	2463	678
1800	1002	2470	684
1820	1019	2476	690
1840	1036	2482	695
1860	1053	2489	701
1880	1070	2495	707
1900	1088	2502	713
1920	1105	2508	718
1940	1122	2515	724
1960	1140	2521	729
1980	1157	2528	735
2000	1175	2534	740
2020	1192	2541	746
2040	1210	2547	751
2060	1227	2554	757
2080	1245	2560	762
2100	1262	2567	768
2120	1280	2573	773
2140	1298	2579	778

P(LAB) (MEV/C)	T(LAB) (MEV)	INV MASS (MEV)	P(CMS) (MEV/C)
2160	1315	2586	784
2180	1333	2592	789
2200	1351	2599	794
2220	1369	2605	800
2240	1387	2612	805
2260	1405	2618	810
2280	1423	2625	815
2300	1441	2631	820
2320	1459	2637	825
2340	1477	2644	830
2360	1495	2650	836
2380	1513	2657	841
2400	1531	2663	846
2420	1549	2669	851
2440	1567	2676	856
2460	1586	2682	861
2480	1604	2688	866
2500	1622	2695	870
2520	1640	2701	875
2540	1659	2708	880
2560	1677	2714	885
2580	1695	2720	890
2600	1714	2727	895
2620	1732	2733	900
2640	1750	2739	904
2660	1769	2745	909
2680	1787	2752	914
2700	1806	2758	919
2720	1824	2764	923
2740	1843	2771	928
2760	1861	2777	933
2780	1880	2783	937

P(LAB) (GEV/C)	T(LAB) (GEV)	INV MASS (GEV)	P(CMS) (GEV/C)
3.0	2.1	2.85	.99
3.2	2.3	2.91	1.03
3.4	2.5	2.97	1.07
3.6	2.7	3.03	1.11
3.8	2.8	3.09	1.15
4.0	3.0	3.15	1.19
4.2	3.2	3.21	1.23
4.4	3.4	3.26	1.27
4.6	3.6	3.32	1.30
4.8	3.8	3.37	1.34
5.0	4.0	3.43	1.37
5.2	4.2	3.48	1.40
5.4	4.4	3.53	1.43
5.6	4.6	3.58	1.47
5.8	4.8	3.63	1.50
6.0	5.0	3.68	1.53
6.2	5.2	3.73	1.56
6.4	5.4	3.78	1.59
6.6	5.6	3.83	1.62
6.8	5.8	3.88	1.64
7.0	6.0	3.93	1.67
7.2	6.2	3.97	1.70
7.4	6.4	4.02	1.73
7.6	6.6	4.07	1.75
7.8	6.8	4.11	1.78
8.0	7.0	4.16	1.81
8.2	7.2	4.20	1.83
8.4	7.4	4.25	1.86
8.6	7.6	4.29	1.88
8.8	7.8	4.33	1.91
9.0	8.0	4.38	1.93
9.2	8.2	4.42	1.95
9.4	8.4	4.46	1.98
9.6	8.5	4.50	2.00
9.8	8.7	4.54	2.02
10.0	8.9	4.58	2.05
10.5	9.4	4.68	2.10
11.0	9.9	4.78	2.16
11.5	10.4	4.88	2.21
12.0	10.9	4.97	2.26
12.5	11.4	5.07	2.31
13.0	11.9	5.16	2.36
13.5	12.4	5.25	2.41
14.0	12.9	5.34	2.46
14.5	13.4	5.42	2.51
15.0	13.9	5.51	2.55
16.0	14.9	5.68	2.64
17.0	15.9	5.84	2.73
18.0	16.9	6.00	2.82
19.0	17.9	6.15	2.90
20.0	18.9	6.30	2.98
22.0	20.9	6.59	3.13
24.0	22.9	6.87	3.28
26.0	24.9	7.14	3.42
28.0	26.9	7.40	3.55
30.0	28.9	7.65	3.68
32.0	30.9	7.89	3.81
34.0	32.9	8.12	3.93
36.0	34.9	8.35	4.05
38.0	36.9	8.57	4.16
40.0	38.9	8.79	4.27
42.0	40.9	9.00	4.38
44.0	42.9	9.20	4.49
46.0	44.9	9.41	4.59
48.0	46.9	9.60	4.69
50.0	48.9	9.80	4.79
55.0	53.9	10.26	5.03
60.0	58.9	10.71	5.26
65.0	63.9	11.14	5.47
70.0	68.9	11.55	5.68

$\Sigma^{\pm}p$

P(LAB) (MEV/C)	T(LAB) (MEV)	INV MASS (MEV)	P(CMS) (MEV/C)
0	0	2131	0
20	0	2131	9
40	1	2132	18
60	2	2132	26
80	3	2132	35
100	4	2133	44
120	6	2134	53
140	8	2135	62
160	11	2136	70
180	14	2137	79
200	17	2139	88
220	20	2140	96
240	24	2142	105
260	28	2144	114
280	32	2145	122
300	37	2148	131
320	42	2150	140
340	48	2152	148
360	53	2155	157
380	59	2157	165
400	65	2160	174
420	72	2163	182
440	79	2166	191
460	86	2169	199
480	93	2172	207
500	101	2175	216
520	108	2178	224
540	117	2182	232
560	125	2186	240
580	134	2189	249
600	142	2193	257
620	151	2197	265
640	161	2201	273
660	170	2205	281
680	180	2209	289
700	190	2213	297
720	200	2218	305
740	211	2222	312
760	222	2227	320
780	232	2231	328
800	243	2236	336
820	255	2241	343
840	266	2245	351
860	278	2250	359
880	289	2255	366
900	301	2260	374
920	314	2265	381
940	326	2270	388
960	338	2275	396
980	351	2281	403
1000	364	2286	410
1020	377	2291	418
1040	390	2296	425
1060	403	2302	432
1080	416	2307	439
1100	430	2313	446
1120	443	2318	453
1140	457	2324	460
1160	471	2329	467
1180	485	2335	474
1200	499	2341	481
1220	513	2346	488
1240	528	2352	495
1260	542	2358	501
1280	557	2364	508
1300	571	2370	515
1320	586	2375	521
1340	601	2381	528
1360	616	2387	535
1380	631	2393	541
1400	646	2399	548
1420	662	2405	554
1440	677	2411	560
1460	692	2417	567
1480	708	2423	573
1500	724	2429	579
1520	739	2435	586
1540	755	2441	592
1560	771	2447	598
1580	787	2453	604
1600	803	2459	610
1620	819	2466	616
1640	835	2472	623
1660	851	2478	629
1680	867	2484	635
1700	884	2490	641
1720	900	2496	646
1740	917	2502	652
1760	933	2509	658
1780	950	2515	664
1800	966	2521	670
1820	983	2527	676
1840	1000	2533	681
1860	1017	2540	687
1880	1034	2546	693
1900	1050	2552	699
1920	1067	2558	704
1940	1084	2565	710
1960	1102	2571	715
1980	1119	2577	721
2000	1136	2583	726
2020	1153	2590	732
2040	1170	2596	737
2060	1188	2602	743
2080	1205	2608	748
2100	1222	2615	754
2120	1240	2621	759
2140	1257	2627	764

P(LAB) (MEV/C)	T(LAB) (MEV)	INV MASS (MEV)	P(CMS) (MEV/C)
2160	1275	2633	770
2180	1292	2639	775
2200	1310	2646	780
2220	1327	2652	785
2240	1345	2658	791
2260	1363	2664	796
2280	1380	2671	801
2300	1398	2677	806
2320	1416	2683	811
2340	1434	2689	816
2360	1451	2696	821
2380	1469	2702	827
2400	1487	2708	832
2420	1505	2714	837
2440	1523	2720	842
2460	1541	2727	847
2480	1559	2733	851
2500	1577	2739	856
2520	1595	2745	861
2540	1613	2751	866
2560	1631	2757	871
2580	1649	2764	876
2600	1668	2770	881
2620	1686	2776	886
2640	1704	2782	890
2660	1722	2788	895
2680	1741	2794	900
2700	1759	2800	905
2720	1777	2807	909
2740	1795	2813	914
2760	1814	2819	919
2780	1832	2825	923

P(LAB) (GEV/C)	T(LAB) (GEV)	INV MASS (GEV)	P(CMS) (GEV/C)
3.0	2.0	2.89	.97
3.2	2.2	2.95	1.02
3.4	2.4	3.01	1.06
3.6	2.6	3.07	1.10
3.8	2.8	3.13	1.14
4.0	3.0	3.18	1.18
4.2	3.2	3.24	1.22
4.4	3.4	3.30	1.25
4.6	3.6	3.35	1.29
4.8	3.8	3.40	1.32
5.0	3.9	3.46	1.36
5.2	4.1	3.51	1.39
5.4	4.3	3.56	1.42
5.6	4.5	3.61	1.45
5.8	4.7	3.66	1.49
6.0	4.9	3.71	1.52
6.2	5.1	3.76	1.55
6.4	5.3	3.81	1.58
6.6	5.5	3.86	1.60
6.8	5.7	3.91	1.63
7.0	5.9	3.95	1.66
7.2	6.1	4.00	1.69
7.4	6.3	4.05	1.72
7.6	6.5	4.09	1.74
7.8	6.7	4.14	1.77
8.0	6.9	4.18	1.80
8.2	7.1	4.23	1.82
8.4	7.3	4.27	1.85
8.6	7.5	4.31	1.87
8.8	7.7	4.36	1.90
9.0	7.9	4.40	1.92
9.2	8.1	4.44	1.94
9.4	8.3	4.48	1.97
9.6	8.5	4.52	1.99
9.8	8.7	4.56	2.01
10.0	8.9	4.60	2.04
10.5	9.4	4.70	2.09
11.0	9.9	4.80	2.15
11.5	10.4	4.90	2.20
12.0	10.9	4.99	2.25
12.5	11.4	5.09	2.31
13.0	11.9	5.18	2.36
13.5	12.4	5.27	2.41
14.0	12.9	5.35	2.45
14.5	13.4	5.44	2.50
15.0	13.9	5.53	2.55
16.0	14.9	5.69	2.64
17.0	15.8	5.86	2.72
18.0	16.8	6.01	2.81
19.0	17.8	6.17	2.89
20.0	18.8	6.32	2.97
22.0	20.8	6.61	3.12
24.0	22.8	6.88	3.27
26.0	24.8	7.15	3.41
28.0	26.8	7.41	3.55
30.0	28.8	7.66	3.68
32.0	30.8	7.90	3.80
34.0	32.8	8.13	3.92
36.0	34.8	8.36	4.04
38.0	36.8	8.58	4.15
40.0	38.8	8.80	4.27
42.0	40.8	9.01	4.37
44.0	42.8	9.21	4.48
46.0	44.8	9.42	4.58
48.0	46.8	9.61	4.69
50.0	48.8	9.81	4.78
55.0	53.8	10.27	5.02
60.0	58.8	10.72	5.25
65.0	63.8	11.15	5.47
70.0	68.8	11.56	5.68

PREFACE TO THE SERIES

This is the second in a new series of reports produced by the Particle Data Group. In this series we will collect and display total and differential cross sections, polarizations, mass spectra, and other similar data. Each report will cover one input channel. This one is YN (the first one was on K^+N[‡]). In the next few months we hope to bring out NN, π^+N, and $\bar{N}N$. Following later will be π^-N, K^-N, etc. All reports will be complete from January 1968, and will also contain selected results before that date. The reports will be updated periodically, as necessary.

At present there are many physicists in the Particle Data Group who are working on one or more phases of these reports. They are:

I. System Development (LRL)

Art Rosenfeld
LeRoy Price
Odette Benary
Naomi Schmidt[†]

II. Encoding and Verifying Data, Editing Reports, Fitting Data (LRL)

Odette Benary
LeRoy Price
Naomi Schmidt[†]

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

K^+N Interactions

Odette Benary (LRL)
Roger Bland (Ecole Polytechnique)
LeRoy Price (LRL)
Naomi Schmidt (Brandeis)
*Charles Wohl (Oxford)
Victor Henri (CERN)

K^-N Interactions - below 2.0 GeV/c

*Claude Bricman (CERN)

K^-N Interactions - above 2.0 GeV/c

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

π^+N Interactions

*Henry Lubatti (Univ. of Wash.)
Fred Winkelmann (SLAC)
James Wolfson (M. I. T.)

π^-N Interactions

*Alan Thorndike (BNL)
Frank Turkot (BNL)

YN and NN Interactions

Gideon Alexander (Tel-Aviv)
*Odette Benary (LRL)

$\bar{N}N$ Interactions

*Tom Ferbel (Rochester)
David Miller (M. I. T.)
Yoshio Sumi (Osaka)
Toshihiro Yoshida (Kyoto)

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

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Berkeley, California 94720
(415) 843-2740, Ext. 6301;
nights, weekends, and holidays
call 642-0466

*"Chairman."

[†]Now at Brandeis Univ., Waltham, Massachusetts.

[‡]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 (Sept. 1969). The supply of this first report has now been exhausted.

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TABLE OF CONTENTS

A COMPILATION OF YN REACTIONS

Particle Data Group

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ABSTRACT—We compile 17 papers reporting Λp, $\Sigma^+ p$ and $\Sigma^- p$. We display cross sections, angular distributions, and polarizations. Included are indices to the papers, as well as a complete listing of the selected YN data. The cutoff date for this report was 1 January 1970.

* Present address: Brandeis University, Waltham, Massachusetts.

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

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Section I.

GENERAL PROCEDURES

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Introduction

It has been known for some time that a comprehensive, evaluated compilation of experimental high energy physics results is essential. In the past there have been numerous collections of data, generally covering rather narrow fields. But because they were not computerized, the authors became "exhausted" on the first edition, and updated versions were never published.

Encouraged by the success of the Particle Data Group's computerized "Particle Properties Tables,"* we have started also to compile cross-sectional data. Our system is completely computer based, so that we will be able to answer specific user requests, in addition to periodically publishing the collected data.

During the last two and one-half years, we have had two full-time physicists here at LRL developing and coding the system programs.

During the last few months we have been feeding data into the system—and this report on YN is our second result. (We consider these first few reports to be more or less "debug" versions—we are still trying to figure out the best ways to organize the reports and present the data.)

We plan to continue our program development and would appreciate any comments you may have on the way the data are displayed, the types of data collected, etc. In the next few months we hope to go to a form of photocomposition. This means essentially that we will have an unlimited character set and can print Greek letters instead of having to spell them out, for example.

*Particle Data Group, Rev. Mod. Phys. 41, 109 (1969).

Scope of the Compilation

1. We will collect all experimental high energy physics results that can be represented by simple tables or graphs, i.e., σ, $d\sigma/d\omega$, polarizations, angular distributions, density matrices, etc.

We leave it to Data Summary Type Libraries to store Dalitz plots or other $\geq$ 2-dimensional displays (although the presence of such data is indicated in our KEY WORDS). 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 January 1968. Before that time we will enter data that are particularly important. But the bulk of the pre-1968 papers will not be put into our system.

4. To reduce the number of errors to the very minimum, all punched information is checked by the physicist who read the article and by another physicist as well.

Data Handling

In order to make this compilation as accurate and complete as possible, many physicists are involved. These physicists fall into two general categories:

a) Those who read and evaluate the data. These physicists (referred to as "readers") are generally experimentalists chosen for their "expertise" in a particular field. In

general they are not from LRL. They are organized into small groups, each group being responsible for a different input channel.

b) Those physicsts who encode the data, run the programs, write system programs, etc. These are all at LRL.

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). This list is summarized in the "Flow Diagram" in Fig. A.

a) The "reader" (physicist) finds a relevant article, reads it, marks it, fills out a form, and mails a copy of the article plus the form to us.

b) Our secretary assigns it a number and it is logged in.

c) The LRL physicist responsible for this initial state quickly scans it, writes out the standard KEY WORDS, etc., to help in the next step.

d) Our secretary transcribes bibliographic information, putting abstract, citations, comments, beam information, and KEY WORDS, onto coding sheets.

e) The LRL physicist transcribes the data that the reader has selected onto coding sheets (this is much more laborious than you might suspect).

f) Key-punch operators punch the data.

g) The LRL physicist puts the cards for a particular article into the correct order.

h) Cards are put onto the DATA TAPE with the DATAPE program.

i) If any cards are out of order, essential information missing, etc., the article is rejected by DATAPE. The physicist repairs the deck, and it is again put through DATAPE.

j) The output DATA TAPE is read by the SKELM program, which makes a listing of all the data stored for each article.

k) The SKELM is looked over by the LRL physicist for obvious errors.

l) SKELM output is mailed to the original physicist "reader," who checks all entries carefully and returns SKELM plus corrections (if any) to us.

m) If any errors are found, steps e) through l) are repeated as many times as necessary.

n) When the reader has no more corrections or changes to make, the LRL physicist gives the article its final verification (i.e., he rechecks all data with the original article). The name of this physicist is put on the tape, and the article is then ready to be used by any one of a number of programs.

Steps b) through n) take, on the average, about 1-3/4 hours per article (1-1/4 hour physicist + 1/2 hour secretary).

Even after being verified, an article can have its contents slightly increased, e.g., if renormalized data are added. In this case only steps e) through k) are repeated.

Again, 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, removing obviously bad data from the graphs (but leaving it in the tables).

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.

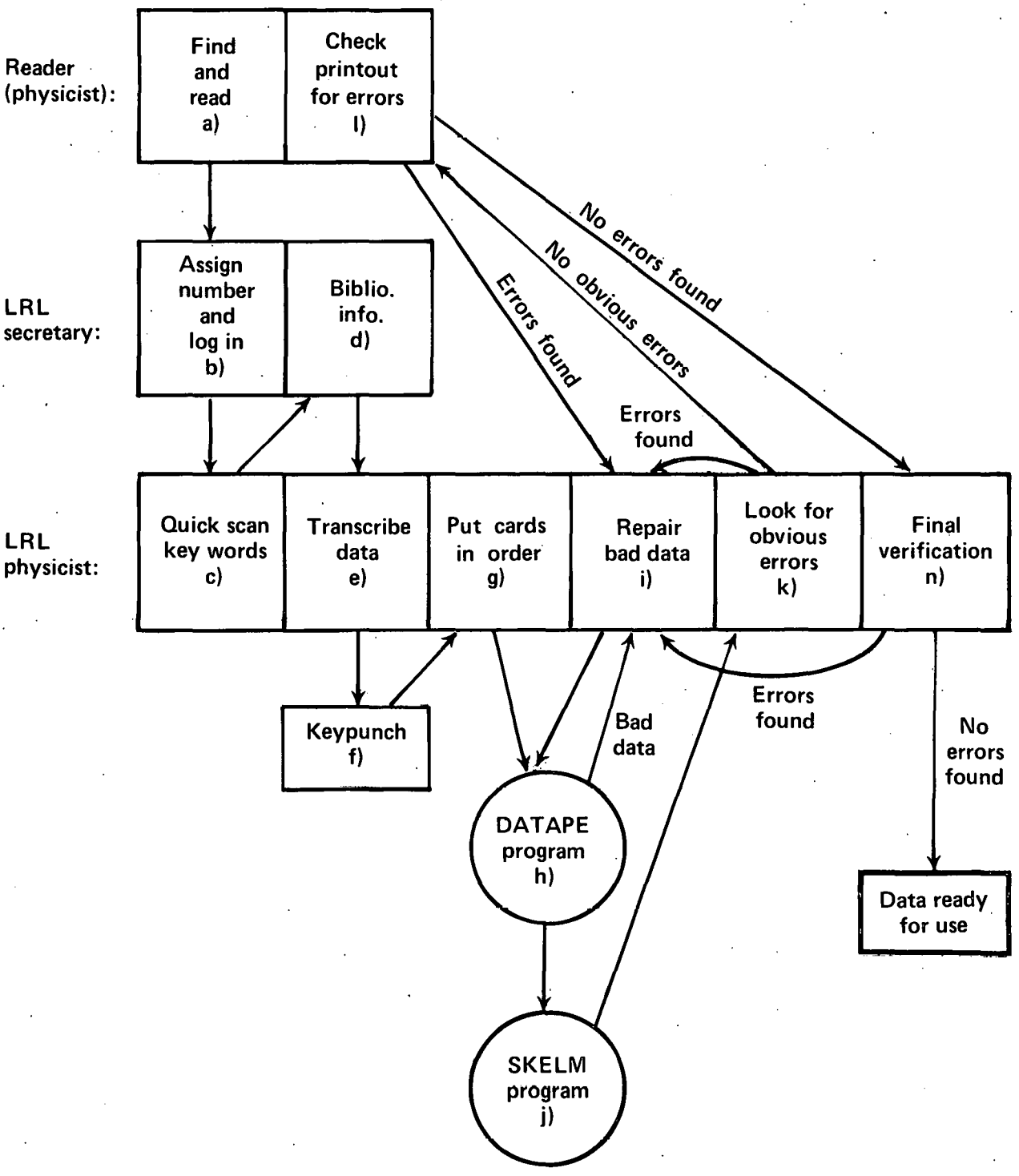

Fig. A.

XBL 701-132

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. Their first reports† were published last year and more reports are expected soon.

We also cooperate with HERA on report distribution: LRL 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.

We originally planned to collaborate closely with John Hornbostel of BNL. He had been compiling cross-section information for a number of years and was going to bring out a series of reports covering the data appearing before January 1968. Sadly, however, he died early last year, with the project incompleted. We wish to thank BNL for sending all of his files to us.

We also thank the Michigan Cross Section Group for sending us all of their files. Their report is referred to in the next section under Williams et al.

Other Cross-Section Compilations

We present below (in chronological order) all of the previous 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. Giacomelli, 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).
- B. Sadoulet, Data Compilation of Antiproton-Proton Reactions into Antihyperon-Hyperon, CERN-HERA 69-2 (1969).
- G. Giacomelli, P. Pini, and S. Stagni, A Compilation of Pion-Nucleon Scattering Data, CERN-HERA 69-1 (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 Partial Wave Amplitudes; A Compilation, UCRL-20030 πN (1970).

Acknowledgments

We wish to thank Arlene Wells for her general help in handling the data. We also thank Marjorie Hutchinson for her assistance with some of the programming.

*See B. Sadoulet, "An Example of an Organization of Compilation of Data," Preprint CERN/D. Ph. II/PHYSICS 68-21.

†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).

Section II.

YN INTERACTIONS

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Comments on the Hyperon-Nucleon Data

At present the data on hyperon-nucleon (YN) interactions are scarce in comparison with the available data on NN, $K^{\pm}N$, and $\pi^{\pm}N$ reactions. This is a direct result of the relatively short lifetime of the hyperons ($< 10^{-10}$ sec), which at present prohibits the construction of the conventional secondary beams used extensively in the study of other elementary particle reactions. Essentially all of the hyperon-proton data (no hyperon-neutron data have yet been reported) have been obtained by using the bubble chamber both as the generator of the hyperon beam (through KN or πN interactions) and as the target for the subsequent YN reaction. In this technique the hyperon beam has a large momentum spread and the rate of data collection is painfully slow. Consequently, the experimenter is often forced to lump together data over a large incident momentum interval, and no detailed study of the differential and total cross sections is possible at the present time. Data on Ξ p and Ω^-p interactions are completely missing, since in addition to the experimental difficulties that exist in the study of other Yp reactions, the production cross sections for the Ξ and Ω^- hyperons are so small that the bubble chamber technique outlined above does not seem to be practical at the present time.

The compilation presented here is based on an earlier non-computerized compilation,* which has been updated and extended to include more features of the data.

Λ-Proton Interactions

Of all the presently available information on the hyperon-proton interactions, the Λ-p data are the most abundant since the lambdas, in addition to their longer lifetime, have the following advantages over other hyperons: a) no energy loss by ionization in the bubble chamber, b) decay (2/3 of the time) into two charged particles, which ensures a higher scanning efficiency and measurement quality, and c) a slightly longer lifetime, which results in a slightly longer decay path length.

The Λ p total cross-section data are concentrated mainly below the ΣN threshold (i. e., below ~ 638 MeV/c). Only one measurement, Bassano et al. (Ref. 10 at the end of this report) exists at higher energy, and it is averaged over a very large Λ momentum interval.

In the 638-880 MeV/c momentum region, the open channels are:

$$\Lambda p \rightarrow \Lambda p, \qquad (1)$$

$$\Lambda p \rightarrow \Sigma^0 p + \Sigma^+ n . \qquad (2)$$

In order to calculate the Λ p total cross section, one could try to evaluate the cross section for reaction (2) by using isospin invariance and detailed balance on the reaction

$$\Sigma^- p \rightarrow \Lambda n.$$

However, at present it is not worthwhile since data on Λ p elastic scattering are quite inprecise in this energy interval.

The Λ p and pp total cross sections are quite similar in shape although the former is smaller by a factor of 5 in the low beam momentum region (i. e., below 200 MeV/c). The smallness of the Λ p cross section might be explained if one attributed the long-range forces to the one-pion exchange, which is forbidden in Λ p scattering.

The small amount of data on Λ p elastic scattering does not yet allow a partial-wave analysis. However, two groups have used their own data below ~ 320 MeV/c for an estimation of the singlet and triplet s-wave scattering lengths [Sechi-Zorn et al. (Ref. 16) and Alexander et al. (Ref. 5)].

The elastic scattering cross-section data do not show at the present time any evidence for resonance formation. On the other hand the possible existence of a Λ p resonance a few MeV below the ΣN threshold has been

*G. Alexander, O. Benary, U. Karshon, and U. Maor, Nucl. Phys. B10, 554 (1969).

investigated recently in $K^- d \rightarrow \Lambda p \pi^-$ reactions* so that more data on $\Lambda p \rightarrow \Lambda p$ near the ΣN threshold would be most useful.

In the absence of sufficient data, varous groups have studied the Λp differential elastic cross section in terms of the two quantities Forward/Backward [or(F-B)/(F+B)] and Polar/Equatorial [or (P-E)/(P+E)], where F and B are the number of events emerging in the forward and backward directions in the Λp center-of-mass system, and P and E are the numbers of events having a scattering angle of $0.5 < |\cos\theta^*_\Lambda| \leq 1.0$ and $0 \leq |\cos\theta^*_\Lambda| < 0.5$ respectively. The behavior of these quantities as a function of the incident momentum suggests that the differential elastic cross section is isotropic up to about 1 GeV/c, with some possible increase of events in the forward direction around 300 MeV/c. The angular distributions above 1 GeV/c show strong peaking in the forward direction.

Σ- Proton Interactions

Unfortunately, due to the scarcity of data, very little can be said about the features of Σ-proton scattering.

At low energy, where almost all the existing data on $\Sigma^\pm p$ elastic scattering are reported, no Coulomb corrections have been applied to the results. This fact might explain the slight forward peaking of the differential elastic cross sections (Fig. 6) both in $\Sigma^+ p$ and $\Sigma^- p$ scattering.

There are two sets of measurements for the reactions

$$\Sigma^- p \rightarrow \Lambda n$$
$$\rightarrow \Sigma^0 n,$$

Yamamoto (Ref. 7) and Engelman (Ref. 8), which seem to agree fairly well with each other. The total $\Sigma^- p$ absorption cross section is approximately equal to the elastic $\Sigma^- p$ cross section, consistent with a completely absorptive reaction.

*See for example the Proceedings of the International Conference on Hyper-nuclear Physics, Argonne National Laboratory, 5-7 May 1969, Vol. I, p. 93.

Figures and Tables

In the following pages are the figures and tables representing the data compilation. For every figure there is a corresponding table on the facing (or same) page. All tables and figures are photographed computer output.

- Occasionally there are pieces of data that are tabulated but not plotted; generally these are obsolete data. Such data have parentheses around them in the tables.
- Data in square brackets are numbers that have been calculated by us, e. g., by summing various partial modes given by different papers but at the same energy, or by applying isospin corrections.
- On graphs versus P_{beam}, the horizontal error bars indicate the limits of the incident momentum range. The vertical error bar is arbitrarily drawn in the center of this interval.
- For elastic scattering the expression for t in the c. m. is

$$t = -2q^2(1-\cos\theta_{YY'}) . \qquad (1)$$

We give in the tables $2q^2$ in $(GeV/c)^2$ and call it 2Q SQUARE.

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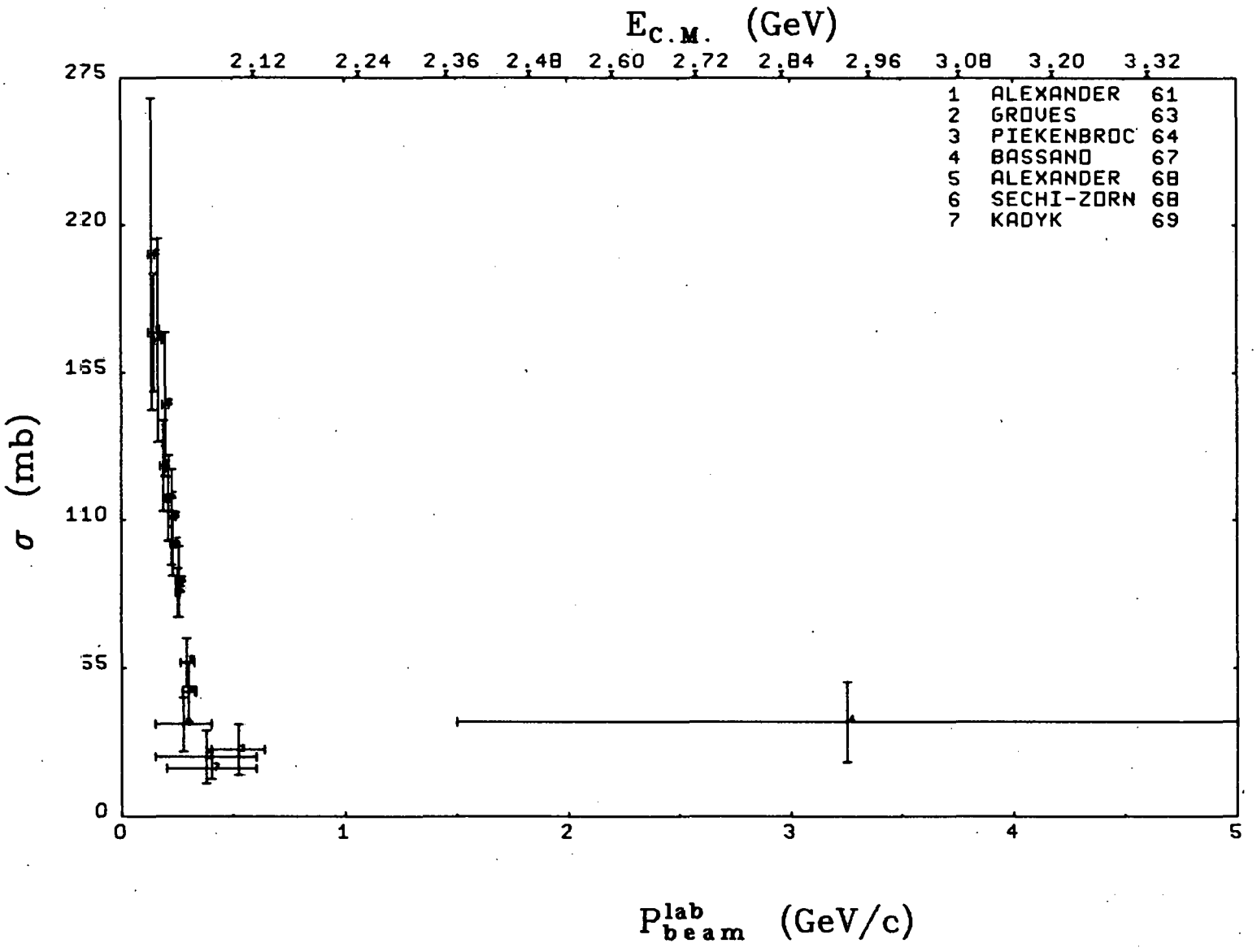
Λp Data

Λp total cross section

P_{beam} (GeV/c)	$E_{c.m.}$	σ_{total} (mb)	References
.135 ± .015	2.057	209.000±58.000	SECHI-ZORN 68
.145 .025	2.058	180.000 22.000	ALEXANDER 68
.165 .015	2.059	177.000 38.000	SECHI-ZORN 68
.185 .015	2.061	130.000 17.000	ALEXANDER 68
.195 .015	2.061	153.000 27.000	SECHI-ZORN 68
.210 .010	2.063	118.000 16.000	ALEXANDER 68
.225 .015	2.064	111.000 18.000	SECHI-ZORN 68
.230 .010	2.064	101.000 12.000	ALEXANDER 68
.250 .010	2.066	83.000 9.000	ALEXANDER 68
.255 .015	2.067	87.000 13.000	SECHI-ZORN 68
.275 .125	2.069	34.000 10.000	PIEKENBROC 64
.290 .030	2.071	57.000 9.000	ALEXANDER 68
.300 .030	2.072	46.000 11.000	SECHI-ZORN 68
.375 .225	2.082	22.000 10.000	GROVES 63
.400 .200	2.085	17.600 +7.000 -4.000	KADYK 69
.519 .119	2.106	24.700 9.300	ALEXANDER 61
3.250 1.750	2.928	35.000 15.000	BASSANO 67

REFERENCES

1	ALEXANDER	61.....PRL	7 348	HBC
2	GROVES	63.....PR	129 1372	HLBC
3	PIEKENBROC	64.....PRL	12 625	HLBC
4	BASSANO	67.....PR	160 1239	HBC
5	ALEXANDER	68.....PR	173 1452	HBC
6	SECHI-ZORN	68.....PR	175 1735	HBC
7	KADYK	69.....UCRL	18805 REV.	HBC



Λp total cross section

Fig. 1. Total Λp cross section over the full momentum range of existing measurements. This figure is introduced for pedagogical reasons only, since six of the seven experiments are below inelastic threshold.

Λp elastic cross section

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{elastic}$ (mb)		References		
.135 ± .015	2.057	209.000	±58.000	SECHI-ZORN	68	
.145 .025	2.058	180.000	22.000	ALEXANDER	68	
.165 .015	2.059	177.000	38.000	SECHI-ZORN	68	
.185 .015	2.061	130.000	17.000	ALEXANDER	68	
.195 .015	2.061	153.000	27.000	SECHI-ZORN	68	
.210 .010	2.063	118.000	16.000	ALEXANDER	68	
.225 .015	2.064	111.000	18.000	SECHI-ZORN	68	
.230 .010	2.064	101.000	12.000	ALEXANDER	68	
.250 .010	2.066	83.000	9.000	ALEXANDER	68	
.255 .015	2.067	87.000	13.000	SECHI-ZORN	68	
.275 .125	2.069	34.000	10.000	PIEKENBROC	64	
.290 .030	2.071	57.000	9.000	ALEXANDER	68	
.300 .030	2.072	46.000	11.000	SECHI-ZORN	68	
.375 .225	2.082	22.000	10.000	GROVES	63	
.400 .200	2.085	17.600	+7.000 −4.000	KADYK	69	*
.519 .119	2.106	24.700	9.300	ALEXANDER	61	
.550 .150	2.112	(14.000	5.467)	CLINE	67	*
.700 .100	2.144	30.500	+9.000 −6.500	KADYK	69	*
.750 .250	2.156	40.000	20.000	CRAWFORD	59	
.819 .181	2.173	20.400	7.700	ALEXANDER	61	
.850 .150	2.181	(15.500	5.820)	CLINE	67	*
.850 .350	2.181	25.000	4.000	BEILLIERE	64	
.950 .550	2.208	42.000	16.000	ARBUZOV	62	
1.000 .200	2.222	17.400	+6.800 −3.200	KADYK	69	*
1.050 .450	2.236	19.000	5.000	GROVES	63	
1.150 .150	2.265	(17.000	6.482)	CLINE	67	*
1.400 .200	2.342	33.500	+2.000 −6.500	KADYK	69	*
1.625 .625	2.413	12.000	4.000	BASSANO	67	
1.800 .200	2.469	15.000	+4.500 −5.300	KADYK	69	*
2.000 .500	2.534	30.000	15.000	ARBUZOV	62	
2.700 1.200	2.758	15.000	4.000	VISHNEVSKI	66	
2.880 .620	2.814	9.000	3.000	BASSANO	67	
4.250 .750	3.220	9.000	4.000	BASSANO	67	

* DATA WAS READ FROM A GRAPH

REFERENCES

1	CRAWFORD	59.....	PRL	2 174	HBC
2	ALEXANDER	61.....	PRL	7 348	HBC
3	ARBUZOV	62.....	JETP	15 676	HLBC
4	GROVES	63.....	PR	129 1372	HLBC
5	BEILLIERE	64.....	PL	12 350	HLBC
6	PIEKENBROC	64.....	PRL	12 625	HLBC
7	VISHNEVSKI	66.....	SJNP	3 511	HLBC
8	BASSANO	67.....	PR	160 1239	HBC
9	CLINE	67.....	PL	25B 446	HBC
10	ALEXANDER	68.....	PR	173 1452	HBC
11	SECHI-ZORN	68.....	PR	175 1735	HBC
12	KADYK	69.....	UCRL	18805 REV.	HBC

Data in parentheses have not been included in the figure.

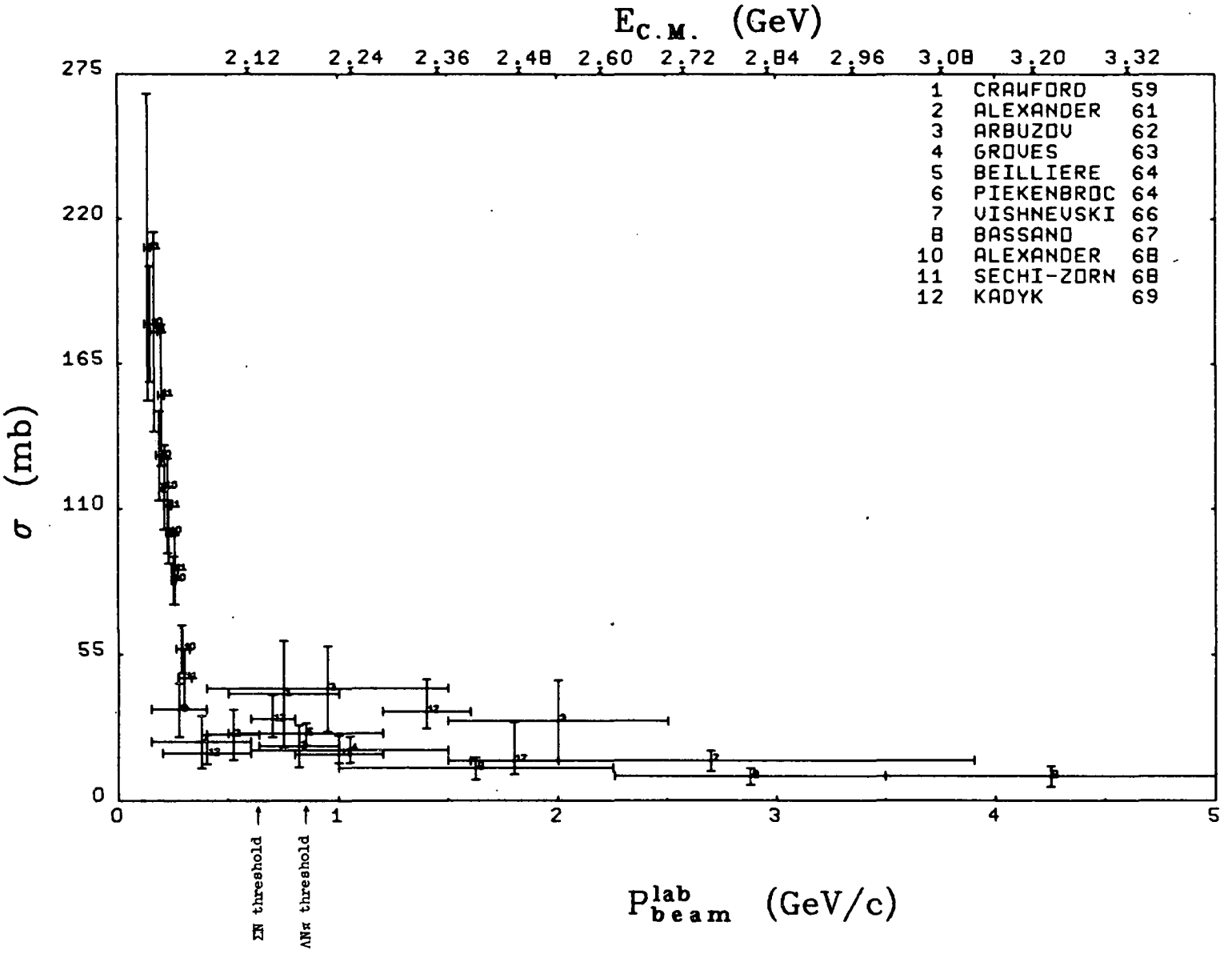


Fig. 2a. Λp elastic cross section (repeated with log scale as Fig. 2b).

See page 18 for table.

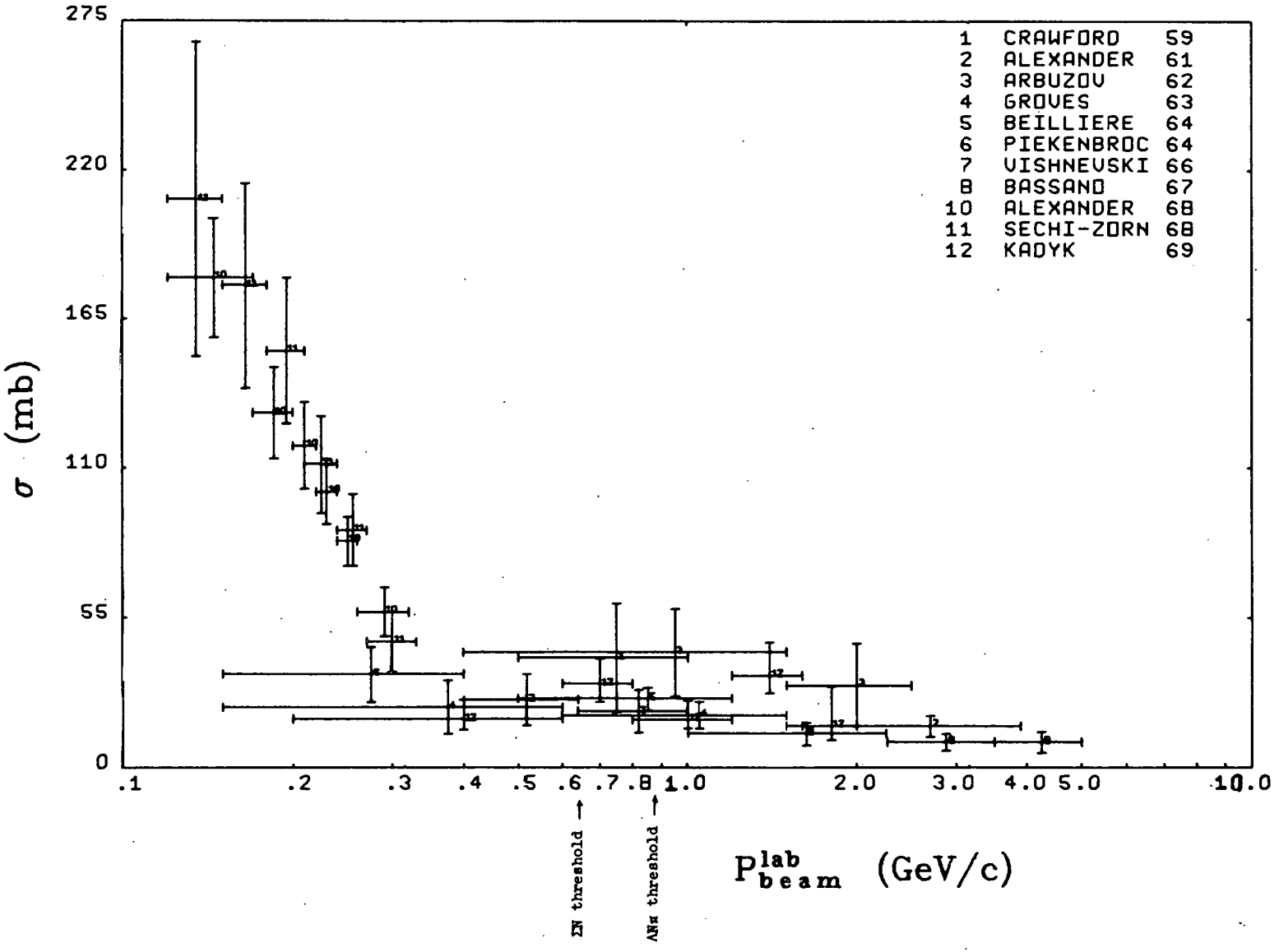


Fig. 2b. Λp elastic cross section same as Fig. 2a, but on log scale.

Λp elastic $dN/d\cos(\theta_{c.m.})$

DISTRIBUTION IN COS(THETA) OF THE SCATT BEAM WITH RESPECT TO THE BEAM DIRECTION IN THE C.M. SYSTEM

BEAM MOMENTUM(CENTRAL VALUE)= .145 GEV/C

BEAM MOMENTUM RANGES FROM .120 TO .170 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	18.000	4.243
-.800	-.600	19.000	4.359
-.600	-.400	23.000	4.796
-.400	-.200	25.000	5.000
-.200	0.	13.000	3.606
0.	.200	18.000	4.243
.200	.400	4.000	2.000

2Q SQUARE= .009

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .185 GEV/C

BEAM MOMENTUM RANGES FROM .170 TO .200 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	8.000	2.828
-.800	-.600	12.000	3.464
-.600	-.400	6.000	2.449
-.400	-.200	17.000	4.123
-.200	0.	14.000	3.742
0.	.200	15.000	3.873
.200	.400	20.000	4.472
.400	.600	4.000	2.000

2Q SQUARE= .014

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .210 GEV/C

BEAM MOMENTUM RANGES FROM .200 TO .220 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	10.000	3.162
-.800	-.600	14.000	3.742
-.600	-.400	5.000	2.236
-.400	-.200	22.000	4.690
-.200	0.	16.000	4.000
0.	.200	10.000	3.162
.200	.400	6.000	2.449
.400	.600	4.000	2.000
.600	.800	1.000	1.000

2Q SQUARE= .018

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .214 GEV/C

BEAM MOMENTUM RANGES FROM .180 TO .248 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.750	20.000	4.000
-.750	-.500	25.000	5.000
-.500	-.250	32.000	6.000
-.250	0.	23.400	5.000
0.	.250	22.000	4.000
.250	.500	25.500	4.600

2Q SQUARE= .019

SECHI-ZORN PR 175 1735(1968) HBC

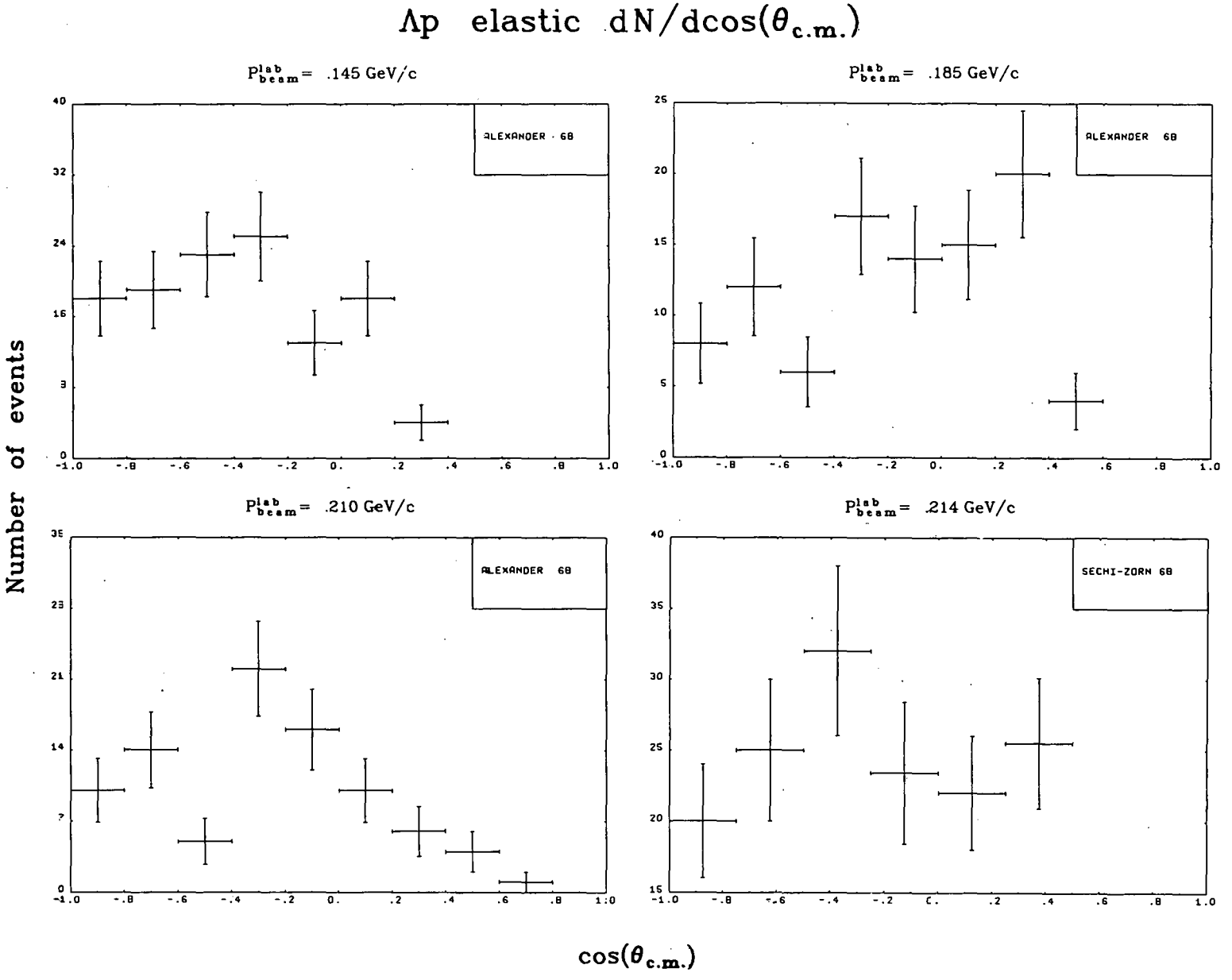


Fig. 3. dN/d cos$\theta_{c.m.}$ for Λp elastic scattering. P^{lab}_{beam} is the central value of the Λ momentum spectrum. (See facing tables for range limits.) The lack of points in the forward direction is due to the lower limit on the range of recoil protons detected in these experiments. The vertical arrows on the cos $\theta_{c.m.}$ scale represent the lower limits of the Λ scattering angles corresponding to a proton length of 1.5 mm.

Λp elastic $dN/d\cos(\theta_{c.m.})$

DISTRIBUTION IN COS(THETA) OF THE SCATT BEAM WITH RESPECT TO THE BEAM DIRECTION IN THE C.M. SYSTEM

BEAM MOMENTUM(CENTRAL VALUE)= .230 GEV/C

BEAM MOMENTUM RANGES FROM .220 TO .240 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA) MINIMUM	COS(THETA) MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	2.000	1.414
-.800	-.600	6.000	2.449
-.600	-.400	13.000	3.606
-.400	-.200	14.000	3.742
-.200	0.	6.000	2.449
0.	.200	8.000	2.828
.200	.400	14.000	3.742
.400	.600	19.000	4.359
.600	.800	6.000	2.449

20 SQUARE= .022

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .250 GEV/C

BEAM MOMENTUM RANGES FROM .240 TO .260 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA) MINIMUM	COS(THETA) MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	11.000	3.317
-.800	-.600	11.000	3.317
-.600	-.400	14.000	3.742
-.400	-.200	11.000	3.317
-.200	0.	14.000	3.742
0.	.200	14.000	3.742
.200	.400	8.000	2.828
.400	.600	20.000	4.472
.600	.800	12.000	3.464

20 SQUARE= .026

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .275 GEV/C

BEAM MOMENTUM RANGES FROM .150 TO .400 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA) MINIMUM	COS(THETA) MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-.800	-.200	2.000	1.414
-.200	.400	7.600	2.757
.400	1.000	9.000	3.000

20 SQUARE= .031

PIEKENBROC PRL 12 625(1964) HLBC

BEAM MOMENTUM(CENTRAL VALUE)= .289 GEV/C

BEAM MOMENTUM RANGES FROM .248 TO .330 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA) MINIMUM	COS(THETA) MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.750	7.800	3.300
-.750	-.500	9.300	3.300
-.500	-.250	7.500	3.100
-.250	0.	11.100	3.500
0.	.250	12.000	4.000
.250	.500	13.000	4.000
.500	.750	25.000	6.600

20 SQUARE= .034

SECHI-ZORN PR 175 1735(1968) HBC

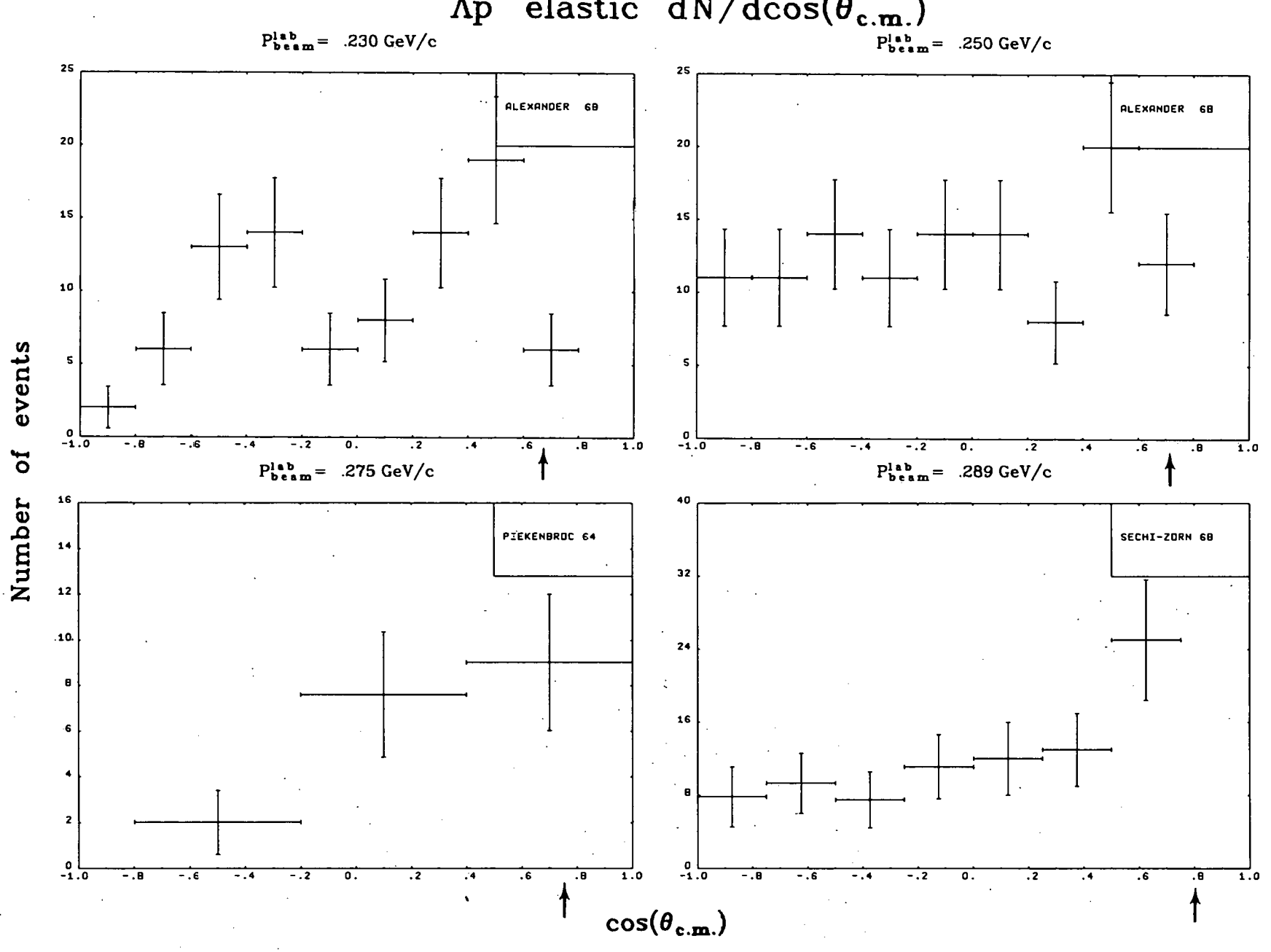


Fig. 3 Continued.

Λp elastic $dN/d\cos(\theta_{c.m.})$

DISTRIBUTION IN COS(THETA) OF THE SCATT BEAM WITH RESPECT TO THE BEAM DIRECTION IN THE C.M. SYSTEM

BEAM MOMENTUM(CENTRAL VALUE)= .290 GEV/C

BEAM MOMENTUM RANGES FROM .260 TO .320 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	3.000	1.732
-.800	-.600	8.000	2.828
-.600	-.400	1.000	1.000
-.400	-.200	8.000	2.828
-.200	0.	1.000	1.000
0.	.200	3.000	1.732
.200	.400	8.000	2.828
.400	.600	13.000	3.606
.600	.800	7.000	2.646

2Q SQUARE= .035

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM= .500 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	5.800	2.408
-.800	-.600	4.000	2.000
-.600	-.400	2.500	1.581
-.400	-.200	4.500	2.121
-.200	0.	3.500	1.871
0.	.200	0.	
.200	.400	1.000	1.000
.400	.600	2.000	1.414
.600	.800	0.	
.800	1.000	1.000	1.000

2Q SQUARE= .100

ARBUZOV JETP 15 676(1962) HLBC

BEAM MOMENTUM(CENTRAL VALUE)= .750 GEV/C

BEAM MOMENTUM RANGES FROM .300 TO 1.200 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.800	9.500	3.082
-.800	-.600	1.000	1.000
-.600	-.400	14.000	3.742
-.400	-.200	13.500	3.674
-.200	0.	7.000	2.646
0.	.200	6.000	2.449
.200	.400	2.000	1.414
.400	.600	13.500	3.674
.600	.800	4.000	2.000
.800	1.000	7.500	2.739

2Q SQUARE= .213

KADYK UCRL 18805 REV.(1969) HBC

BEAM MOMENTUM(CENTRAL VALUE)= 3.750 GEV/C

BEAM MOMENTUM RANGES FROM 2.500 TO 5.000 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-.800	-1.000	0.	
-.600	-.800	0.	
-.400	-.600	0.	
-.200	-.400	0.	
0.	-.200	0.	
.200	0.	0.	
.400	.200	0.	
.600	.400	1.000	1.000
.800	.600	2.000	1.414
1.000	.800	11.000	3.317

2Q SQUARE= 2.615

BASSANO PR 160 1239(1967) HBC

BEAM MOMENTUM= 2.700 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (NUMBER OF EVENTS)	
-1.000	-.500	3.500	1.871
-.500	0.	3.200	1.789
0.	.500	3.500	1.871
.500	1.000	9.000	3.000

2Q SQUARE= 1.687

VISHNEVSKI SJNP 3 511(1966) HLBC

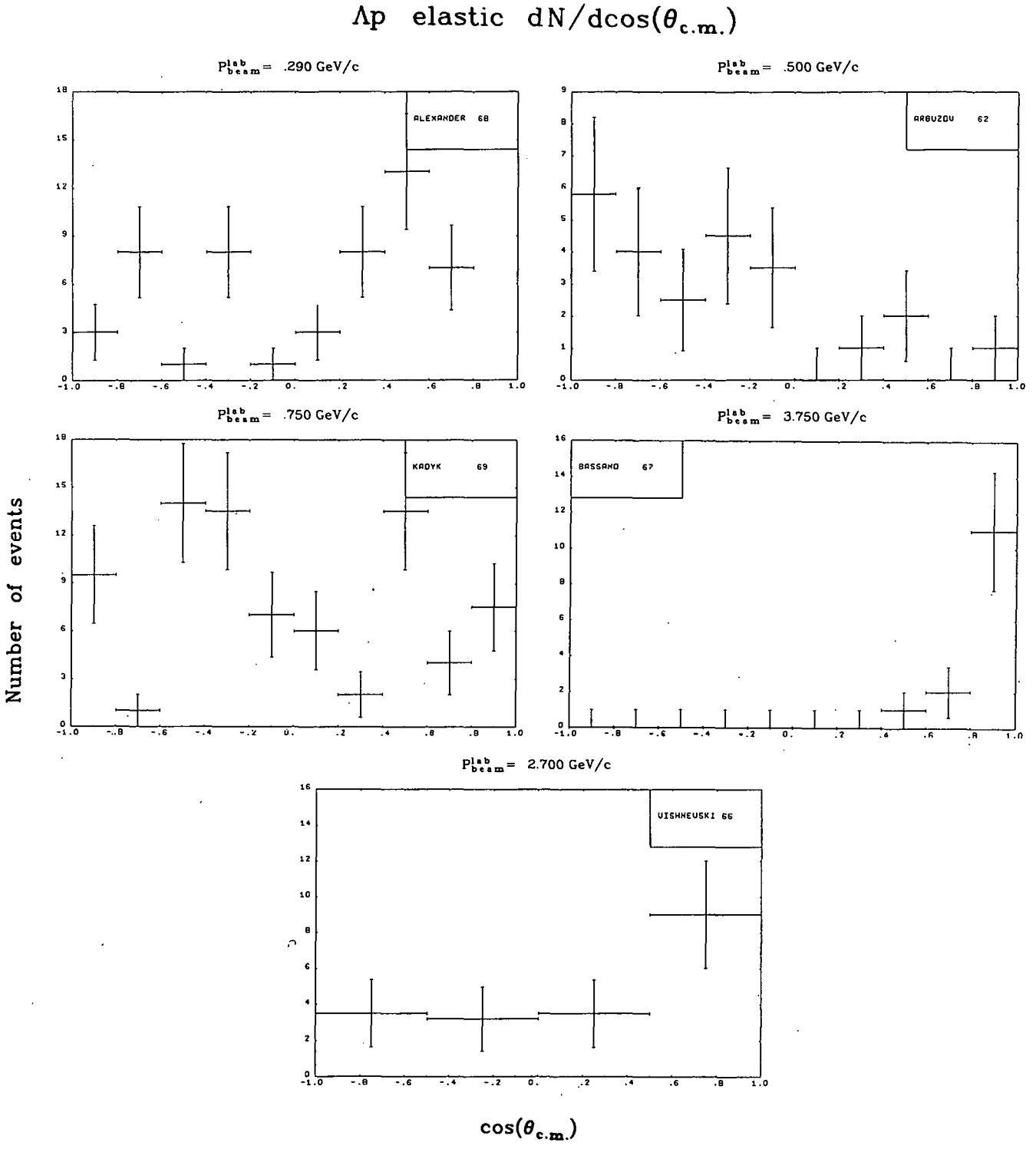


Fig. 3 Continued.

Λp elastic (F−B)/(F+B) and (P−E)/(P+E) ratios

P_{beam} (GeV/c)		$E_{c.m.}$	(F − B)/(F + B)		References	
.210	± .010	2.063	−.290	± .133	ALEXANDER 68	
.214	.034	2.063	.−53	.111	SECHI-ZORN 68	
.230	.010	2.064	.275	.118	ALEXANDER 68	
.250	.010	2.066	.074	.107	ALEXANDER 68	
.289	.041	2.071	.286	.102	SECHI-ZORN 68	
.290	.030	2.071	.315	.145	ALEXANDER 68	
.300	.100	2.072	−.205	.319	CLINE 67	*
.550	.150	2.112	.087	.171	CLINE 67	*
.700	.300	2.144	0.	.250	ALEXANDER 61	
.750	.450	2.156	−.150	.110	KADYK 69	#
.850	.150	2.181	.070	.151	CLINE 67	*
1.000	.500	2.222	−.670	.150	ARBUZOV 62	#
1.150	.150	2.265	.142	.181	CLINE 67	*
2.700	1.200	2.758	.300	.220	VISHNEVSKI 66	#
3.750	1.250	3.077	1.000	.140	BASSANO 67	*

* DATA WAS READ FROM A GRAPH
#CALCULATED BY US FROM DATA IN THIS ARTICLE

REFERENCES

1	ALEXANDER	61.....	PRL	7 348	HBC
2	ARBUZOV	62.....	JETP	15 676	HLBC
3	VISHNEVSKI	66.....	SJNP	3 511	HLBC
4	BASSANO	67.....	PR	160 1239	HBC
5	CLINE	67.....	PL	258 446	HBC
6	ALEXANDER	68.....	PR	173 1452	HBC
7	SECHI-ZORN	68.....	PR	175 1735	HBC
8	KADYK	69.....	UCRL	18805 REV.	HBC

P_{beam} (GeV/c)		$E_{c.m.}$	(P − E)/(P + E)		References	
.210	± .010	2.063	0.	± .145	ALEXANDER 68	
.230	.010	2.064	−.149	.132	ALEXANDER 68	
.250	.010	2.066	.065	.109	ALEXANDER 68	
.290	.030	2.071	.005	.158	ALEXANDER 68	
.300	.100	2.072	−.190	.298	CLINE 67	*
.550	.150	2.112	.138	.171	CLINE 67	*
.700	.300	2.144	.286	.255	ALEXANDER 61	
.850	.150	2.181	.259	.148	CLINE 67	*
1.150	.150	2.265	−.198	.179	CLINE 67	*
2.700	1.200	2.758	.300	.220	VISHNEVSKI 66	#

* DATA WAS READ FROM A GRAPH
#CALCULATED BY US FROM DATA IN THIS ARTICLE

REFERENCES

1	ALEXANDER	61.....	PRL	7 348	HBC
2	VISHNEVSKI	66.....	SJNP	3 511	HLBC
3	CLINE	67.....	PL	258 446	HBC
4	ALEXANDER	68.....	PR	173 1452	HBC

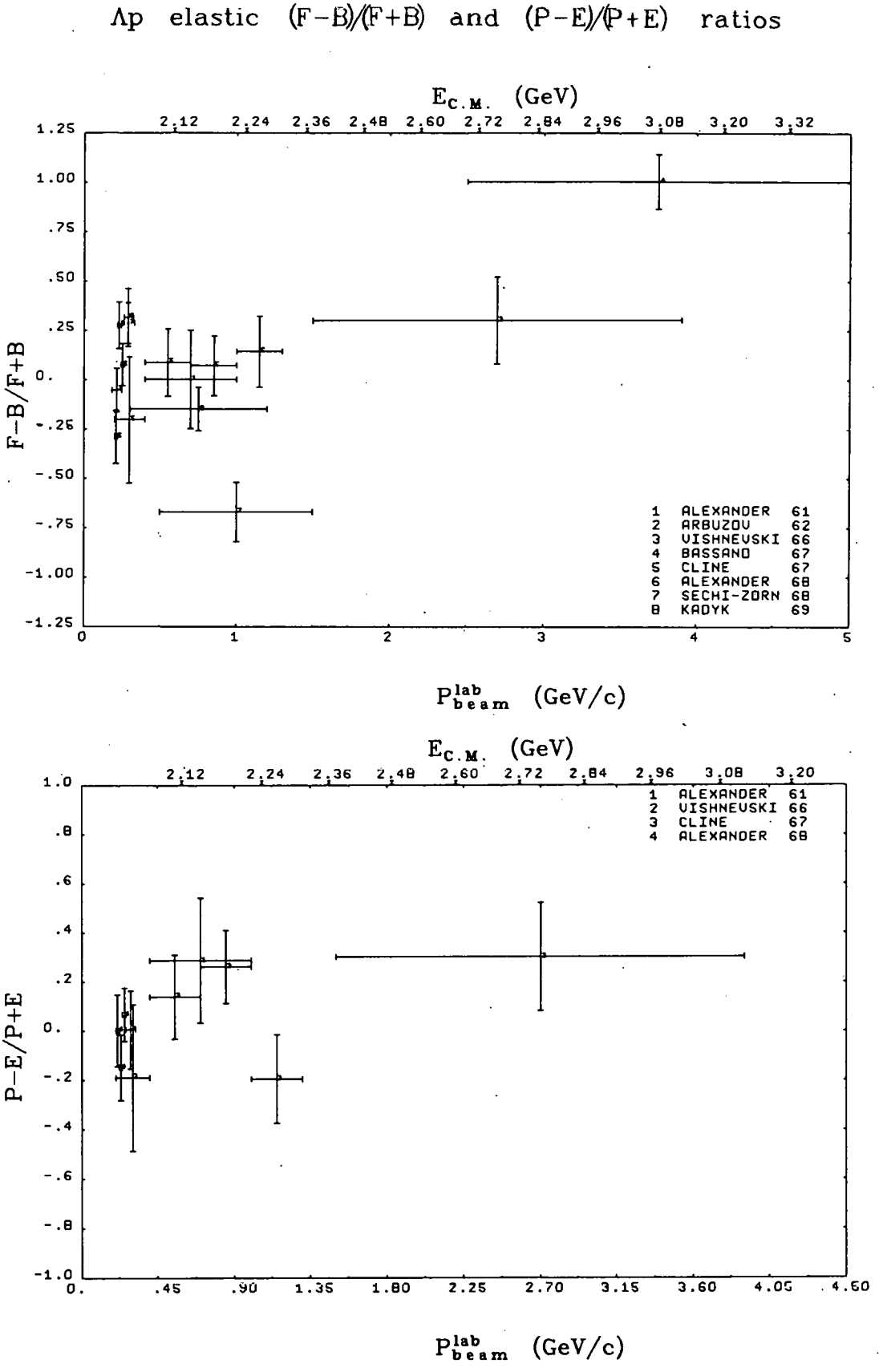


Fig. 4. (F-B)/(F+B) and (P-E)/(P+E) ratios in Λp elastic scattering. When authors have reported F/B and P/E ratios, we have transformed them to (F-B)/(F+B) and (P-E)/(P+E). Where no such ratios were quoted, we have calculated them from the given angular distributions. The values calculated by us might be systematically underestimated because of the loss of events with the Λ emitted in the forward direction.

Polarization in Λp elastic scattering

DISTRIBUTION IN COS(THETA) OF THE SCATT BEAM WITH RESPECT TO THE BEAM DIRECTION IN THE C.M. SYSTEM

BEAM MOMENTUM(CENTRAL VALUE)= .210 GEV/C

BEAM MOMENTUM RANGES FROM .200 TO .220 GEV/C

COS(THETA) MINIMUM	MAXIMUM	POLARIZ+-DPOL
-1.000	0.	0. ± .310
0.	1.000	-.500 .480

2Q SQUARE= .018

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .230 GEV/C

BEAM MOMENTUM RANGES FROM .220 TO .240 GEV/

COS(THETA) MINIMUM	MAXIMUM	POLARIZ+-DPOL
-1.000	0.	-.370 ± .380
0.	1.000	-.110 .320

2Q SQUARE= .022

ALEXANDER PR 173 1452(1968) HB

BEAM MOMENTUM(CENTRAL VALUE)= .250 GEV/C

BEAM MOMENTUM RANGES FROM .240 TO .260 GEV/C

COS(THETA) MINIMUM	MAXIMUM	POLARIZ+-DPOL
-1.000	0.	.480 ± .300
0.	1.000	-.510 .290

2Q SQUARE= .026

ALEXANDER PR 173 1452(1968) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .290 GEV/C

BEAM MOMENTUM RANGES FROM .260 TO .320 GEV/

COS(THETA) MINIMUM	MAXIMUM	POLARIZ+-DPOL
-1.000	0.	.130 ± .520
0.	1.000	0. .380

2Q SQUARE= .035

ALEXANDER PR 173 1452(1968) HB

BEAM MOMENTUM(CENTRAL VALUE)= .850 GEV/C

BEAM MOMENTUM RANGES FROM .400 TO 1.300 GEV/C

COS(THETA) MINIMUM	MAXIMUM	POLARIZ+-DPOL
-1.000	1.000	.110 ± .300

2Q SQUARE= .267

CLINE PL 258 446(1967) HBC

Table I. Λ polarization in Λp elastic scattering. The values reported by Alexander et al. (Ref. 5) are αP (polarization times the Λ decay assymetry parameter). It is not clear whether Cline et al. (Ref. 15) report αP or P.

Λp inelastic cross sections

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{\Sigma^0 p}$ (mb)	References
.819 ± .181	2.173	8.500 ± 4.900	ALEXANDER 61
.850 .350	2.181	2.500 +2.500 -1.400	BEILLIERE 64

REFERENCES

1	ALEXANDER 61.....	PRL	7	348	HBC
2	BEILLIERE 64.....	PL	12	350	HLBC

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{\Sigma^+ n}$ (mb)	References
.770 ± .070	2.161	30.000±20.000	CRAWFORD 59

REFERENCES

1	CRAWFORD 59.....	PRL	2	174	HBC

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{\Lambda p\pi^+\pi^-}$ (mb)	References
3.200 ± 1.800	2.913	1.800 ± .700	BASSANO 67

REFERENCES

1	BASSANO 67.....	PR	160	1239	HBC

Table II. Λp inelastic cross sections.

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$\Sigma^{\pm}$ Data

$\Sigma^{\pm}p$ elastic cross section

$\Sigma^{+}p$

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{elastic}$ (mb)	References	
.153 ± .005	2.132	203.000 ± 117.000	DOSCH	66
.161	2.133	83.000 34.000	RUBIN	67
.163 .005	2.133	143.000 58.000	DOSCH	66
.173 .005	2.133	89.000 28.000	DOSCH	66
1.000 .900	2.283	38.000 +8.000 -4.000	STANNARD	61

REFERENCES

1	STANNARD	61.....PR	121 1513	HLBC
2	DOSCH	66.....PL	21 236	HBC
3	RUBIN	67.....PR	159 1149	HBC

$\Sigma^{-}p$

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{elastic}$ (mb)	References	
.140 ± .005	2.139	207.000 ± 85.000	DOSCH	66
.150 .005	2.140	198.000 48.000	DOSCH	66
.150	2.140	166.000 33.000	RUBIN	67
.160 .005	2.140	189.000 32.000	DOSCH	66
1.000 .900	2.289	10.000 +6.000 -4.000	STANNARD	61

REFERENCES

1	STANNARD	61.....PR	121 1513	HLBC
2	DOSCH	66.....PL	21 236	HBC
3	RUBIN	67.....PR	159 1149	HBC

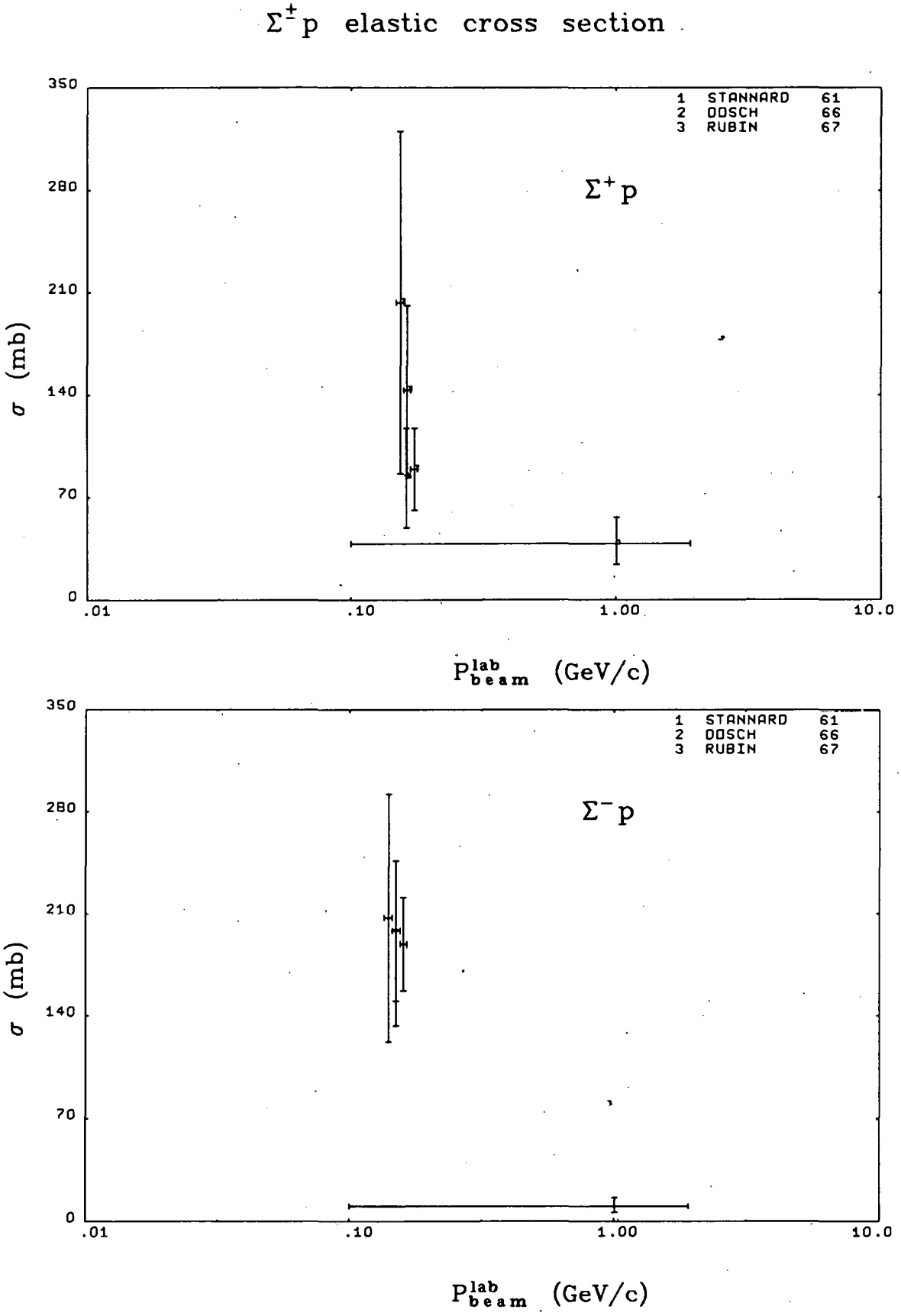

Fig. 5. $\Sigma^{\pm}p$ elastic cross sections over the full momentum range of existing measurements.

$\Sigma^{\pm}p$ elastic $d\sigma/d\omega$

DISTRIBUTION IN COS(THETA) OF THE SCATT BEAM WITH RESPECT TO THE BEAM DIRECTION IN THE C.M. SYSTEM

$\Sigma^{+}p$

BEAM MOMENTUM(CENTRAL VALUE)= .163 GEV/C

BEAM MOMENTUM RANGES FROM .148 TO .178 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (MILLIBARNS/STERADIAN)
-.200	-.400	40.000 ± 20.000
0.	-.200	30.000 20.000
.200	0.	40.000 20.000
.400	.200	90.000 30.000
.600	.400	120.000 50.000
.800	.600	170.000 110.000

2Q SQUARE= .010

DOSCH PL 21 236(1966) HBC

$\Sigma^{-}p$

BEAM MOMENTUM(CENTRAL VALUE)= .150 GEV/C

BEAM MOMENTUM RANGES FROM .135 TO .165 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA)

MINIMUM	MAXIMUM	SIGMA +- DSIGMA (MILLIBARNS/STERADIAN)
-.200	-.400	90.000 ± 20.000
0.	-.200	105.000 20.000
.200	0.	80.000 20.000
.400	.200	120.000 20.000
.600	.400	115.000 25.000
.800	.600	200.000 110.000

2Q SQUARE= .009

DOSCH PL 21 236(1966) HBC

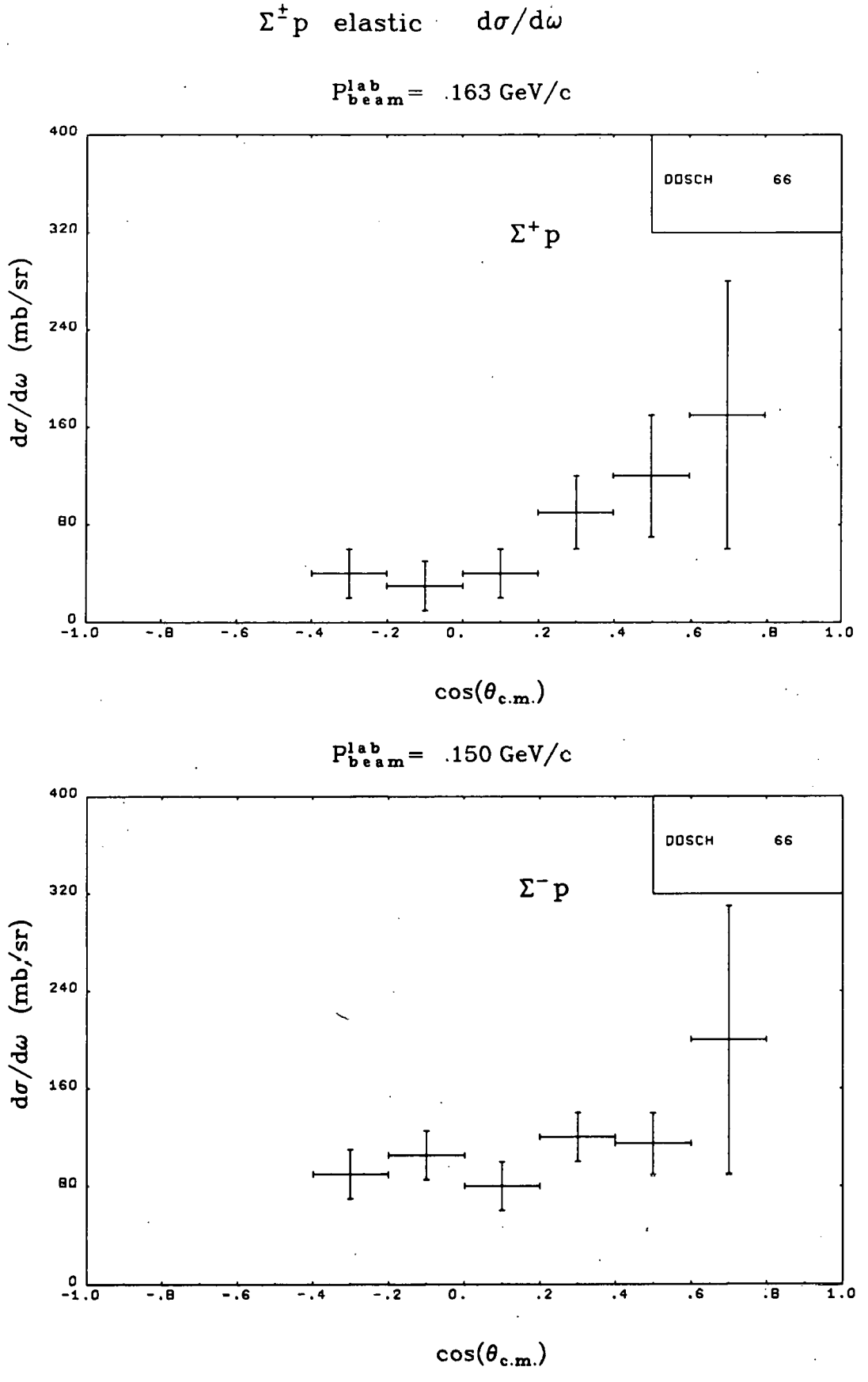

Fig. 6. Differential cross sections for $\Sigma^{\pm}p$ elastic scattering. The data are not corrected for Coulomb effects.

cross sections for $\Sigma^- p \rightarrow \Lambda n$ $\rightarrow \Sigma^0 n$

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{\Lambda n}$ (mb)	References
.109	2.138	170.000±50.000	ENGELMANN 66 *
.119	2.138	170.000 45.000	ENGELMANN 66 *
.129	2.139	140.000 30.000	ENGELMANN 66 *
.139	2.139	160.000 30.000	ENGELMANN 66 *
.149	2.140	140.000 20.000	ENGELMANN 66 *
.159	2.140	115.000 15.000	ENGELMANN 66 *
.175 ± .025	2.141	117.000 31.000	YAMAMOTO 69
.250 .050	2.147	138.000 37.000	YAMAMOTO 69
.350 .050	2.158	25.000 15.000	YAMAMOTO 69
.450 .050	2.171	67.000 24.000	YAMAMOTO 69
.550 .050	2.188	27.000 9.000	YAMAMOTO 69

* DATA WAS READ FROM A GRAPH

REFERENCES

1	ENGELMANN 66.....PL	21 587	HBC
2	YAMAMOTO 69.....AEC	NY03651-11	HBC

P_{beam} (GeV/c)	$E_{c.m.}$	$\sigma_{\Sigma^0 n}$ (mb)	References
.111	2.138	395.000±95.000	ENGELMANN 66 *
.121	2.138	160.000 40.000	ENGELMANN 66 *
.131	2.139	160.000 30.000	ENGELMANN 66 *
.141	2.139	125.000 25.000	ENGELMANN 66 *
.151	2.140	110.000 20.000	ENGELMANN 66 *
.161	2.140	115.000 15.000	ENGELMANN 66 *
.175 ± .025	2.141	141.000 34.000	YAMAMOTO 69
.250 .050	2.147	134.000 36.000	YAMAMOTO 69
.350 .050	2.158	54.000 20.000	YAMAMOTO 69
.450 .050	2.171	42.000 20.000	YAMAMOTO 69
.550 .050	2.188	27.000 12.000	YAMAMOTO 69

* DATA WAS READ FROM A GRAPH

REFERENCES

1	ENGELMANN 66.....PL	21 587	HBC
2	YAMAMOTO 69.....AEC	NY03651-11	HBC

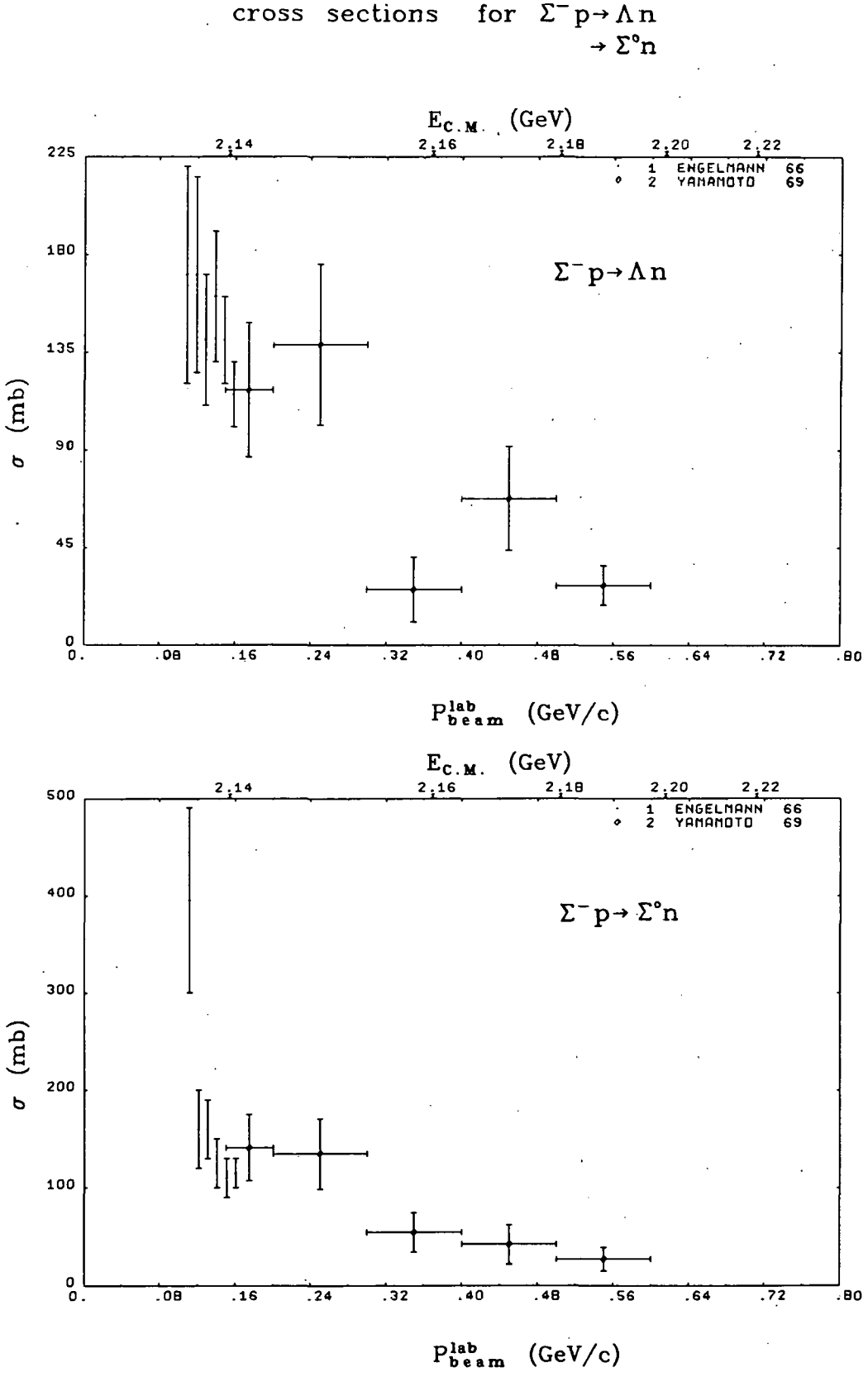

Fig. 7. Cross sections for $\Sigma^- p \to \Sigma^0 n$ and $\Sigma^- p \to \Lambda n$.

$d\sigma/d\omega$ for $\Sigma^- p \rightarrow \Lambda n$

DISTRIBUTION IN COS(THETA) OF THE LAMBDA WITH RESPECT TO THE BEAM DIRECTION IN THE C.M. SYSTEM

BEAM MOMENTUM(CENTRAL VALUE)= .135 GEV/C

BEAM MOMENTUM RANGES FROM .100 TO .170 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA) MINIMUM	COS(THETA) MAXIMUM	SIGMA +- DSIGMA (MILLIBARNS/STERADIAN)
-1.000	-.800	75.000 ± 15.000
-.800	-.600	00.000 15.000
-.600	-.400	65.000 15.000
-.400	-.200	60.000 12.000
-.200	0.	90.000 17.000
0.	.200	70.000 14.000
.200	.400	60.000 12.000
.400	.600	96.000 17.000
.600	.800	85.000 15.000
.800	1.000	85.000 15.000

2Q SQUARE= .007

ENGELMANN PL 21 587(1966) HBC

BEAM MOMENTUM(CENTRAL VALUE)= .160 GEV/C

BEAM MOMENTUM RANGES FROM .150 TO .170 GEV/C

****THIS DATA WAS READ FROM A GRAPH****

COS(THETA) MINIMUM	COS(THETA) MAXIMUM	SIGMA +- DSIGMA (MILLIBARNS/STERADIAN)
-1.000	-.800	45.000 ± 13.000
-.800	-.600	55.000 16.000
-.600	-.400	38.000 13.000
-.400	-.200	60.000 18.000
-.200	0.	79.000 20.000
0.	.200	60.000 17.000
.200	.400	40.000 15.000
.400	.600	80.000 20.000
.600	.800	105.000 25.000
.800	1.000	95.000 20.000

2Q SQUARE= .010

ENGELMANN PL 21 587(1966) HBC

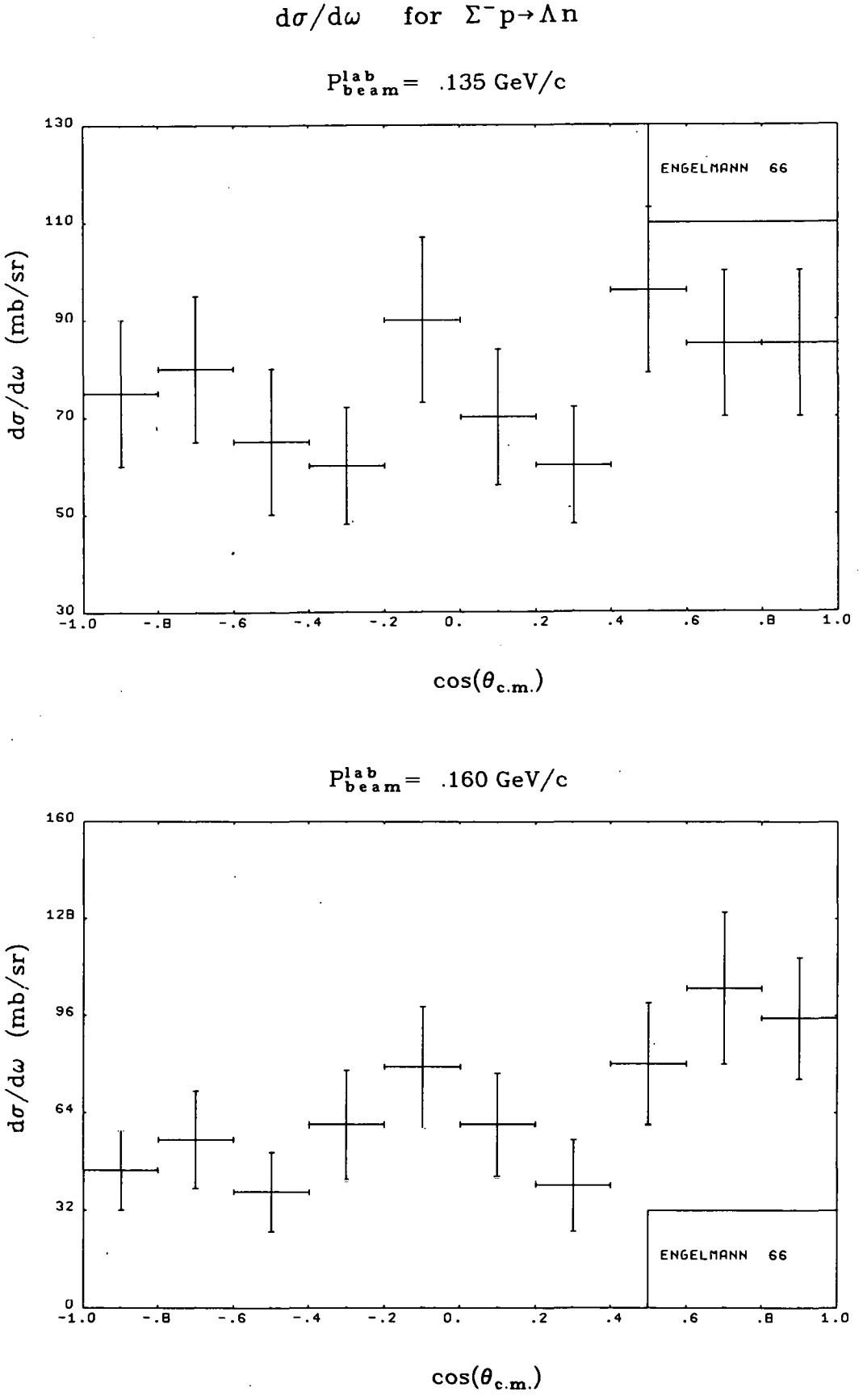

Fig. 8. Differential cross sections for the reaction $\Sigma^- p \rightarrow \Lambda n$.

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Section III.

DATA LISTINGS

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In this section we present a listing of all the YN 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.

We debated for some time whether or not we should give these listings because they are rather lengthy. As an experiment, we decided to put them in the first few editions. If you find them useful, let us know.

Actually, these listings do contain a large amount of information not included in the tables and graphs already presented in Section II.

- In particular there are a number of articles giving mass spectra etc., for which we have punched no data but have punched the bibliographic information and keywords. A person interested in hyperon interactions may find many of these papers quite useful. (These papers are not referred to in any way in Section II.)
- 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 yet 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.
- We also indicate here how background-resonance separations were made and the values of the parameters used (or fitted).
- 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).
- Some papers give fitted values for various parameters in which we are interested. Recently we have started encoding this information. In the future we plan to include more of these fitted quantities.

To repeat, the above items are some of the things you will find in this section that are not presented in Section II.

We have also found that theses are frequently hard to come by. Thus we feel that our listing of theses may help give their data greater distribution than they might otherwise have. We would like to make the general appeal that a copy of all particle physics theses be sent to us.

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 first mention that the order of the articles is "random," and has no physical meaning. The order is, however, the same as given in the Reference list,

and as given in the Indices in Section IV.

Above the double line in each article you will find the title, authors and institutions, abstract (if the article had one), citations, KEY WORDS, comments, beam information, etc.

Below the double line in each article appear the data. We 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 punch both, if we feel that both forms are useful, and display them side-by-side in the listings that follow.

We have tried to be particularly careful about including systematic errors, whenever given by the authors. We have also tried to indicate exactly how resonance and background separations have been made. 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 "This data was read from a graph." (In some cases the tables we received have been more up to date than the published graphs.)

Because of the limitations imposed by not having a printer with Greek letters, we have had to spell out many symbols. One exception is, however, the abbreviation for microbarns, μb: we use "UB." We hope that we will be able, in the near future, to use a more complete set of characters, so that our output will be easier to read.

1 ELASTIC SCATTERING CROSS SECTION OF LAMBDA-0 HYPERONS ON NUCLEONS. (PHYS. LETTERS 12, 350 (1964))

P.BEILLIERE,J.L.GOMEZ,A.LLORET,A.ROUSSET (ECOLE POLYTECHNIQUE, PARIS, FRANCE)
K.MYKELBOST,J.M.OLSEN (FYSISK INSTITUTT, BERGEN, NORWAY)

CITATIONS
PHYS. REV. LETTERS 2, 174 (1959), PHYS. REV. LETTERS 7, 348 (1961), JETP 15 676 (1962), PHYS. REV. 129, 1372 (1963), REV. MOD. PHYS. 30, 368 (1958), CERN 64-1 (1964), AND PHYS. LETTERS 11, 174 (1964).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON HEAVY LIQUID AT 1.47 GEV/C.

THIS EXPERIMENT USES A HEAVY LIQUID BUBBLE CHAMBER. A TOTAL OF 20000 PICTURES ARE REPORTED ON.

KEY WORDS - LAMBDA CROSS SECTION

COMPOUND KEY WORDS - LAMBDA CROSS SECTION

(PAGE 351)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .5 TO 1.2 GEV/C.

REACTION	MILLI-BARNS	NO. EVENTS
LAMBDA PROTON -		
ELASTIC	25.0 +- 4.0	86
SIGMA0 PROTON	2.5 + 2.5 - 1.4	

2 LAMBDA INTERACTIONS IN HYDROGEN. (PHYS. REV. LETTERS 2, 174 (1959))

F.S.CRAWFORD,JR.,M.CRESTI,M.L.GOOD,F.T.SOLMITZ,M.L.STEVENSON,H.K.TICHO (U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA, AND UNIV. OF CALIFORNIA, BERKELEY, CALIF., USA)

CITATIONS
UCRL 3924 (1957), AND BULL. AM. PHYS. SOC. 3, 363 (1958).

ARTICLE READ BY ODETTE BENARY IN 6/69, AND VERIFIED BY LRP.

BEAM IS PI- ON PROTON AT AN UNSPECIFIED MOMENTUM.

THIS EXPERIMENT USES A HYDROGEN BUBBLE CHAMBER.

KEY WORDS - LAMBDA PROTON CROSS SECTION

LAMBDA PROTON ELASTIC CROSS SECTION. (PAGE 175)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.5	1.0	40. +- 20.	4

CROSS SECTION FOR LAMBDA PROTON - SIGMA+ NEUTRON. (PAGE 176)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.70	.84	30. +- 20.	2

3 LAMBDA P ELASTIC SCATTERING. [PHYS. REV. LETTERS 12, 625 (1964)]

L.PIEKENBROCK,F.OPPENHEIMER [UNIV. OF COLORADO, BOULDER, COLO., USA]

CITATIONS
PHYS. REV. LETTERS 2, 174 (1959), PHYS. REV. LETTERS 7, 348 (1961), JETP 16 676 (1962), PHYS. REV. 129, 1372 (1963), NUOVO CIMENTO 25, 1072 (1962), AND NUOVO CIMENTO 13, 371 (1959).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON HEAVY LIQUID AT AN UNSPECIFIED MOMENTUM.

THIS EXPERIMENT USES THE L.R.L. 30 IN. (HL) BUBBLE CHAMBER. A TOTAL OF 45000 PICTURES ARE REPORTED ON.

KEY WORDS - LAMBDA CROSS SECTION ANGULAR DISTRIBUTION

COMPOUND KEY WORDS - LAMBDA CROSS SECTION

[PAGE 626]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .15 TO .40 GEV/C.

REACTION	MILLI-BARNS	NO. EVENTS
LAMBDA PROTON -		
TOTAL	34. +- 10.	11
ELASTIC	34. 10. [1]	11

[1] AT THESE ENERGIES, THIS IS THE ONLY CHANNEL OPEN..

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. [FIGURE 2]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .15 TO .40 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	COS(THETA) MAX	NO. EVENTS
-.8	-.2	2.0
-.2	.4	7.6
.4	1.0	9.0

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

4 INVESTIGATION INTO THE ELASTIC SCATTERING OF SIGMA+- HYPERONS ON HYDROGEN. [PHYS. REV. 121, 1513 (1961)]

F.R.STANNARD [U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA]

ABSTRACT AN INVESTIGATION HAS BEEN MADE INTO THE ELASTIC SCATTERING OF SIGMA HYPERONS ON HYDROGEN. THE EXPERIMENT WAS BASED ON A SAMPLE OF 12,000 SIGMA PARTICLES FORMED IN A PROPANE BUBBLE CHAMBER BY THE INTERACTIONS OF 1.15 BEV/C K- MESONS. A TOTAL TRACK LENGTH OF 210 METERS IN THE ENERGY RANGE 100 TO 700 MEV HAS BEEN EXAMINED. TEN EXAMPLES WERE FOUND OF THE REACTION SIGMA+ P - SIGMA+ P, AND SIX OF THE REACTION SIGMA- P - SIGMA- P. THE ESTIMATED DIFFERENTIAL CROSS SECTIONS FOR THE TWO PROCESSES ARE, RESPECTIVELY, 38(-14 +18)MB AND 10(-4 +6)MB. THE SCATTERING ANGLE DISTRIBUTIONS IN THE C.M. SYSTEM APPEAR ISOTROPIC FOR THE SIGMA+ PARTICLES, AND PEAKED FORWARD FOR THE SIGMA- PARTICLES. THE RESULTS ARE DISCUSSED IN RELATION TO VARIOUS THEORETICAL PREDICTIONS, AND, IN PARTICULAR, SOME EVIDENCE IS FOUND FAVORING THE GAMMEL-THALER METHOD OF TREATING THE TRIPLET ODD-PARITY NUCLEON-NUCLEON POTENTIAL.

CITATIONS
PHYS. REV. 107, 1685 (1957), REVIEW OF SCIENTIFIC INSTRUMENTS 29, 874 (1958), LRL INTERDEPARTMENTAL REPORT 4320-60 M7 (1957), LRL INTERDEPARTMENTAL REPORT 4320-60 M6 (1957), PHYS. REV. 108, 383 (1957), PHYS. REV. 116, 1001 (1959), PHYS. REV. 104, 205 (1956), UCRL 9362 (1960), NUOVO CIMENTO 5, 742 (1957), NUOVO CIMENTO 13, 690 (1959), PHYS. REV. 100, 939 (1955), PHYS. REV. 107, 277 (1957), NUOVO CIMENTO 2, 824 (1955), NUOVO CIMENTO 15, 873 (1960), PHYS. REV. 106, 1296 (1957), ANNALS OF PHYSICS 2, 407 (1957), PROC. NATIONAL ACADEMY OF SCI. 38 449 (1952), CERN CONFERENCE 187 (1958), PHYS. REV. LETTERS 1, 70 (1958), PHYS. REV. 109, 1229 (1958), PHYS. REV. 114, 874 (1959), PHYS. REV. 107, 1337 (1957), PHYS. REV. 107, 1714 (1957), PHYS. REV. 92, 1023 (1953), AND JINR AECTR-3591.

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON HEAVY LIQUID AT 1.15 GEV/C.

THIS EXPERIMENT USES THE L.R.L. 30 IN. (HL) BUBBLE CHAMBER. A TOTAL OF 100000 PICTURES ARE REPORTED ON.

KEY WORDS - SIGMA+/- CROSS SECTION MODELS

COMPOUND KEY WORDS - SIGMA+/- CROSS SECTION

SIGMA+ PROTON ELASTIC CROSS SECTION. [PAGE 1520]

LABORATORY BEAM MOMENTUM GEV/C MIN	LABORATORY BEAM MOMENTUM GEV/C MAX	MILLI-BARNS	NO. EVENTS
.1	1.9	38. + 18. - 14.	10

SIGMA- PROTON ELASTIC CROSS SECTION. [PAGE 1520]

LABORATORY BEAM MOMENTUM GEV/C MIN	LABORATORY BEAM MOMENTUM GEV/C MAX	MILLI-BARNS	NO. EVENTS
.1	1.9	10. + 6. - 4.	6

5

STUDY OF THE LAMBDA-N SYSTEM IN LOW-ENERGY LAMBDA-P ELASTIC SCATTERING. (PHYS. REV. 173, 1452 (1968))

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R.ENGELMANN,H.FILTHUTH W.LUGHOFER (UNIV. HEIDELBERG, HEIDELBERG, GERMANY)

ABSTRACT THE PRESENT PAPER IS BASED ON 378 LAMBDA-P ELASTIC SCATTERING EVENTS IN THE INCIDENT-MOMENTUM REGION 120-320 MEV/C. DIFFERENTIAL AND TOTAL CROSS SECTIONS HAVE BEEN MEASURED IN SEVERAL MOMENTUM INTERVALS AND FOUND TO BE CONSISTENT WITH PREDOMINANTLY S-WAVE SCATTERING. NO SIGNIFICANT INDICATION FOR THE EXISTENCE OF A LOW-ENERGY LAMBDA-P RESONANCE HAS BEEN FOUND. USING THE EFFECTIVE-RANGE APPROXIMATION, THE FOUR SCATTERING PARAMETERS A(S), A(T), R(S), AND R(T), WERE EVALUATED WITH AND WITHOUT FURTHER ASSUMPTIONS ON THE LAMBDA-P INTERACTION PROPERTIES. BEST VALUES OBTAINED FROM THE FOUR-PARAMETER FIT WERE A(S) = -1.8, A(T) = -1.6, R(S) = 2.8, AND R(T) = 3.3 F. A LIKELIHOOD-FUNCTION MAPPING PROCEDURE IS USED TO DESCRIBE THE LARGE AND STRONGLY CORRELATED ERRORS OF THESE VALUES.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN DUBNA CONFERENCE 675 (1964), PHYS. REV. LETTERS 13, 484 (1964), AND PHYS. LETTERS 19, 715 (1966).

ADDITIONAL CITATIONS
INT. CONF. ON H.E. PHYS.,NUC.STRUCTURE,REHOVOTH 36 (1967), NUOVO CIMENTO 45A, 1038 (1966), PHYS. REV. 114, 593 (1959), NUC. PHYS. 50, 177 (1964), PHYS. REV. 137, B294 (1965), PHYS. REV. 153, 1091 (1967), PHYS. REV. 159, 853 (1967), PHYS. REV. 165, 1093 (1968), ANNALS OF PHYSICS 19, 458 (1962), NUC. PHYS. 55, 34 (1964), NUOVO CIMENTO 39, 886 (1965), PHYS. LETTERS 19, 320 (1965), PHYS. REV. 140, 1013 (1965), PHYS. REV. 140, B1366 (1965), PHYS. REV. LETTERS 13, 282 (1964), UNIV. OF MARYLAND 469 (1965), UNIV. OF MARYLAND 846 (1968), PHYS. REV. LETTERS 14, 604 (1965), NUC. PHYS. 31, 251 (1962), NUC. PHYS. 64, 593 (1965), PHYS. REV. 152, 975 (1966), PHYS. REV. 141, 1387 (1966), NUOVO CIMENTO 41, 374 (1966), NUOVO CIMENTO 33, 137 (1964), NUOVO CIMENTO 36, 120 (1965), AND PROGRESS OF THEORETICAL PHYSICS 15, 222 (1956).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT 0. GEV/C.

THIS EXPERIMENT USES THE SACLAY 81 CM (H) BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.

KEY WORDS - LAMBDA CROSS SECTION DIFFERENTIAL CROSS SECTION POLARIZATION PHASE SHIFT MODELS
STRANGE PARTICLES

COMPOUND KEY WORDS - LAMBDA CROSS SECTION

LAMBDA PROTON TOTAL CROSS SECTION. (TABLE 2)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.12	.17	180. +- 22.	65
.17	.20	130. 17.	62
.20	.22	118. 16.	58
.22	.24	101. 12.	65
.24	.26	83. 9.	85
.26	.32	57. 9.	43

LAMBDA PROTON ELASTIC CROSS SECTION. (TABLE 2)

(AT THESE ENERGIES, THIS IS THE ONLY CHANNEL OPEN.)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.12	.17	180. +- 22.	65
.17	.20	130. 17.	62
.20	.22	118. 16.	58
.22	.24	101. 12.	65
.24	.26	83. 9.	85
.26	.32	57. 9.	43

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 6)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .12 TO .17 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	18
-.8	-.6	19
-.6	-.4	23
-.4	-.2	25
-.2	.0	13
.0	.2	18
.2	.4	4

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 6)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .17 TO .20 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	8
-.8	-.6	12
-.6	-.4	6
-.4	-.2	17
-.2	.0	14
.0	.2	15
.2	.4	20
.4	.6	4

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 6)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .20 TO .22 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	10
-.8	-.6	14
-.6	-.4	5
-.4	-.2	22
-.2	.0	16
.0	.2	10
.2	.4	6
.4	.6	4
.6	.8	1

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 6)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .22 TO .24 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	2
-.8	-.6	6
-.6	-.4	13
-.4	-.2	14
-.2	.0	6
.0	.2	8
.2	.4	14
.4	.6	19
.6	.8	6

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 6)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .24 TO .26 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	11
-.8	-.6	11
-.6	-.4	14
-.4	-.2	11
-.2	.0	14
.0	.2	14
.2	.4	8
.4	.6	20
.6	.8	17

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 6)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .26 TO .32 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	3
-.8	-.6	8
-.6	-.4	1
-.4	-.2	8
-.2	.0	1
.0	.2	3
.2	.4	8
.4	.6	13
.6	.8	7

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC POLARIZATION FOR LAMBDA PROTON. (TABLE 2)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .20 TO .22 GEV/C.

COS(THETA) MIN	MAX	(ALPHA)* POLARIZATION
-1.	0.	.00 +- .31
0.	1.	-.50 .48

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC POLARIZATION FOR LAMBDA PROTON. [TABLE 21

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .22 TO .24 GEV/C.

COS(THETA) MIN	COS(THETA) MAX	(ALPHA)* POLARIZATION
-1.	0.	-.37 +- .38
0.	1.	-.11 .32

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC POLARIZATION FOR LAMBDA PROTON. [TABLE 21

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .24 TO .26 GEV/C.

COS(THETA) MIN	COS(THETA) MAX	(ALPHA)* POLARIZATION
-1.	0.	.48 +- .30
0.	1.	-.51 .29

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC POLARIZATION FOR LAMBDA PROTON. [TABLE 21

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .26 TO .32 GEV/C.

COS(THETA) MIN	COS(THETA) MAX	(ALPHA)* POLARIZATION
-1.	0.	.13 +- .52
0.	1.	.00 .38

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [TABLE 21

LABORATORY BEAM MOMENTUM GEV/C MIN	LABORATORY BEAM MOMENTUM GEV/C MAX	F/B
.20	.22	.55 +- .16
.22	.24	1.76 .45
.24	.26	1.16 .25
.26	.32	1.92 .62

POLAR TO EQUATORIAL RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [TABLE 21

LABORATORY BEAM MOMENTUM GEV/C MIN	LABORATORY BEAM MOMENTUM GEV/C MAX	P/E
.20	.22	1.00 +- .29
.22	.24	.74 .20
.24	.26	1.14 .25
.26	.32	1.01 .32

6 INTERACTIONS OF LAMBDAS WITH PROTONS. (PHYS. REV. LETTERS 7, 348 (1961))

G.ALEXANDER,J.A.ANDERSON,F.S.CRAWFORD JR.,M.LASKAR,L.J.LLOYD (U.C. LAWRENCE RAD. LAB., BERKELEY, CALIF., USA)

CITATIONS
PHYS. REV. LETTERS 2, 174 (1959), NUOVO CIMENTO 13, 371 (1959), PHYS. REV. 110, 574 (1958), UCRL 9460 (1960), NUOVO CIMENTO 18, 1003 (1960), PROC. NATIONAL ACADEMY OF SCI. 38 449 (1952), ANNALS OF PHYSICS 2, 407 (1957), PHYS. REV. 106, 1296 (1957), AND UNIV. OF ROCHESTER NYO-9746 (1961).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS PI- ON PROTON AT 1.035 GEV/C.

THIS EXPERIMENT USES THE L.R.L. 72 IN. (H) BUBBLE CHAMBER.

KEY WORDS = LAMBDA CROSS SECTION

COMPOUND KEY WORDS = LAMBDA CROSS SECTION

LAMBDA PROTON TOTAL CROSS SECTION. (TABLE 2)

(AT THIS ENERGY, ONLY THE ELASTIC CHANNEL IS OPEN.)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.400	.638	24.7 +- 9.3	7

LAMBDA PROTON ELASTIC CROSS SECTION. (TABLE 2)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.400	.638	24.7 +- 9.3	7
.638	1.000	20.4 7.7	7

CROSS SECTION FOR LAMBDA PROTON = SIGMA0 PROTON. (TABLE 2)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.638	1.000	8.5 +- 4.9	3

CROSS SECTION FOR LAMBDA PROTON = LAMBDA NUCLEON PION. (TABLE 2)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.88	1.00	< 14.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. (PAGE 351)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	F/B
.4	1.0	1.0 +- .5

POLAR TO EQUATORIAL RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. (PAGE 351)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	P/E
.4	1.0	1.8 +- 1.0

7

STUDY OF SIGMA- P → LAMBDA N AND SIGMA- P → SIGMAO N REACTIONS AT P(SIGMA-)BETWEEN 0 AND 600 MEV/C. [USAEC REPORT NYO3651-11 (1969)]

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P.YAMIN,D.BERLEY [BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

CITATIONS
PHYS. REV. 131, 2248 (1963), PHYS. REV. LETTERS 19, 1074 (1967), PHYS. REV. LETTERS 19, 979 (1967), PHYS. LETTERS 21, 587 (1966), PHYS. REV. 130, 319 (1963), PHYS. LETTERS 21, 109 (1966), PHYS. REV. 75, 1664 (1949), AND PHYS. REV. LETTERS 3, 281 (1959).

ARTICLE READ BY ODETTE BENARY IN 10/69, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT .4 GEV/C.

THIS EXPERIMENT USES THE B.N.L. 30 IN. (H) BUBBLE CHAMBER. A TOTAL OF 1000000 PICTURES ARE REPORTED ON.

GENERAL COMMENTS ON THIS ARTICLE
1 SUBMITTED BY THE U. OF MASSACHUSETTS, AMHERST, TO THE INTERNATIONAL CONF. ON HYPERNUCLEAR PHYSICS., ARGONNE NAT'L. LAB., MAY 5-7, 1969.
2 THE RESULTS ARE STILL PRELIMINARY.
3 AS THE DATA IN THIS ARTICLE IS PRELIMINARY WE HAVE NOT PUNCHED ANY OF IT. THE DATA BELOW ALL COMES FROM A LATER PRIVATE COMMUNICATION FROM S. YAMAMOTO. THE PUNCHED DATA IS ALSO PRELIMINARY.

KEY WORDS - SIGMA- POLARIZATION CROSS SECTION ANGULAR DISTRIBUTION

CROSS SECTION FOR SIGMA- PROTON → LAMBDA NEUTRON + SIGMAO NEUTRON.

(PRIVATE COMMUNICATION FROM STEVEN YAMAMOTO OCTOBER 1969)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.150	.200	263. +- 46.
.200	.250	143. 28.
.250	.300	120. 24.
.300	.350	53. 16.
.350	.400	27. 12.
.400	.450	65. 18.
.450	.500	45. 15.
.500	.550	22. 8.
.550	.600	21. 8.
.600	.625	9. 8.

CROSS SECTION FOR SIGMA- PROTON → LAMBDA NEUTRON.

(PRIVATE COMMUNICATION FROM STEVEN YAMAMOTO OCTOBER 1969)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.15	.20	117. +- 31.
.20	.30	138. 37.
.30	.40	25. 15.
.40	.50	67. 24.
.50	.60	27. 9.

CROSS SECTION FOR SIGMA- PROTON → SIGMAO NEUTRON.

(PRIVATE COMMUNICATION FROM STEVEN YAMAMOTO OCTOBER 1969)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.15	.20	141. +- 34.
.20	.30	134. 36.
.30	.40	54. 20.
.40	.50	42. 20.
.50	.60	27. 12.

8 INELASTIC SIGMA- P INTERACTIONS AT LOW MOMENTA. [PHYS. LETTERS 21, 587 (1966)]

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ABSTRACT THE TOTAL CROSS SECTIONS FOR THE TWO REACTIONS SIGMA- P → LAMBDA N AND SIGMA-P → SIGMA-O N IN THE MOMENTUM INTERVAL 105 ≤ P SIGMA- ≤ 165 MEV/C ARE PRESENTED. FOR THE PROCESS SIGMA- P → LAMBDA N THE DIFFERENTIAL CROSS SECTION AND THE LAMBDA POLARIZATION ARE GIVEN.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 14, 162 (1964), AND PHYS. LETTERS 21, 236 (1966).

ADDITIONAL CITATIONS
COLUMBIA UNIVERSITY NEVIS-145 (1966), PHYS. REV. 129, 1795 (1963), PHYS. REV. 129, 1795 (1963), PHYS. LETTERS 21, 109 (1966), PHYS. REV. LETTERS 13, 299 (1964), AND PHYS. REV. LETTERS 13, 291 (1964).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT 0. GEV/C.

THIS EXPERIMENT USES THE SACLAY 81 CM (H) BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.

KEY WORDS • SIGMA- CROSS SECTION DIFFERENTIAL CROSS SECTION LAMBDA POLARIZATION

COMPOUND KEY WORDS • SIGMA- CROSS SECTION LAMBDA POLARIZATION

CROSS SECTION FOR SIGMA- PROTON • SIGMA0 NEUTRON. (FIGURE 1)

(THESE CROSS SECTIONS ARE SENSITIVE TO THE SIGMA- LIFETIME. A VALUE OF 1.58 X 10**-10 SEC. WAS ASSUMED. SEE FOOTNOTE ON PAGE 588.)

. THIS DATA WAS READ FROM A GRAPH .

LABORATORY BEAM MOMENTUM GEV/C	MILLI-BARNS
.111	395. +- 95.
.121	160. 40.
.131	160. 30.
.141	125. 25.
.151	110. 20.
.161	115. 15.

CROSS SECTION FOR SIGMA- PROTON • LAMBDA NEUTRON. (FIGURE 1)

(THESE CROSS SECTIONS ARE SENSITIVE TO THE SIGMA- LIFETIME. A VALUE OF 1.58 X 10**-10 SEC. WAS ASSUMED. SEE FOOTNOTE ON PAGE 588.)

. THIS DATA WAS READ FROM A GRAPH .

LABORATORY BEAM MOMENTUM GEV/C	MILLI-BARNS
.109	170. +- 50.
.119	170. 45.
.129	140. 30.
.139	160. 30.
.149	140. 20.
.159	115. 15.

DIFFERENTIAL CROSS SECTION FOR SIGMA- PROTON • LAMBDA NEUTRON. (FIGURE 2A)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .10 TO .17 GEV/C.
NUMBER OF EVENTS = 289.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-COS(THETA) MB
-1.0	-.8	75. +- 15.
-.8	-.6	80. 15.
-.6	-.4	65. 15.
-.4	-.2	60. 12.
-.2	.0	90. 17.
.0	.2	70. 14.
.2	.4	60. 12.
.4	.6	96. 17.
.6	.8	85. 15.
.8	1.0	85. 15.

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

DIFFERENTIAL CROSS SECTION FOR SIGMA- PROTON → LAMBDA NEUTRON. [FIGURE 28]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .15 TO .17 GEV/C.
NUMBER OF EVENTS = 144.

(THESE DATA ARE ALSO INCLUDED IN SET ABOVE.)

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	COS(THETA) MAX	D-SIGMA/D-COS(THETA) MB
-1.0	-.8	45. +- 13.
-.8	-.6	55. 16.
-.6	-.4	38. 13.
-.4	-.2	60. 18.
-.2	.0	79. 20.
.0	.2	60. 17.
.2	.4	40. 15.
.4	.6	80. 20.
.6	.8	105. 25.
.8	1.0	95. 20.

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

9

ELASTIC SCATTERING OF LAMBDA HYPERONS FROM PROTONS. [PHYS. REV. 129, 1372 (1963)]

T.H.GROVES (UNIV. OF WISCONSIN, MADISON, WISC., USA)

ABSTRACT THE LAMBDA-PROTON ELASTIC SCATTERING CROSS SECTION HAS BEEN MEASURED TO BE 20 +- 5 MB. THIS VALUE REPRESENTS AN AVERAGE OVER THE MOMENTUM INTERVAL 150-1500 MEV/C. IT IS BASED ON 26 EVENTS OBSERVED IN A PROPANE BUBBLE CHAMBER. THE LAMBDA HYPERONS WERE PRODUCED BY THE INTERACTIONS OF 1.15 BEV/C K- MESONS IN THE PROPANE.

CITATIONS
PHYS. REV. 125, 1067 (1962), PHYS. REV. LETTERS 2, 174 (1959), PHYS. REV. LETTERS 7, 348 (1961), DUBNA D-820, REVIEW OF SCIENTIFIC INSTRUMENTS 29, 874 (1958), REVIEW OF SCIENTIFIC INSTRUMENTS 31, 1054 (1960), UCRL 9475, PHYS. REV. 87, 425 (1952), ROCHESTER CONFERENCE 878 (1960), NUOVO CIMENTO 13, 371 (1959), AND ANNALS OF PHYSICS 16, 263 (1961).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON HEAVY LIQUID AT 1.15 GEV/C.

THIS EXPERIMENT USES THE L.R.L. 30 IN. (HL) BUBBLE CHAMBER. A TOTAL OF 105000 PICTURES ARE REPORTED ON.

KEY WORDS - LAMBDA CROSS SECTION

COMPOUND KEY WORDS - LAMBDA CROSS SECTION

LAMBDA PROTON TOTAL CROSS SECTION. [PAGE 1377]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.15	.60	22. +- 10.	6

LAMBDA PROTON ELASTIC CROSS SECTION. [PAGE 1377]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.15	.60	22. +- 10.	6
.60	1.50	19. 5.	20

10 LAMBDA-PROTON INTERACTIONS AT HIGH ENERGIES. [PHYS. REV. 160, 1239 (1967)]

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J.LEITNER [SYRACUSE UNIV., SYRACUSE, N. Y., USA, AND BROOKHAVEN NAT. LAB., UPTON, L.I., N. Y., USA]

ABSTRACT LAMBDA-PROTON INTERACTIONS LEADING TO FINAL STATES OF THE TYPES LAMBDA P, LAMBDA P 2 PI, AND SIGMA P PI HAVE BEEN INVESTIGATED IN THE MOMENTUM RANGE OF APPROXIMATELY 1 - 5 BEV/C. FINAL-STATE RESONANCE PRODUCTION IS DISCUSSED IN TERMS OF MESON-EXCHANGE MODELS AND INELASTIC CROSS SECTIONS ARE ESTIMATED. THE ELASTIC AND TOTAL CROSS SECTIONS, AVERAGED OVER THE FULL ENERGY RANGE, ARE FOUND TO BE APPROXIMATELY 10 AND 35 MB RESPECTIVELY. THESE VALUES ARE IN GOOD AGREEMENT WITH PREDICTIONS BASED ON VARIOUS VERSIONS OF THE QUARK MODEL.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN DUBNA CONFERENCE 1964 662.

ADDITIONAL CITATIONS
PHYS. REV. LETTERS 13, 484 (1964), PHYS. REV. LETTERS 13, 282 (1964), PHYS. REV. 129, 1372 (1963), PHYS. REV. LETTERS 7, 348 (1961), JETP 15 676 (1962), PHYS. LETTERS 23, 702 (1966), PHYS. REV. 143, 1034 (1966), PHYS. REV. LETTERS 11, 425 (1963), PHYS. REV. LETTERS 16, 71 (1966), JETP 2 65 (1965), AND PHYS. REV. 150, 1372 (1966).

ARTICLE READ BY LEROY PRICE IN 10/67, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON FROM 4.6 TO 5.0 GEV/C.

THIS EXPERIMENT USES A HYDROGEN BUBBLE CHAMBER. A TOTAL OF 150000 PICTURES ARE REPORTED ON.

GENERAL COMMENTS ON THIS ARTICLE
1 THESE ARE PRELIMINARY RESULTS (SMALL STATISTICS).

KEY WORDS * LAMBDA CROSS SECTION Y*(1385) SIGMA MODELS MASS SPECTRUM ANGULAR DISTRIBUTION

COMPOUND KEY WORDS * LAMBDA CROSS SECTION

CROSS SECTION FOR LAMBDA PROTON * SIGMA+ PI- PROTON + SIGMA- PI+ PROTON. [PAGE 1243]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
1.2	5.0	1.0 +- .4	9

CROSS SECTION FOR LAMBDA PROTON * LAMBDA PROTON PI+ PI-. [PAGE 1243]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
1.4	5.0	1.8 +- .7	11

LAMBDA PROTON TOTAL CROSS SECTION. [PAGE 1243]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
1.5	5.0	35. +- 15.

LAMBDA PROTON ELASTIC CROSS SECTION.

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
1.00	2.25	12. +- 4.	25
2.26	3.50	9. 3.	27
3.50	5.00	9. 4.	8

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. [FIGURE 5]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM 2.5 TO 5.0 GEV/C.

(AUTHORS INDICATE THAT DATA ARE UNCORRECTED)

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MAX	MIN	NO. EVENTS
1.0	.8	11
.8	.6	2
.6	.4	1
.4	.2	0
.2	.0	0
.0	-.2	0
-.2	-.4	0
-.4	-.6	0
-.6	-.8	0
-.8	-1.0	0

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [1]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	(F-B)/(F+B)
2.5	5.0	1.00 +- .14

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

II

ELASTIC SCATTERING OF LAMBDA HYPERONS AND (KO)1 MESONS ON HYDROGEN. [JETP 15 676 (1962)]

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ABSTRACT THE ELASTIC SCATTERING OF LAMBDA HYPERONS AND (KO)1 MESONS ON PROTONS IS INVESTIGATED. THE ELASTIC SCATTERING CROSS SECTIONS ARE ESTIMATED ON THE BASIS OF 20 DETECTED CASES OF THE REACTION LAMBDA + P→LAMBDA + P AND 16 CASES OF THE REACTION (KO)1 + P→(KO)1 + P. THE ANGULAR DISTRIBUTIONS OF THE SCATTERED PARTICLES AND THE MOMENTUM DISTRIBUTIONS OF THE PARTICLES BEFORE SCATTERING ARE DESCRIBED. EXPERIMENTAL DATA ON THE SCATTERING OF LAMBDA HYPERONS, HAVING MOMENTA IN THE INTERVAL FROM 500 TO 1500 MEV/C, IS COMPARED WITH THEORETICAL CALCULATIONS.

CITATIONS
PHYS. REV. LETTERS 2, 174 (1959), PRIBORI I TECH TECH. EXP. 1 41 (1959), INSTRUMENTS AND EXPERIMENTAL TECHNIQUES 1 43 (1959), PHYS. REV. 123, 1465 (1961), JETP 13 323 (1961), PHYS. REV. 121, 1513 (1961), PHYS. REV. LETTERS 6, 300 (1961), PHYS. REV. LETTERS 6, 383 (1961), JETP 13 917 (1961), AND NUC. PHYS. 22, 410 (1961).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS PI- ON HEAVY LIQUID FROM 7 TO 8 GEV/C.

THIS EXPERIMENT USES A HEAVY LIQUID BUBBLE CHAMBER. A TOTAL OF 70000 PICTURES ARE REPORTED ON.

KEY WORDS * LAMBDA CROSS SECTION ANGULAR DISTRIBUTION KO

COMPOUND KEY WORDS * LAMBDA CROSS SECTION KO CROSS SECTION KO ANGULAR DISTRIBUTION

LAMBDA PROTON ELASTIC CROSS SECTION. [PAGE 679]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.4	1.5	42. +- 16.
1.5	2.5	30. 15.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. [FIGURE 4C]

LABORATORY BEAM MOMENTUM = .5 +- 1.5 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	5.8
-.8	-.6	4.0
-.6	-.4	2.5
-.4	-.2	4.5
-.2	.0	3.5
.0	.2	.0
.2	.4	1.0
.4	.6	2.0
.6	.8	.0
.8	1.0	1.0

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [1]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	(F-B)/(F+B)
.5	1.5	-.67 +- .15

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

12

ELASTIC SCATTERING OF LAMBDA HYPERONS WITH AVERAGE MOMENTUM 2.7 BEV/C BY PROTONS. (SOVIET JNP 3 511 (1966))

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ABSTRACT WE HAVE EXPERIMENTALLY DETERMINED THE TOTAL CROSS SECTION FOR ELASTIC SCATTERING OF LAMBDA HYPERONS WITH AVERAGE MOMENTUM = 2.7 +- 1.2 BEV/C BY PROTONS, WHICH TURNS OUT TO BE 15 +- 4 MB. THIS VALUE IS COMPARED WITH THE THEORETICAL AND EXPERIMENTAL DATA KNOWN PREVIOUSLY.

CITATIONS
PHYS. REV. LETTERS 2, 174 (1959), PHYS. REV. LETTERS 7, 348 (1961), JETP 42 979 (1962), JETP 15 676 (1962), PHYS. REV. 129, 1372 (1963), PHYS. REV. LETTERS 12, 625 (1964), PHYS. REV. LETTERS 13, 282 (1964), PHYS. REV. LETTERS 13, 484 (1964), PHYS. LETTERS 12, 350 (1964), PRIBORI I TECH TECH. EXP. 1 41 (1959), JINR R-1959 (1965), JINR R-2215 (1965), JINR R-1352 (1963), JINR R-1468 (1963), AND NUOVO CIMENTO 36, 189 (1965).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS NEUTRON ON HEAVY LIQUID FROM 2.786 TO 10.900 GEV/C. (BEAM KINETIC ENERGY = 2 TO 10 GEV)

THIS EXPERIMENT USES A HEAVY LIQUID BUBBLE CHAMBER. A TOTAL OF 116000 PICTURES ARE REPORTED ON.

KEY WORDS - LAMBDA CROSS SECTION ANGULAR DISTRIBUTION

COMPOUND KEY WORDS - LAMBDA CROSS SECTION

LAMBDA PROTON ELASTIC CROSS SECTION. (PAGE 514)

LABORATORY BEAM MOMENTUM GEV/C	MILLI-BARNS	NO. EVENTS
2.7 +- 1.2	15. +- 4.	12

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. (FIGURE 3)

LABORATORY BEAM MOMENTUM = 2.7 GEV/C (MEAN VALUE).

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.5	3.5
-.5	.0	3.2
.0	.5	3.5
.5	1.0	9.0

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. (1)

LABORATORY BEAM MOMENTUM GEV/C	(F-B)/(F+B)
2.7 +- 1.2	.30 +- .22

(1) CALCULATED BY US FROM DATA IN THIS ARTICLE.

POLAR TO EQUATORIAL RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. (1)

LABORATORY BEAM MOMENTUM GEV/C	(P-E)/(P+E)
2.7 +- 1.2	.30 +- .22

(1) CALCULATED BY US FROM DATA IN THIS ARTICLE.

13 LOW-ENERGY (SIGMA+ P) AND (SIGMA- P) ELASTIC SCATTERING. (PHYS. REV. 159, 1149 (1967))

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R.A.BURNSTEIN (ILLINOIS INST. OF TECH., CHICAGO ILL., USA)

ABSTRACT THE CROSS SECTIONS FOR THE ELASTIC SCATTERING OF SIGMA+ AND SIGMA- HYPERONS ON PROTONS HAVE BEEN MEASURED. THE HYPERONS WERE PRODUCED BY THE INTERACTIONS OF STOPPING K- MESONS IN A HYDROGEN BUBBLE CHAMBER. THE CROSS SECTION FOR (SIGMA- P) ELASTIC SCATTERING IS 166 +- 33 MB, AT A MEAN LABORATORY MOMENTUM OF 150 MEV/C. THE CROSS SECTION FOR (SIGMA+ P) ELASTIC SCATTERING IS 84 +- 34 MB AT A MEAN LABORATORY MOMENTUM OF 161.5 MEV/C. THESE MEASUREMENTS, AS WELL AS THE RESULTS OF SIMILAR EXPERIMENTS, ARE COMPARED WITH SEVERAL RECENT THEORETICAL PREDICTIONS OF HYPERON-NUCLEON SCATTERING CROSS SECTIONS.

CITATIONS
UNIV. OF MARYLAND 652 (1967), PHYS. REV. 135, B565 (1964), UNIV. OF MARYLAND 565 (1965), NUOVO CIMENTO 34, 1167 (1964), PHYS. LETTERS 21, 109 (1966), PHYS. REV. 151, 1116 (1966), UNIV. OF MARYLAND 469 (1965), PHYS. LETTERS 19, 715 (1966), PHYS. LETTERS 21, 236 (1966), NUCLEAR INSTRUMENTS AND METHODS 20, 51 (1963), UCRL 9099, REVIEW OF SCIENTIFIC INSTRUMENTS 33, 181 (1962), UNIV. OF MARYLAND 652 (1967), PHYS. REV. 127, 1305 (1962), AND PHYS. REV. LETTERS 14, 29 (1964).

ARTICLE READ BY LERCY PRICE IN 10/67, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT 0. GEV/C.

THIS EXPERIMENT USES THE SACLAY 81 CM (H) BUBBLE CHAMBER. A TOTAL OF 75000 PICTURES ARE REPORTED ON.

KEY WORDS * SIGMA CROSS SECTION ANGULAR DISTRIBUTION

COMPOUND KEY WORDS * SIGMA CROSS SECTION

SIGMA- PROTON ELASTIC CROSS SECTION. (TABLE 3)

LABORATORY BEAM MOMENTUM GEV/C (1)	MILLI-BARNS	NO. EVENTS
.15	166. +- 33.	25

(1) MEAN VALUE.

(TABLE 3)

LABORATORY BEAM MOMENTUM = .1615 GEV/C (MEAN VALUE).

REACTION	MILLI-BARNS	NO. EVENTS
SIGMA+ PROTON *		
TOTAL	83. +- 34.	9
ELASTIC	83. 34. (1)	9

(1) AT THIS ENERGY, THIS IS THE ONLY CANNEL OPEN.

14 LAMBDA P SCATTERING FOR P(LAMBDA)=300 - 1200 MEV/C -- PRELIMINARY RESULTS. [UCRL 18805 REV. (1969)]

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CITATIONS
NUOVO CIMENTO 25, 1072 (1962), PHYS. REV. LETTERS 20, 1452 (1968), PHYS. REV. LETTERS 22, 483 (1969), AND VIENNA CONFERENCE 173 (1968).

ARTICLE READ BY ODETTE BENARY IN 9/69, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT 1.5 GEV/C.

THIS EXPERIMENT USES THE L.R.L. 25 IN. (H) BUBBLE CHAMBER. A TOTAL OF 260000 PICTURES ARE REPORTED ON.

GENERAL COMMENTS ON THIS ARTICLE
1 THE RATE OF LAMBDA PRODUCTION WAS ENHANCED BY MEANS OF A PLATINUM PLATE INTRODUCED INSIDE THE BUBBLE CHAMBER.

KEY WORDS - LAMBDA CROSS SECTION DIFFERENTIAL CROSS SECTION

COMPOUND KEY WORDS - LAMBDA CROSS SECTION

LAMBDA PROTON TOTAL CROSS SECTION.

(AT THIS ENERGY, ONLY THE ELASTIC CHANNEL IS OPEN)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS [1]
.2	.6	17.6 + 7.0 - 4.0

[1] ERRORS ARE STATISTICAL ONLY.

LAMBDA PROTON ELASTIC CROSS SECTION. [FIGURE 4]
NUMBER OF EVENTS = 62.

. THIS DATA WAS READ FROM A GRAPH .

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS [1]
.2	.6	17.6 + 7.0 - 4.0
.6	.8	30.5 + 9.0 - 6.5
.8	1.2	17.4 + 6.8 - 3.2
1.2	1.6	33.5 + 12.0 - 6.5
1.6	2.0	15.0 + 14.5 - 5.3

[1] ERRORS ARE STATISTICAL ONLY.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. [FIGURE 5]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .3 TO 1.2 GEV/C.

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.0	-.8	9.5
-.8	-.6	1.0
-.6	-.4	14.0
-.4	-.2	13.5
-.2	.0	7.0
.0	.2	6.0
.2	.4	2.0
.4	.6	13.5
.6	.8	4.0
.8	1.0	7.5

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [1]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	(F-B)/(F+B)
.3	1.2	-.15 +- .11

[1] CALCULATED BY US FROM DATA IN THIS ARTICLE.

15 ELASTIC LAMBDA-PROTON SCATTERING FROM 400 - 1300 MEV/C. [PHYS. LETTERS 25B, 446 (1967)]

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ABSTRACT LAMBDA-PROTON ELASTIC SCATTERING FROM MOMENTA OF 400 TO 1300 MEV/C HAS BEEN STUDIED USING LAMBDAS PRODUCED BY HYDROGEN AND DEUTERIUM BUBBLE CHAMBERS EXPOSED TO A K- BEAM OF MOMENTUM ABOUT 1 GEV/C. 78 ELASTIC LAMBDA P SCATTERS HAVE BEEN OBSERVED. THE ABSOLUTE CROSS SECTION IS ESTIMATED. THE ANGULAR DISTRIBUTION FOR ELASTIC SCATTERING IS CONSISTENT WITH ISOTROPY THROUGHOUT THIS REGION.

CITATIONS
UCRL 11527, PHYS. REV. LETTERS 17, 348 (1961), JETP 15 676 (1962), PHYS. REV. 129, 1372 (1963), SOVIET JNP 3 511 (1966), NUOVO CIMENTO 42, 67 (1966), AND REV. MOD. PHYS. 30, 368 (1958).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM NO. 1 IS K- ON PROTON FROM .8 TO 1.1 GEV/C.
NO. 2 IS K- ON DEUTERON FROM .8 TO 1.1 GEV/C.

THIS EXPERIMENT USES THE L.R.L. 25 IN. (H) BUBBLE CHAMBER.

KEY WORDS - CROSS SECTION ANGULAR DISTRIBUTION POLARIZATION

LAMBDA PROTON ELASTIC CROSS SECTION. [FIGURE 1]

(THESE CROSS SECTIONS ARE NORMALIZED TO PREVIOUS LAMBDA P SCATTERING EXPERIMENTS (30 PER CENT ERROR IN NORMALIZATION IS NOT INCLUDED))

. THIS DATA WAS READ FROM A GRAPH .

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS [1]
.4	.7	14.0 +- 3.5
.7	1.0	15.5 3.5
1.0	1.3	17.0 4.0

[1] PLUS POSSIBLE SYSTEMATIC ERROR OF +- 30 PER CENT.

ELASTIC POLARIZATION FOR LAMBDA PROTON. [PAGE 447]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .4 TO 1.3 GEV/C.

(IT IS NOT CLEAR IF THE AUTHORS REPORT THE POLARIZATION OR THE POLARIZATION TIMES THE LAMBDA DECAY ASYMMETRY PARAMETER.)

COS(THETA) MIN	MAX	POLARIZATION
-1.	1.	.11 +- .30

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.
THE POLARIZATION IS OF THE LAMBDA ALONG THE NORMAL TO THE PRODUCTION PLANE IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [FIGURE 3]

. THIS DATA WAS READ FROM A GRAPH .

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	F/B
.2	.4	.66 +- .44
.4	.7	1.19 .41
.7	1.0	1.15 .35
1.0	1.3	1.33 .49

POLAR TO EQUATORIAL RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. [FIGURE 3]

. THIS DATA WAS READ FROM A GRAPH .

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	P/E
.2	.4	.68 +- .42
.4	.7	1.32 .46
.7	1.0	1.70 .54
1.0	1.3	.67 .25

16 LOW-ENERGY LAMBDA PROTON ELASTIC SCATTERING. [PHYS. REV. 175, 1735 (1968)]

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ABSTRACT THE CROSS SECTIONS FOR LAMBDA P ELASTIC SCATTERING WITH LAMBDA MOMENTA IN THE INTERVAL 110-330 MEV/C HAVE BEEN MEASURED. OUR RESULTS ARE BASED ON 224 SCATTERING EVENTS FOUND IN A SAMPLE OF 95,600 LAMBDA HYPERONS OBSERVED IN AN EXPOSURE OF THE 81-CM SACLAY HYDROGEN BUBBLE CHAMBER TO A STOPPING K- BEAM. THESE CROSS SECTIONS ARE ANALYZED IN TERMS OF EFFECTIVE-RANGE THEORY. A WIDE SPECTRUM OF SOLUTIONS IN THIS FORMALISM GIVE ACCEPTABLE AGREEMENT WITH THE DATA.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. REV. LETTERS 13, 282 (1964), AND UNIV. OF MARYLAND 469 (1965).

ADDITIONAL CITATIONS
PHYS. REV. 111, 967 (1958), PHYS. REV. 114, 593 (1959), CERN 64-1 P.173 (1963), PHYS. REV. LETTERS 13, 484 (1964), PHYS. REV. LETTERS 19, 715 (1966), PHYS. REV. 127, 1305 (1962), UCRL 9099, REVIEW OF SCIENTIFIC INSTRUMENTS 33, 181 (1962), PHYS. REV. 133, B420, PHYS. REV. LETTERS 14, 603, PHYS. REV., 1452 (1968), PHYS. REV. LETTERS 3, 281 (1959), ANNALS OF PHYSICS 19, 458 (1962), NUC. PHYS. 55, 34 (1964), PHYS. LETTERS 24B, 543 (1967), PHYS. LETTERS 19, 320 (1965), PHYS. REV. 111, 1387 (1966), AND PHYS. REV. 159, 853 (1967).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT 0. GEV/C.

THIS EXPERIMENT USES THE SACLAY 81 CM (H) BUBBLE CHAMBER. A TOTAL OF 100000 PICTURES ARE REPORTED ON.

KEY WORDS = LAMBDA CROSS SECTION DIFFERENTIAL CROSS SECTION PHASE SHIFT

COMPOUND KEY WORDS = LAMBDA CROSS SECTION

LAMBDA PROTON TOTAL CROSS SECTION. [TABLE 1]

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.12	.15	209. +- 58.	14
.15	.18	177. 38.	28
.18	.21	153. 27.	49
.21	.24	111. 18.	54
.24	.27	87. 13.	59
.27	.33	46. 11.	20

LAMBDA PROTON ELASTIC CROSS SECTION. [TABLE 1]

(AT THESE ENERGIES, THIS IS THE ONLY CHANNEL OPEN.)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS	NO. EVENTS
.12	.15	209. +- 58.	14
.15	.18	177. 38.	28
.18	.21	153. 27.	49
.21	.24	111. 18.	54
.24	.27	87. 13.	59
.27	.33	46. 11.	20

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. [FIGURE 4]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .248 TO .330 GEV/C.

(THIS DISTRIBUTION HAS A CUTOFF AT COS(THETA) = +.75)

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.00	-.75	7.8 +- 3.3
-.75	-.50	9.3 3.3
-.50	-.25	7.5 3.1
-.25	.00	11.1 3.5
.00	.25	12.0 4.0
.25	.50	13.0 4.0
.50	.75	25.0 6.6

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR LAMBDA PROTON. [FIGURE 4]

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .180 TO .248 GEV/C.

(THIS DISTRIBUTION HAS A CUTOFF AT COS(THETA) = +.50)

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MIN	MAX	NO. EVENTS
-1.00	-.75	20.0 +- 4.0
-.75	-.50	25.0 5.0
-.50	-.25	32.0 6.0
-.25	.00	23.4 5.0
.00	.25	22.0 4.0
.25	.50	25.5 4.6

THETA IS THE ANGLE THAT THE LAMBDA MAKES WITH THE BEAM IN THE GRAND C.M.

FORWARD TO BACKWARD RATIO FOR LAMBDA PROTON ELASTIC SCATTERING. (PAGE 1737)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	F/B
.180	.248	.9 +- .2
.248	.330	1.8 .4

17 ELASTIC SIGMA P SCATTERING AT LOW MOMENTA. (PHYS. LETTERS 21, 236 (1966))

H.G.DOSCH,R.ENGELMANN,H.FILTHUTH,V.HEPP,E.KLUGE (UNIV. HEIDELBERG, HEIDELBERG, GERMANY)

ABSTRACT ELASTIC SIGMA+- P SCATTERING CROSS SECTIONS AND ANGULAR DISTRIBUTIONS ARE GIVEN IN THE MOMENTUM INTERVAL OF 135-175 MEV/C.

CLOSELY RELATED REFERENCES
CONTINUATION OF PREVIOUS EXPERIMENT IN PHYS. LETTERS 14, 162 (1965).

ADDITIONAL CITATIONS
PHYS. LETTERS 19, 320 (1965), AND NUCLEAR INSTRUMENTS AND METHODS 20, 51 (1963).

ARTICLE READ BY ODETTE BENARY IN 1/69, AND VERIFIED BY LRP.

BEAM IS K- ON PROTON AT 0. GEV/C.

THIS EXPERIMENT USES THE SACLAY 81 CM (H) BUBBLE CHAMBER. A TOTAL OF 200000 PICTURES ARE REPORTED ON.

KEY WORDS + SIGMA+ CROSS SECTION DIFFERENTIAL CROSS SECTION SIGMA-

COMPOUND KEY WORDS + SIGMA+ CROSS SECTION SIGMA- CROSS SECTION

SIGMA+ PROTON TOTAL CROSS SECTION. (TABLE 1)
NUMBER OF EVENTS = 66.

(NOT CORRECTED FOR COULOMB EFFECTS.)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.148	.158	203. +- 117.
.150	.160	143. 58.
.168	.178	89. 28.

SIGMA+ PROTON ELASTIC CROSS SECTION. (TABLE 1)
NUMBER OF EVENTS = 66.

(AT THESE ENERGIES, THIS IS THE ONLY CHANNEL OPEN. NOT CORRECTED FOR COULOMB EFFECTS.)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.148	.158	203. +- 117.
.158	.168	143. 58.
.168	.178	89. 28.

SIGMA- PROTON ELASTIC CROSS SECTION. (TABLE 1)
NUMBER OF EVENTS = 446.

(NOT CORRECTED FOR COULOMB EFFECTS.)

LABORATORY BEAM MOMENTUM GEV/C MIN	MAX	MILLI-BARNS
.135	.145	207. +- 85.
.145	.155	198. 48.
.155	.165	189. 32.

ELASTIC DIFFERENTIAL CROSS SECTION FOR SIGMA+ PROTON. (FIGURE 1)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .148 TO .178 GEV/C.
NUMBER OF EVENTS = 30.

(NOT CORRECTED FOR COULOMB EFFECTS. THIS DISTRIBUTION IS GIVEN FOR ONLY -.4>COS(THETA)>.8)

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MAX	MIN	D-SIGMA/D-COS(THETA) MB
.8	.6	170. +- 110.
.6	.4	120. 50.
.4	.2	90. 30.
.2	.0	40. 20.
.0	-.2	30. 20.
-.2	-.4	40. 20.

THETA IS THE ANGLE THAT THE SIGMA+ MAKES WITH THE BEAM IN THE GRAND C.M.

ELASTIC DIFFERENTIAL CROSS SECTION FOR SIGMA- PROTON. (FIGURE 1)

DATA IS AVERAGED OVER LABORATORY BEAM MOMENTUM FROM .135 TO .165 GEV/C.
NUMBER OF EVENTS = 130.

(NOT CORRECTED FOR COULOMB EFFECTS. THIS DISTRIBUTION IS GIVEN FOR ONLY -.4>COS(THETA)>.8)

. THIS DATA WAS READ FROM A GRAPH .

COS(THETA) MAX	COS(THETA) MIN	D-SIGMA/D-COS(THETA) MB
.8	.6	200. +- 110.
.6	.4	115. 25.
.4	.2	120. 20.
.2	.0	80. 20.
.0	-.2	105. 20.
-.2	-.4	90. 20.

THETA IS THE ANGLE THAT THE SIGMA- MAKES WITH THE BEAM IN THE GRAND C.M.

Section IV.

INDICES

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With all of the information for each article stored in a computer - searchable fashion, one could generate numerous types of indices; two types that we have found most useful are included in this section.

1. MOMENTUM INDICES—Here we list all of our YN articles classified by input channel (Λ p, Σ^+p, or Σ^-p) and then 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.

2. KEY WORDS CLASSIFICATION—As stated in Section III, each article is assigned certain KEY WORDS. These words (or phrases) are intended to indicate the contents of the article. As our list of KEY WORDS 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. We hope to have this remedied by our next edition of YN.

If you have any suggestions for other useful indices, please let us know. We believe that a good set of indices will make this report much more valuable.

Key Words Classification

ANGULAR DISTRIBUTION
[3] PIEKENBROCK ET AL., PHYS. REV. LETTERS 12, 625 (1964)
[7] YAMAMOTO ET AL., USAEC REPORT NY03651-11 (1969)
[10] BASSANO ET AL., PHYS. REV. 160, 1239 (1967)
[11] ARBUZOV ET AL., JETP 15 676 (1962)
[12] VISHNEVSKII ET AL., SOVIET JNP 3 511 (1966)
[13] RUBIN ET AL., PHYS. REV. 159, 1149 (1967)
[15] CLINE ET AL., PHYS. LETTERS 25B, 446 (1967)

CROSS SECTION
[1] BEILLIERE ET AL., PHYS. LETTERS 12, 350 (1964)
[2] CRAWFORD ET AL., PHYS. REV. LETTERS 2, 174 (1959)
[3] PIEKENBROCK ET AL., PHYS. REV. LETTERS 12, 625 (1964)
[4] STANNARD, PHYS. REV. 121, 1513 (1961)
[5] ALEXANDER ET AL., PHYS. REV. 173, 1452 (1968)
[6] ALEXANDER ET AL., PHYS. REV. LETTERS 7, 348 (1961)
[7] YAMAMOTO ET AL., USAEC REPORT NY03651-11 (1969)
[8] ENGELMANN ET AL., PHYS. LETTERS 21, 587 (1966)
[9] GROVES, PHYS. REV. 129, 1372 (1963)
[10] BASSANO ET AL., PHYS. REV. 160, 1239 (1967)
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[12] VISHNEVSKII ET AL., SOVIET JNP 3 511 (1966)
[13] RUBIN ET AL., PHYS. REV. 159, 1149 (1967)
[14] KADYK ET AL., UCRL 18805 REV. (1969)
[15] CLINE ET AL., PHYS. LETTERS 25B, 446 (1967)
[16] SECHI-ZORN ET AL., PHYS. REV. 175, 1735 (1968)
[17] OOSCH ET AL., PHYS. LETTERS 21, 236 (1966)

DIFFERENTIAL CROSS SECTION
[5] ALEXANDER ET AL., PHYS. REV. 173, 1452 (1968)
[8] ENGELMANN ET AL., PHYS. LETTERS 21, 587 (1966)
[14] KADYK ET AL., UCRL 18805 REV. (1969)
[16] SECHI-ZORN ET AL., PHYS. REV. 175, 1735 (1968)
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[1] BEILLIERE ET AL., PHYS. LETTERS 12, 350 (1964)
[2] CRAWFORD ET AL., PHYS. REV. LETTERS 2, 174 (1959)
[3] PIEKENBROCK ET AL., PHYS. REV. LETTERS 12, 625 (1964)
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[14] KADYK ET AL., UCRL 18805 REV. (1969)
[16] SECHI-ZORN ET AL., PHYS. REV. 175, 1735 (1968)

MASS SPECTRUM
[10] BASSANO ET AL., PHYS. REV. 160, 1239 (1967)

MODELS
[4] STANNARD, PHYS. REV. 121, 1513 (1961)
[5] ALEXANDER ET AL., PHYS. REV. 173, 1452 (1968)
[10] BASSANO ET AL., PHYS. REV. 160, 1239 (1967)

PHASE SHIFT
[5] ALEXANDER ET AL., PHYS. REV. 173, 1452 (1968)
[16] SECHI-ZORN ET AL., PHYS. REV. 175, 1735 (1968)

POLARIZATION
[5] ALEXANDER ET AL., PHYS. REV. 173, 1452 (1968)
[7] YAMAMOTO ET AL., USAEC REPORT NY03651-11 (1969)
[8] ENGELMANN ET AL., PHYS. LETTERS 21, 587 (1966)
[15] CLINE ET AL., PHYS. LETTERS 25B, 446 (1967)

PROTON
[2] CRAWFORD ET AL., PHYS. REV. LETTERS 2, 174 (1959)

SIGMA
[10] BASSANO ET AL., PHYS. REV. 160, 1239 (1967)
[13] RUBIN ET AL., PHYS. REV. 159, 1149 (1967)

SIGMA+
[17] OOSCH ET AL., PHYS. LETTERS 21, 236 (1966)

SIGMA+/-
[4] STANNARD, PHYS. REV. 121, 1513 (1961)

SIGMA-
[7] YAMAMOTO ET AL., USAEC REPORT NY03651-11 (1969)
[8] ENGELMANN ET AL., PHYS. LETTERS 21, 587 (1966)
[17] OOSCH ET AL., PHYS. LETTERS 21, 236 (1966)

STRANGE PARTICLES
[5] ALEXANDER ET AL., PHYS. REV. 173, 1452 (1968)

Y*(1385)
[10] BASSANO ET AL., PHYS. REV. 160, 1239 (1967)

Momentum Index (Λ p)

BEAM MOMENTUM	1ST AUTHOR	JOURNAL	VOLUME,PAGE	INSTITUTIONS	DETECTOR	YEAR PUBLISHED	REF.NR.
.120	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.120	ALEXANDER	PR	173 1452	REHO HEID	HBC	68	5
.150	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.150	GROVES	PR	129 1372	WISC	HLBC	63	9
.150	PIEKENBROC	PRL	12 625	COLO	HLBC	64	3
.170	ALEXANDER	PR	173 1452	REHO HEID	HBC	68	5
.180	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.200	CLINE	PL	258 446	WISC	HBC	67	15
.200	KADYK	UCRL	18805 REV.	LRL BERK	HBC	69	14
.200	ALEXANDER	PR	173 1452	REHO HEID	HBC	68	5
.210	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.220	ALEXANDER	PR	173 1452	REHO HEID	HBC	68	5
.240	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.240	ALEXANDER	PR	173 1452	REHO HEID	HBC	68	5
.248	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.260	ALEXANDER	PR	173 1452	REHO HEID	HBC	68	5
.270	SECHI-ZORN	PR	175 1735	UMD IIT	HBC	68	16
.300	KADYK	UCRL	18805 REV.	LRL BERK	HBC	69	14
.400	CLINE	PL	258 446	WISC	HBC	67	15
.400	ARBUZOV	JETP	15 676	JINR	HLBC	62	11
.400	ALEXANDER	PRL	7 348	LRL	HBC	61	6
.500	ARBUZOV	JETP	15 676	JINR	HLBC	62	11
.500	CRAWFORD	PRL	2 174	LRL BERK	HBC	59	2
.500	BEILLIERE	PL	12 350	EPOL BERG	HLBC	64	1
.600	KADYK	UCRL	18805 REV.	LRL BERK	HBC	69	14
.600	GROVES	PR	129 1372	WISC	HLBC	63	9
.638	ALEXANDER	PRL	7 348	LRL	HBC	61	6
.700	CLINE	PL	258 446	WISC	HBC	67	15
.700	CRAWFORD	PRL	2 174	LRL BERK	HBC	59	2
.800	KADYK	UCRL	18805 REV.	LRL BERK	HBC	69	14
.880	ALEXANDER	PRL	7 348	LRL	HBC	61	6
1.000	CLINE	PL	258 446	WISC	HBC	67	15
1.000	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10
1.200	KADYK	UCRL	18805 REV.	LRL BERK	HBC	69	14
1.200	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10
1.400	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10
1.500	ARBUZOV	JETP	15 676	JINR	HLBC	62	11
1.500	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10
1.600	KADYK	UCRL	18805 REV.	LRL BERK	HBC	69	14
2.260	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10
2.500	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10
2.700	VISHNEVSKI	SJNP	3 511	JINR	HLBC	66	12
3.500	BASSANO	PR	160 1239	SYR SYR BNL	HBC	67	10

Momentum Index (Σ^+p)

BEAM MOMENTUM	1ST AUTHOR	JOURNAL	VOLUME,PAGE	INSTITUTIONS	DETECTOR	YEAR PUBLISHED	REF.NR.
.100	STANNARD	PR	121 1513	LRL	HLBC	61	4
.148	DOSCH	PL	21 236	HEID	HBC	66	17
.158	DOSCH	PL	21 236	HEID	HBC	66	17
.162	RUBIN	PR	159 1149	UMD IIT	HBC	67	13
.168	DOSCH	PL	21 236	HEID	HBC	66	17

Momentum Index (Σ^-p)

BEAM MOMENTUM	1ST AUTHOR	JOURNAL	VOLUME,PAGE	INSTITUTIONS	DETECTOR	YEAR PUBLISHED	REF.NR.
.100	ENGELMANN	PL	21 587	HEID	HBC	66	8
.100	STANNARD	PR	121 1513	LRL	HLBC	61	4
.109	ENGELMANN	PL	21 587	HEID	HBC	66	8
.111	ENGELMANN	PL	21 587	HEID	HBC	66	8
.119	ENGELMANN	PL	21 587	HEID	HBC	66	8
.121	ENGELMANN	PL	21 587	HEID	HBC	66	8
.129	ENGELMANN	PL	21 587	HEID	HBC	66	8
.131	ENGELMANN	PL	21 587	HEID	HBC	66	8
.135	DOSCH	PL	21 236	HEID	HBC	66	17
.139	ENGELMANN	PL	21 587	HEID	HBC	66	8
.141	ENGELMANN	PL	21 587	HEID	HBC	66	8
.145	DOSCH	PL	21 236	HEID	HBC	66	17
.149	ENGELMANN	PL	21 587	HEID	HBC	66	8
.150	RUBIN	PR	159 1149	UMD IIT	HBC	67	13
.150	ENGELMANN	PL	21 587	HEID	HBC	66	8
.150	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.151	ENGELMANN	PL	21 587	HEID	HBC	66	8
.155	DOSCH	PL	21 236	HEID	HBC	66	17
.159	ENGELMANN	PL	21 587	HEID	HBC	66	8
.161	ENGELMANN	PL	21 587	HEID	HBC	66	8
.200	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.250	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.300	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.350	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.400	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.450	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.500	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.550	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7
.600	YAMAMOTO	AEC	NY03651-11	MASS BNL	HBC	69	7

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In Alphabetical Order

Reference No.	
[5]	ALEXANDER, ET AL., PHYS. REV. 173, 1452 (1968)
[6]	ALEXANDER, ET AL., PHYS. REV. LETTERS 7, 348 (1961)
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[9]	GROVES, PHYS. REV. 129, 1372 (1963)
[14]	KADYK, ET AL., UCRL 18805 REV. (1969)
[3]	PIEKENBROCK, ET AL., PHYS. REV. LETTERS 12, 625 (1964)
[13]	RUBIN, ET AL., PHYS. REV. 159, 1149 (1967)
[16]	SECHI-ZORN, ET AL., PHYS. REV. 175, 1735 (1968)
[4]	STANNARD, PHYS. REV. 121, 1513 (1961)
[12]	VISHNEVSKII, ET AL., SOVIET JNP 3 511 (1966)
[7]	YAMAMOTO, ET AL., USAEC REPORT NY03651-11 (1969)

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[1]	BEILLIERE, ET AL., PHYS. LETTERS 12, 350 (1964)
[2]	CRAWFORD, ET AL., PHYS. REV. LETTERS 2, 174 (1959)
[3]	PIEKENBROCK, ET AL., PHYS. REV. LETTERS 12, 625 (1964)
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[8]	ENGELMANN, ET AL., PHYS. LETTERS 21, 587 (1966)
[9]	GROVES, PHYS. REV. 129, 1372 (1963)
[10]	BASSANO, ET AL., PHYS. REV. 160, 1239 (1967)
[11]	ARBUZOV, ET AL., JETP 15 676 (1962)
[12]	VISHNEVSKII, ET AL., SOVIET JNP 3 511 (1966)
[13]	RUBIN, ET AL., PHYS. REV. 159, 1149 (1967)
[14]	KADYK, ET AL., UCRL 18805 REV. (1969)
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[16]	SECHI-ZORN, ET AL., PHYS. REV. 175, 1735 (1968)
[17]	DOSCH, ET AL., PHYS. LETTERS 21, 236 (1966)

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