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ABSTRACT

Tabulated differential cross sections are presented for the production of protons, deuterons, tritons, helium-3, and alpha particles from ^{54}Fe bombarded by 62-, 39-, and 29-MeV protons Continuum differential cross sections are listed at 20 angles for 62-MeV, 7 angles for 39-MeV, and 5 angles for 29-MeV incident protons. The low-energy cutoffs on the spectra range from 1 5 to 6 MeV for the different particle types. Angular distributions are given for excitation, by 62 MeV protons, of states at 0.0, 1.41, 2.55, 2.97, 3.3, 3.84, 4.28, 4.60, 4.81, 6.38, 7.25, 8.02, and 8.52 MeV in ^{54}Fe, and at 0.0, 0.76, 1 39, 2.85, 2.99, 3 38, 3.58, 4.28, and 7.34 MeV in ^{53}Fe. Levels in ^{52}Fe at 0.0, 0.85, 4.43, 5.37, 6.1, 6 44, and 8.59 MeV were observed, however, no angular distributions are presented for these levels.

The differential cross sections for the production of proton, deuteron, triton, helium-3, and alpha particles produced by bombardment of ^{54}Fe by 62-, 39-, and 29-MeV protons were measured over a secondary energy range from as low as $\sim$ 1.5 MeV to 62 MeV. The details of the experimental system and data analysis have been reported elsewhere,[1] as has been data from other targets.[2] This report gives the tabulated cross sections for the secondary charged particles.

The incident protons were accelerated by the Oak Ridge Isochronous Cyclotron, momentum analyzed in a 153-deg magnet, and focused on the target in a spot of approximately 8-mm diameter The reaction particles from the target were detected in an all solid-state, three-counter telescope utilizing lithium-drifted germanium as the total absorption detector.[3] The overall energy resolution attained by the spectrometer was approximately

180 KeV (FWHM) for 62-MeV incident protons. The secondary particle type was determined by a combination of ΔE vs E and flight time vs E methods which permitted unambiguous identification over an energy range from a few MeV to 62 MeV. Table 1 lists the low-energy cutoffs for the data presented in this report. Data were obtained from four ADC's for each event, processed in an on-line PDP-8 computer, and written on magnetic tape. The data were finally analyzed on the ORNL IBM-360 and CDC-1604 computers and on the PDP-8.

The ^{54}Fe target was fabricated by the Isotopes Division at the Oak Ridge National Laboratory with thickness of 3.33 ± 0.03 mg/cm^2 and non-uniformity of ± 1.5%. Other experimental parameters and the assigned systematic uncertainties are shown in Table 2. The thickness of the target was the limiting factor for the low-energy cutoff of the alpha particle data while the other particle spectra were limited by experimental factors shown in Table 1. Some of the data reported here were not taken utilizing the time-of-flight system; for this data the low-energy cutoffs were determined by the stopping power of the first detector (100 microns). A list of the factors by which counts are multiplied to give millibarns (steradian^{-1}), in the laboratory system, are given in Table 3. These depend on beam current, target thickness, detector collimator area, and the deadtime corrections described in Ref. 1.

The data tabulated in this report have been corrected for the effects of nuclear reactions in the germanium detector, "dead" layer in the path of the scattered particles, multiple scattering of the secondary protons by the ΔE detectors, energy loss of the scattered particles in the target, and collimator edge penetration by the scattered particles. It was not necessary to apply the collimator edge penetration correction to those data denoted by run numbers (see Table 3) between 4000 and 4050 or to

Table 1.

Low-Energy Cutoffs

	Cutoff	Reason
	62-MeV Incident Protons	
Proton	~ 2.0 or 3.7 MeV	TOF "Foldover" or lack of TOF data
Deuteron	~ 2 4 or 4.7 MeV	TOF "Foldover" or lack of TOF data
Triton	6 4 MeV	Mass-3 ambiguity in TOF
Helium-3	12.4 MeV	Lack of TOF Data
Alpha	~ 4.8 or 13.6 MeV	Target thickness or lack of TOF data
	39-MeV Incident Protons	
Proton	~ 1.6 MeV	TOF Background
Deuteron	~ 3.0 MeV	TOF Background
Triton	6.4 MeV	Mass-3 ambiguity in TOF
Helium-3	~ 7 1 or 12.4 MeV	Mass-3 ambiguity or lack of TOF data
Alpha	4.2 MeV	Target thickness
	29-MeV Incident Protons	
Proton	~ 1.5 MeV	TOF Background
Deuteron	~ 2.3 MeV	TOF Background
Triton	6.4 MeV	Mass-3 ambiguity in TOF
Helium-3	12.4 MeV	Lack of TOF data
Alpha	~ 4.0 MeV	Target thickness

Table 2.

Experimental Parameters and Uncertainties

^{54}Fe Target

Thickness	3.33 ± 0.033 mg/cm^2
Nonuniformity	± 1.5%
Purity	97.21% (2.79% ^{56}Fe)

Beam Energies

Run designation	Beam Energy
0100	61 50 ± 0.1 MeV
2000	61.89 ± 0 1 MeV
4000	61 25 ± 0.1 MeV
5000	61.74 ± 0.1 MeV
7000	60.86 ± 0.1 MeV
6000	38.75 ± 0.1 MeV
0000	28.81 ± 0.1 MeV

Collimators Used

Run designation	Material	Thickness (cm)	Area(±1 5%) (cm^2)	Distance(±1%) (cm)
0000	Ta	0 13	0.522	45.8
0100	Ta	0.432	0.522	45.8
2000	Ni	0.653	0.183	46.2
4000	NE-102	0.1	0.353	47.0
5000	Ni	0.653	0.259	46.2
6000	Ne-102	0 1	0.353	47.0
7000	Ni	0 653	0.265	46.4

Detector Angle	± 0 5 deg
Zero Angle	± 0.5 deg
Angular resolution	± 1.2 deg
Target Angle	± 0 5 deg
Beam Spot Diameter	0.8 cm (typical)
Beam Spot Walk	± 0.4 cm
Collimator misalignment at chamber center	± 0.5 cm
Uncertainty in number of protons striking target	± 1%
Uncertainty in dead time measurement	± 2%
Uncertainty in various corrections to data	± 2%
Combined absolute uncertainty	± 5% (except 4000 runs)
Combined absolute uncertainty for 4000 runs	± 10%
Combined absolute uncertainty for data with unusually small cross sections	± 10%

Table 3

List of Angles, Run Numbers, and Factors

Lab Angle (deg)	Run Number	Factor[a]
	62 MeV	
12	0123	1.37 (-2)[b]
15	5016	3.22 (-3)
20	4020	1 65 (-2)
25	4017	2 93 (-4)
27	5020	3 33 (-4)
30	5007	3 48 (-4)
35	4021	3 57 (-3)
40	5002	9.37 (-4)
45	4032	2 32 (-3)
45	7000	8 73 (-4)
47	5042	5.67 (-4)
50	5010	5.25 (-4)
55	4025	1.44 (-3)
60	5043	5.32 (-4)
65	5011	1 79 (-4)
70	5044	7 10 (-4)
75	7100	3.24 (-4)
80	5012	1 33 (-4)
90	4010	1.11 (-4)
100	2070	1 10 (-4)
110	5015	1.17 (-4)
120	7002	3 75 (-4)
135	4011	7.52 (-5)
160	2067	1.17 (-3)
	39 MeV	
15	6007	6.77 (-3)
20	6006	1.45 (-3)
30	6001	1.01 (-3)
47	6005	3.76 (-4)
60	6003	2 77 (-4)
90	6004	2.38 (-4)
120	6010	2 47 (-4)
	29 MeV	
15	0010	5 19 (-3)
30	0001	5.41 (-4)
60	0014[c]	3 94 (-4)
60	0004	2.67 (-4)
90	0015[c]	4.68 (-4)
90	0007	3.49 (-4)
125	0017	4.53 (-4)

a) numbers by which the counts are multiplied to give laboratory systems millibarns/steradian for iron. For the reaction cross sections in Tables 5 and 6, this factor was multiplied by 1 03 to correct for the isotopic impurity

b) read as 1.37×10^{-2}

c) These runs were used only for proton data, the factor given is based on normalization to the following run.

any of the 40-MeV data since a thin anticoincidence collimator was used for these data. The corrections are described in reference 1.

The magnitudes of the "tail" correction for nuclear reactions in the germanium detector and for collimator edge penetration are both dependent upon the number and spectral distribution of the recorded counts. These corrections are significant only for protons at scattering angles less than about 30 deg, where the spectra are dominated by strong elastic scattering, and the corrections generally fall rapidly with angle within that range The uncertainty in the correction for collimator penetration is taken as 20% of the correction, which is approximately proportional to pulse height. This uncertainty is significant only for the 62-MeV data at 12 and 15 deg., as shown in the table below. The uncertainty in the reaction tail correction is taken as 25% of the correction, which rises from zero to its full value between 35 and 45 MeV for the 62-MeV data (between 23 and 29 and 17 and 21 for the 39- and 29-MeV data) and then remains roughly constant up to the elastic peak The cross section uncertainty in the standard correction is tabulated below for the runs in which it is significant. These uncertainties must be combined with the overall uncertainties of Table 2 and with statistical uncertainties.

Angle [deg]	Uncertainty from reaction tail correction at 45 MeV [mb(ster-MeV)$^{-1}$]	Uncertainty from collimator edge penetration at 45 MeV [mb(ster-MeV)$^{-1}$]
	62 MeV	
12	± 0.93	± 0.28
15	± 0.38	± 0.37
27	± 0.019	
30	± 0.018	
	39 MeV	
15	± 0.46	
20	± 0.14	
30	± 0.016	
	29 MeV	
15	± 0.29	
30	± 0.009	

A large amount of tail, uncompensated by the standard tail correction, has been found in the 39 MeV 15- and 20-degree proton data Presumably this tail was caused by detector misalignment. To correct for the extra tail, 0.88 ± 0.44 mb/sr/MeV and 0.17 ± 0.09 mb/sr/MeV was subtracted from the 15- and 20-degree data respectively, between the elastic energy and 27 MeV, and a decreasing amount was subtracted in the region between 27 and 17 MeV. This difficulty was discovered and its magnitude estimated by examination of the number of events with energy below ~ 22 MeV and outside all proper ΔE by E regions, in comparison with the magnitude above ~ 22 MeV of the standard tail correction for protons

Figure 1 shows the proton spectra at 30 degrees from ^{54}Fe bombarded by protons of the three incident energies, while Figure 2 shows the first few MeV of excitation for the proton spectrum at 62 MeV. The differential cross sections for the elastic scattering of 62-, 39-, and 29-MeV protons are listed in Table 4,* and the differential cross sections for excitation by 62-MeV protons of states in ^{54}Fe at 1.41-, 2.55-, 2.97-, 3.27-, 3.84-, 4.28-, 4.60-, 4.81-, 6.38-, 7.25-, 8.02-, and 8.25-MeV are listed in Table 5. In some cases, in order to obtain the peak cross sections, an apparent continuum (presumably consisting of many weakly excited and unresolved levels) was subtracted from the data. For example, in Fig. 2, a smooth continuum with magnitude varying from 0.2 to 0.3 mb/sr/MeV was subtracted from the peaks with excitation between 3.5 and 6.0 MeV. The Q-values listed are those extracted from the experiment and are estimated to be uncertain by ± 0.02 MeV. The levels with lowest excitation are in good agreement with the previously reported level structure in ^{54}Fe. Inelastic cross sections were not extracted from the data taken with the

*Tables 4-26 are collected at the end of report.

lower energy incident protons since only a few angles were represented The errors shown in all the tables are based entirely on Poisson statistics and should be used in combination with the combined overall uncertainty, shown in Table 2.

Figure 3 shows the deuteron spectra at 30 degrees for the three incident energies and Figure 4 shows the excitation plot of the deterons observed at 30 deg for incident 62-MeV protons. States in ^{53}Fe were observed at 0-, 0.76-, 1.39-, 2.06-, 2.85-, 2.99-, 3.38-, 3.58-, 3.76-, 4.28-, and 7.34 MeV, in good agreement with lower energy (p,d) data[4] and with (^{3}He,α) data.[5] Differential cross sections for 62 MeV incident protons are listed in Table 6 for all of these states in ^{53}Fe. The cross sections for the 2.85-, 2.99-, and 3.38-, 3.58-, 3.76-MeV groups of states were very hard to extract and the uncertainties of these levels are ± 40% for the first two and ± 20% for the other three. A persistent bump in the (p,d) cross sections is observed at 7.1 MeV in ^{53}Fe, but at favorable angles it is seen to be complex, perhaps based on rather strongly excited levels at about 7.05 and 7.25 MeV.

Figure 5 shows the triton spectra at 30 degrees for the three bombarding energies and Figure 6 shows an excitation plot of the first few MeV of excitation for the tritons observed at 30 degrees for incident 62-MeV protons. The statistics were too poor at all angles other than 27 and 30 degrees to identify levels, however, several levels were observed in both the 27- and 30-degree data (and in some cases in the 62-MeV 15-degree and 39-MeV 30-degree data). The observed levels are, with Q-value uncertainty of ± 0.04 MeV, 0.0-, 0.85-, 4.43-, 5.37-, 6.1-, 6.44-, and 8.59-MeV. Figures 7 and 8 show the spectra integrated over angle, for the three incident energies, for incident helium-3 and alpha particles, respectively.

The integrals over angle were obtained by using a trapezoidal quadrature and assuming the cross section at zero degrees was equal to the cross section at the smallest data angle, and that the cross section at 180 degrees was equal to the cross section at the largest angle at which data was obtained. The breadths of the low-energy alpha peaks are somewhat misleading because the energy of the peak changes approximately 2 MeV between forward and backward angles.

Tables 7, 8, and 9 list binned laboratory cross sections integrated over angle for each particle type for 62-, 39-, and 29-MeV proton bombardment, respectively, in units of millibarns/MeV, the energy listed is for the lower edge of each bin. Table 10 shows the energy integrated laboratory cross section in units of millibarns/steradian, and the average energies in MeV, at each angle for the three incident energies used. This table also lists the low-energy cutoffs for the data from each angle. The total cross sections in millibarns, average energies in MeV, and average forward momenta in MeV/c, are listed in Table 11 for each incident energy. The secondary proton cross sections listed do not include the elastic scattering cross sections, while the cross sections for the other secondary particles include all observed events.

Tables 12 through 16 list for each angle the laboratory cross section for proton, deuteron, triton, helium-3, and alpha particle production from 62-MeV incident protons on ^{54}Fe, averaged over $\sim$ 0.4-MeV wide bins below 7 MeV (10 MeV for helium particles) and $\sim$ 1-MeV wide bins elsewhere, in units of millibarns(steradian)$(MeV)^{-1}$. The bin energies listed are for the center of the bins. Tables 17-21 and Tables 22-26 list the above cross sections for 38.8-MeV and 28.8-MeV incident protons, respectively. All cross sections are listed for energies above the cutoffs shown on Table 9.

The secondary particle spectra in these tables often show a local effect at the energy corresponding to stopping of the incident particle in the nickel foil which covered the germanium detector. The effect is exaggerated or hidden depending on the precision of the gain measurement in the second (500 m) silicon detector. It appears at about 9, 12, and 15 MeV for incident protons, deuterons, and tritons, and at about 33 and 35 MeV for ^{3}He and ^{4}He. The total number of recorded counts is not affected.

The data in this report for incident 60-MeV protons supersedes that on ^{54}Fe which is in Ref. 1 (ORNL-4274). The reanalysis typically found more events, and the foil thicknesses, etc., were remeasured. Integral cross sections rose by an average of 7%; the cross sections for individual levels by somewhat less.

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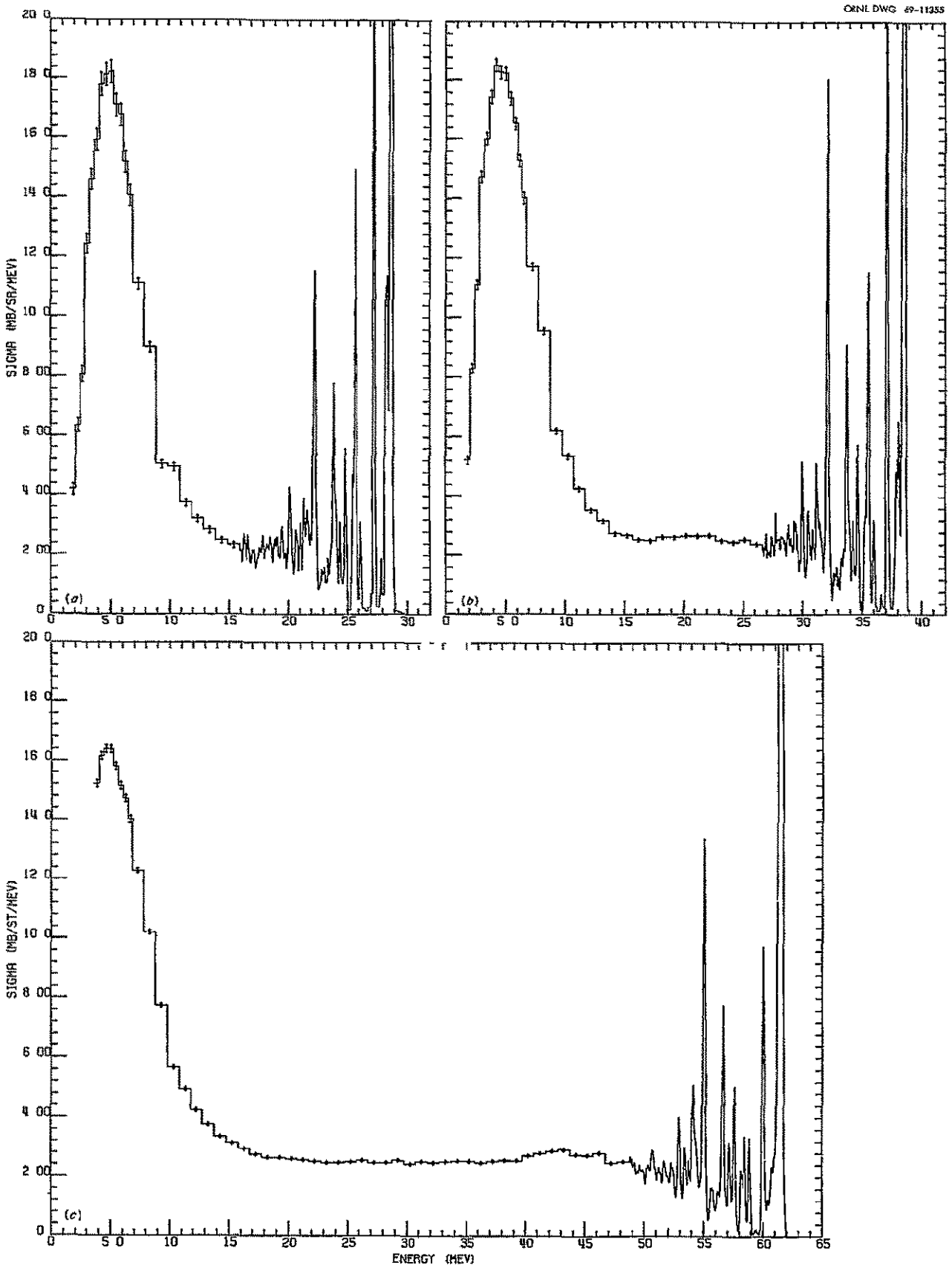

Fig. 1. Proton Spectra from ^{54}Fe at 30 degrees Incident Proton Energy
a. 28.8 MeV b. 38 8 MeV c. 61.7 MeV

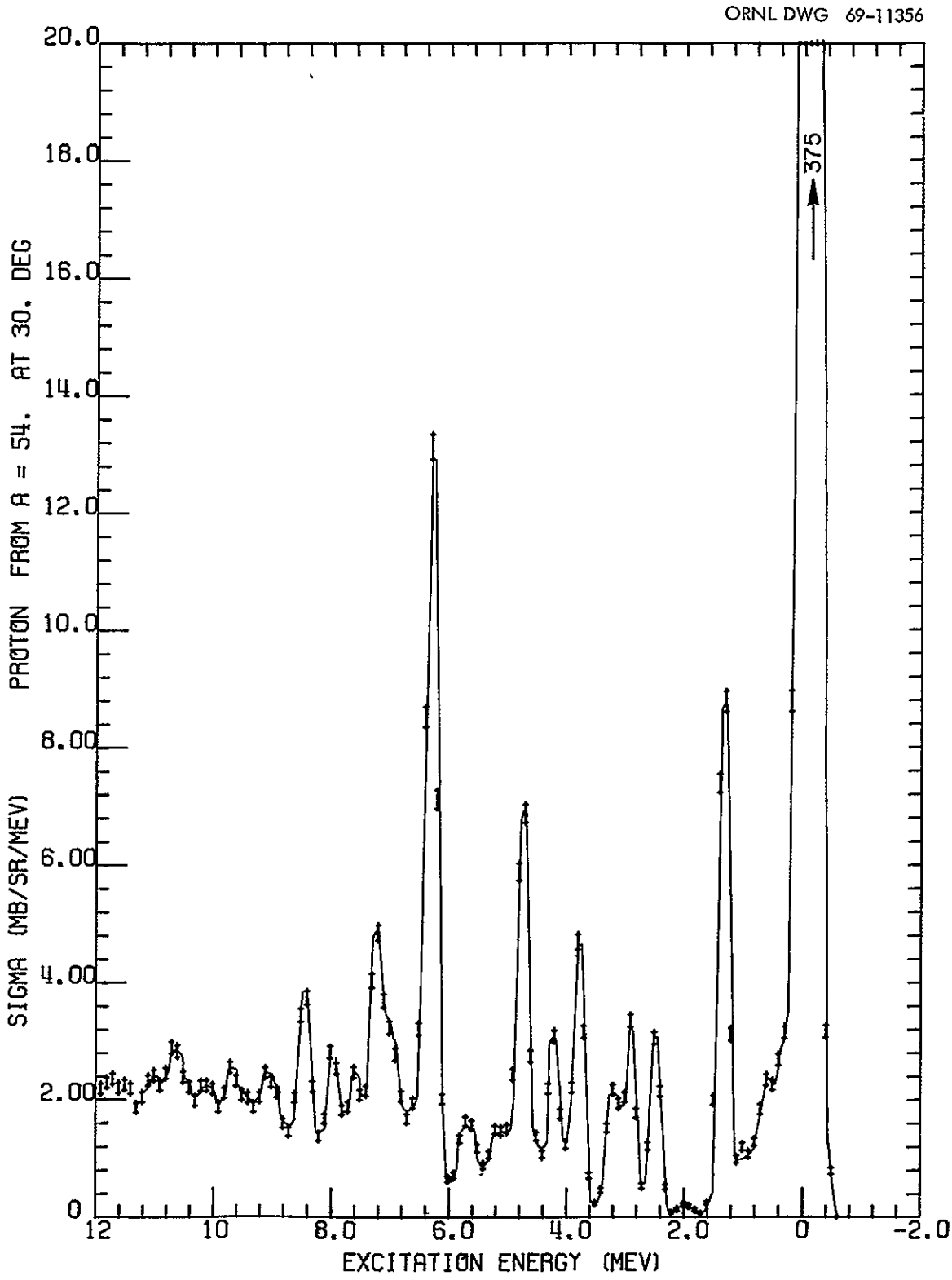

Fig. 2. High-Energy Proton Pulse Height Spectrum from ^{54}Fe at 30 degrees. Incident Proton Energy - 61.7 MeV

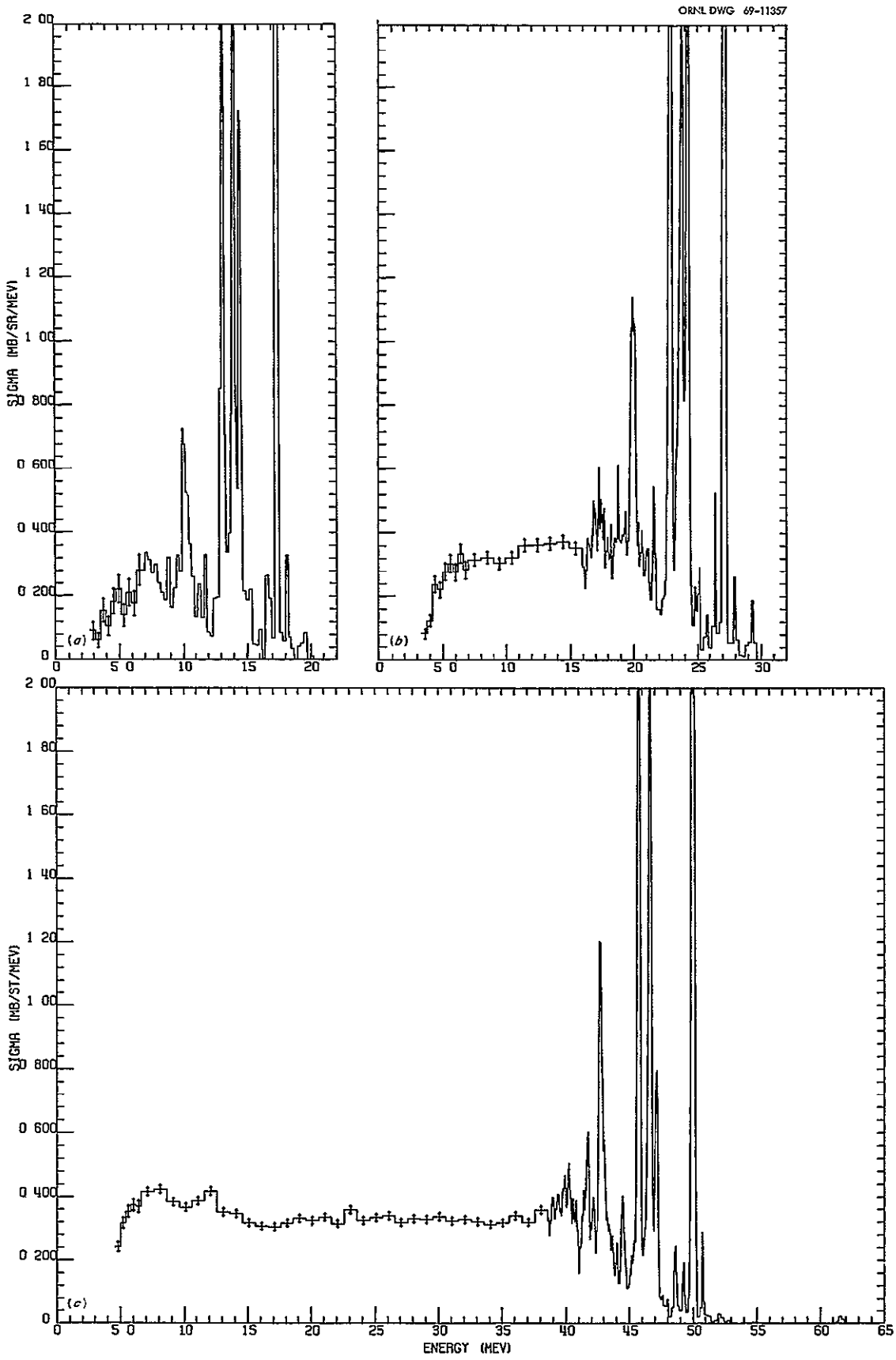

Fig. 3. Deuteron Spectra from ^{54}Fe at 30 degrees Incident Proton Energy
a. 28.8 MeV b. 38.8 MeV c. 61.7 MeV

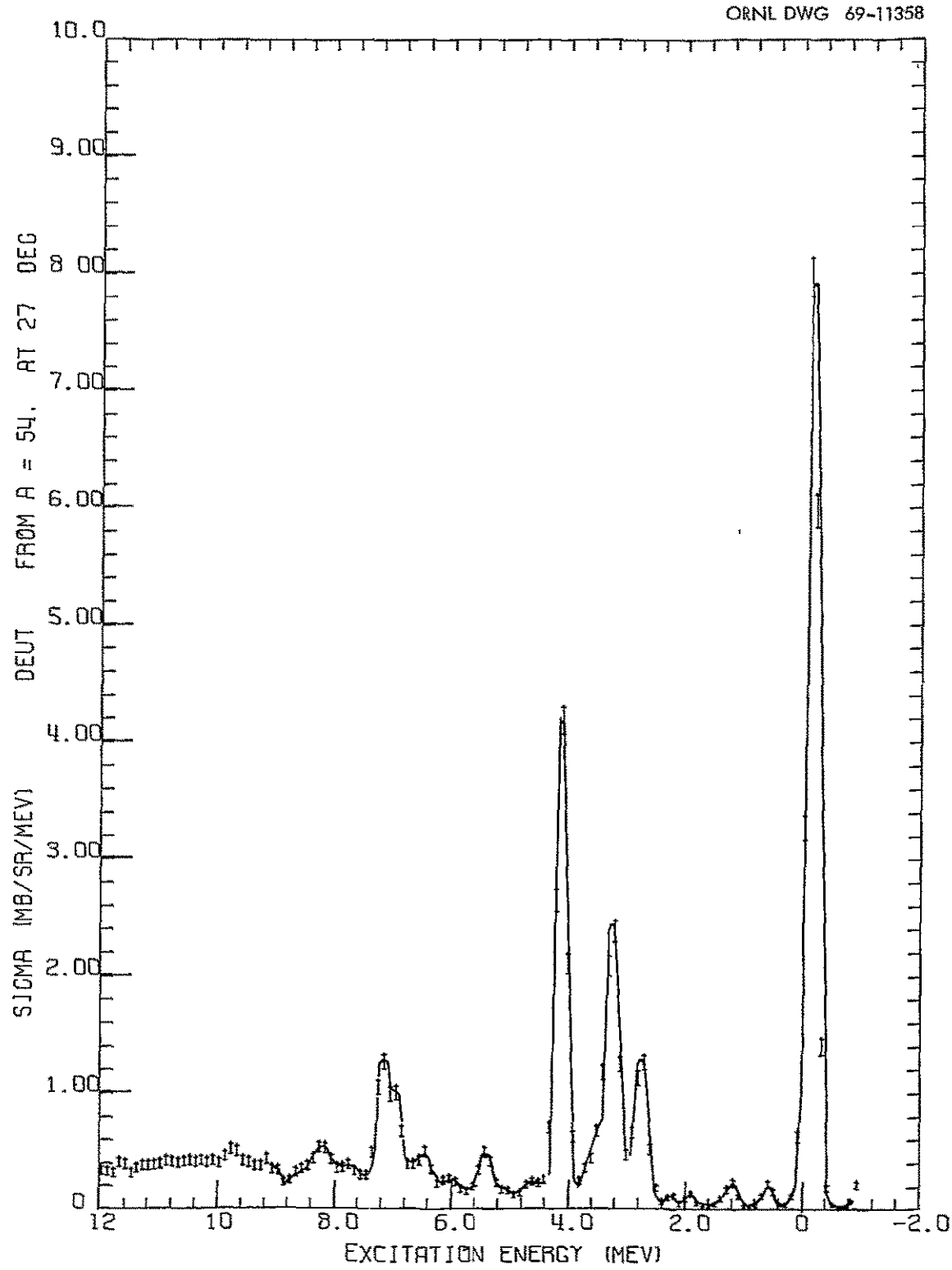

Fig. 4. High-Energy Deuteron Pulse Height Spectrum from ^{54}Fe at 30 degrees.

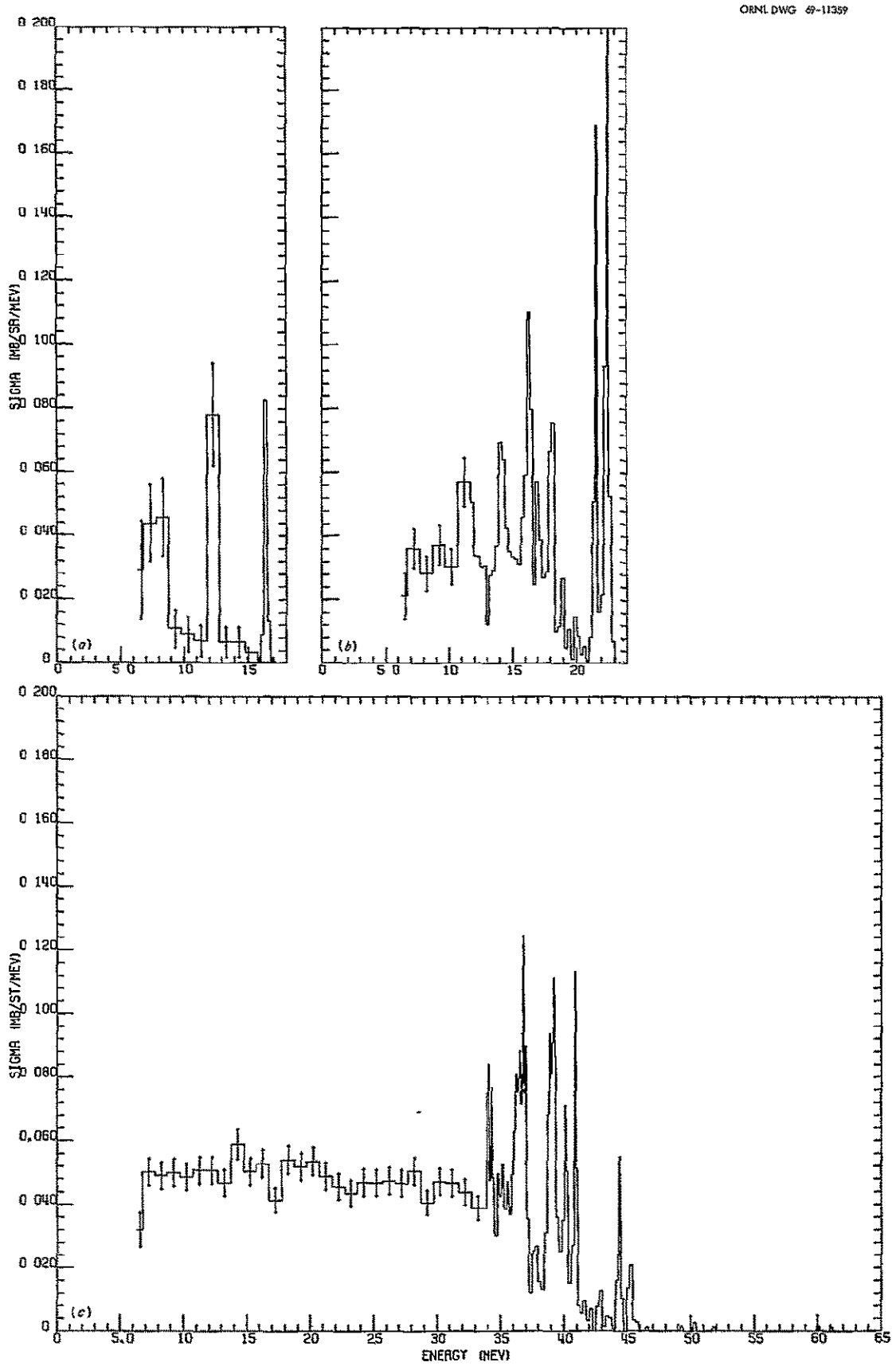

Fig. 5. Triton Spectra from ^{54}Fe at 30 degrees Incident Proton Energy
a. 28.8 MeV b. 38.8 MeV c 61.7 MeV

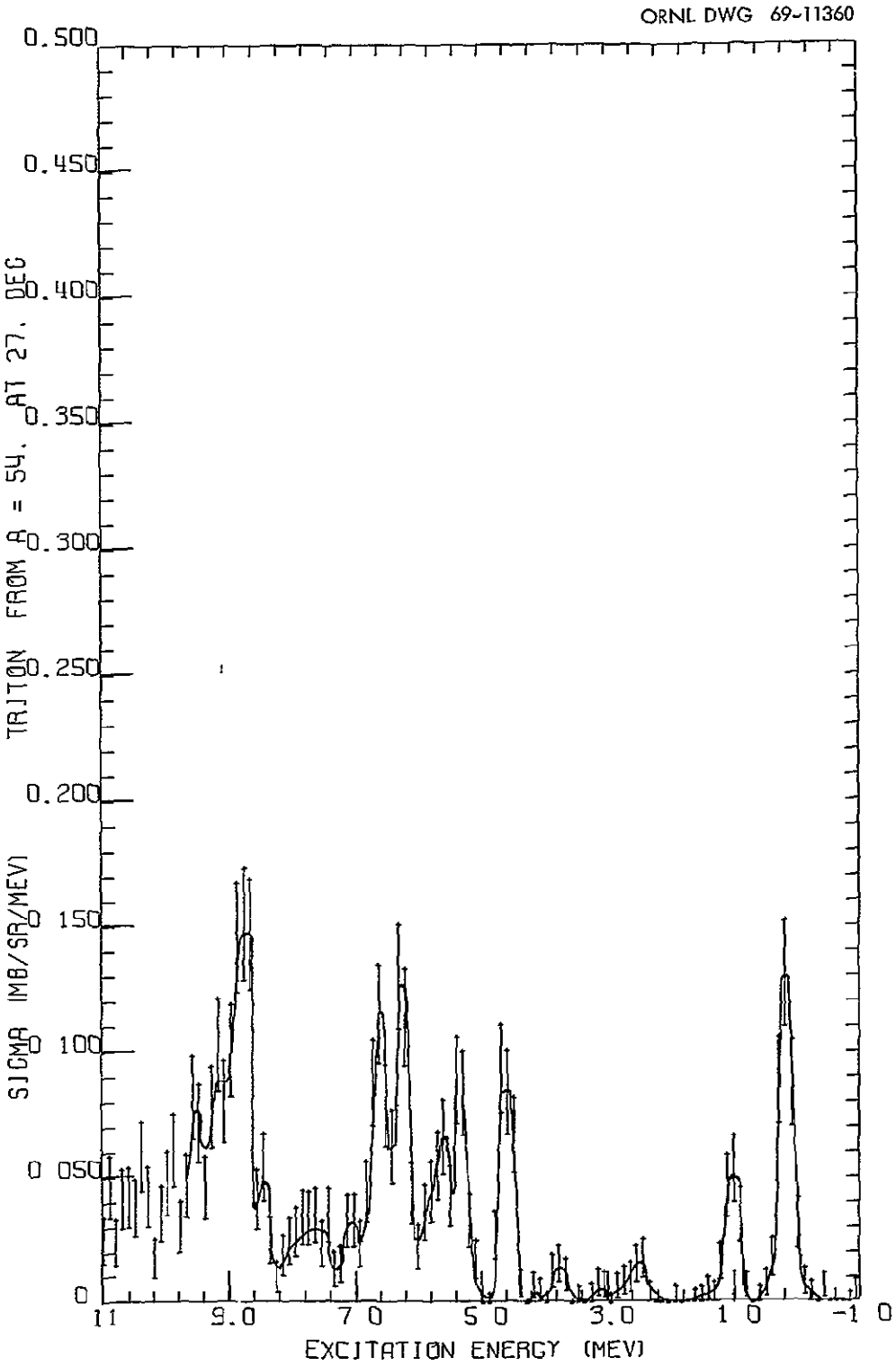

Fig. 6. High-Energy Triton Pulse Height Spectrum from ^{54}Fe at 30 degrees.

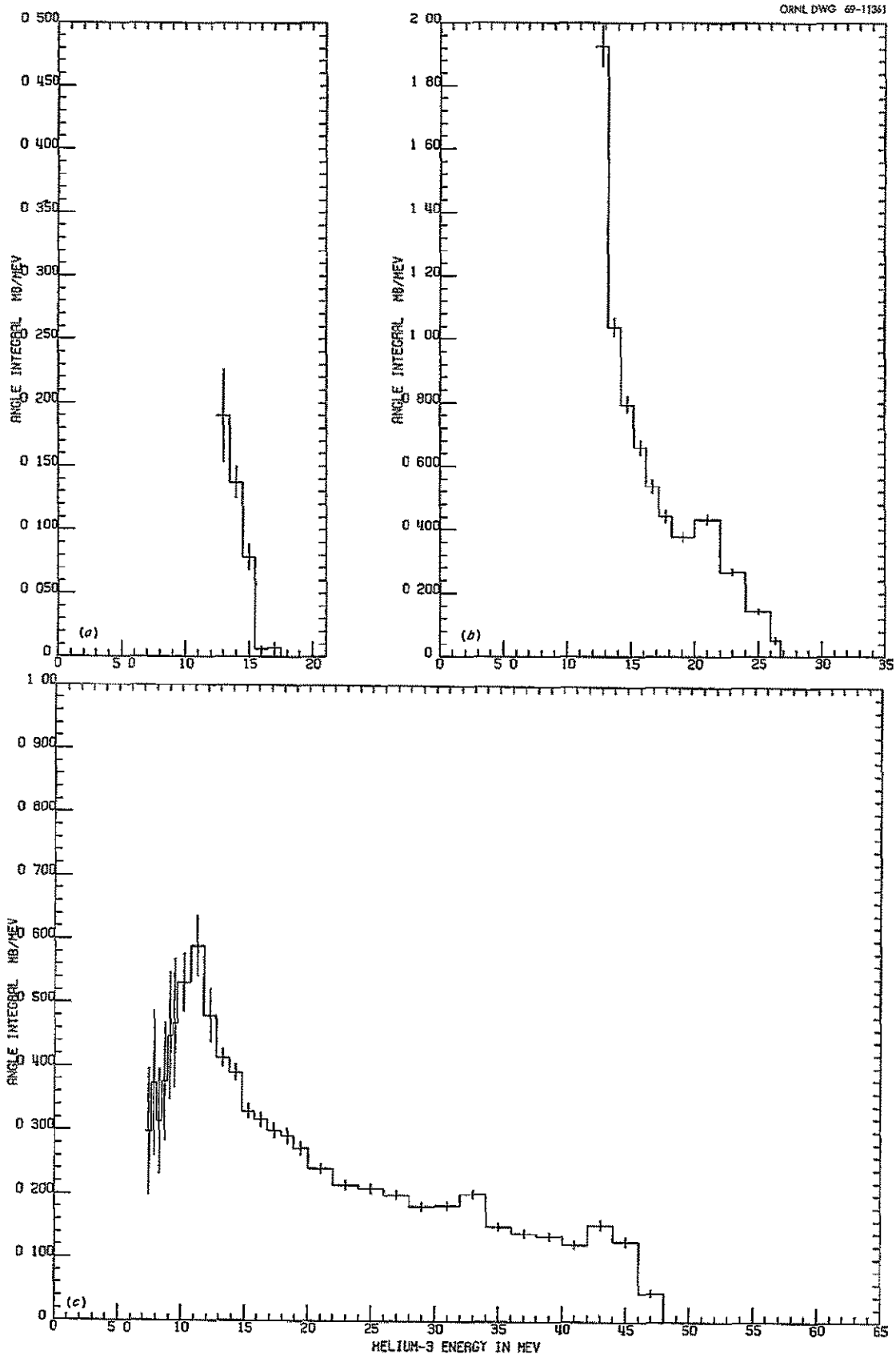

Fig. 7. Angle Integrated Helium-3 Spectra from ^{54}Fe Incident Proton Energy
a. 28.8 MeV b. 38.8 MeV c. 61.7 MeV

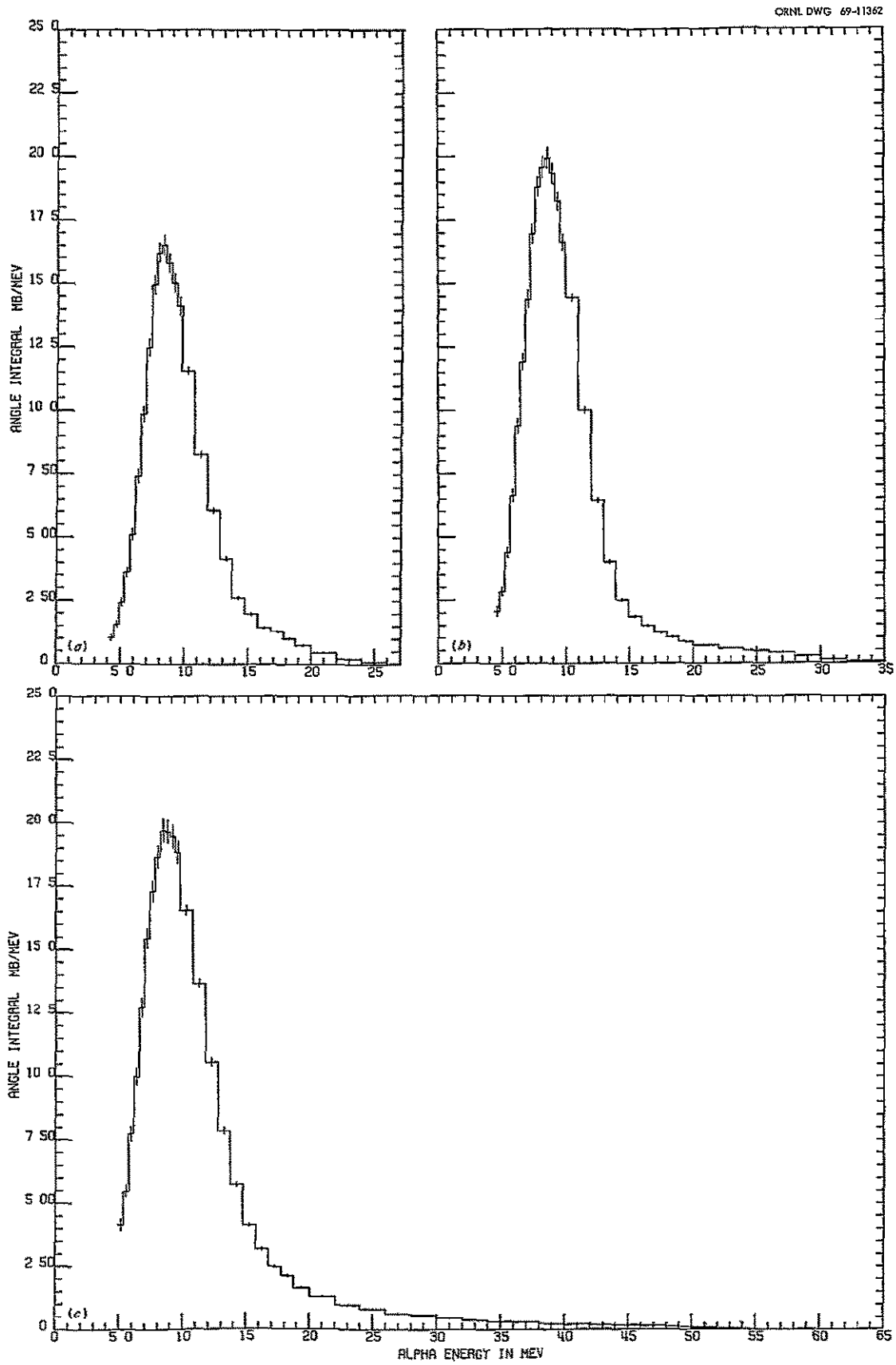

Fig 8. Angle Integrated Alpha Spectra from ^{54}Fe Incident Proton Energy

a. 28.8 MeV b. 38.8 MeV c. 61.7 MeV

Table 4 $^{54}Fe(p,p)^{54}Fe$

Elastic Scattering

C M.Angle (deg)	Cross Section C. M. (mb/sr)	Statistical Uncertainty (± %)	C.M.Angle (deg)	Cross Section C. M. (mb/sr)	Statistical Uncertainty (± %)
	62-MeV Incident Protons			38.8-MeV Incident Protons	
12.3	4011.5	0.1	15.3	3114.	0.1
15 4	2183.9	0.1	20.3	953.2	0.1
25.4	46.2	0.3	30 5	31.4	0.5
27.4	51.3	0.2	47 7	68.1	0.2
30.5	85.2	0 1	60.9	13.0	0.4
35.7	79.1	0.4	91.1	1.82	1.1
40.7	43.1	0 4	121.0	0 56	2 1
45.7	13 8	0.4			
47.7	9.17	0.7			
50.8	8 49	0.7			
55.9	7.05	0.7			
60.9	4 93	1 0			
65.9	2.33	0.8			
71.0	1.47	2.1			
76.0	1.49	1.4		28.8-MeV Incident Protons	
81.1	0 91	1 2			
91.1	0 16	2.7	15.3	3022.7	0.1
101.1	0.12	9.9	30.4	21.8±	1.2
111 1	0.090	3.6	60.9	8.3	0.5
121.0	0.018	15.3	91.1	4 5	0.8
135.8	0.010	9.1	125.9	2.05	1.5

Table 5. $^{54}Fe(p,p')^{54}Fe$

62-MeV Protons Incident

C.M Angle (deg)	Cross Section C. M. (mb/sr)	Uncertainty (± %)	C M Angle (deg)	Cross Section C M. (mb/sr)	Uncertainty (± %)	C.M.Angle (deg)	Cross Section C M (mb/sr)	Uncertainty (± %)
	1.41 MeV Level			2 55 MeV Level (cont)			3.27 MeV Level (cont)	
12.3	7.1	7	81.0	0.014	11	60.9	0.068	12
15.4	7.5	2	91.0	0.0042	31	65.9	0 046	9
25.4	4.20	1	111 1	0.0021	25	71.0	0 045	19
27.4	3.77	1				81.1	0.021	9
30.5	2 17	1		2.97 MeV Level				
35.7	0 82	10					3.84 MeV Level	
40.7	1.59	2	12 3	7.9	6			
45.7	1.57	2	15 4	5.6	3	12.3	0.91	24
47.7	1.08	2	25.4	2 11	2	15 4	0.77	11
50 8	0.72	3	27 4	1.73	1	27 4	1.03	2
55.9	0.37	4	30.5	0.76	3	30.5	1 03	2
60.9	0.36	4	35 7	0.25	19	35.7	0.44	9
65.9	0.31	2	40.7	0.96	3	40 7	0.46	5
71.0	0 174	7	45 7	0.96	4	47.7	0.190	7
76.0	0.107	6	47 7	0.74	3	50.8	0.126	9
81.1	0.063	5	50.8	0.46	4	55.9	0.086	11
91 1	0.049	5	55.9	0.17	7	60.9	0.075	11
111.1	0.0088	12	60.9	0.200	6	65.9	0.074	6
121.0	0.010	20	65.9	0.196	3	71.0	0.038	18
135 8	0.0016	25	71.0	0.122	8	76.1	0.036	14
			81 0	0.054	5	81 1	0.031	9
	2.55 MeV Level		91 0	0.016	12			
15.4	0.66	10	111.1	0.0062	19		4 28 MeV Level	
25.4	0.59	5						
27.4	0.70	2		3.27 MeV Level		15 4	0 54	16
30.5	0.73	2				27.4	0.46	5
35.7	0.36	11	12 3	1.13	21	30 5	0.46	5
40.7	0.58	4	15.4	0.94	23	35.7	0.21	20
45 7	0.44	6	25.4	0.29	10	40 7	0.29	9
47.7	0.31	4	27.4	0 62	5	47 7	0 098	14
50.8	0.214	6	30.5	0 44	4	50 8	0.082	14
55.9	0.10	10	35 7	0.18	23	55.9	0 049	20
60.9	0.10	8	40.7	0.24	10	60.9	0 035	27
65.9	0.048	6	47.7	0 13	8	65.9	0.025	17
71.0	0.028	17	50.8	0.14	9	81.1	0.014	50
			55 9	0.047	7			

(continued on next page)

Table 5. (continued)

C M Angle (deg)	Cross Section C. M. (mb/sr)	Uncertainty (± %)	C M.Angle (deg)	Cross Section C M (mb/sr)	Uncertainty (± %)	C M.Angle (deg)	Cross Section C M. (mb/sr)	Uncertainty (± %)
	4.60 MeV Level			6.38 MeV Level			8.02 MeV Level	
15.4	0 46	19	12.3	3 04	10	12.3	0 64	34
25 5	0.43	8	15.4	3 40	4	15 4	0.62	19
27.5	0.13	13	25.5	3 14	2	25 5	0.30	10
30.5	0.058	28	27.5	3 69	1	27 5	0 49	6
35 7	0.060	58	30.5	3.10	1	30.5	0.35	7
40 7	0.11	19	35.7	1.18	6	35 7	0.14	29
47.7	0.039	31	40.7	0.75	5	40 7	0.062	39
50 8	0.019	44	47.7	0.63	4	47 7	0.024	60
66.0	0.018	22	50.8	0.66	4	50.8	0.086	18
71.0	0.011	54	55 9	0.31	5	55.9	0.015	75
			61.0	0 28	6	61.0	0.054	21
	4.81 MeV Level		66 0	0.24	4	66 0	0.025	24
			71.0	0 190	9			
12.3	0 78	31	76.1	0 126	8		8.52 MeV Level	
15.4	1.65	7	81 1	0.075	6			
25.4	1.23	10	91.2	0.016	20	25 5	0.57	6
27.4	1 75	2	111.1	0 0094	15	27.5	0.74	3
30.5	1.46	2	135 8	0 0029	21	30 5	0.61	5
35.7	0 54	10				35 7	0.26	18
40.7	0.34	10		7.25 MeV Level		40 7	0 17	21
47.7	0.25	8				47 8	0.10	22
50.8	0.23	8	12 3	0.75	30	50 8	0.13	14
55.9	0 090	25	25.5	0.44	8	55 9	0.046	28
60.9	0.078	35	27.5	0 86	4	60.9	0.079	19
65 9	0.054	25	30 5	0.71	5	71.0	0.028	36
81.1	0 035	10	35.7	0.24	23	76 1	0.020	29
			40.7	0.26	14			
			47 7	0.25	10			
			50 8	0.17	11			
			55.9	0 075	16			
			66.0	0.026	31			

Table 6. $^{54}Fe(p,d)^{53}Fe$

62-MeV Incident Protons

C M Angle (deg)	Cross Section C. M. (mb/sr)	Uncertainty (± %)	C.M Angle (deg)	Cross Section C M (mb/sr)	Uncertainty (± %)	C M.Angle (deg)	Cross Section C. M. (mb/sr)	Uncertainty (± %)
	Ground State (Q = -11.30 MeV)			0 76 MeV Level			2.85 MeV Level	
12.5	4.2	6	41.1	0.019	23	12.5	0,44	42
15.5	4 11	3	48.2	0.0061	30	15.5	0.68	40
20.5	2.5	10	61.5	0.0046	40	20.5	0.30	40
25 7	2.15	1	66.5	0.0037	24	25 7	0.24	40
27 7	1 91	1				27.7	0 12	40
30.8	1.70	1		1.39 MeV Level		30 8	0.12	40
36.0	1.01	4				36.0	0 081	43
41.1	1.07	3				41 1	0.164	40
46.2	0.68	10	15.5	0.062	22	48.2	0 039	42
48.2	0.59	3	27.7	0 068	7	51.3	0.046	42
51 3	0 54	3	30.8	0.061	8	56.4	0.020	43
56.4	0.35	3	41.1	0 034	18	61.5	0 036	42
61.4	0.35	4	48.2	0.012	38	66.5	0 020	42
66.5	0.24	3	51.3	0.030	14	71.6	0 019	45
71.6	0.16	7	56.4	0 0099	33	76.6	0 018	43
76.6	0.17	4						
91 8	0.035	6		2.06 MeV Level			2.99 MeV Level	
101.7	0.029	20						
111.6	0.013	10	12.5	0 11	34			
121.0	0 0067	23	27.7	0 023	15	12 5	0.51	45
136.3	0.0017	22	30.8	0.010	7	15 5	0 57	42
			41.1	0 022	21	20.5	0.64	40
	0.76 MeV Level		48 2	0.0046	42	25 7	0.14	40
			51.3	0.0075	29	27 7	0 15	40
12.5	0 12	40	66.5	0 001	44	30 8	0 054	45
15 5	0 14	15				36.0	0 062	50
20.5	0.14	13				41 1	0.069	50
25.7	0.12	5				48.2	0.040	43
27 7	0.056	8				51 3	0 026	43
30.8	0 042	9				56.4	0.015	50
						61.5	0.017	45
						66.5	0.020	43
						71.6	0 0057	50
						76.6	0.0039	50

(continued on next page)

Table 6. (continued)

C.M.Angle (deg)	Cross Section C. M. (mb/sr)	Uncertainty (± %)	C.M Angle (deg)	Cross Section C M (mb/sr)	Uncertainty (± %)	C.M.Angle (deg)	Cross Section C M (mb/sr)	Uncertainty (± %)
	3.38 MeV Level			3.76 MeV Level			7.34 MeV Level	
12.3	1 22	25	12.4	0.22	30	12.4	0.56	23
15.5	1.44	20	15.5	0.08	38	15.6	0.79	8
20.5	0.48	20	27.8	0.026	30	20.5	0 11	28
27.7	0.55	20	30.8	0 019	36	27 7	0.19	7
30 8	0.44	20	41 1	0.035	35	30.8	0 11	11
41.1	0.20	25	48 2	0.030	35	48.2	0.027	32
48.2	0.098	50	51.3	0 012	38	51.3	0.039	20
51.3	0.15	20	56.4	0.015	30	56.4	0 025	25
56 4	0 058	23	61.5	0.012	36	61.5	0 023	26
61.5	0.051	23	71.6	0.010	30	66 5	0.019	17
66.5	0.063	20	76.6	0.008	38	71 6	0 018	30
71.6	0.034	23				76.6	0 009	36
76.6	0.028	23		4.28 MeV Level				
	3 58 MeV Level							
			12.4	1.79	9			
			15.5	2 20	3			
12.4	0.41	30	20.5	0.98	10			
15.5	0.26	30	25.7	1.05	10			
20.5	0 12	30	27.7	0.96	2			
27.7	0.073	25	30.8	0 73	3			
30.8	0.046	25	36 1	0.49	7			
41.1	0.035	36	41 1	0.50	5			
48.2	0.071	45	48.2	0 32	4			
51.3	0.058	22	51.3	0.30	4			
56 4	0.033	30	56 4	0.190	6			
61.5	0 038	30	61.5	0 200	6			
66.5	0.022	25	66.5	0.140	4			
71.6	0.035	30	71.6	0.135	8			
76 6	0 024	30	76 6	0.091	7			
			91 8	0.027	8			
			111.7	0 015	9			
			136.3	0.0029	20			

Table 7. Angle-Integrated Cross Sections from 62 MeV

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Proton			Proton (continued)			Deuteron (continued)	
1.66	61 6	1 2	44.00	9 42	0 06	20.00	1 45	0.02
2.06	89.4	1.2	46.00	8.50	0.06	22.00	1 40	0.02
2 47	120.0	1 1	48.00	7 71	0 06	24.00	1 33	0.02
2 88	159.3	1.3	50.00	7.00	0.05	26.00	1.28	0.02
3.28	191 0	1.4	52 00	7.01	0.05	28.00	1 26	0 02
3.69	185 4	0.9	54.00	6.92	0.05	30.00	1.23	0.02
4.10	185.5	0.7	56.00	5.40	0 05	32.00	1 17	0 02
4 51	181.9	0.7	58 00	5 92	0 06	34.00	1.17	0 02
4.91	174 4	0.7	60.00	7.86	0.16	36.00	1 27	0.02
5.32	163.6	0.7	60 53			38.00	1 31	0 02
5 73	150.6	0.7				40.00	1.35	0.02
6.14	138.4	0.6				42.00	1.61	0 02
6.54	124.7	0.6		Deuteron		44.00	1 94	0.03
6.95	107.0	0.2	2 43	0.82	0 11	46.00	1 85	0 03
7.97	86.3	0.2	2 83	1.21	0.12	48 00	1 53	0.02
8.99	59.8	0.2	3.23	1.80	0.14	50 00	0.98	0.02
10 01	42.0	0.1	3 63	2 53	0.17	52.00		
11 02	34.0	0.1	4.03	3.33	0.19			
12.04	28 3	0.1	4.43	3.58	0.20			
13 06	24.2	0.1	4.83	3 59	0.14		Triton	
14.08	21 3	0.1	5.23	3 79	0.10	6.31	0.38	0.11
15 10	19 5	0.1	5.63	3.91	0.11	6 71	0.369	0 013
16 12	17.7	0.1	6 03	4 04	0.11	7 71	0.358	0.012
17.13	16 5	0 1	6.43	3.92	0.10	8.71	0.350	0.012
18.15	15.5	0.1	6.83	3.70	0.04	9.71	0 345	0.013
20 00	14.2	0.1	7.83	3.33	0 04	10.71	0.311	0.012
22 00	13.4	0.1	8 83	3.09	0 04	11 71	0.306	0 013
24.00	12.6	0.1	9.83	2.80	0 04	12 71	0.281	0.011
26.00	12.0	0.1	10 83	2 68	0.03	13.70	0.272	0 011
28.00	11.5	0.1	11.83	2 42	0 03	14 70	0.242	0 010
30.00	11.0	0.1	12.83	2 01	0.03	15.70	0.226	0.010
32.00	10 5	0.1	13.83	1 81	0 03	16.70	0.215	0.011
34.00	10.3	0 1	14 83	1 72	0 03	17.70	0.192	0 010
36.00	10.1	0.1	15 84	1 63	0.03	18.70	0.177	0 008
38.00	9.9	0.1	16.84	1 58	0.03	20.00	0.172	0 007
40.00	10.2	0.1	17 84	1 53	0.03	22 00	0.147	0.006
42.00	10.1	0.1	18.84	1 49	0.03	24.00	0.151	0.006

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Table 7 (continued)

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Triton (continued)	
26.00	0.157	0.007
28 00	0.148	0.007
30.00	0.130	0.006
32.00	0.135	0.006
34.00	0.144	0.007
36.00	0.129	0.006
38 00	0.100	0.005
40.00	0.055	0.005
42.00	0.023	0.003
44.00	0.044	0.005
46.00	0.003	0.001
48.00	0.0	
	Helium-3	
7.26	0.30	0.10
7.67	0.37	0.11
8 07	0.31	0.08
8.48	0.38	0.09
8.89	0.45	0.10
9.29	0.47	0.10
9.70	0 53	0.05
10.72	0 59	0.05
11 74	0.48	0.04
12.76	0 413	0.013
13.78	0 390	0.013
14.79	0.330	0.011
15.81	0.316	0.012
16.83	0 299	0.011
17.85	0.291	0.012
18.87	0.272	0.010
20.00	0.240	0.007
22.00	0.215	0 007
24.00	0.210	0 007
26.00	0.199	0 007
28.00	0 181	0.006
30.00	0.183	0.006

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Helium-3 (continued)	
32.00	0.202	0.006
34 00	0.151	0.006
36.00	0 140	0 006
38.00	0.135	0 006
40 00	0 122	0 006
42.00	0.154	0.007
44 00	0.127	0.007
46.00	0.046	0.005
48.00	0.001	0.000
50.00		
	Alpha	
4.92	4.14	0.24
5.33	5.48	0 24
5.73	7.72	0.29
6 13	9.97	0.33
6.53	12.72	0 37
6.93	15.45	0 39
7.33	17 29	0.41
7 73	18.66	0.44
8.13	19.69	0.45
8 53	19.64	0.45
8 93	19 44	0 45
9 33	18 83	0 44
9.73	16.53	0 18
10.73	13.64	0.15
11.73	10.55	0.15
12.73	7.80	0.13
13.73	5.70	0 08
14.73	4 10	0.05
15.73	3.16	0.05
16.73	2.47	0 04
17.73	2.11	0.04
18 73	1 63	0 03
20.00	1 30	0.02
22.00	0.962	0 020

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Alpha (continued	
24 00	0 805	0 019
26 00	0.618	0 015
28.00	0 570	0.017
30 00	0.465	0 014
32.00	0.373	0 013
34.00	0 325	0.012
36 00	0 300	0.011
38.00	0 233	0.010
40.00	0.200	0.010
42.00	0.173	0 009
44.00	0.166	0.010
46.00	0.141	0.010
48.00	0.103	0.008
50.00	0 074	0 007
52.00	0 032	0.005
54.00	0 012	0 003
56 00	0.008	0.003
58 00		

a) Bin energy listed is the low-energy edge of the bin. The highest bin energy listed is the upper edge of the last bin

Table 8. Angle-Integrated Cross Sections from 38.8 MeV

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Proton			Deuteron			Triton	
1.56	70 0	0.8	2.96	1.10	0 11	6.28	0 21	0.05
1.96	107.7	1 0	3.35	1 64	0.12	6.68	0.163	0.012
2.36	150.4	1.2	3.75	2 01	0.13	7.68	0.174	0 012
2.76	185.4	1.3	4.15	2 43	0.14	8 67	0.200	0 013
3.15	198.5	1 3	4.55	2 71	0.14'	9.66	0.174	0 012
3.55	207.0	1 4	4.94	2.85	0 12	10.66	0.192	0.012
3.95	215.5	1.1	5.34	2.76	0.12	11.65	0 184	0.012
4.35	206.0	1.1	5.74	2.71	0.12	12.64	0.159	0.011
4 74	197.4	1.0	6.13	2 68	0.12	13.64	0.212	0 013
5.14	185.2	1.0	6.53	2.41	0.11	14 63	0.160	0 012
5.54	170.2	1.0	6.93	2 50	0 05	15 62	0.226	0 013
5.94	155.3	0.9	7.92	2 30	0 04	16.62	0.127	0.010
6.33	138 4	0.9	8.92	2.07	0.04	17.61	0.106	0 009
6.73	109.4	0.4	9.91	2.06	0.04	18.60	0.040	0.005
7 72	83.2	0.3	10 90	2.00	0.04	20 00	0.115	0.007
8.72	59.0	0.2	11.90	1.95	0.04	22 00	0.126	0 007
9.71	42.6	0.2	12 89	1 85	0 04	24 00	0.002	0 001
10.70	32.2	0.2	13 88	1 74	0.04	26.00	0.001	0 001
11.70	25.90	0.15	14.88	1 63	0 04	27 02		
12.69	22.06	0.14	15.87	1 63	0 04			
13.68	18.90	0.13	16.86	1.57	0.04			
14.68	17.19	0.12	17.86	1.57	0.04			
15 67	15.71	0.11	18.85	1.98	0 04			
16.66	15 06	0.11	20.00	1.78	0.03			
17.66	14.86	0.11	22.00	3.07	0.04			
18.65	14 29	0.09	24.00	1.95	0 03			
20.00	13.37	0.07	26.00	3.26	0.04			
22.00	12.40	0.07	28 00	0.054	0 006			
24.00	11.16	0.07	28.76					
26.00	9.92	0.10						
28.00	9.17	0.11						
30.00	10.14	0.11						
32.00	9.80	0.11						
34 00	11.33	0.11						
36.00	13.59	0.14						
37 89								

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Table 8 (continued)

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Helium-3			Alpha				
12.24	1.93	0.07	4.40	2.06	0.19			
13.24	1.02	0.03	4.79	2.84	0.16			
14.23	0.78	0 03	5 19	4.39	0.20			
15.22	0.65	0.02	5.59	6.6	0.2			
16.22	0.53	0.02	5.99	9.3	0.3			
17.21	0 44	0.02	6 38	11.9	0.3			
18.20	0.373	0 013	6.78	14.4	0 4			
20 00	0.430	0 013	7.18	16.9	0 4			
22.00	0 264	0.010	7 58	18 8	0.4			
24.00	0 145	0.008	7.97	19 5	0 4			
26.00	0 024	0 004	8.37	19.9	0.4			
28 00	0.002	0 001	8.77	19.3	0.4			
30.00			9 16	18 2	0.4			
			9.56	16 6	0.3			
			9.96	14.4	0.1			
			10.95	10.0	0.1			
			11.95	6.44	0.08			
			12 94	4.00	0.06			
			13 93	2 49	0 04			
			14 93	1.84	0.04			
			15.92	1.48	0.04			
			16.91	1.21	0.03			
			17.91	1.03	0.03			
			18.90	0.85	0.02			
			20.00	0.703	0.017			
			22.00	0 576	0.015			
			24.00	0.485	0.014			
			26.00	0 407	0 013			
			28.00	0 260	0.010			
			30.00	0.139	0.008			
			32 00	0.057	0.005			
			34 00	0.044	0.007			
			35.03					

a) Bin energy listed is the low-energy edge of the bin. The highest bin energy listed is the upper edge of the last bin.

Table 9. Angle-Integrated Cross Sections from 28 8 MeV

Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)	Bin Energy[a] (MeV)	Cross Section (mb/MeV)	Error (mb/MeV)
	Proton			Deuteron			Helium-3	
1.69	58.7	0.9	2.55	0 78	0 10	12.50	0.19	0.04
2.09	80.6	0.9	2.95	0.67	0.08	13 50	0.137	0.013
2.50	109.4	1.0	3 36	0 95	0.10	14 50	0.079	0.010
2.90	168.3	1.3	3 76	1.49	0 12	15 51	0.006	0 002
3.30	193 8	1.4	4 16	1 87	0 13	16.51	0.007	0 005
3.71	202.6	1.4	4.57	1 97	0 13	17 52		
4 11	210.7	1.4	4.97	1.87	0 12			
4.52	208 8	1.4	5 37	1.88	0 12		Alpha	
4 92	200 2	1 4	5 78	2 13	0 13	4.10	1 05	0.11
5 32	189 0	1.3	6.18	2.04	0.13	4.50	1 57	0.13
5.73	171.9	1.3	6 58	1.87	0 10	4.90	2 44	0.16
6.13	154.6	1.2	6 99	1.78	0 05	5 30	3.62	0.19
6.53	130.8	0.9	8.00	1.77	0 05	5.70	5 11	0.22
6.94	109.9	0.4	9.01	1.96	0.05	6 11	7 41	0.27
7 95	79.4	0.3	10.01	1.89	0.05	6.51	9.88	0 30
8 96	50.6	0.3	11.02	1 54	0 05	6.91	12 51	0 34
9 96	43 3	0.3	12 03	1.98	0 05	7 31	14.98	0.37
10.97	32 3	0.2	13.04	4 13	0.07	7.71	16.23	0.38
11.98	26 4	0.2	14.05	2 92	0.06	8.12	16.55	0.38
12 99	22 2	0.2	15.06	1.07	0.04	8.52	15 82	0 37
14 00	19.1	0.2	16.07	2.76	0.06	8.92	15 03	0.35
15.01	17 4	0.2	17.08	5 43	0.08	9 32	14.13	0.34
16.02	15 7	0.2	18.09	0.143	0 014	9 72	11.58	0.13
17.03	15 3	0.2	19.20			10 73	8.27	0.10
18.04	14 1	0.1				11 73	6.08	0 09
20.00	15.0	0.1		Triton		12.74	4.18	0.07
22.00	13 8	0.1	6 46	0 17	0 04	13.74	2.62	0.06
24.00	13.5	0.1	6.86	0 119	0.012	14 75	1 98	0.05
26.00	12 4	0.1	7.87	0 143	0.014	15 75	1.45	0 04
27.83			8 87	0 056	0.009	16.76	1 29	0.04
			9.88	0 083	0.011	17 76	1.01	0 04
			10.88	0 135	0.014	18 77	0.75	0 03
			11 89	0.158	0.014	20.00	0.458	0.017
			12.89	0.146	0.019	22 00	0.205	0.011
			13 90	0.019	0.007	24.00	0 081	0.007
			14 90			26.00	0.008	0.003
						27 02		

a) Bin energy listed is the low-energy edge of the bin. The highest bin energy listed is the upper edge of the last bin.

Table 10 Energy Integrated Differential Cross Sections and Average Energies for ^{54}Fe

Angle deg	Proton[a] $\sigma \pm \Delta\sigma$[b] (mb/sr)	Proton $\bar{E}$[c] (MeV)	Proton COE[d] (MeV)	Deuteron $\sigma \pm \Delta\sigma$[b] (mb/sr)	Deuteron $\bar{E}$[c] (MeV)	Deuteron COE[d] (MeV)	Triton $\sigma \pm \Delta\sigma$[b] (mb/sr)	Triton $\bar{E}$[c] (MeV)	Triton COE[d] (MeV)	Helium-3 $\sigma \pm \Delta\sigma$[b] (mb/sr)	Helium-3 $\bar{E}$[c] (MeV)	Helium-3 COE[d] (MeV)	Alpha $\sigma \pm \Delta\sigma$[b] (mb/sr)	Alpha $\bar{E}$[c] (MeV)	Alpha COE[d] (MeV)
						62-MeV Protons Incident									
12	471 5 ± 2 5	28 6	1 86	33 6 ± 0 7	35 0	4 81	2 46 ± 0 18	27 1	6 37	2 89 ± 0 20	32 6	12 43	19 6 ± 0 5	18 5	7 37
15	388 2 ± 1 1	28 0	3 69	34 9 ± 0 3	35 0	4 79	2 52 ± 0 09	26 3	6 34	2 84 ± 0 10	31 7	12 32	9 1 ± 0 2	26 1	13 62
20				28 3 ± 0 2	34 3	4 89	2 22 ± 0 05	25 9	6 47	2 60 ± 0 06	30 9	12 58	17 8 ± 0 5	16 8	7 48
27	230 6 ± 0 3	23 7	2 40	19 6 ± 0.1	30.5	4.79	1 84 ± 0 03	24 7	6 34	2 03 ± 0 03	29 9	12 39	18 0 ± 0 1	16 2	6 74
30	218 1 ± 0 3	23 4	3 64	18 0 ± 0 1	29 7	4 59	1 71 ± 0 02	23 9	6 34	1 82 ± 0 03	29 3	12 33	7 0 ± 0 05	23 9	13 63
35	209 1 ± 0 8	21 1	2 34	16 3 ± 0 2	29 1	4 89	1 46 ± 0 06	23 0	6 47	1 58 ± 0 05	28 2	12 59	16.6 ± 0 2	15 3	7 48
45	190 7 ± 0 4	17 8	1 70	12 2 ± 0 1	25 1	4 66	1 16 ± 0 03	21 0	6 41	1 41 ± 0 04	23 7	7.26	14.8 ± 0 2	14.5	7 42
47	167 3 ± 0 3	17 8	2 15	11 0 ± 0 1	24 9	3 95	0 98 ± 0 02	21 2	6 36	1 04 ± 0 02	26 3	12 41	14 7 ± 0 1	14 0	5 26
50	144 0 ± 0 3	18 4	3 64	10 2 ± 0 1	25 0	4 79	0 93 ± 0 02	20 8	6 34	0 95 ± 0 02	25 8	12 33	4 64± 0 05	21 9	13 63
55	146 7 ± 0 5	14 8	2 00	8 59± 0 06	24 1	4 89	0 79 ± 0 02	19 1	6 42	1 03 ± 0 04	21 6	7 28	12 9 ± 0 1	13 9	7 49
60	135 8 ± 0 3	14 4	2.15	8 07± 0 06	22 3	2 45	0 65 ± 0 02	19 3	6 35	0 64 ± 0 02	24 4	12 41	12 7 ± 0 1	12 8	4 95
65	113 1 ± 0 2	14 7	3 65	6 75± 0.04	21 7	4 80	0 57 ± 0 01	18 6	6 35	0 61 ± 0 01	23 8	12 35	3 12± 0 02	20 8	13 65
70	121 3 ± 0 3	12 0	1 65	6 21± 0 07	19 8	2 65	0 51 ± 0 02	18 2	6 36	0 48 ± 0 02	23 1	12 42	11 5 ± 0 1	12 0	5 01
75	108 8 ± 0 2	12 8	3 74	5 62± 0 04	20 2	4 89	0 45 ± 0 01	17 6	6 44	0 46 ± 0 01	22 7	12 48	2 51± 0 03	20 7	13 78
80	94 0 ± 0 1	11 8	3 65	4 69± 0 03	18 6	4 85	0 37 ± 0 01	16 6	6 35	0 38 ± 0 01	21 8	12 45	2 18± 0 02	20 1	13 75
90	84 6 ± 0 1	10 1	3 70	3 54± 0 02	16 0	4 85	0 34 ± 0 01	14 5	6 40	0 29 ± 0 01	20 8	12 50	1 63± 0 01	19 4	13 85
100	102 5 ± 0.3	8 2	1 68	3.46± 0 06	13 4	2 75	0 22 ± 0 02	14 4	6 62	0 40 ± 0.02	16 3	7 79	10 5 ± 0 1	10 6	5.09
110	71 2 ± 0 1	9 1	3 76	2 46± 0 02	13 9	4 96	0 18 ± 0 01	13 5	6 46	0 166± 0.004	19 8	12 63	1 08± 0 01	18 8	13 93
120	94 2 ± 0 2	7 4	1 71	2 74± 0 03	11 4	2 41	0 17 ± 0 01	12 6	6 42	0 145± 0 007	18 8	12 49	9 53± 0 06	9 7	4 86
135	67.1 ± 0 1	8 1	3 70	1 91± 0 01	11 3	4 90	0 18 ± 0 01	11 7	6 40	0.127± 0.003	18 4	12 56	0 77± 0 01	17 7	13 71
160	94 5 ± 0 3	6 7	1 50	2 38± 0 05	8 9	2 35	0 10 ± 0 01	11 1	6 40	0 258± 0 017	12 8	7 25	9.88± 0 11	9 1	4 50

a) does not include elastic scattering

b) these uncertainties are statistical only

c) average energy

d) low-energy cutoff

(continued on next page)

Table 10 (continued)

Lab Angle deg	Proton[a] σ ± Δσ[b] (mb/sr)	Proton $\bar{E}$[c] (MeV)	Proton COE[d] (MeV)	Deuteron σ ± Δσ[b] (mb/sr)	Deuteron $\bar{E}$[c] (MeV)	Deuteron COE[d] (MeV)	Triton σ ± Δσ[b] (mb/sr)	Triton $\bar{E}$[c] (MeV)	Triton COE[d] (MeV)	Helium-3 σ ± Δσ[b] (mb/sr)	Helium-3 $\bar{E}$[c] (MeV)	Helium-3 COE[d] (MeV)	Alpha σ ± Δσ (mb/sr)	Alpha $\bar{E}$[c] (MeV)	Alpha COE[d] (MeV)
							38 8 MeV Protons Incident								
15	230 8 ± 1 3	17 8	1 79	16 2 ± 0 3	20 4	4 76	0 93 ± 0 08	15 7	6 30	2 02 ± 0 12	18 1	12 26	14 8 ± 0 3	13 3	4 27
20	199 6 ± 0 5	15 3	1 79	17 5 ± 0 2	20 3	2 98	1 08 ± 0 04	16 9	6 31	2 27 ± 0 06	17 2	7 15	13 9 ± 0 2	12 7	4 42
30	184 1 ± 0 4	13 2	1 59	12 3 ± 0 1	19 2	3 38	0 62 ± 0 03	14 7	6 30	1 55 ± 0 04	17 7	12 26	12 5 ± 0 1	12 6	7 15
47	138.6 ± 0 2	12 3	3 63	6 84± 0 05	17 2	4 47	0 41 ± 0 01	14 7	6 26	1 19 ± 0 02	16 2	7 11	11 3 ± 0 1	12 1	5 02
60	133 8 ± 0 2	9 9	1 59	4 60± 0 04	14 9	2 58	0 24 ± 0 01	13 0	6 26	0 69 ± 0 01	16 6	12 27	10 2 ± 0 1	10 7	4 57
90	74.9 0 1	9 3	3 78	2 16± 0 02	13.2	4 93	0 102± 0 005	12 4	6 47	0 31 ± 0 01	16 4	12 59	64 ± 0 01	18 2	13 88
120	101 9 ± 0 2	6 6	1 40	1 86± 0 02	10 2	1 84	0 052± 0 004	11 4	6 43	0 213± 0 007	15 3	12 40	8 29 ± 0 05	8 8	3 89
							28 8 MeV Protons Incident								
15	238 ± 1	12 2	2 61	8 44± 0 2	12 8	3 31	0 54 ± 0 05	11 8	6 42	0 19 ± 0 03	13 9	12 48	13 2 ± 0 3	11 6	4 51
30	149 2 ± 0 3	10 1	1 72	8 35± 0 07	13 7	2 57	0 16 ± 0 01	10 1	6 46	0 088± 0 007	14 1	12 56	11 1 ± 0 1	11 4	3 89
60	118 2 ± 0 2	8 4	1 91	2 90± 0 03	11 4	2 97	0 073± 0 004	9 8	6 48	0 032± 0 003	14 0	12 51	8 43 ± 0 05	10 4	4 12
90	102 1 ± 0 2	7 1	1 51	1.65± 0 02	9 9	2 37	0 040±0 004	9 5	6 54	0 019±0 003	13 4	12 73	6 13 ± 0 05	9 4	4.33
125	89 8 ± 0 2	6 3	1 41	0 99± 0 02	8 6	2 26	0 016±0 003	9 7	6 48	0 003±0 001	13 2	12 52	6 47 ± 0 05	8 8	4 07

a) does not include elastic scattering

b) these uncertainties are statistical only

c) average energy

d) low-energy cutoff

Table 11. Total Cross Sections — ^{54}Fe

Particle	$\sigma \pm \Delta\sigma$ (mb)	$\bar{E}$ (MeV)	$\overline{pc}$ (MeV)	Lower Energy Limit (MeV)
	62-MeV Incident Protons			
Proton[a]	1670. ± 1.6	14.1	51.	1.66
Deuteron	87.3 ± 0.3	23.4	151.	2.43
Triton	6.92 ± 0.07	20.3	181.	6.32
Helium-3	9.55 ± 0.14	22.1	164.	7.26
Alpha	149.5 ± 0.6	12.1	51.	4.93
	38.8-MeV Incident Protons			
Proton[a]	1542. ± 2.	9.5	31.4	1.56
Deuteron	54.5 ± 0.3	15.9	121.	2.96
Triton	2.69 ± 0.05	14.1	161.	6.28
Helium-3	7.7 ± 0.1	16.6	155.	12.24
Alpha	120.7 ± 0.5	10.3	51.	4.40
	28.8-MeV Incident Protons			
Proton[a]	1409 ± 2.0	8.1	26.5	1.69
Deuteron	34.7 ± 0.2	11.8	106.	2.54
Triton	0.93 ± 0.04	10.4	142.	6.46
Helium-3	0.42 ± 0.04	13.8	200.	12.49
Alpha	95.9 ± 0.5	9.9	51.5	4.10

a) does not include elastic scattering

Table 12
PROTON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

12 DEG - RUN 123			15 DEG - RUN 5016			27 DEG - RUN 5020			30 DEG - RUN 5007			35 DEG - RUN 4021		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
2.03	5 01	0.41	3.87	16.22	0.36	2 57	7 80	0.08	3.82	15.22	0.12	2 52	7 77	0.23
2.43	5.63	0.44	4.27	17.01	0.37	2.97	10.50	0.09	4.22	16 17	0.12	2 93	12 53	0.29
2.83	8.61	0.54	4.66	16.94	0.37	3 37	14.03	0.11	4.62	16.40	0.12	3.33	14 25	0.31
3.23	14.24	0.70	5.06	17.05	0 37	3.77	14.29	0.11	5 02	16.39	0.12	3.74	15.08	0.32
3.64	14 82	0.71	5 46	17.07	0 37	4.17	15.40	0.11	5.42	15.81	0.12	4.15	15 40	0.32
4.04	15.07	0.72	5.86	16.15	0.36	4.57	15.53	0.11	5.82	15.14	0.11	4.56	15 91	0.33
4.44	16.97	0.76	6.26	16.10	0.36	4.97	15.47	0.11	6 22	14 72	0.11	4.96	15.28	0 32
4.84	18.18	0.79	6.66	15.90	0.36	5.37	15.17	0.11	6.61	14.03	0 11	5 37	15.44	0.33
5.24	16.42	0.75	7.36	14.37	0.22	5.77	14.37	0 11	7.31	12.29	0 07	5.78	14.23	0.31
5 64	17 02	0.76	8.36	12.51	0.20	6.17	13.52	0.11	8.31	10.21	0.06	6.19	14.03	0.31
6.04	15 82	0.74	9.35	10.13	0.18	6.57	12.94	0.10	9.31	7.74	0.05	6.59	13.31	0.30
6.44	14 82	0.71	10.35	8 14	0.16	7.27	11.08	0.06	10.31	5.66	0.04	7 31	11.70	0 18
7.14	15.20	0 46	11.35	7.41	0.15	8.27	9.26	0.06	11.31	4.94	0.04	8.32	10.59	0.17
8.15	12.72	0.42	12.35	6.96	0.15	9 26	7.42	0 05	12.31	4.24	0 04	9.34	6 55	0.13
9.15	10.16	0.37	13.35	6 46	0.14	10.26	5.22	0.04	13.30	3.75	0.04	10.36	4.28	0 11
10.15	9.19	0.35	14.34	6.14	0.14	11.26	4 27	0.04	14 30	3.34	0.03	11.38	3.85	0.10
11.16	8 65	0 34	15.34	6.04	0.14	12.26	3.59	0.03	15.30	3.13	0.03	12.40	3.32	0.10
12.16	8.09	0.33	16.34	6.05	0.14	13.26	3.27	0.03	16 30	2.94	0.03	13 41	2.98	0 09
13 16	7.86	0.33	17.34	5.79	0.14	14 26	3.00	0.03	17 30	2.75	0.03	14.43	2.66	0.09
14.16	7.03	0.31	18.33	5.77	0.14	15.26	2.77	0.03	18.30	2.64	0.03	15.45	2 59	0.08
15 17	6 93	0.31	19.33	5 75	0 14	16 26	2.66	0.03	19.29	2.64	0.03	16.47	2.23	0.08
16 17	7.42	0.32	20.33	5.70	0.14	17.25	2.62	0.03	20 29	2 59	0.03	17.49	2 30	0 08
17.17	7.26	0 31	21.33	5.88	0.14	18.25	2.57	0.03	21 29	2.56	0.03	18.51	2.27	0.08
18.18	6 11	0.29	22.33	5.90	0.14	19.25	2.55	0.03	22.29	2.51	0.03	19.52	2.15	0.08
19.18	6.91	0 31	23.32	5.72	0.14	20 25	2.45	0 03	23 29	2.46	0 03	20.54	2.18	0 08
20.18	6.66	0.30	24 32	5.95	0.14	21.25	2 46	0.03	24.29	2.47	0.03	21.56	2.22	0.08
21.18	6.68	0.30	25 32	5.63	0.13	22.25	2.54	0.03	25.28	2.50	0.03	22 58	2.18	0.08
22.19	6.89	0.31	26.32	5 69	0.14	23.25	2.47	0.03	26 28	2.55	0.03	23.60	2.26	0 08
23.19	6.67	0.30	27.31	5.46	0.13	24.25	2.51	0.03	27 28	2.46	0.03	24.61	1.96	0.07
24.19	7.08	0.31	28.31	5.46	0.13	25 24	2.49	0.03	28.28	2.47	0.03	25 63	2.12	0.08
25.20	7.06	0.31	29.31	5.22	0.13	26.24	2.56	0 03	29.28	2.55	0 03	26 65	2.06	0.08
26 20	5.94	0.28	30 31	5.53	0.13	27.24	2.57	0.03	30.28	2.43	0.03	27.67	2.16	0.08
27.20	7.14	0.31	31.31	5.76	0.14	28.24	2.58	0.03	31.27	2.51	0.03	28 69	2.17	0 08
28.20	7.57	0 32	32.30	5.35	0.13	29.24	2.57	0.03	32 27	2.47	0.03	29.71	2.24	0.08
29.21	7 85	0.33	33.30	5.10	0.13	30.24	2.60	0.03	33.27	2 51	0.03	30 72	2.12	0.08
30.21	7.39	0.32	34.30	5 06	0.13	31.24	2.57	0.03	34.27	2.52	0.03	31.74	2.08	0 08
31 21	7 41	0 32	35.30	5.64	0.13	32.24	2.63	0.03	35.27	2.52	0.03	32.76	2 20	0.08
32 21	7.09	0.31	36.29	5.78	0.14	33.24	2.60	0.03	36.27	2 46	0.03	33 78	2 37	0.08
33.22	7 07	0.31	37.29	6.41	0.14	34.23	2.62	0.03	37.27	2.52	0.03	34.80	2.47	0.08
34.22	7.45	0.32	38.29	6.24	0.14	35 23	2.59	0.03	38.26	2.56	0.03	35 82	2.49	0.08
35.22	8.34	0.34	39.29	6.52	0.15	36.23	2.60	0.03	39.26	2.55	0.03	36.83	2.76	0.09
36.23	7.12	0.31	40.29	6.59	0.15	37.23	2.64	0.03	40 26	2 72	0.03	37 85	2.64	0 09
37.23	6 48	0.30	41 28	6.78	0.15	38.23	2.67	0.03	41 26	2.79	0.03	38.87	2.66	0.09
38.23	7.27	0.32	42.28	6.79	0.15	39.23	2.77	0.03	42.26	2.87	0.03	39.89	2 64	0.08
39.23	6.06	0.29	43.28	7.20	0.15	40 23	2.89	0.03	43.26	2.93	0.03	40 91	2.61	0 08
40 24	6 83	0 31	44.28	7.39	0.15	41.23	2.97	0.03	44.25	2.75	0.03	41 92	2.83	0.09
41.24	9.86	0.37	45.28	6.65	0.15	42.22	3 07	0.03	45.25	2.73	0.03	42.94	2.62	0.08
42.24	9.73	0.36	46 27	6.95	0.15	43.22	3.12	0.03	46.25	2.81	0.03	43.96	2.63	0 08
43.25	8.11	0.33	47.27	6.51	0.15	44 22	3.07	0.03	47.25	2.48	0 03	44 98	2 60	0.08
44.25	8.89	0.35	48.27	5.65	0.14	45.22	3.01	0.03	48 25	2.52	0.03	46.00	2 21	0.08
45 25	6.93	0.31	49.27	6.15	0.14	46.22	3.04	0.03	49.25	2.38	0.03	47.02	2 02	0.07
46 25	7.38	0.32	50.26	5 83	0.14	47.22	2.71	0.03	50 24	2.29	0.03	48.03	2 27	0.08
47.26	6 87	0.31	51.26	5.27	0.13	48.22	2.81	0.03	51.24	2.26	0 03	49.05	1.96	0.07
48.26	6 50	0.30	52.26	5.40	0.13	49.22	2.68	0 03	52.24	2.03	0.03	50.07	2.13	0.08
49.26	5.92	0.28	53 26	5.37	0.13	50.21	2.33	0.03	53.24	2.36	0.03	51.09	1 90	0 07
50.27	5.82	0 28	54 26	4.46	0.12	51.21	2 51	0.03	54 24	2 91	0.03	52.11	1.93	0 07
51 27	5.39	0 27	55 25	5.85	0.14	52 21	2 26	0 03	55 24	4.03	0.04	53 12	1 99	0.07
52.27	6 67	0.30	56.25	2.21	0.08	53 21	2.68	0.03	56.23	2.44	0.03	54 14	2 58	0 08
53.27	5.31	0.27	57.25	3.56	0.11	54.21	3.16	0.03	57.23	2 36	0.03	55.16	1.35	0.06
54.28	3.91	0.23	58.25	5.49	0.13	55 21	4.78	0.04	58.23	1.48	0 02	56.18	2 13	0 08
55 28	5 41	0.27	59.24	2 20	0.08	56 21	2.11	0.03	59 23	0.78	0.02	57.20	1.58	0.07
56 28	4 16	0.24	60.14	10.32	0.20	57.21	2.96	0.03	60 13	3.24	0 04	58.22	1 37	0 06
57.28	4.16	0.24	0.0	0.0	0 0	58 21	2.62	0.03	0.0	0.0	0.0	59.16	2.14	0.08
58.29	11.758	0.401	0.0	0.0	0.0	59.20	0.802	0.016	0 0	0 0	0.0	0.0	0 0	0.0
59.29	7 569	0.322	0.0	0.0	0.0	60 05	5 528	0 051	0 0	0.0	0 0	0.0	0 0	0.0
60.12	20 398	0.655	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 12 (Cont'd)

PROTON FROM A = 54 BOMBARDED BY 62 MEV PROTONS.

45 DEG - RUN 7000			47 DEG - RUN 5042			50 DEG - RUN 5010			55 DEG - RUN 4025			60 DEG - RUN 5043		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
1 88	4.12	0 09	2.33	6 92	0.10	3.82	14.14	0 14	2.16	5.82	0 14	2.33	6 76	0.09
2.28	6 40	0.12	2.73	9 00	0.11	4.22	14.60	0.14	2 57	7.97	0.17	2 73	9 00	0.11
2.68	8 74	0 14	3.13	12.58	0 13	4 62	15.05	0 14	2.98	11 67	0.20	3 13	13.37	0 13
3 08	10.58	0.15	3.53	13.86	0.14	5 02	14.63	0.14	3.39	13.95	0.22	3.53	13.46	0.13
3.48	15.24	0.18	3.93	14.55	0.14	5.42	14 09	0 14	3 79	14 65	0 23	3 93	14.20	0.14
3.88	15 55	0.18	4.33	15.07	0.15	5 82	13.32	0 13	4 20	15.18	0.23	4.33	14.55	0.14
4 28	16.71	0.19	4.73	15.08	0.15	6.22	12 52	0.13	4.61	14.46	0 23	4 73	14.33	0 14
4 68	16.78	0.19	5.13	14.65	0 14	6.61	11.50	0.12	5 02	14.93	0.23	5 13	14.08	0.14
5 08	16.21	0.19	5.53	13.91	0.14	7.31	9.78	0 07	5 42	13 92	0.22	5 53	13 28	0.13
5 48	15.65	0.18	5.93	13.21	0.14	8 31	7.87	0.06	5.83	12.88	0.21	5 93	12.19	0 13
5.88	14.60	0.18	6.33	12 38	0 13	9.31	6.24	0.06	6 24	12.30	0.21	6 33	11.47	0.12
6 28	13 98	0.17	6.73	11.39	0.13	10 31	4.27	0.05	6.65	11.81	0.20	6.73	10.53	0.12
6.68	13 04	0.17	7 43	9.56	0.07	11 31	3 44	0 04	7 36	10.32	0.12	7 43	8.77	0 07
7.39	11 25	0.10	8.44	8.02	0.07	12.31	2.94	0.04	8 38	8.99	0.11	8 43	7.33	0 06
8 39	9.12	0.09	9 44	6.07	0.06	13.30	2.51	0.04	9 39	5.40	0.09	9.43	5 28	0.05
9 39	7.65	0.08	10.44	4 33	0.05	14.30	2.34	0 04	10.41	3.78	0.07	10.43	3 79	0.04
10 39	5.11	0.07	11.44	3 40	0 04	15.30	2.15	0.03	11.43	3.20	0 07	11.43	3 04	0 04
11 39	4.15	0.06	12.44	2.90	0.04	16 30	2.03	0.03	12.45	2.48	0.06	12 43	2.55	0.04
12 39	3.43	0.05	13.44	2.56	0.04	17 30	1.96	0.03	13.47	2.18	0.06	13.43	2.25	0.03
13 39	3 13	0.05	14.44	2.38	0.04	18.30	1.79	0.03	14.49	2 01	0.05	14.43	1.92	0.03
14.40	2.72	0.05	15.44	2.18	0.04	19 29	1.80	0.03	15.51	1.93	0.05	15.43	1 86	0 03
15.40	2.60	0.05	16.44	1.99	0.03	20.29	1.70	0 03	16.52	1.70	0.05	16 43	1.64	0 03
16 40	2.41	0.05	17.45	1.92	0.03	21 29	1 72	0.03	17.54	1.57	0.05	17.44	1.54	0.03
17 40	2.30	0.04	18.45	1.87	0.03	22 29	1.73	0.03	18.56	1 60	0.05	18.44	1.52	0.03
18.40	2.14	0.04	19.45	1 86	0.03	23.29	1.66	0.03	19.58	1.52	0.05	19.44	1 45	0.03
19.40	2.25	0.04	20.45	1.84	0.03	24 29	1 71	0.03	20 60	1.48	0.05	20 44	1 40	0.03
20 40	2.13	0.04	21.45	1.84	0.03	25.29	1.67	0.03	21.62	1.53	0.05	21.44	1 38	0.03
21.40	2 15	0.04	22.45	1.81	0.03	26.28	1 69	0.03	22 63	1.35	0 04	22.44	1.34	0.03
22.41	2.11	0.04	23.45	1.79	0.03	27.28	1.63	0.03	23.65	1.33	0.04	23 44	1 37	0.03
23 41	2 10	0.04	24.45	1.76	0.03	28 28	1 57	0.03	24.67	1 40	0.04	24 44	1.30	0.03
24.41	2.00	0.04	25.46	1.78	0.03	29.28	1 57	0 03	25.69	1.34	0.04	25.44	1.23	0.03
25.41	1.98	0.04	26.46	1.82	0.03	30.28	1 57	0.03	26.71	1.37	0 04	26 44	1 25	0.03
26 41	2 02	0.04	27.46	1.74	0.03	31.28	1.55	0.03	27.73	1.29	0.04	27.44	1.21	0.03
27.41	2.019	0 042	28.46	1.754	0.032	32.27	1.540	0 028	28 74	1 258	0.042	28.44	1.166	0.025
28.41	1.956	0.041	29.46	1 709	0.031	33.27	1 461	0 028	29.76	1 216	0 041	29 44	1.157	0.025
29.42	2.017	0.042	30.46	1.703	0.031	34.27	1.461	0 028	30.78	1.232	0.042	30 44	1 096	0.024
30.42	2.017	0.042	31.46	1.638	0.030	35.27	1 411	0 027	31.80	1.255	0 042	31 44	1 093	0.024
31.42	1.932	0.041	32.46	1.678	0.031	36 27	1.416	0.027	32.82	1.187	0.041	32.44	1.098	0 024
32.42	1.862	0.040	33.47	1.634	0.030	37.27	1.368	0.027	33.84	1 181	0.041	33.45	1 009	0.023
33.42	1.858	0.040	34 47	1.635	0.030	38 27	1.307	0.026	34.85	1.220	0.041	34 45	1.012	0 023
34.42	1.797	0.040	35.47	1.536	0.029	39.26	1.403	0 027	35.87	1.093	0.039	35.45	0 985	0.023
35.42	1.762	0.039	36.47	1.567	0.030	40.26	1.336	0.027	36.89	1.202	0.041	36.45	0.960	0 023
36.43	1.739	0.039	37.47	1 546	0.030	41.26	1.323	0.026	37.91	1.084	0.039	37.45	0.922	0 022
37 43	1.717	0.039	38.47	1.498	0.029	42.26	1.266	0.026	38.93	1.017	0.038	38 45	0.884	0.022
38.43	1 741	0.039	39.47	1.500	0.029	43.26	1.310	0 026	39 95	1.003	0 038	39 45	0.877	0 022
39.43	1 736	0.039	40.47	1.475	0 029	44.26	1.265	0.026	40.97	1 043	0.038	40.45	0.864	0 021
40.43	1.790	0.040	41 47	1 536	0.029	45.25	1.223	0 025	41 98	0.937	0.036	41 45	0.828	0.021
41.43	1.809	0.040	42.48	1.508	0.029	46 25	1.150	0 025	43.00	0.917	0.036	42 45	0.822	0 021
42.43	1.751	0.039	43.48	1.522	0.029	47.25	1.147	0 025	44.02	0.867	0 035	43.45	0.7o9	0.020
43.44	1 809	0.040	44.48	1.432	0.028	48.25	1.120	0.024	45 04	0.866	0.035	44.45	0.766	0 020
44.44	1 654	0.038	45.48	1 448	0.029	49 25	0.930	0.022	46 06	0.834	0.034	45 45	0 708	0 019
45.44	1 602	0.037	46.48	1.307	0 027	50.25	1.058	0.024	47 08	0.717	0.032	46 45	0.662	0.019
46.44	1 475	0 036	47 48	1.282	0.027	51.24	0.828	0.021	48.09	0.736	0.032	47.45	0.643	0.018
47.44	1.472	0.036	48.48	1.278	0 027	52.24	0.851	0 021	49.11	0.695	0 031	48 45	0.579	0 018
48.44	1.293	0.034	49.48	1 124	0 025	53.24	0.789	0 020	50.13	0.668	0 031	49.45	0.578	0.018
49.44	1 302	0.034	50.49	1.125	0.025	54.24	1.275	0.026	51.15	0 583	0 029	50.46	0.539	0.017
50.45	1.224	0.033	51.49	0.986	0 024	55.24	0.517	0.016	52.17	0.601	0.029	51.46	0.440	0 015
51.45	1.180	0 032	52 49	0.959	0 023	56.24	0.772	0.020	53 19	0.643	0 030	52.46	0 454	0.016
52.45	1.018	0.030	53.49	1.007	0.024	57 24	0.336	0.013	54.20	0 585	0.029	53.46	0 488	0.016
53.45	1 556	0.037	54.49	1.233	0 026	58 23	0.735	0.020	55.22	0 504	0.027	54.46	0.517	0.017
54.45	0.861	0.027	55.49	0.708	0.020	59.23	0.766	0.020	56 24	0 332	0.022	55.46	0 427	0.015
55.45	1.096	0.031	56.49	0 773	0.021	59 86	0.074	0 012	57.26	0 388	0.023	56.46	0.240	0 011
56.45	0.586	0.023	57.49	0.612	0.019	0.0	0.0	0.0	58 28	0 258	0.019	57.46	0.310	0.013
57.46	1 429	0.035	58 50	0.793	0.021	0.0	0.0	0.0	58.99	0 764	0 052	58 46	0 105	0.007
58.46	1.418	0.035	59.45	1.226	0.028	0.0	0.0	0.0	0.0	0.0	0.0	59.46	0.400	0.015
59.03	1.086	0.079	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 0	59.99	0 051	0.023

Table 12 (Cont'd)

PROTON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS

65 DEG - RUN 5011			70 DEG - RUN 5044			75 DEG - RUN 7100			80 DEG - RUN 5012			90 DEG - RUN 4010		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
3.82	13.97	0.08	1 78	4.06	0.08	3.92	15.02	0.11	3.83	13.94	0.07	3.88	14.59	0.06
4 22	14.45	0.08	2.18	6.15	0.10	4 32	15.48	0.11	4.23	14.25	0.07	4.28	14 76	0.06
4.62	14.38	0.08	2.58	8.24	0.12	4.72	15 40	0.11	4 63	14.21	0.07	4 68	14.35	0.06
5.02	14 15	0.08	2 98	11.44	0.14	5.12	14.89	0.11	5.03	13.73	0.07	5.08	13.75	0.06
5.42	13.34	0.08	3.38	14.52	0.16	5.52	14.17	0.11	5 43	13.09	0.07	5.48	12.89	0.06
5.82	12.47	0.07	3.78	13.53	0.15	5.92	13 26	0 10	5 83	11.98	0.06	5.88	11.85	0.06
6.22	11.66	0.07	4.18	14.06	0.16	6 31	11.87	0.10	6.23	11.06	0.06	6.28	10 94	0.06
6.62	10.61	0.07	4.58	13.85	0.16	6.71	11.08	0 09	6.63	10 08	0 06	6.68	10 12	0.05
7.32	9.04	0.04	4 98	13 64	0.16	7 41	9 17	0 05	7.33	8.38	0.03	7.38	8.37	0.03
8.32	7 29	0.04	5 38	13.11	0.15	8.41	7.44	0.05	8.33	6.73	0.03	8.38	7.23	0.03
9.32	5.773	0.032	5.78	12.278	0.148	9.41	5.975	0.044	9.33	5.226	0 026	9.38	3.674	0.020
10.32	3.804	0.026	6.18	11 214	0 141	10.41	4 103	0.036	10.33	3.373	0.021	10.38	2.803	0.018
11.32	2 993	0.023	6.58	10.327	0.135	11.41	3.174	0.032	11.33	2.606	0.019	11.38	2.332	0 016
12.32	2.446	0.021	7.29	8.749	0.079	12.41	2.514	0 029	12.33	2 121	0.017	12.38	1.862	0.014
13.32	2.119	0 019	8.29	6.922	0.070	13.40	2.123	0.026	13.33	1.789	0.015	13.38	1.551	0.013
14.32	1.865	0.018	9.29	5.320	0.061	14.40	1.841	0.024	14.33	1.553	0.014	14.38	1.325	0.012
15.32	1.686	0.017	10.29	3 470	0.050	15 40	1.687	0 023	15.33	1 391	0.014	15.38	1.170	0.011
16.32	1.562	0.017	11.29	2.772	0.044	16.40	1.504	0.022	16.33	1.249	0 013	16.38	1.045	0 011
17.32	1.444	0.016	12.29	2.288	0.040	17.40	1 427	0.022	17.33	1.136	0.012	17 38	0.915	0.010
18.32	1.381	0.016	13.29	1.966	0.037	18.40	1.320	0.021	18.33	1.056	0.012	18.38	0.849	0.010
19 32	1.314	0.015	14 29	1.712	0.035	19.39	1.323	0.021	19.33	1.013	0.012	19.38	0 777	0.009
20.32	1.288	0.015	15.30	1.577	0.033	20.39	1.170	0.019	20.33	0.915	0.011	20.38	0 720	0.C09
21.32	1.244	0.015	16.30	1.393	0.031	21.39	1 112	0.019	21.33	0.897	0.011	21.38	0 667	0.009
22.32	1.226	0.015	17.30	1.340	0.031	22.39	1.071	0.019	22.33	0.856	0.011	22.38	0.615	0 008
23.32	1.187	0.015	18.30	1.238	0.030	23.39	1.017	0.018	23.33	0.796	0.010	23.38	0 578	0.008
24.32	1.143	0.014	19.30	1.213	0 029	24 39	1.006	0.018	24.33	0.771	0.010	24.38	0.532	0.008
25 32	1 113	0.014	20.30	1.114	0.028	25.38	0.929	0.017	25.33	0.724	0 010	25.38	0.495	0.007
26.32	1.102	0.014	21.30	1.106	0.028	26.38	0.918	0.017	26.33	0.691	0.010	26.38	0 465	0.007
27.32	1.054	0.014	22.31	1.058	0 027	27.38	0.851	0.017	27.33	0.667	0.009	27.38	0.430	0.007
28.32	1.011	0.013	23.31	1.006	0.027	28.38	0.828	0.016	28.33	0 615	0.009	28.38	0.406	0.007
29 32	0.980	0.013	24.31	1.008	0.027	29.38	0.787	0.016	29 33	0.578	0.009	29.38	0.376	0.006
30 32	0.964	0 013	25.31	1.009	0.027	30.38	0.754	0.016	30.33	0.568	0.009	30.38	0 344	0.006
31.31	0.911	0.013	26.31	0.896	0.025	31.37	0.697	0.015	31.33	0.529	0.008	31.38	0.332	0.006
32.31	0.900	0.013	27.31	0.896	0.025	32 37	0.681	0.015	32 33	0 513	0.008	32.38	0.310	0.006
33.31	0 889	0.013	28.31	0.840	0.024	33.37	0.662	0 015	33.33	0.482	0.008	33.38	0.281	0.006
34 31	0 840	0.012	29.32	0.819	0.024	34 37	0.610	0.014	34.33	0.467	0.008	34.38	0 270	0.005
35.31	0 826	0.012	30.32	0.784	0.024	35 37	0.591	0 014	35.33	0.414	0.007	35 38	0.250	0.005
36.31	0.763	0.012	31.32	0.704	0.022	36.37	0.561	0.013	36.33	0.397	0.007	36.38	0.230	0.005
37.31	0.764	0.012	32.32	0.727	0.023	37.37	0.518	0.013	37 33	0.387	0.007	37.38	0.217	0.005
38.31	0.707	0.011	33.32	0.680	0.022	38 36	0.525	0 013	38.33	0.355	0.007	38.38	0.199	0.005
39.31	0.716	0.011	34.32	0.643	0.021	39.36	0.499	0.013	39.33	0.348	0.007	39.38	0.186	0 005
40.31	0.706	0.011	35.32	0.637	0.021	40.36	0.470	0.012	40.33	0.333	0.007	40.38	0 177	0.004
41.31	0.667	0.011	36.33	0.635	0.021	41 36	0.446	0 012	41 33	0.311	0.006	41.38	0.165	0 004
42.31	0.642	0.011	37.33	0.575	0.020	42.36	0.418	0 012	42 33	0.305	0.006	42.38	0 151	0 004
43 31	0.632	0.011	38.33	0.577	0.020	43.36	0.406	0 011	43 33	0.271	0 006	43.38	0.132	0.004
44.31	0.605	0.010	39.33	0.576	0.020	44 35	0 383	0.011	44 33	0.265	0.006	44.38	0.116	0.004
45.31	0.563	0 010	40.33	0.498	0.019	45.35	0.341	0 011	45.33	0.234	0.006	45.38	0 112	0.004
46.31	0.513	0.010	41.33	0.534	0.019	46.35	0.337	0.010	46.33	0.223	0.005	46.38	0.097	0 003
47.31	0.525	0.010	42.33	0.495	0 019	47 35	0.283	0 010	47.33	0.189	0.005	47 38	0.076	0.003
48.31	0.440	0.009	43.34	0.459	0.018	48 35	0.288	0.010	48.33	0.170	0.005	48.38	0.072	0.003
49.31	0.465	0 009	44.34	0.423	0.017	49.35	0.276	0.009	49 33	0.177	0.005	49.38	0.058	0 003
50.31	0 434	0.009	45.34	0 421	0.017	50.34	0 225	0.009	50.33	0.151	0.004	50.39	0.051	0.002
51.31	0.370	0.008	46.34	0.392	0.017	51.34	0.202	0.008	51.33	0.135	0.004	51.39	0.047	0.002
52.31	0.355	0.008	47.34	0.365	0.016	52.34	0.227	0.009	52.33	0 128	0.004	52 39	0 052	0.002
53.31	0 371	0.008	48.34	0.340	0.016	53 34	0.224	0.009	53.33	0.148	0.004	53.39	0.025	0.002
54.31	0.422	0.009	49.34	0.348	0.016	54.34	0.183	0.008	54 33	0.072	0.003	54.39	0.030	0 002
55.31	0.316	0.008	50.35	0.273	0.014	55.34	0.103	0.006	55.33	0.116	0.004	55.39	0.024	0 002
56.31	0.172	0.006	51.35	0.265	0.014	56.33	0.148	0.007	56.33	0.075	0.003	56.39	0.041	0.002
57.31	0.250	0.007	52.35	0.234	0.013	57.33	0.058	0 004	57.33	0.066	0.003	57.39	0.051	0.002
58.31	0.052	0.003	53.35	0.285	0.014	57.96	0.226	0 017	58.33	0.066	0.003	57.94	0.008	0.003
59 16	0.435	0 011	54.35	0.276	0.014	0.0	0.0	0.0	59.06	0.019	0.002	0.0	0 0	0.0
0.0	0 0	0.0	55.35	0.199	0.012	0.0	0.0	0.0	0.0	0 0	0.0	0.0	0 0	0 0
0.0	0.0	0.0	56.35	0.090	0.008	0.0	0.0	0.0	0 0	0.0	0.0	0 0	0 0	0 0
0.0	0.0	0 0	57.36	0.196	0 012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0 0	0.0	0 0	58.36	0.093	0.008	0.0	0.0	0.0	0.0	0 0	0.0	0.0	0 0	0 0
0.0	0.0	0.0	59.08	0.189	0.017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 12 (Cont'd)
PROTON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

100 DEG - RUN 2070			110 DEG - RUN 5015			120 DEG - RUN 7002			135 DEG - RUN 4011			160 DEG - RUN 2067		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
1.86	4.37	0.11	3.93	13.57	0.06	1.88	5.41	0.07	3.88	14 42	0.05	1.67	5.40	0 13
2.27	6.96	0.14	4.33	13.60	0.06	2.28	7.99	0.09	4.28	14.17	0.05	2.07	7.82	0.15
2.67	9.27	0.16	4.73	13.25	0.06	2.68	10.31	0.10	4.68	13.51	0.05	2.47	10.39	0.17
3.08	11.18	0.17	5 14	12.45	0.06	3.08	13.55	0.11	5.08	12.60	0.05	2 87	12.55	0.19
3.49	16.44	0.21	5.54	11.62	0.06	3 49	14.42	0.12	5.48	11 55	0 05	3 27	18.04	0.23
3.90	15.11	0 20	5.94	10.57	0.06	3.89	14.61	0.12	5.88	10.37	0.04	3.67	17.20	0.22
4.30	14.90	0.20	6.34	9.48	0.05	4.29	14.36	0.12	6.28	9.47	0.04	4 07	15.48	0.21
4.71	14.70	0.20	6.74	8.49	0.05	4.69	13.89	0 11	6.68	8.55	0.04	4.47	14.79	0.21
5.12	14.17	0.20	7.44	6.97	0.03	5.09	13.21	0 11	7.38	6.99	0.02	4.87	13.83	0.20
5.52	13 23	0.19	8.44	5.48	0.03	5.49	12.21	0.11	8.38	5 92	0.02	5.27	12.47	0 19
5.93	11 93	0.18	9.44	4.11	0.02	5.89	11.15	0 10	9.38	3 00	0.02	5.67	11.10	0.18
6.34	10.61	0.17	10.45	2.59	0.02	6.29	10.02	0.10	10.38	2.21	0.01	6.07	10.10	0 17
6.75	9.43	0.16	11.45	1.94	0.02	6.70	8.85	0.09	11.38	1.74	0.01	6.47	8.73	0 16
7.46	8.01	0.09	12.45	1.57	0.01	7.40	7.26	0.05	12.38	1.38	0.01	7.17	7.37	0.09
8.48	6.50	0.08	13.45	1.24	0.01	8.40	5.53	0.05	13.38	1.10	0.01	8.17	5.55	0 08
9.50	4 16	0.07	14.45	1.06	0.01	9.40	4.43	0.04	14.38	0.90	0.01	9.17	3.62	0.07
10.51	2.75	0.05	15.46	0.92	0.01	10.41	2.78	0.03	15.38	0.76	0.01	10 17	2.58	0 05
11.53	2.32	0.05	16.46	0.79	0 01	11.41	2.01	0.03	16 38	0.65	0.01	11.17	1.95	0.05
12.55	1.88	0.04	17 46	0.70	0.01	12.41	1.60	0.02	17.39	0 55	0.01	12 17	1.55	0.04
13.57	1.47	0.04	18.46	0.63	0.01	13.42	1.27	0.02	18.39	0.49	0.01	13.17	1.23	0.04
14.59	1.25	0.04	19.46	0.58	0.01	14.42	1.06	0.02	19.39	0.42	0 01	14.17	1.04	0 03
15.61	1.10	0.03	20.47	0.50	0 01	15.42	0.90	0.02	20.39	0.36	0.01	15.17	0 88	0.03
16.63	0.91	0.03	21.47	0.45	0.01	16.42	0.80	0.02	21.39	0.33	0 01	16.17	0.69	0.03
17.64	0.86	0.03	22.47	0.41	0.01	17.43	0.68	0.02	22.39	0.29	0 00	17.17	0.62	0.03
18.66	0 801	0.029	23.47	0.388	0.007	18.43	0.565	0.015	23.39	0.260	0.004	18.17	0.505	0.024
19.68	0.720	0.028	24.47	0.346	0.006	19.43	0.557	0.014	24 39	0.225	0.004	19.17	0.495	0.024
20 70	0.631	0.026	25.48	0.315	0.006	20.44	0.471	0.013	25 39	0.205	0.004	20.17	0.441	0.023
21.72	0.570	0.025	26.48	0.285	0.006	21.44	0.418	0.013	26.39	0.188	0.004	21 17	0.338	0.020
22.74	0.533	0.024	27.48	0.269	0.006	22.44	0.410	0.012	27.39	0.158	0.003	22.17	0.330	0 020
23.75	0.494	0 023	28.48	0.238	0 005	23.45	0.362	0.012	28.39	0 141	0 003	23.17	0.268	0.018
24.77	0.458	0.022	29.48	0.222	0.005	24.45	0.306	0.011	29.39	0.120	0 003	24.17	0.270	0.018
25.79	0.387	0.020	30.49	0 195	0.005	25.45	0.286	0 010	30.39	0.115	0.003	25.17	0.170	0.014
26.81	0.408	0.021	31.49	0.178	0.005	26.45	0.254	0.010	31 39	0.098	0.003	26.17	0.172	0 014
27.83	0.318	0.018	32.49	0.160	0.004	27.46	0.222	0.009	32.39	0.090	0 003	27.17	0.186	0.015
28.85	0 295	0.018	33.49	0.145	0.004	28.46	0.208	0.009	33.40	0.080	0.002	28.17	0.152	0.013
29.86	0.315	0.018	34.49	0.134	0.004	29.46	0.160	0.008	34.40	0.069	0.002	29.17	0.137	0 013
30.88	0.259	0.017	35.50	0 123	0.004	30.47	0.164	0.008	35 40	0 060	0.002	30.17	0.113	0 012
31.90	0.227	0.016	36.50	0.107	0.004	31.47	0.146	0.007	36.40	0.054	0.002	31.17	0.101	0 011
32.92	0.248	0 016	37.50	0 101	0.003	32.47	0.122	0.007	37.40	0.046	0.002	32.17	0.072	0 009
33.94	0.197	0.015	38.50	0.086	0.003	33.48	0.099	0.006	38.40	0.041	0.002	33.17	0.083	0 010
34.96	0.184	0.014	39.50	0.073	0.003	34 48	0.089	0.006	39.40	0.037	0.002	34.17	0.068	0.009
35.97	0.160	0.013	40.51	0.068	0.003	35.48	0.095	0.006	40.40	0.031	0.002	35 17	0.074	0.009
36.99	0.155	0 013	41.51	0 062	0.003	36.48	0.085	0.006	41.40	0.025	0.001	36.17	0.044	0.007
38.01	0.137	0.012	42.51	0.057	0.003	37.49	0.073	0.005	42 40	0.021	0 001	37.17	0.046	0.007
39.03	0.137	0.012	43.51	0.052	0.002	38.49	0.064	0.005	43.40	0.018	0.001	38.17	0.038	0 007
40.05	0.107	0 011	44.51	0.042	0.002	39.49	0 055	0.005	44.40	0.016	0.001	39.17	0.024	0 005
41.07	0.117	0.011	45.52	0.038	0.002	40.50	0.048	0.004	45.40	0.013	0.001	40.17	0.020	0.005
42.09	0.087	0.010	46.52	0.030	0.002	41.50	0.043	0.004	46.40	0.009	0.001	41.17	0.018	0 005
43.10	0.075	0.009	47.52	0.026	0.002	42.50	0.040	0.004	47.40	0.008	0.001	42 17	0.019	0.005
44.12	0 085	0.010	48.52	0.026	0.002	43.51	0.042	0.004	48.40	0.006	0.001	43.17	0.018	0 005
45.14	0.063	0.008	49.52	0.023	0.002	44.51	0.032	0.003	49.40	0.006	0.001	44 17	0.012	0.004
46.16	0.057	0 008	50.53	0.019	0.002	45.51	0.018	0.003	50.41	0.005	0.001	45.17	0.007	0.003
47.18	0 051	0 007	51.53	0.021	0.002	46 51	0.026	0.003	51.41	0.005	0.001	46.17	0 009	0.003
48.20	0.037	0.006	52.53	0.016	0.001	47.52	0.018	0.003	52 41	0.003	0.000	47.17	0.004	0 002
49.21	0.032	0.006	53.53	0.009	0 001	48.52	0 015	0 002	53.41	0.002	0.000	48.17	0.008	0.003
50.23	0.036	0.006	54.53	0.013	0.001	49.52	0.015	0.002	54.41	0.002	0.000	49 17	0 002	0 002
51.25	0.035	0.006	55.54	0.011	0.001	50.53	0.012	0.002	55.41	0.001	0.000	50.17	0.002	0.002
52.27	0.026	0.005	56.54	0.003	0.001	51.53	0.016	0 002	56.26	0.003	0 001	51.17	0.0	0.0
53.29	0.026	0.005	57.51	0.010	0 001	52.53	0.009	0.002	0.0	0.0	0.0	52 17	0.001	0 001
54.31	0.019	0.004	0.0	0.0	0.0	53.54	0 009	0.002	0.0	0.0	0.0	53.17	0.0	0.0
55.32	0.014	0.004	0.0	0.0	0.0	54.54	0.012	0.002	0.0	0.0	0.0	54.17	0.0	0.0
56.34	0.016	0.004	0.0	0.0	0.0	55.54	0.002	0.001	0.0	0.0	0.0	55.17	0.002	0.002
57.36	0.007	0.003	0.0	0.0	0.0	56.52	0.013	0 002	0.0	0.0	0.0	55.85	0 0	0.0
58.20	0.015	0.005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 13

DEUTERON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

12 DEG - RUN 123			15 DEG - RUN 5016			20 DEG - RUN 4020			27 DEG - RUN 5020			30 DEG - RUN 5007		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
4.99	0 185	0.079	4 96	0 380	0 055	5 07	0 334	0 031	4 97	0 330	0 017	4 77	0 256	0.015
5.39	0.317	0 104	5 36	0 308	0 050	5.48	0 303	0 029	5 37	0.356	0.017	5 17	0 304	0.016
5.79	0.288	0.099	5 76	0 519	0 065	5 88	0 357	0 032	5.77	0 356	0.017	5.57	0 363	0.018
6 19	0 502	0 131	6 16	0 462	0 061	6 29	0 445	0.035	6.17	0.405	0 018	5 97	0 366	0 018
6.59	0.457	0 125	6 56	0 490	0 063	6.70	0.387	0 033	6 57	0.399	0 018	6 37	0.376	0 018
7 30	0.339	0 068	7 26	0 407	0 036	7 41	0 434	0 022	7 27	0 437	0.012	6 76	0 409	0.019
8 30	0 448	0 078	8 26	0 428	0 037	8.43	0 378	0 021	8.27	0 406	0.012	7.46	0 425	0.012
9.30	0.497	0 082	9.26	0.415	0 037	9 45	0 422	0 022	9 26	0 426	0 012	8 46	0 411	0.012
10 30	0 450	0 078	10.25	0 376	0 035	10 47	0 418	0 022	10.26	0.397	0 012	9 46	0 383	0 012
11 31	0.356	0 070	11 25	0.377	0 035	11.49	0 534	0.025	11 26	0.380	0.011	10 46	0.359	0 011
12 31	0.358	0.070	12 25	0 553	0.042	12 51	0 376	0 021	12 26	0 421	0.012	11.46	0.416	0.012
13 31	0.356	0 070	13 25	0 461	0 039	13 52	0 290	0.018	13 26	0.373	0.011	12.46	0.388	0 012
14 31	0.462	0 079	14 24	0.442	0.038	14.54	0 309	0 019	14 26	0 336	0 011	13 45	0.360	0 011
15.32	0 486	0.081	15 24	0 395	0.036	15 56	0 306	0 019	15 26	0.333	0.011	14 45	0.340	0.011
16 32	0 374	0 071	16.24	0.365	0 034	16 58	0 328	0 019	16 26	0 332	0 011	15.45	0 322	0 011
17.32	0.450	0.078	17 24	0 423	0.037	17 60	0 333	0 019	17.25	0 338	0 011	16 45	0 297	0.010
18 33	0 448	0.078	18 24	0 354	0.034	18 62	0.315	0 019	18 25	0 348	0 011	17 45	0.313	0.010
19.33	0 504	0.083	19.23	0.378	0.035	19 64	0.336	0.019	19 25	0.341	0 011	18 45	0 321	0 011
20.33	0 366	0 071	20.23	0.465	0.039	20 66	0 347	0.020	20 25	0 339	0 011	19.45	0.340	0.011
21.33	0 491	0 082	21.23	0 463	0.039	21 67	0 319	0.019	21.25	0 334	0 011	20 44	0.327	0 011
22.34	0 352	0 069	22 23	0 415	0 037	22 69	0 381	0 021	22 25	0 361	0 011	21 44	0 339	0 011
23.34	0 460	0 079	23 23	0 495	0 040	23 71	0.380	0.021	23.25	0 338	0 011	22.44	0.324	0 011
24.34	0.430	0 077	24 22	0 439	0.038	24.73	0.375	0 021	24.25	0 357	0.011	23 44	0 356	0 011
25 35	0 453	0 079	25 22	0 446	0 038	25 75	0 379	0 021	25 24	0 353	0 011	24.44	0.321	0 011
26.35	0 412	0 075	26 22	0 452	0 038	26 77	0 401	0 021	26 24	0 344	0 011	25.44	0 348	0 011
27.35	0 409	0.075	27 22	0 477	0 039	27 79	0.430	0 022	27 24	0 375	0 011	26.44	0.333	0 011
28.35	0 555	0 087	28 22	0 535	0 042	28 81	0 413	0 022	28.24	0.374	0.011	27.43	0.332	0 011
29 36	0.532	0.085	29.21	0.584	0.043	29 83	0 445	0.022	29 24	0.352	0.011	28.43	0 331	0.011
30 36	0 546	0 086	30.21	0 518	0 041	30.84	0 423	0.022	30.24	0 361	0 011	29.43	0.332	0.011
31 36	0 566	0 088	31 21	0 560	0 043	31 86	0 480	0 023	31 24	0 336	0 011	30.43	0.327	0.011
32 37	0 532	0.085	32.21	0 611	0 044	32 88	0 489	0 024	32 24	0.329	0 010	31.43	0.347	0.011
33 37	0.553	0 087	33.20	0 699	0 048	33 90	0 492	0.024	33.24	0.347	0.011	32.43	0 319	0 011
34 37	0.530	0 085	34.20	0 646	0.046	34.92	0 515	0 024	34 23	0 341	0 011	33.42	0 322	0 011
35 37	0 688	0.097	35.20	0.682	0 047	35 94	0 636	0 027	35.23	0 347	0 011	34.42	0.315	0.010
36 38	0 757	0.102	36.20	0 712	0.048	36.96	0.626	0.027	36 23	0 373	0.011	35.42	0 327	0 011
37.38	1.029	0.119	37 20	0.734	0.049	37 98	0 674	0 028	37 23	0.352	0 011	36 42	0 343	0.011
38.38	0.708	0 098	38 19	0 867	0 053	38 99	0.757	0 029	38 23	0 371	0 011	37 42	0.340	0 011
39.38	0.829	0.106	39 19	0.843	0.052	40 01	0.827	0 031	39 23	0 409	0.012	38 42	0.342	0 011
40.39	1.065	0.121	40.19	1 065	0 059	41 03	0 779	0 030	40 23	0 435	0.012	39 42	0 389	0 012
41 39	0 776	0.103	41 19	0 729	0.049	42 05	1.121	0 036	41 23	0 365	0 011	40 41	0.386	0.012
42.39	1 314	0.134	42 19	0.959	0 056	43 07	1 206	0 037	42 22	0 439	0 012	41 41	0 370	0 011
43 40	1 724	0 153	43 18	2 392	0 088	44 09	0 662	0 027	43.22	0 649	0.015	42.41	0.560	0.014
44.40	0 826	0.106	44.18	0 566	0.043	45 11	1.830	0 046	44.22	0.285	0 010	43.41	0.333	0 011
45.40	1 450	0 141	45 18	0.462	0 039	46 13	1 788	0 045	45 22	0.410	0 012	44.41	0.222	0.009
46 40	2.967	0 201	46 18	2 696	0 093	47 14	1.347	0 039	46.22	1 463	0.022	45.41	0.934	0.018
47.41	1 229	0.130	47 17	3 576	0 107	48 16	0.408	0 021	47.22	0 628	0 014	46 41	0.822	0 017
48.41	0 154	0 046	48 17	0 127	0 020	49 18	1.695	0 044	48 22	0.093	0 006	47.40	0.271	0.010
49 41	0.236	0 057	49 17	0 230	0.027	50 20	1.610	0 043	49.22	0.096	0 006	48.40	0.086	0.005
50.42	4.349	0.244	50 17	4 266	0 117	51 22	0 045	0 007	50 21	1 960	0.026	49.40	0 542	0 014
50 97	0 47	0 25	50 74	0 0	0.0	51.86	0 06	0.02	51 16	0.06	0.00	50.20	2.09	0 03

Table 13 (Cont'd)

DEUTERON FROM A = 54 BOMBARDED BY 62 MEV PROTONS.

35 DEG - RUN 4021			45 DEG - RUN 7000			47 DEG - RUN 5042			50 DEG - RUN 5010			55 DEG - RUN 4024		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
5 07	0.309	0 046	4 83	0 265	0 024	4 13	0 249	0.019	4.97	0.296	0.020	5.07	0 297	0 016
5 47	0 355	0 049	5 23	0 382	0.029	4 53	0 240	0 018	5 37	0.339	0.021	5 48	0 334	0.017
5 88	0 494	0 058	5.63	0 390	0.029	4 93	0 260	0.019	5 77	0.349	0 021	5.89	0 330	0 017
6 29	0 479	0 057	6 03	0 445	0.031	5 33	0 326	0.021	6 17	0.378	0.022	6 30	0 358	0 018
6 69	0.433	0 054	6 43	0.453	0.031	5.73	0 297	0.020	6.56	0.367	0.022	6 70	0.359	0 018
7 41	0 438	0.035	7 13	0 418	0 019	6 13	0 354	0 022	7 26	0.352	0.014	7.42	0 392	0.012
8 43	0.379	0.032	8.14	0.409	0.019	6 53	0.350	0 022	8 26	0 368	0.014	8.44	0.326	0 011
9.44	0 421	0 034	9 14	0 395	0 019	7 23	0 362	0 014	9 26	0 332	0 013	9.46	0.312	0.010
10.46	0 349	0.031	10.14	0 403	0 019	8 23	0 345	0 014	10 26	0.304	0 013	10 48	0.301	0 010
11 48	0 394	0 033	11.14	0 363	0 018	9 24	0.372	0 015	11 26	0 311	0.013	11 50	0.332	0.011
12.50	0 337	0 030	12.14	0 344	0.017	10 24	0 323	0 014	12.26	0 325	0.013	12 52	0 244	0 009
13.52	0 285	0 028	13.14	0 342	0 017	11 24	0.325	0 014	13 25	0 274	0.012	13 54	0.202	0 008
14.53	0 277	0 028	14.14	0.310	0.016	12 24	0 318	0 013	14.25	0.248	0.011	14 55	0 190	0 008
15 55	0 292	0 028	15 15	0 291	0 016	13 24	0.284	0 013	15.25	0.240	0.011	15.57	0 185	0 008
16 57	0 291	0 028	16 15	0 259	0 015	14 24	0 245	0 012	16 25	0 224	0 011	16.59	0 180	0 008
17 59	0 250	0 026	17 15	0 239	0 014	15.24	0 253	0 012	17.25	0.236	0.011	17.61	0 171	0 008
18 61	0 270	0 027	18 15	0.275	0 015	16 24	0 266	0.012	18 25	0 196	0.010	18.63	0.178	0 008
19.63	0 294	0 028	19 15	0.231	0.014	17 25	0.254	0 012	19.24	0.224	0.011	19 65	0.173	0 008
20 64	0 283	0 028	20 15	0.281	0 016	18 25	0 251	0 012	20 24	0.209	0 010	20 67	0 159	0 008
21 66	0.275	0.027	21 15	0.265	0.015	19.25	0 217	0.011	21 24	0.217	0 011	21.69	0.170	0 008
22 68	0 330	0 030	22 16	0 259	0 015	20 25	0.248	0.012	22 24	0 200	0.010	22.71	0 162	0.007
23 70	0 274	0.027	23.16	0.244	0 015	21 25	0.228	0.011	23.24	0.209	0.010	23 73	0.164	0.008
24 72	0 250	0 026	24.16	0 236	0 014	22 25	0.202	0 011	24 24	0 209	0 010	24 75	0 165	0.008
25 74	0 314	0 029	25.16	0.254	0 015	23.25	0 231	0 011	25 24	0.216	0 011	25.77	0 167	0 008
26 75	0 280	0 028	26 16	0.239	0 014	24.25	0 220	0 011	26.23	0.176	0.010	26.79	0 154	0 007
27 77	0 297	0 029	27 16	0.228	0 014	25 26	0 248	0 012	27 23	0 208	0 010	27 81	0.167	0 008
28 79	0 268	0.027	28.16	0 237	0 014	26 26	0 221	0.011	28 23	0 201	0.010	28.83	0.147	0 007
29 81	0 355	0 031	29 17	0 248	0 015	27 26	0 216	0 011	29 23	0 190	0 010	29 85	0 156	0 007
30 83	0 330	0 030	30 17	0 235	0 014	28 26	0 217	0.011	30.23	0.189	0 010	30 87	0.158	0 007
31 84	0 296	0.028	31 17	0 255	0.015	29.26	0.201	0.011	31 23	0 184	0 010	31 89	0 143	0.007
32 86	0 269	0 027	32.17	0 198	0 013	30 26	0 201	0.011	32 22	0 194	0 010	32 91	0.146	0.007
33 88	0 294	0 028	33.17	0 238	0 014	31 26	0 190	0 010	33 22	0.165	0 009	33.93	0.147	0 007
34.90	0 268	0 027	34.17	0 174	0 012	32.26	0.207	0.011	34.22	0.181	0 010	34.95	0.140	0 007
35 92	0 321	0 030	35 17	0 186	0.013	33 26	0 183	0.010	35.22	0 177	0 010	35 97	0.145	0 007
36 94	0 337	0 030	36 18	0.220	0.014	34 27	0.192	0 010	36.22	0 178	0 010	36 99	0 152	0.007
37 95	0 384	0 032	37.18	0.182	0.013	35 27	0 189	0 010	37.22	0.163	0.009	38.01	0 163	0 008
38.97	0.382	0 032	38 18	0.235	0.014	36 27	0.187	0.010	38.22	0.184	0.010	39 03	0.160	0.007
39 99	0 365	0.032	39.18	0 223	0 014	37 27	0 165	0 010	39 21	0.175	0 010	40.04	0 130	0 007
41.01	0 329	0.030	40 18	0 201	0.013	38 27	0.177	0.010	40.21	0.156	0.009	41.06	0.150	0.007
42 03	0.514	0 038	41 18	0 256	0 015	39 27	0 188	0 010	41.21	0 155	0 009	42 08	0.135	0 007
43.04	0 280	0 028	42.18	0 142	0 011	40.27	0 157	0.009	42 21	0.200	0 010	43.10	0 116	0.006
44 06	0 403	0 033	43 19	0 117	0 010	41 27	0.183	0 010	43 21	0.096	0 007	44 12	0.291	0.010
45 08	0.723	0.044	44 19	0 442	0 020	42.28	0 236	0 012	44 21	0.095	0 007	45.14	0 219	0.009
46 10	0 624	0 041	45 19	0.426	0.019	43.28	0.183	0 007	45.20	0.366	0.014	46.16	0 083	0 005
47 12	0 183	0 022	46 19	0 127	0 011	44.28	0 101	0 008	46.20	0 319	0 013	47.18	0.068	0.005
48.14	0.232	0 025	47 19	0.048	0.007	45 28	0 391	0 015	47 20	0.035	0 004	48 20	0 304	0.010
49.15	1 252	0 059	48 19	0 558	0 022	46.28	0.340	0 014	48 20	0 047	0.005	49.22	0 101	0 006
50 17	0 116	0 018	49.19	0.190	0 013	47 28	0 025	0 004	49.20	0 554	0 017	50.24	0 092	0.001
51.19	0 022	0 008	50.20	0.011	0.003	48 28	0 050	0.005	49.85	0 005	0 003	51 03	0 002	0 001
51.83	0 0	0 0	51 20	0.004	0 002	49.28	0 599	0.018	0.0	0 0	0.0	0.0	0.0	0.0
0 0	0 0	0 0	51.87	0.004	0 003	50 29	0 021	0.003	0 0	0 0	0.0	0 0	0.0	0 0
0.0	0 0	0 0	0.0	0.0	0.0	50 94	0 002	0 002	0.0	0 0	0.0	0.0	0.0	0.0

Table 13 (Cont'd)

DEUTERON FROM A = 54 BOMBARDED BY 62 MEV PROTONS.

60 DEG – RUN 5043			65 DEG – RUN 5011			70 DEG – RUN 5044			75 DEG – RUN 7100			80 DEG – RUN 5012		
NERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
2 63	0 058	0.009	4 97	0.288	0.011	2 83	0.050	0.009	5.07	0.309	0.016	5.03	0.295	0.010
3 03	0.086	0 011	5.37	0.299	0 012	3.23	0.086	0.012	5 47	0.303	0.016	5.43	0 322	0.010
3.43	0.129	0.013	5 77	0 325	0.012	3 63	0.142	0.016	5 87	0.294	0.015	5.83	0.316	0.010
3.83	0.197	0 016	6.17	0.326	0.012	4 03	0.260	0.021	6.26	0.324	0.016	6.23	0 318	0.010
4.23	0.280	0.019	6.57	0.355	0 013	4 43	0 260	0 021	6 66	0 311	0 016	6 63	0 301	0.010
4.63	0 243	0.018	7.27	0 325	0 008	4 83	0.266	0.022	7.36	0 319	0 010	7.33	0.295	0.006
5.03	0.299	0.020	8.27	0.309	0 007	5 23	0.291	0 023	8.36	0.283	0.010	8 33	0.262	0.006
5.43	0 324	0.021	9.27	0.273	0 007	5.63	0.331	0 024	9.36	0.256	0 009	9.33	0.233	0.006
5.83	0.345	0.021	10.27	0.254	0 007	6 03	0.296	0.023	10.36	0 252	0 009	10.33	0.212	0.005
6 23	0 327	0.021	11 27	0.245	0 007	6.43	0.350	0 025	11.36	0.228	0.009	11.33	0.216	0.005
6.63	0.322	0 021	12 27	0.260	0.007	7.13	0 314	0.015	12 36	0 214	0 008	12 33	0.204	0.005
7.33	0.310	0.013	13.27	0.220	0 006	8 14	0 287	0.014	13 35	0 193	0.008	13.33	0.162	0 005
8 33	0.279	0.012	14 27	0 186	0.006	9.14	0.275	0.014	14 35	0.170	0.007	14.33	0.148	0.004
9.33	0 288	0 012	15 27	0.168	0.005	10 14	0.254	0.013	15.35	0.150	0 007	15.33	0.128	0.004
10.33	0 287	0 012	16.27	0.170	0.006	11.14	0.227	0.013	16.35	0.141	0.007	16 33	0.121	0.004
11 33	0.248	0 011	17 27	0 169	0.006	12.14	0.218	0.012	17 35	0.150	0.007	17.33	0.114	0.004
12.33	0 265	0.012	18 27	0 159	0 005	13.14	0.184	0.011	18.35	0.133	0.007	18.33	0.119	0.004
13.33	0.208	0.011	19 27	0.149	0 005	14.14	0.173	0 011	19.34	0.125	C 006	19.33	0.107	0.004
14.33	0 208	0 011	20.27	0 148	0 005	15 15	0.155	0 010	20 34	0.124	0.006	20.33	0.104	0 004
15.33	0.201	0 010	21 27	0 153	0.005	16.15	0.150	0 010	21.34	0.109	0.006	21.33	0.097	0.004
16.33	0 190	0.010	22 27	0.142	0 005	17.15	0.156	0 011	22.34	0 113	0.006	22.33	0.097	0.004
17.34	0.186	0.010	23.27	0.141	0.005	18 15	0 131	0.010	23.34	0 119	0 006	23 33	0.091	0.003
18.34	0.165	0.009	24 27	0.137	0.005	19 15	0 140	0 010	24 34	0 105	0 006	24 33	0.085	0.003
19.34	0 179	0 010	25.27	0.130	0.005	20 15	0.121	0.009	25.33	0 115	0.006	25 33	0.084	0.003
20.34	0.187	0.010	26.27	0.123	0.005	21 15	0.136	0.010	26 33	0.104	0.006	26.33	0 077	0.003
21 34	0.168	0.009	27.27	0 114	0.005	22.16	0.116	0 009	27.33	0.103	0.006	27.33	0.077	0.003
22.34	0.177	0 010	28.27	0.115	0 005	23 16	0 120	0 009	28.33	0.092	0.005	28.33	0 064	0.003
23 34	0 156	0 009	29 27	0 123	0.005	24 16	0.116	0.009	29 33	0.090	0.005	29.33	0.070	0.003
24 34	0.148	0.009	30.27	0 112	0.004	25.16	0.101	0 008	30 33	0 088	0.005	30.33	0 060	0 003
25.34	0.152	0.009	31.26	0 103	0 004	26 16	0 100	0 008	31 32	0 087	0.005	31.33	0.065	0.003
26 34	0.132	0.008	32.26	0 107	0 004	27 16	0.113	0.009	32 32	0.072	0.005	32.33	0.058	0.003
27.34	0.135	0 008	33.26	0.098	0 004	28 16	0 087	0 008	33 32	0.074	0.005	33.33	0.053	0.003
28.34	0.142	0.009	34.26	0 096	0 004	29.17	0.090	0.008	34.32	0.084	0.005	34.33	0.053	0.003
29.34	0.155	0 009	35 26	0.093	0.004	30 17	0.088	0 008	35.32	0 071	0.005	35.33	0.054	0.003
30.34	0 127	0 008	36.26	0 096	0.004	31.17	0.093	0.008	36.32	0.069	0.005	36.33	0.048	0.003
31 34	0.136	0.009	37 26	0.099	0.004	32.17	0.090	0.008	37 32	0.069	0 005	37.33	0.051	0.003
32 34	0.117	0.008	38 26	0.097	0 004	33 17	0 081	0 008	38.31	0.060	0.004	38.33	0.045	0 002
33 34	0.118	0.008	39 26	0.085	0.004	34.17	0 067	0.007	39 31	0.057	0.004	39.33	0 039	0.002
34 35	0.118	0 008	40.26	0 073	0 004	35 17	0.087	0.008	40.31	0.064	0.005	40 33	0 041	0.002
35.35	0 106	0 007	41.26	0 111	0 004	36 18	0.074	0.007	41.31	0.039	0.004	41.33	0 041	0.002
36 35	0.106	0.008	42.26	0.068	0 003	37 18	0.072	0 007	42 31	0 038	0.004	42.33	0.027	0.002
37 35	0.114	0 008	43 26	0 048	0 003	38.18	0.084	0 008	43.31	0.136	0.007	43 33	0 068	0 003
38 35	0.116	0.008	44.26	0 167	0.005	39 18	0 051	0 006	44.30	0 105	0.006	44 33	0.077	0 003
39.35	0.124	0.008	45 26	0 130	0 005	40 18	0.073	0.007	45.30	0.017	0.002	45.33	0.031	0 002
40.35	0.109	0.008	46.26	0.049	0 003	41 18	0.083	0 008	46.30	0 016	0 002	46.33	0 013	0.001
41.35	0 142	0 009	47 26	0 021	0.002	42 18	0.047	0.006	47.30	0.177	0.008	47.33	0.014	0.001
42.35	0.092	0.007	48 26	0.215	0.006	43 19	0.045	0.006	48.30	0.004	0.001	47.91	0 387	0 019
43.35	0 061	0.006	48.88	0.109	0 009	44 19	0 155	0 010	48 85	0 0	0.0	0.0	0.0	0.0
44.35	0 219	0.011	0.0	0.0	0.0	45.19	0 112	0.009	0.0	0.0	0.0	0 0	0 0	0.0
45.35	0 161	0 009	0 0	0 0	0 0	45.19	0 016	0.003	0 0	0.0	0.0	0 0	0 0	0.0
46.35	0.087	0.007	0.0	0.0	0.0	47 19	0 010	0.003	0.0	0 0	0.0	0.0	0.0	0.0
47.35	0.031	0.004	0.0	0.0	0 0	48 19	0 169	0.011	0 0	0 0	0 0	0.0	0.0	0.0
48.35	0 158	0.009	0 0	0 0	0.0	49 19	0 004	0 002	0 0	0 0	0 0	0.0	0 0	0.0
49 35	0.207	0 010	0 0	0 0	0 0	49 89	0 006	0.003	0.0	0 0	0 0	0 0	0.0	0 0
50 18	0 002	0 001	0.0	0.0	0 0	0.0	0 0	0 0	0.0	0.0	0 0	0.0	0.0	0.0

Table 13 (Cont'd)

DEUTERON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

90 DEG - RUN 4010			100 DEG - RUN 2070			110 DEG - RUN 5015			120 DEG - RUN 7002			135 DEG - RUN 4011		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
5 03	0 300	0 009	2 93	0 066	0.013	5 14	0 264	0.009	2 58	0.052	0 007	5.08	0.284	0 007
5 43	0 295	0.009	3.34	0 111	0 017	5 54	0 275	0 009	2 98	0.100	0 010	5.48	0 279	0.007
5 83	0.300	0.009	3.74	0 153	0.020	5 94	0.261	0 009	3 39	0.148	0.012	5.88	0.263	0.007
6.23	0 316	0.009	4.15	0 256	0.026	6.34	0.256	0.009	3.79	0.197	0.014	6 28	0.265	0.007
6.63	0 334	0.010	4.56	0.271	0.027	6 74	0.241	0.008	4.19	0 227	0.015	6 68	0.241	0 007
7.33	0.306	0 006	4.96	0.320	0.029	7.44	0.224	0.005	4.59	0.301	0.017	7.38	0.216	0.004
8.33	0.269	0.005	5.37	0.263	0.027	8 44	0 189	0.005	4.99	0 232	0.015	8 38	0 178	0 004
9.33	0 217	0.005	5.78	0 330	0.030	9.44	0 164	0.004	5.39	0 271	0.016	9.38	0 151	0 003
10.33	0 202	0 005	6 19	0.320	0.029	10 45	0.149	0 004	5 79	0.277	0.016	10 38	0.131	0.003
11.33	0.192	0.005	6.59	0.278	0.027	11 45	0.132	0.004	6.19	0 298	0.017	11.38	0.123	0.003
12.33	0.131	0.004	7.31	0.279	0 017	12 45	0 125	0 004	6.59	0 263	0.016	12.38	0 084	0 003
13.33	0.105	0.003	8 33	0 256	0.017	13 45	0.096	0 003	7.30	0.225	0 009	13.38	0.058	0 002
14.33	0.090	0.003	9 34	0.207	0.015	14 45	0.081	0 003	8 30	0.196	0 009	14 38	0 053	0 002
15.33	0.090	0.003	10.36	0.197	0 015	15 46	0.071	0.003	9.30	0.181	0.008	15.38	0 044	0.002
16.33	0.081	0.003	11.38	0.156	0 013	16 46	0 061	0 003	10.31	0 138	0.007	16.38	0 040	0 002
17.33	0.076	0.003	12 40	0.123	0.011	17.46	0.056	0 003	11.31	0.123	0 007	17.39	0 035	0.002
18.33	0.079	0.003	13.42	0.101	0.010	18.46	0 053	0 002	12.31	0.127	0 007	18.39	0.028	0 001
19.33	0 068	0.003	14 44	0 072	0 009	19.46	0.046	0 002	13.31	0.092	0.006	19.39	0.026	0.001
20.33	0.067	0.003	15.45	0.071	0 009	20.47	0.041	0.002	14.32	0 072	0 005	20.39	0 024	0 001
21.33	0.062	0.003	16.47	0 086	0 010	21 47	0.040	0 002	15.32	0.063	0.005	21.39	0.018	0.001
22.33	0.060	0.003	17 49	0.065	0.008	22.47	0 036	0 002	16.32	0 060	0.005	22.39	0.021	0.001
23.33	0 057	0.003	18 51	0.068	0.009	23 47	0 036	0.002	17 33	0.054	0.005	23.39	0.018	0.001
24.33	0.051	0.002	19.53	0 053	0.008	24.47	0 033	0.002	18.33	0.048	0.004	24 39	0 017	0.001
25.33	0.054	0.002	20 55	0 058	0 008	25 48	0.029	0.002	19 33	0.045	0.004	25 39	0 015	0.001
26.33	0.054	0.002	21.56	0 069	0.009	26.48	0 028	0.002	20.34	0.032	0 003	26.39	0.012	0 001
27.33	0.048	0.002	22.58	0 044	0.007	27.48	0 022	0.002	21 34	0.036	0.004	27.39	0.011	0.001
28.33	0 040	0.002	23.60	0.058	0 008	28 48	0.022	0.002	22 34	0.028	0.003	28.39	0.010	0 001
29.33	0.045	0 002	24.62	0.046	0 007	29 48	0 020	0 002	23.34	0 031	0 003	29 39	0.008	0.001
30.33	0.039	0.002	25.64	0.042	0 007	30 49	0.019	0.001	24.35	0.022	0.003	30.39	0.006	0 001
31.33	0 036	0.002	26 66	0.046	0.007	31 49	0.016	0.001	25 35	0.024	0.003	31.39	0.006	0.001
32.33	0 034	0.002	27 68	0.039	0 007	32 49	0.014	0.001	26.35	0.017	0.003	32.39	0.005	0 001
33.33	0 031	0.002	28 69	0 026	0 005	33.49	0.016	0.001	27.36	0.018	0 003	33.40	0 005	0 001
34.33	0.034	0.002	29 71	0 019	0.005	34.49	0.011	0.001	28.36	0.017	0.003	34.40	0.005	0.001
35.33	0.028	0.002	30.73	0 019	0 005	35.50	0.013	0 001	29.36	0.012	0.002	35 40	0.004	0 001
36.33	0.027	0.002	31 75	0.029	0.006	36.50	0.012	0.001	30.37	0.013	0.002	36.40	0.004	0.001
37.33	0.024	0.002	32.77	0 023	0.005	37.50	0.009	0.001	31.37	0.013	0.002	37.40	0.003	0.000
38.33	0.022	0.002	33.79	0 027	0 005	38.50	0 010	0 001	32 37	0.014	0.002	38.40	0.002	0.000
39.33	0 021	0.002	34.80	0 015	0.004	39.50	0.008	0 001	33 37	0.011	0.002	39.40	0 003	0.000
40 33	0.024	0 002	35 82	0.016	0.004	40.51	0.005	0 001	34.38	0 014	0.002	40.40	0.002	0.000
41.33	0.021	0.002	36.84	0.016	0.004	41.51	0.003	0.001	35.38	0.006	0.002	41.40	0 004	0.001
42.33	0.027	0 002	37 86	0.015	0.004	42 51	0 015	0 001	36 38	0 006	0.001	42.40	0.002	0.000
43.33	0.039	0.002	38.88	0.017	0.004	43.51	0.010	0 001	37.39	0.007	0.002	43.40	0 001	0.000
44.33	0.015	0 001	39 90	0.018	0.004	44 51	0.001	0.000	38.39	0 004	0 001	44.40	0.001	0.000
45.33	0.008	0 001	40.91	0.012	0.004	45 52	0.003	0.001	39 39	0.005	0.001	45.40	0.002	0.000
46.33	0.012	0.001	41.93	0.006	0 003	46 52	0 013	0 001	40.40	0.000	0.000	46.33	0.0	0.0
47.33	0.035	0.002	42.95	0.030	0.006	0 0	0 0	0.0	41.40	0.014	0.002	0.0	0.0	0.0
48.26	0 001	0.000	43.97	0.020	0 005	0.0	0 0	0 0	42.40	0.006	0.001	0.0	0.0	0.0
0.0	0.0	0.0	44.99	0.003	0 002	0 0	0 0	0.0	43.40	0.001	0.000	0.0	0.0	0.0
0.0	0.0	0.0	46.01	0.003	0.002	0 0	0.0	0 0	44.41	0.002	0 001	0.0	0.0	0.0
0.0	0.0	0.0	46.77	0.000	0.001	0.0	0.0	0 0	45 41	0.007	0.002	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0 0	0.0	0 0	46.41	0.0	0.0	0.0	0.0	0.0
0.0	0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.99	0.0	0.0	0.0	0.0	0.0

Table 13 (Cont'd)

DEUTERON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

160 DEG - RUN 2067

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
2.52	0 095	0.017												
2 92	0 149	0.021												
3 32	0 22	0 03												
3 72	0 24	0.03												
4 12	0 31	0.03												
4.52	0.43	0.04												
4 92	0 27	0.03												
5.32	0 30	0.03												
5.72	0 24	0.03												
6 12	0 21	0.03												
6 52	0 27	0.03												
7 22	0.208	0.016												
8.22	0 159	0.014												
9 22	0.163	0 014												
10 22	0 120	0.012												
11.22	0 108	0 011												
12 22	0.081	0.010												
13.22	0 060	0.008												
14 22	0 042	0.007												
15 22	0 056	0.008												
16 22	0 040	0.007												
17 22	0.031	0 006												
18 22	0 032	0.006												
19 22	0 027	0 006												
20 22	0 023	0.005												
21 22	0 016	0.004												
22.22	0 022	0.005												
23 22	0.010	0.003												
24.22	0 013	0.004												
25 22	0.012	0.004												
26 22	0 012	0.004												
27.22	0.003	0 002												
28.22	0 005	0.002												
29 22	0.006	0.003												
30.22	0.005	0.002												
31 22	0 003	0.002												
32 22	0 001	0.001												
33 22	0 005	0 002												
34 22	0 002	0.002												
35 22	0.004	0.002												
36 22	0 001	0.001												
37.22	0.002	0 002												
38 22	0 0	0.0												
39.22	0.0	0.0												
40.22	0.001	0 001												
41.22	0 001	0 001												
42.22	0.0	0.0												
43.22	0 0	0.0												
44 22	0.0	0.0												
45 22	0.0	0.0												
46 22	0 0	0.0												
47.22	0 0	0.0												
48 22	0 0	0 0												
49.22	0.0	0.0												
50 22	0.0	0.0												
51 22	0.0	0.0												
52 22	0.0	0.0												
53 22	0.0	0 0												
54.22	0.0	0 0												
55 22	0 0	0.0												
56.22	0.0	0 0												
57.22	0.0	0 0												
58.22	0 0	0 0												
59.22	0 0	0 0												
60.22	0.0	0 0												
61.22	0 0	0.0												
61.87	0 0	0 0												

Table 14

TRITON FROM A = 54 BOMBARDED BY 62 MEV PROTONS

12 DEG - RUN 123			15 DEG - RUN 5016			20 DEG - RUN 4020			27 DEG - RUN 5020			30 DEG - RUN 5007		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.54	0 034	0 034	6.51	0 043	0 019	6 65	0 054	0 012	6.52	0 041	0 006	6.52	0.033	0.005
7 25	0 014	0 014	7 21	0 040	0.011	7.36	0.058	0 008	7 22	0 046	0 004	7 21	0.050	0 004
8.25	0 014	0 014	8 21	0.042	0.012	8 38	0 047	0 007	8.22	0.049	0 004	8.21	0.049	0 004
9 25	0 014	0.014	9 21	0.057	0 014	9.40	0.047	0 007	9.21	0 050	0 004	9 21	0.050	0.004
10 25	0 096	0.036	10 20	0 076	0 016	10 42	0 047	0.007	10 21	0 045	0.004	10.21	0.047	0 004
11 26	0 096	0.036	11 20	0.042	0 012	11 44	0 059	0 008	11 21	0 052	0 004	11.21	0.053	0.004
12 26	0 093	0 036	12.20	0 047	0 012	12 45	0 066	0 009	12.21	0 044	0 004	12 21	0.050	0.004
13 26	0.944	3 024	13.20	0 069	0.015	13 47	0 091	0 010	13 21	0.052	0 004	13.21	0 049	0 004
14.26	0 027	0 019	14 19	0 090	0 017	14 49	0 069	0.009	14.21	0.054	0 004	14.20	0 058	0.004
15 27	0.065	0.030	15.19	0 077	0.016	15.51	0.050	0 008	15 21	0.057	0 004	15 20	0 050	0.004
16.27	0.072	0 031	16 19	0.088	0 017	16.53	0.045	0 007	16 21	0 053	0.004	16 20	0 052	0 004
17.27	0 095	0 036	17.19	0 061	0 014	17 55	0 051	0 008	17.20	0.052	0 004	17.20	0 043	0 004
18 28	0 045	0 025	18.19	0 069	0.015	18 57	0.070	0.009	18.20	0.045	0.004	18.20	0.053	0 004
19.28	0 037	0 023	19.18	0 048	0 012	19 59	0.046	0 007	19 20	0 055	0 004	19 20	0.052	0.004
20.28	0 055	0 027	20.18	0 067	0.015	20 61	0.041	0.007	20 20	0 056	0.004	20 19	0.052	0 004
21 28	0 082	0 033	21 18	0 057	0.014	21.62	0 039	0 007	21 20	0 052	0 004	21 19	0 050	0 004
22 29	0.031	0 021	22 18	0 061	0 014	22 64	0.051	0.008	22.20	0 051	0 004	22.19	0 046	0 004
23 29	0 037	0 023	23 18	0 045	0 012	23 66	0 058	0 008	23 20	0 049	0 004	23.19	0.043	0 004
24 29	0.041	0 024	24 17	0.052	0.013	24 68	0 073	0.009	24 20	0 051	0 004	24.19	0.047	0.004
25.30	0 037	0 023	25.17	0 066	0 015	25 70	0.055	0 008	25 19	0 046	0 004	25 19	0.047	0 004
26.30	0 125	0 041	26.17	0.075	0 016	26 72	0 055	0.008	26.19	0.046	0 004	26 19	0 047	0.004
27 30	0 089	0 035	27 17	0 095	0 018	27 74	0.065	0 009	27.19	0 051	0 004	27 18	0 047	0.004
28 30	0 117	0 040	28.17	0.043	0 012	28 76	0 062	0.008	28 19	0.053	0.004	28 18	0 051	0.004
29 31	0.068	0 031	29 16	0 058	0 014	29 77	0 069	0.009	29 19	0.055	0 004	29 18	0 042	0.004
30.31	0.096	0.036	30 16	0.080	0.016	30 79	0 059	0 008	30.19	0.048	0.004	30 18	0 047	0 004
31 31	0 055	0 027	31 16	0 065	0.015	31 81	0.052	0 008	31 19	0 052	0.004	31 18	0 046	0 004
32 32	0 027	0.019	32 16	0.068	0 015	32 83	0.060	0.008	32 19	0.049	0 004	32.18	0.044	0.004
33.32	0 082	0 033	33 15	0 068	0.015	33 85	0 065	0.009	33.19	0 046	0.004	33.18	0.039	0.004
34.32	0 068	0.031	34 15	0 088	0.017	34 87	0.063	0.008	34 18	0 049	0 004	34.17	0.053	0.004
35 32	0 096	0 036	35 15	0 059	0 014	35 89	0 073	0 009	35 18	0.038	0 004	35 17	0 044	0 004
36 33	0 057	0 028	36.15	0 081	0 016	36 91	0.110	0 011	36 18	0 069	0.005	36.17	0.064	0.005
37.33	0 123	0 041	37 15	0 144	0 022	37 92	0 038	0.007	37 18	0 066	0.005	37.17	0 045	0.004
38.33	0 055	0 027	38.14	0.050	0 013	38 94	0.081	0.010	38.18	0.028	0 003	38 17	0 022	0.003
39 33	0 027	0 019	39.14	0 091	0 017	39 96	0.032	0.006	39.18	0.073	0 005	39.17	0 068	0.005
40 34	0 068	0 031	40.14	0 079	0.016	40 98	0 039	0.007	40.18	0.044	0.004	40.16	0 032	0.003
41 34	0.096	0 036	41.14	0 088	0 017	42 00	0.013	0 004	41.18	0 030	0 003	41.16	0 029	0 003
42 34	0.027	0 019	42 14	0.003	0 003	43 02	0.017	0.004	42 17	0 006	0 001	42 16	0 005	0 001
43 35	0.0	0 0	43 13	0.006	0 005	44.04	0.039	0 007	43.17	0.006	0 001	43 16	0.007	0 002
44.35	0.098	0 037	44.13	0 018	0.008	45 06	0 082	0 010	44.17	0.017	0 002	44.16	0.015	0.002
45 35	0 068	0 031	45 13	0 083	0.016	46 08	0 009	0 003	45 17	0.038	0.004	45 16	0 010	0.002
45 93	0 0	0 0	46.13	0.006	0 005	47 09	0 009	0.003	46 17	0.002	0 001	46 16	0 001	0 001
0 0	0.0	0.0	46.93	0.005	0 005	47.65	0 011	0.011	46 84	0.0	0.0	46 78	0.0	0.0

Table 14 (Cont'd)

TRITON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

35 DEG - RUN 4021			45 DEG - RUN 7000			47 DEG - RUN 5042			50 DEG - RUN 5010			55 DEG - RUN 4024		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.64	0.057	0.020	6.58	0 048	0 010	6 53	0.034	0 007	6 51	0.029	0 006	6 60	0.026	0.005
7.36	0.048	0.011	7 29	0.047	0.006	7.23	0.044	0.005	7.21	0.034	0.004	7.32	0 043	0.004
8.37	0.043	0 011	8.29	0 045	0 006	8.23	0.035	0 004	8.21	0 045	0.005	8.34	0.046	0.004
9 39	0.042	0 011	9 29	0.049	0 007	9.24	0.035	0 004	9 21	0.036	0.004	9.35	0.047	0 004
10.41	0 049	0.012	10 29	0 045	0.006	10.24	0 046	0.005	10.21	0.042	0.005	10.37	0.041	0.004
11.43	0.065	0.013	11.29	0.049	0.007	11.24	0 037	0 005	11.21	0.038	0 004	11.39	0.044	0.004
12.45	0.062	0 013	12.29	0 040	0.006	12 24	0.037	0 005	12.21	0.032	0 004	12.41	0.045	0 004
13.47	0.068	0 014	13.29	0.036	0.006	13.24	0.039	0 005	13 20	0.040	0.005	13 43	0.037	0.004
14.48	0.059	0.013	14.29	0 057	0.007	14.24	0 031	0 004	14 20	0.034	0.004	14 45	0.033	0.003
15.50	0.032	0.009	15.30	0.043	0 006	15.24	0.035	0 004	15.20	0.041	0.005	15 47	0 025	0.003
16.52	0.026	0 008	16.30	0 045	0 006	16.24	0 038	0.005	16.20	0.030	0.004	16.49	0.028	0.003
17.54	0 034	0 010	17 30	0 043	0.006	17.25	0.035	0.004	17.20	0.036	0 004	17.51	0.014	0.002
18.56	0.042	0.011	18.30	0 038	0.006	18.25	0.029	0 004	18 20	0.032	0 004	18.53	0.024	0.003
19.57	0.035	0.010	19 30	0 027	0.005	19.25	0 026	0 004	19 20	0.026	0.004	19.55	0.022	0.003
20.59	0.030	0.009	20 30	0.041	0.006	20.25	0.029	0 004	20.19	0.025	0 004	20 57	0 021	0.003
21.61	0.050	0 012	21 30	0.030	0.005	21.25	0 032	0 004	21 19	0.033	0.004	21.59	0.021	0.003
22.63	0.034	0 010	22.31	0.031	0 005	22.25	0.026	0.004	22.19	0.025	0.004	22.61	0.023	0.003
23.65	0.013	0.006	23.31	0.029	0.005	23.25	0.031	0 004	23 19	0 018	0.003	23.63	0 018	0.003
24 67	0 031	0 009	24.31	0 026	0.005	24 25	0 027	0 004	24.19	0.028	0 004	24.65	0.017	0.002
25 68	0.042	0 011	25.31	0.032	0.005	25.26	0.027	0.004	25.19	0 024	0 004	25.67	0.017	0 002
26.70	0.038	0.010	26 31	0.029	0 005	26.26	0 024	0.004	26.18	0.022	0 003	26.69	0 018	0.002
27.72	0 039	0.010	27 31	0.029	0.005	27 26	0.022	0.004	27 18	0.022	0 003	27.71	0 015	0.002
28 74	0.049	0.012	28 31	0.034	0.005	28.26	0.020	0.003	28 18	0.019	0.003	28 73	0.019	0 003
29.76	0.037	0 010	29.32	0 032	0 005	29.26	0.023	0 004	29.18	0.024	0.004	29.75	0.016	0.002
30.78	0.032	0 009	30.32	0.030	0 005	30.26	0 019	0.003	30 18	0.026	0.004	30.77	0 019	0.003
31 79	0 034	0 010	31.32	0 024	0.005	31 26	0 020	0.003	31.18	0 021	0 003	31.79	0.013	0 002
32 81	0.055	0.012	32.32	0 034	0.005	32.26	0.019	0 003	32.17	0.019	0 003	32.81	0.014	0.002
33 83	0 059	0.013	33.32	0 022	0.004	33.26	0.017	0.003	33.17	0.014	0 003	33.83	0 014	0.002
34.85	0.051	0 012	34.32	0 021	0.004	34 27	0.018	0.003	34 17	0.020	0.003	34.84	0.017	0.002
35 87	0 059	0 013	35.32	0.038	0 006	35 27	0.030	0.004	35.17	0.025	0.004	35 86	0 011	0.002
36.88	0.034	0.010	36.33	0 008	0 003	36 27	0 031	0.004	36 17	0.020	0 003	36 88	0.010	0.002
37.90	0 025	0.008	37 33	0.020	0 004	37.27	0 011	0.003	37.17	0.012	0 003	37.90	0.012	0.002
38 92	0.036	0 010	38 33	0 030	0.005	38.27	0.017	0.003	38.17	0 012	0 003	38.92	0.005	0 001
39.94	0.027	0.009	39.33	0 007	0 002	39 27	0 021	0.003	39.16	0.023	0.003	39.94	0 006	0.001
40 96	0 005	0.004	40 33	0.002	0.001	40 27	0.009	0.002	40 16	0.008	0.002	40.96	0.002	0.001
41.98	0 009	0.005	41.33	0.006	0 002	41 27	0.003	0.001	41 16	0.002	0.001	41.98	0 000	0.000
42 99	0.008	0.005	42.33	0 001	0.001	42 28	0.002	0 001	42.16	0.0	0 0	43 00	0.001	0.001
44.01	0 005	0 004	43 34	0 011	0.003	43 28	0.004	0 001	43.16	0.005	0.002	44 02	0.002	0.001
45.03	0 003	0.003	44.34	0.003	0 002	44 28	0 006	0 002	44 16	0.003	0 001	45.04	0.001	0.001
46 05	0.0	0 0	44.94	0 0	0 0	45 28	0 002	0.001	44.83	0.002	0.002	46.01	0 001	0.001
46.79	0.0	0.0	0.0	0 0	0 0	46.08	0 0	0 0	0.0	0.0	0.0	0 0	0.0	0 0

Table 1h (Cont'd)

TRITON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

60 DEG – RUN 5043			65 DEG – RUN 5011			70 DEG – RUN 5044			75 DEG – RUN 7100			80 DEG – RUN 5012		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.53	0 044	0 008	6.52	0.034	0 004	6.53	0 041	0.009	6 61	0.031	0.005	6.53	0.028	0.003
7.23	0.029	0 004	7.22	0.031	0 002	7.24	0 026	0.004	7.31	0 032	0.003	7.23	0 028	0.002
8 23	0.032	0 004	8.22	0.032	0 002	8 24	0.026	0.004	8.31	0.026	0.003	8.23	0.024	0.002
9.23	0 035	0.004	9.22	0.028	0.002	9 24	0.023	0 004	9.31	0.029	0.003	9.23	0 028	0.002
10 23	0 029	0 004	10.22	0.030	0 002	10.24	0.027	0.004	10.31	0 027	0 003	10 23	0.021	0.002
11 23	0.030	0.004	11 22	0.028	0 002	11.24	0.017	0.004	11.31	0.024	0.003	11 23	0.021	0.002
12.23	0.031	0.004	12.22	0.030	0.002	12.24	0.023	0.004	12.31	0.022	0.003	12 23	0.022	0 002
13.23	0 033	0 004	13.22	0.025	0.002	13 24	0.027	0.004	13.30	0 021	0 003	13 23	0.014	0 001
14 23	0.023	0 004	14 22	0.028	0.002	14.24	0.035	0 005	14 30	0 016	0.002	14 23	0.019	0.002
15.23	0 026	0.004	15 22	0 021	0.002	15 25	0.021	0.004	15 30	0.021	0.003	15.23	0.017	0.002
16 23	0.023	0.004	16.22	0.021	0.002	16.25	0.019	0.004	16 30	0.023	0.003	16 23	0.015	0 001
17.24	0.029	0 004	17 22	0.021	0.002	17.25	0.019	0.004	17 30	0.018	0.002	17.23	0.014	0 001
18.24	0.016	0.003	18.22	0 023	0.002	18 25	0 019	0.004	18.30	0.016	0 002	18.23	0.012	0 001
19.24	0.021	0 003	19.22	0.018	0.002	19.25	0.019	0.004	19.29	0.014	0.002	19.23	0 010	0 001
20.24	0.015	0 003	20.22	0 016	0 002	20.25	0.016	0.003	20 29	0.006	0.001	20.23	0 010	0 001
21.24	0 016	0 003	21.22	0.016	0 002	21.25	0.017	0.003	21.29	0 011	0.002	21.23	0.010	0.001
22.24	0.019	0.003	22.22	0 016	0.002	22 26	0.018	0.004	22.29	0 010	0.002	22 23	0.009	0 001
23 24	0.018	0 003	23.22	0 015	0.002	23.26	0.010	0.003	23.29	0.010	0.002	23.23	0.008	0.001
24.24	0.018	0 003	24.22	0.013	0.002	24.26	0.007	0 002	24.29	0.013	0 002	24.23	0.010	0.001
25 24	0.016	0.003	25.22	0.016	0.002	25.26	0.016	0 003	25.28	0.007	0.002	25.23	0.008	0.001
26 24	0 016	0 003	26 22	0.010	0.001	26.26	0.013	0.003	26 28	0.009	0 002	26.23	0.006	0.001
27.24	0.012	0.002	27.22	0.011	0.001	27.26	0.012	0.003	27.28	0.010	0 002	27.23	0.007	0.001
28.24	0.016	0 003	28.22	0 010	0 001	28.26	0.008	0.002	28.28	0.005	0 001	28.23	0.006	0.001
29.24	0.012	0.003	29.22	0.011	0 001	29.27	0.009	0.002	29 28	0 009	0.002	29 23	0 005	0 001
30.24	0.010	0.002	30.22	0.009	0 001	30.27	0.008	0.002	30.28	0 007	0.002	30.23	0.004	0 001
31.24	0.015	0.003	31.21	0.009	0.001	31.27	0.004	0.002	31.27	0.007	0.002	31.23	0.004	0.001
32.24	0.010	0 002	32 21	0.011	0 001	32.27	0.008	0.002	32.27	0 009	0.002	32 23	0 003	0.001
33.24	0.010	0.002	33.21	0.007	0.001	33.27	0.006	0 002	33 27	0.010	0.002	33.23	0.003	0.001
34.25	0 011	0 002	34.21	0.006	0.001	34 27	0.006	0.002	34.27	0 004	0.001	34 23	0.006	0.001
35.25	0.015	0 003	35.21	0.012	0.001	35 27	0.008	0 002	35.27	0.003	0.001	35.23	0 003	0.001
36.25	0 008	0.002	36.21	0.005	0.001	36 28	0.005	0.002	36 27	0.006	0.001	36.23	0.004	0.001
37.25	0.005	0.002	37.21	0.008	0.001	37.28	0.003	0 002	37.27	0.006	0.001	37.23	0.004	0.001
38.25	0 012	0 002	38 21	0.009	0.001	38.28	0.010	0.003	38.26	0.003	0.001	38 23	0 002	0.001
39.25	0.009	0.002	39 21	0.004	0.001	39.28	0 001	0 001	39.26	0.000	0 000	39.23	0.000	0.000
40.25	0.002	0.001	40.21	0.001	0.000	40.28	0.001	0.001	40.26	0.0	0.0	40.23	0.000	0.000
41.25	0 000	0.001	41.21	0.001	0 000	41 28	0 0	0 0	41 26	0 000	0.000	41.23	0.0	0 0
42.25	0.001	0.001	42 21	0.001	0.000	42.28	0.001	0.001	42.26	0.001	0.000	42 23	0.000	0.000
43.25	0.000	0 001	43.21	0.003	0.001	43 29	0 0	0.0	43.26	0 001	0.000	43.23	0.000	0.000
44.25	0.002	0 001	44.21	0.000	0.000	44.29	0.0	0.0	43.88	0.0	0.0	44.16	0.0	0.0
45.23	0.0	0.0	44.86	0.0	0.0	45.01	0 0	0 0	0 0	0 0	0.0	0.0	0.0	0.0

Table 14 (Cont'd)

TRITON FROM A = 54 BOMBARDED BY 62 MEV PROTONS

90 DEG - RUN 4010			100 DEG - RUN 2070			110 DEG - RUN 5015			120 DEG - RUN 7002			135 DEG - RUN 4011		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6 58	0.036	0 003	7 10	0.025	0 005	6 64	0 022	0 003	6 59	0 017	0 004	6 58	0 027	0 002
7 28	0 034	0 002	8 12	0 016	0 004	7.34	0 021	0 002	7 30	0.022	0.003	7 28	0 028	0.001
8.28	0 031	0.002	9 14	0 022	0 005	8 34	0 018	0.001	8 30	0 021	0.003	8 28	0 026	0 001
9 28	0 028	0 002	10 16	0 027	0 005	9 34	0 020	0 002	9.30	0.017	0 003	9.28	0 021	0 001
10 28	0 026	0 002	11 18	0.006	0 003	10 35	0 016	0 001	10 31	0.015	0.002	10.28	0 016	0 001
11 28	0 027	0 002	12 20	0 015	0 004	11 35	0 012	0.001	11 31	0 015	0.002	11.28	0 013	0 001
12 28	0 023	0 002	13 21	0 010	0 003	12 35	0 010	0 001	12 31	0.008	0.002	12.28	0 010	0 001
13.28	0 019	0 001	14 23	0 005	0 002	13 35	0 011	0.001	13 31	0 006	0 002	13 28	0 008	0 001
14 28	0 016	0 001	15.25	0 011	0 003	14 35	0 009	0 001	14 32	0.008	0 002	14.28	0 008	0 001
15.28	0.012	0 001	16 27	0 011	0 003	15 36	0 006	0.001	15.32	0.010	0.002	15.28	0 007	0.001
16 28	0 012	0.001	17 29	0 016	0 004	16 36	0 006	0 001	16 32	0 007	0.002	16 28	0.005	0.001
17 28	0 007	0 001	18 31	0 007	0 003	17.36	0.006	0 001	17 33	0.003	0.001	17 29	0.004	0.001
18 28	0.007	0.001	19.32	0 004	0.002	18 36	0 004	0 001	18 33	0 002	0 001	18 29	0 002	0 000
19 28	0 008	0 001	20.34	0 005	0 002	19 36	0 004	0 001	19 33	0.004	0 001	19.29	0 003	0.000
20 28	0 006	0.001	21.36	0 004	0 002	20 37	0 004	0.001	20 34	0 003	0 001	20.29	0 003	0.000
21 28	0.007	0 001	22 38	0 004	0 002	21 37	0 003	0.001	21 34	0 003	0 001	21 29	0 002	0.000
22 28	0 006	0 001	23 40	0 005	0 002	22 37	0 002	0.001	22 34	0 001	0.001	22 29	0.001	0.000
23 28	0 005	0 001	24.42	0 003	0 002	23 37	0 002	0 000	23 34	0 002	0 001	23 29	0 001	0 000
24 28	0 004	0 001	25 43	0 002	0 002	24 37	0 002	0 001	24 35	0.001	0.001	24.29	0 001	0.000
25.28	0 004	0.001	26 45	0 002	0 002	25 38	0 002	0.000	25 35	0 001	0.001	25.29	0 001	0 000
26 28	0 004	0 001	27 47	0 005	0 002	26.38	0.001	0.000	26 35	0 001	0 001	26.29	0 001	0 000
27 28	0 004	0 001	28 49	0 002	0 002	27.38	0 002	0.000	27 36	0 001	0 001	27 29	0 001	0.000
28 28	0 003	0 001	29 51	0 0	0 0	28 38	0 002	0 000	28 36	0.001	0 001	28 29	0 001	0.000
29 28	0 003	0 001	30.53	0 002	0 002	29.38	0.001	0 000	29 36	0.001	0 001	29 29	0 000	0.000
30 28	0.002	0 000	31 54	0 0	0.0	30 39	0 001	0 000	30 37	0.0	0 0	30 29	0.000	0.000
31 28	0 002	0 000	32.56	0 001	0.001	31 39	0 001	0.000	31.37	0.000	0 000	31.29	0 000	0.000
32.28	0 003	0 001	33.58	0 001	0 001	32.39	0 001	0 000	32 37	0 001	0 001	32 29	0 000	0 000
33.28	0 005	0 001	34 60	0 002	0 001	33 39	0.001	0.000	33 37	0.000	0.000	33.29	0 000	0.000
34.28	0 002	0 000	35.62	0 001	0.001	34 39	0 001	0 000	34 38	0.000	0 000	34 30	0 000	0.000
35.28	0 002	0.000	36 59	0 0	0 0	35 40	0 001	0 000	35 38	0 0	0.0	35 30	0 000	0.000
36 28	0.002	0 000	0.0	0 0	0.0	36 40	0.000	0.000	36 38	0.0	0.0	36 30	0 0	0 0
37 28	0 001	0 000	0 0	0.0	0 0	36 95	0.0	0 0	37 39	0 000	0 000	37.30	0 0	0 0
38.28	0 000	0 000	0.0	0 0	0 0	0 0	0.0	0 0	38 39	0 0	0 0	38.30	0.000	0 000
39.28	0 000	0 000	0.0	0.0	0 0	0 0	0.0	0 0	39 39	0.0	0.0	39.30	0.000	0.000
40.28	0 001	0 000	0.0	0 0	0 0	0 0	0 0	0 0	40.40	0.0	0 0	40.30	0.000	0.000
41 28	0.000	0 000	0 0	0.0	0.0	0 0	0 0	0 0	41.35	0 0	0 0	41.10	0.000	0 000
42 28	0 000	0 000	0 0	0 0	0 0	0 0	0.0	0 0	0 0	0.0	0 0	0.0	0.0	0.0
43 21	0.000	0 000	0 0	0 0	0.0	0 0	0.0	0.0	0.0	0 0	0.0	0.0	0.0	0 0

Table 14 (Cont'd)

TRITON FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

160 DEG - RUN 2067

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.57	0 018	0 007												
7.27	0.010	0 003												
8 27	0 022	0 005												
9.27	0.016	0 004												
10 27	0 011	0 004												
11.27	0.006	0.003												
12.27	0 011	0 004												
13 27	0.005	0 003												
14 27	0 003	0.002												
15 27	0.0	0.0												
16.27	0 002	0 002												
17.27	0 0	0.0												
18 27	0.001	0 001												
19.27	0 002	0.002												
20.27	0.0	0 0												
21 27	0 002	0 002												
22 27	0 0	0 0												
23.27	0 0	0 0												
24 27	0.002	0 002												
25.27	0 0	0.0												
26 27	0.001	0.001												
27 27	0 0	0.0												
28 27	0 001	0.001												
29 27	0 0	0 0												
30.27	0 0	0 0												
31.27	0.0	0 0												
32.27	0 0	0.0												
33.27	0.0	0 0												
34.27	0.0	0.0												
35.27	0 0	0 0												
36 27	0 0	0 0												
37 27	0.0	0 0												
38.27	0 0	0.0												
39.27	0 0	0.0												
40 27	0 0	0 0												
41 27	0.0	0 0												
42.27	0 0	0.0												
43.27	0 0	0.0												
44.27	0 0	0.0												
45.27	0 0	0 0												
46 27	0 0	0 0												
47 27	0 0	0 0												
48 27	0 0	0 0												
49.27	0 0	0 0												
50 27	0 0	0.0												
51 27	0 0	0 0												
52 27	0 0	0.0												
53 27	0.0	0 0												
54 27	0.0	0.0												
55.27	0.0	0 0												
56.27	0.0	0.0												
57.27	0 0	0 0												
58.27	0 0	0 0												
59.27	0 0	0 0												
60.27	0 0	0.0												
61 27	0 0	0 0												
61 90	0.0	0.0												

Table 15

HELIUM-3 FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

12 DEG - RUN 123			15 DEG - RUN 5016			20 DEG - RUN 4020			27 DEG - RUN 5020			30 DEG - RUN 5007		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 91	0.041	0.024	12.80	0.064	0 014	13.07	0.073	0 009	12 86	0.059	0.004	12.81	0 055	0 004
13.91	0 090	0.035	13 80	0 068	0 015	14 08	0 062	0 008	13 86	0.061	0.004	13.80	0 059	0 005
14.92	0.037	0.022	14.79	0 070	0.015	15.10	0.050	0 008	14.86	0.058	0.004	14.80	0 061	0.005
15.92	0 089	0.035	15 79	0.052	0 013	16.12	0 071	0 009	15.86	0.060	0.004	15.80	0.066	0.005
16 92	0 046	0 025	16.79	0.038	0.011	17.14	0.054	0.008	16.85	0.053	0.004	16 80	0.055	0.004
17 93	0.092	0.035	17.79	0.046	0.012	18.16	0 067	0.009	17 85	0.069	0.005	17.80	0.050	0.004
18 93	0.068	0 031	18.79	0.099	0.018	19.18	0.061	0.008	18.85	0 057	0.004	18.80	0.048	0 004
19.93	0.082	0.033	19.78	0.067	0.015	20 20	0.071	0.009	19.85	0.061	0 005	19.80	0.052	0.004
20.93	0 023	0.018	20 78	0.082	0.016	21.22	0.058	0.008	20 85	0 054	0 004	20.79	0 047	0.004
21.94	0.072	0.031	21.78	0.048	0.012	22 24	0.069	0 009	21.85	0 053	0 004	21.79	0 051	0 004
22 94	0 090	0.035	22.78	0 058	0 014	23.25	0.046	0.007	22 85	0.056	0 004	22.79	0 057	0.004
23 94	0.076	0.032	23.77	0 084	0.017	24 27	0.051	0 008	23 85	0 064	0.005	23 79	0.056	0.004
24 94	0 096	0 036	24.77	0 063	0.014	25.29	0.070	0.009	24.85	0.054	0.004	24.79	0.052	0.004
25.95	0.109	0.039	25 77	0.046	0.012	26 31	0.092	0 010	25 84	0.053	0.004	25.79	0.048	0.004
26 95	0 042	0 024	26.77	0.077	0.016	27.33	0 092	0.010	26 84	0.049	0.004	26.78	0 046	0.004
27.95	0.079	0.033	27 77	0.068	0.015	28 35	0.055	0.008	27.84	0.052	0.004	27.78	0.051	0.004
28.96	0.041	0.024	28 76	0.061	0.014	29.37	0.070	0 009	28.84	0.067	0.005	28.78	0 046	0.004
29.96	0.048	0.026	29.76	0.072	0 015	30.39	0.067	0.009	29.84	0 056	0.004	29 78	0.051	0.004
30 96	0 064	0 030	30 76	0.080	0.016	31 40	0.108	0.011	30.84	0.055	0.004	30.78	0 067	0.005
31.96	0 056	0 028	31.76	0.093	0.017	32.42	0.143	0.013	31 84	0.046	0.004	31 78	0.051	0 004
32.97	0 012	0 013	32.76	0 121	0.020	33 44	0.120	0.012	32.84	0.071	0 005	32 78	0.058	0.005
33 97	0 061	0 029	33.75	0.103	0.019	34.46	0 080	0 009	33.83	0 062	0.005	33 77	0 058	0 004
34.97	0 059	0 028	34 75	0 061	0.014	35 48	0 061	0.008	34.83	0 046	0 004	34.77	0.046	0 004
35.98	0 085	0.034	35 75	0.127	0 020	36.50	0 072	0 009	35 83	0.057	0.004	35 77	0 051	0 004
36.98	0.102	0.037	36 75	0.087	0 017	37.52	0 070	0.009	36.83	0.051	0.004	36 77	0.044	0.004
37.98	0.100	0 037	37.74	0.123	0.020	38 54	0.077	0.009	37.83	0 056	0.004	37.77	0.051	0.004
38.98	0.126	0.041	38 74	0.084	0 016	39 55	0 076	0.009	38.83	0.058	0 004	38.77	0.050	0.004
39 99	0 027	0.019	39.74	0.103	0.018	40.57	0.067	0 009	39.83	0.057	0.004	39.77	0 048	0 004
40 99	0.063	0.029	40.74	0 070	0 015	41 59	0.069	0.009	40 83	0 059	0.004	40.76	0.043	0.004
41 99	0 141	0.044	41.74	0.112	0.019	42.61	0.071	0 009	41.82	0.059	0 004	41.76	0.052	0.004
43 00	0 127	0.042	42 73	0 117	0 019	43 63	0.136	0.012	42 82	0.068	0.005	42.76	0 054	0.004
44 00	0.216	0.054	43 73	0.182	0.024	44 65	0.106	0.011	43.82	0.114	0.006	43.76	0.082	0 005
45.00	0.217	0 054	44.73	0 129	0 020	45 67	0 061	0 008	44.82	0 050	0.004	44 76	0.035	0 003
46.00	0.018	0 016	45 73	0.024	0.009	46 69	0.048	0 007	45.82	0.057	0.004	45.76	0.053	0.004
47.01	0 171	0 048	46.73	0.062	0.014	47 71	0.003	0 002	46.82	0.029	0.003	46.75	0 027	0 003
47 76	0.027	0.027	47.72	0.008	0 005	48 72	0.0	0.0	47.82	0.001	0 001	47.75	0 001	0.001
0.0	0.0	0.0	48 72	0.0	0 0	49 62	0.003	0.002	48 82	0 0	0.0	48 75	0.0	0.0
0.0	0 0	0.0	49.42	0.0	0.0	0.0	0.0	0.0	49.34	0.0	0.0	49.28	0 0	0.0

Table 15 (Cont'd)

HELIUM-3 FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

35 DEG - RUN 4021			45 DEG - RUN 7000			47 DEG - RUN 5042			50 DEG - RUN 5010			55 DEG - RUN 4025		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
13 37	0 066	0.010	7.44	0 035	0 009	12 89	0.054	0.006	12 80	0.058	0 006	7 46	0 016	0.007
14.09	0.059	0.009	7 84	0.027	0.008	13 89	0.053	0.005	13 80	0.043	0.005	7.87	0.016	0.008
15.11	0 046	0.008	8 24	0 047	0 010	14 89	0 043	0 005	14 80	0.045	0.005	8.27	0.010	0 006
16.13	0.061	0.009	8.64	0.037	0 009	15 89	0.042	0.005	15.80	0.041	0 005	8.68	0.024	0 009
17.15	0.054	0 009	9.04	0.052	0 011	16 90	0 040	0 005	16.80	0.046	0 005	9 09	0.039	0 012
18 17	0 039	0 008	9.44	0 043	0 010	17.90	0 037	0.005	17.80	0.037	0.004	9.50	0.043	0.012
19.19	0 049	0.008	10 14	0 052	0 007	18 90	0.036	0 005	18 80	0 040	0 005	10 21	0.059	0 009
20.21	0.056	0.009	11 14	0.047	0 006	19 90	0 040	0.005	19.79	0.036	0 004	11 23	0.068	0.010
21.23	0.048	0 008	12.14	0.052	0.007	20.90	0.038	0 005	20.79	0 036	0.004	12.25	0.053	0.009
22.25	0 049	0.009	13 14	0.054	0 007	21 90	0.042	0 005	21.79	0.036	0.004	13.26	0.043	0.008
23.27	0.032	0.007	14 14	0 063	0.007	22.90	0 037	0 005	22.79	0.022	0 003	14.28	0 040	0.008
24.29	0 039	0 008	15.15	0.052	0 007	23 90	0.037	0 005	23 79	0.034	0 004	15.30	0 047	0.008
25.31	0 041	0 008	16.15	0.042	0.006	24.90	0.031	0 004	24.79	0 033	0 004	16 32	0.045	0.008
26 33	0.047	0 008	17.15	0.044	0.006	25 91	0.037	0 005	25.78	0 025	0 004	17.34	0 044	0.008
27 35	0.052	0 009	18.15	0.045	0.006	26 91	0.029	0 004	26.78	0 026	0.004	18.36	0 039	0.007
28 36	0 065	0 010	19 15	0.044	0 006	27 91	0 027	0 004	27 78	0.027	0 004	19.38	0 028	0.006
29.38	0.049	0.009	20 15	0 039	0.006	28.91	0.035	0.004	28.78	0.027	0.004	20.39	0.017	0.005
30.40	0 073	0.010	21.15	0.046	0 006	29 91	0 025	0.004	29 78	0.023	0.004	21.41	0 031	0.007
31.42	0 042	0 008	22 16	0 042	0.006	30 91	0.030	0 004	30 78	0 020	0.003	22.43	0 026	0.006
32.44	0 092	0 012	23 16	0 036	0.006	31 91	0 023	0.004	31.78	0.026	0.004	23 45	0.028	0 006
33 46	0 045	0 008	24 16	0.040	0.006	32 91	0 033	0.004	32.77	0.031	0 004	24 47	0 027	0.006
34.48	0.041	0 008	25 16	0 037	0.006	33.92	0 029	0.004	33.77	0.025	0.004	25 49	0.027	0.006
35 50	0 040	0 008	26.16	0.033	0.005	34 92	0 029	0 004	34 77	0.027	0.004	26.50	0.031	0.007
36.52	0 034	0 007	27.16	0 034	0.005	35 92	0 026	0.004	35 77	0.028	0.004	27 52	0.025	0 006
37.54	0 028	0 006	28 16	0.039	0 006	36 92	0.018	0.003	36 77	0.015	0.003	28 54	0.015	0.005
38 56	0 046	0.008	29.17	0.030	0.005	37.92	0.016	0.003	37.77	0.019	0.003	29 56	0.028	0.006
39.58	0 035	0.007	30.17	0 028	0.005	38.92	0 014	0.003	38 76	0.016	0 003	30.58	0.026	0.006
40 60	0 034	0.007	31.17	0.031	0 005	39 92	0 019	0.003	39.76	0.016	0.003	31.60	0.023	0 006
41 62	0.023	0 006	32.17	0.035	0.006	40.92	0.017	0.003	40 76	0.018	0 003	32.61	0 039	0 007
42 64	0 028	0.006	33.17	0.034	0 005	41 93	0.017	0.003	41 76	0 011	0 002	33 63	0.023	0.006
43.56	0.058	0.009	34.17	0.032	0.005	42.93	0.026	0.004	42.76	0.021	0.003	34.65	0.010	0.004
44.68	0 017	0 005	35.17	0.033	0 005	43.93	0 014	0 003	43.76	0.012	0.003	35.67	0.018	0.005
45 69	0 043	0.008	36.18	0.031	0.005	44.93	0.019	0 003	44.76	0.014	0.003	36.69	0.016	0.005
46.71	0.010	0.004	37.18	0.028	0.005	45 93	0 018	0 003	45.75	0 013	0.003	37 71	0 012	0.004
47.73	0.0	0.0	38 18	0.024	0.005	46.93	0.001	0 001	46.75	0.001	0.001	38.72	0.003	0 002
48.75	0.0	0.0	39.18	0 038	0.006	47 93	0.0	0.0	47.75	0 0	0.0	39 74	0 011	0 004
49.47	0 0	0 0	40.18	0.028	0.005	48.58	0.0	0.0	48.37	0.0	0.0	40.76	0.015	0.005
0.0	0 0	0.0	41.18	0.023	0 004	0 0	0.0	0.0	0 0	0 0	0.0	41.78	0.009	0.004
0.0	0.0	0.0	42 18	0 030	0.005	0.0	0.0	0.0	0.0	0 0	0.0	42.80	0.005	0.003
0.0	0.0	0.0	43.19	0 014	0.003	0 0	0.0	0 0	0 0	0 0	0.0	43.82	0 002	0.002
0.0	0.0	0 0	44 19	0 026	0.005	0 0	0 0	0 0	0.0	0.0	0.0	44.84	0.020	0.005
0.0	0.0	0.0	45.19	0.004	0.002	0.0	0 0	0.0	0.0	0 0	0.0	45.85	0.001	0.001
0 0	0 0	0.0	46 19	0.0	0 0	0.0	0.0	0.0	0 0	0 0	0.0	46.87	0 0	0.0
0.0	0.0	0.0	47.19	0.0	0 0	0.0	0 0	0.0	0.0	0.0	0 0	47.89	0 0	0.0
0 0	0.0	0.0	48.19	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	48.60	0.0	0 0
0 0	0.0	0.0	49.19	0.001	0 001	0.0	0 0	0 0	0.0	0.0	0.0	0.0	0.0	0.0
0 0	0.0	0.0	49.87	0.0	0.0	0.0	0.0	0 0	0.0	0 0	0 0	0.0	0.0	0.0

Table 15 (Cont'd)

HELIUM-3 FROM A = 54 BOMBARDED BY 62 MEV PROTONS.

60 DEG - RUN 5043

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 88	0 041	0 005
13 88	0 036	0 004
14 88	0 039	0 005
15 88	0 036	0 004
16 89	0.033	0 004
17 89	0 034	0 004
18 89	0 026	0 004
19 89	0.028	0 004
20.89	0 015	0.003
21 89	0 021	0.003
22.89	0 025	0 004
23 89	0 013	0.003
24.89	0 018	0.003
25 89	0 021	0 003
26 89	0 019	0 003
27 89	0 018	0.003
28 89	0 018	0 003
29 89	0 017	0 003
30 89	0 020	0 003
31.89	0 016	0 003
32 89	0 023	0 003
33.90	0.015	0 003
34.90	0 017	0 003
35.90	0.013	0 003
36.90	0.012	0 003
37 90	0 009	0 002
38 90	0 006	0 002
39 90	0 010	0 002
40 90	0 008	0 002
41.90	0 007	0 002
42.90	0 006	0 002
43.90	0 007	0 002
44.90	0 007	0 002
45.90	0 000	0.001
46.90	0.0	0 0
47.73	0 0	0.0

65 DEG - RUN 5011

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 82	0 038	0 003
13 82	0 036	0 003
14 82	0 036	0.003
15 82	0.033	0.002
16 82	0.033	0 002
17 82	0 028	0 002
18 82	0 030	0 002
19 82	0.025	0.002
20 82	0 026	0 002
21 82	0 024	0 002
22.82	0 024	0.002
23 82	0 023	0 002
24 82	0 024	0.002
25 82	0 020	0.002
26 82	0.018	0.002
27 82	0 017	0 002
28 82	0.013	0 002
29 82	0 012	0 001
30 82	0 016	0.002
31.81	0 014	0 002
32 81	0 017	0 002
33.81	0 017	0.002
34 81	0 012	0 001
35 81	0 011	0 001
36 81	0.009	0 001
37 81	0 009	0 001
38 81	0 007	0 001
39 81	0 005	0 001
40 81	0 005	0.001
41 81	0 008	0 001
42 81	0 007	0 001
43 81	0 002	0 001
44 81	0 007	0 001
45 81	0 001	0 000
46 81	0 000	0 000
47.53	0 0	0 0

70 DEG - RUN 5044

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 89	0 037	0.005
13 89	0.037	0.005
14 90	0 023	0 004
15.90	0.022	0.004
16 90	0.027	0 004
17 90	0.031	0 005
18.90	0 023	0 004
19 90	0.030	0 005
20 90	0.015	0 003
21 91	0 021	0 004
22 91	0 018	0 004
23 91	0 015	0 003
24 91	0.013	0 003
25 91	0 018	0 004
26 91	0.015	0.003
27.91	0 005	0 002
28 92	0 013	0 003
29 92	0 015	0.003
30.92	0 012	0 003
31.92	0 011	0 003
32 92	0 013	0 003
33 92	0 010	0 003
34.92	0 003	0 001
35 93	0 005	0.002
36 93	0 006	0 002
37 93	0 007	0 002
38 93	0 005	0.002
39 93	0.005	0.002
40.93	0 004	0 002
41 93	0 007	0 002
42.94	0 003	0 001
43 94	0 002	0 001
44.94	0 003	0.002
45 94	0.0	0 0
46 94	0.0	0.0
47 49	0 0	0 0

75 DEG - RUN 7100

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 95	0 031	0 003
13.95	0 035	0 003
14 95	0 034	0.003
15.95	0 026	0.003
16.95	0 025	0 003
17 95	0 024	0 003
18 94	0 022	0 003
19 94	0 027	0 003
20.94	0 020	0 003
21 94	0 019	0.003
22.94	0 013	0.002
23 94	0 015	0 002
24 94	0 013	0.002
25 93	0.013	0 002
26 93	0.014	0.002
27 93	0.016	0 002
28.93	0 010	0.002
29 93	0.011	0 002
30 93	0.009	0.002
31 92	0.012	0.002
32.92	0.007	0 001
33 92	0.012	0 002
34.92	0 007	0 002
35.92	0.006	0 001
36 92	0 005	0 001
37 91	0 006	0 001
38 91	0.005	0 001
39 91	0.004	0.001
40.91	0 005	0.001
41 91	0.003	0 001
42.91	0.003	0 001
43 90	0 001	0.001
44.90	0.0	0.0
45 88	0 0	0 0
0 0	0 0	0.0
0 0	0 0	0 0

80 DEG - RUN 5012

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12.93	0 037	0 002
13.93	0.032	0.002
14 93	0 029	0.002
15 93	0.022	0 002
16 93	0 022	0 002
17.93	0 020	0.002
18.93	0 020	0 002
19 93	0.021	0.002
20 93	0.013	0 001
21 93	0.017	0.001
22 93	0 012	0.001
23 93	0 012	0 001
24 93	0 013	0 001
25.93	0 011	0 001
26.93	0.009	0 001
27.93	0.009	0 001
28 93	0.009	0 001
29 93	0 010	0 001
30 93	0.007	0.001
31 93	0.007	0 001
32.93	0 007	0 001
33.93	0.006	0 001
34 93	0.006	0 001
35.93	0.005	0 001
36.93	0.004	0.001
37.93	0.002	0 001
38 93	0 003	0.001
39.93	0.003	0 001
40 93	0.003	0 001
41.93	0 002	0 001
42.93	0.001	0 000
43 93	0 003	0 001
44.71	0.0	0 0
0.0	0.0	0.0
0.0	0.0	0.0
0 0	0.0	0 0

Table 15 (Cont'd)
HELIUM-3 FROM A = 54 BOMBARDED BY 62 MEV. PROTONS.

90 DEG - RUN 4010			100 DEG - RUN 2070			110 DEG - RUN 5015			120 DEG - RUN 7002			135 DEG - RUN 4011		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	EPROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 98	0.027	0 002	7 97	0 035	0 010	13.10	0.021	0.002	12 96	0.022	0 003	12.93	0.019	0.001
13 98	0.025	0 002	8.38	0 018	0.007	14.10	0.020	0.002	13.97	0 018	0.003	13 93	0.018	0 001
14 98	0 027	0 002	8 78	0.030	0 009	15 11	0 013	0 001	14 97	0.015	0 002	14 93	0.012	0 001
15 98	0 022	0.002	9.19	0.027	0 009	16 11	0.013	0 001	15 97	0.012	0.002	15.93	0.010	0 001
16 98	0 020	0 001	9.60	0 031	0 009	17.11	0.011	0.001	16 98	0.009	0 002	16.94	0.009	0 001
17.98	0 016	0 001	10.31	0 037	0.006	18 11	0.009	0 001	17 98	0 009	0.002	17.94	0.010	0.001
18 98	0 015	0 001	11.33	0 047	0 007	19 11	0 013	0 001	18 98	0 010	0.002	18 94	0 007	0 001
19 98	0 015	0.001	12 35	0.030	0.006	20.12	0 008	0.001	19.98	0 010	0 002	19 94	0 006	0.001
20.98	0 011	0 001	13.37	0 024	0 005	21 12	0.007	0 001	20 99	0 004	0.001	20 94	0.005	0 001
21 98	0 014	0 001	14 38	0.021	C 005	22.12	0 005	0.001	21 99	0.005	0.001	21.94	0 004	0 001
22 98	0.009	0 001	15 40	C.017	0.004	23 12	0 005	0 001	22 99	0 006	0 001	22 94	0 004	0 001
23 98	0.010	0 001	16.42	C 016	0.004	24.12	0.004	0.001	24 00	0.002	0 001	23.94	0 003	0 000
24 98	0.009	0 001	17 44	0 016	0.004	25.13	0 003	0 001	25 00	0 006	0 001	24.94	0 003	0 000
25 98	0 008	0 001	18.46	0.015	C 004	26.13	0.005	0.001	26.00	0.001	0.001	25.94	0.003	0.000
26 98	0 006	0 001	19.48	0 009	0 003	27 13	0 003	0 001	27 01	0 002	0 001	26.94	0.002	0.000
27 98	0 007	0 001	20 50	0 019	C 005	28 13	0.003	0 001	28.01	0 002	0 001	27.94	0.002	0.000
28.98	0 006	C.001	21.51	0 008	0 003	29 13	0.003	0 001	29.01	0 001	0.001	28.94	0 002	0 000
29 98	0 007	0 001	22 53	0.005	0.002	30 14	0.002	0 000	30 01	C.002	0.001	29 94	0.001	0 000
30.98	0 006	0 001	23.55	0.011	0.003	31 14	0.002	0.001	31.02	0 002	0.001	30 94	0 001	0.000
31 98	0 006	0 001	24 57	0.011	0 003	32 14	C 002	0 000	32.02	0.0	0.0	31 94	0.001	0.000
32 98	0 004	0 001	25 59	0.009	0.003	33 14	0.002	0 000	33.02	0.001	0 001	32.94	0 001	0.000
33 98	0 002	0 001	26 61	0 011	0 003	34 14	0 002	0 000	34 03	0 001	0 001	33.95	0.000	0 000
34.98	0.004	0.001	27.62	0.003	0 002	35.15	0 002	0.000	35 03	0 001	0 001	34 95	0 000	0 000
35 98	0 003	0 001	28 64	0 008	0 003	36 15	0 001	0.000	36 03	0.001	0 001	35 95	0 000	0 000
36 98	0.001	0.000	29 66	0.005	0 002	37 15	0 001	0 000	37.04	0.001	0.001	36 95	0.000	0 000
37 98	0 001	0 000	30 68	0 002	0 002	38 15	0 001	0 000	38 04	0 0	0 0	37 95	0.000	0.000
38 98	0.001	0 000	31.70	0.001	0 001	39.15	0.001	0.000	39 04	0.000	0.000	38 95	0.000	0.000
39 98	0 001	0 000	32 72	0 002	0 002	40 16	0 001	0 000	40 04	0.001	0 001	39 95	0.000	0 000
40 98	0.001	0 000	33 73	0 003	0.002	41.16	0.000	0.000	41.05	0 0	0 0	40.95	0.000	0.000
41.98	0 001	0 000	34 75	0 0	0 0	42 16	0.001	0 000	42 05	0 0	0.0	41.95	0 0	0 0
42.98	0.000	0 000	35.77	0 0	0 0	43 16	0.000	0.000	43 05	0 0	0.0	42.95	0 0	0.0
43.98	0 000	0 000	36 79	0 003	0 002	44 16	0.0	0 0	43.81	0 0	0 0	43 55	0 0	0 0
44 98	0 0	0 0	37 81	0 001	0 001	44 84	0.0	0 0	0.0	0.0	0.0	0 0	0 0	0 0
45 71	0.0	0 0	38.83	0.001	0.001	0 0	0.0	0 0	0.0	0 0	0.0	0 0	0.0	0.0
0 0	0 0	0.0	39 84	0.0	0.0	0.0	0.0	0.0	0 0	0.0	0 0	0.0	0.0	0.0
0.0	0.0	0.0	40 86	0 002	0.002	0.0	0 0	0.0	0 0	0 0	0.0	0 0	0 0	0.0
0 0	0 0	0.0	41 88	C 0	C 0	0 0	0 0	0.0	0.0	0.0	0 0	0.0	0 0	0.0
0.0	0 0	0.0	42 90	0 0	0.0	0.0	0 0	0 0	0 0	0 0	0.0	0.0	0.0	0.0
0 0	0 0	0 0	43 92	0 0	0.0	C 0	0 0	0 0	0 0	0 0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	44 73	0 0	0.0	0 0	0 0	0.0	0 0	0 0	0.0	0.0	0.0	0.0

Table 15 (Cont'd)

HELIUM-3 FROM A = 54 BOMBARDED BY 62 MEV PROTONS.

160 DEG - RUN 2067

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
7 42	0.025	0 009												
7.82	0.046	0.012												
8.22	0 026	0 009												
8.62	0.034	0.010												
9.02	0.032	0 010												
9 42	0 040	0 011												
10 12	0.028	0 006												
11.12	0.027	0.006												
12 12	0 025	0 005												
13.12	0.016	0.004												
14.12	0.023	0 005												
15.12	0 004	0.002												
16 12	0.006	0 003												
17.12	0 007	0 003												
18 12	0 011	0.004												
19.12	0.002	0 001												
20 12	0.005	0 003												
21.12	0.001	0.001												
22 12	0.003	0.002												
23.12	0 0	0 0												
24.12	0.003	0.002												
25.12	0 002	0 002												
26 12	0.003	0 002												
27 12	0 002	0 002												
28.12	0 003	0.002												
29.12	0 0	0.0												
30 12	0.0	0 0												
31 12	0 001	0.001												
32.12	0.001	0 001												
33 12	0 0	0 0												
34.12	0.0	0.0												
35.12	0 0	0.0												
36.12	0.0	0 0												
37 12	0.0	0.0												
38.12	0.0	0.0												
39.12	0.0	0 0												
40 12	0 0	0 0												
41.12	0.0	0.0												
42.12	0 0	0 0												
43 12	0 0	0 0												
44 12	0.0	0.0												
45.12	0 0	0.0												
46 12	0.0	0.0												
47 12	0.0	0 0												
48 12	0 0	0 0												
49.12	0.0	0 0												
50.12	0 0	0 0												
51 12	0 0	0.0												
52.12	0.0	0.0												
53 12	0.0	0 0												
54 12	0 0	0.0												
55.12	0.0	0 0												
56.12	0 0	0 0												
57.12	0 0	0 0												
58 12	0 0	0.0												
59 12	0 0	0.0												
60 12	0.0	0.0												
61 12	0.0	0 0												
61 82	0.0	0.0												

Table 16
ALPHA FROM A = 54 BOMBARDED BY 62 MEV PROTONS.

12 DEG - RUN 123			15 DEG - RUN 5016			20 DEG - RUN 4020			27 DEG - RUN 5020			30 DEG - RUN 5007		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
7.55	0 682	0.153	14.10	0 932	0.055	7.65	0.923	0.193	6.92	0.582	0.022	14.10	0 870	0.017
7.95	1.424	0.221	15.09	0.816	0.051	8.06	1.382	0.236	7.32	0.797	0.026	15.10	0 676	0.015
8.35	1.496	0.226	16.09	0.629	0.045	8.47	1.515	0.248	7.72	1.059	0.030	16.10	0.554	0.014
8.75	1 586	0.233	17.09	0.535	0.042	8.87	1.605	0.255	8.12	1.359	0.034	17 10	0.450	0.013
9.15	1.537	0.229	18 09	0.468	0.039	9.28	1.651	0.258	8.51	1.598	0 036	18 10	0.378	0 011
9.55	1 887	0.254	19.08	0.400	0.036	9 69	1.904	0.277	8 91	1.757	0.038	19.10	0 332	0.011
10.25	1.825	0.158	20.08	0.336	0.033	10.40	2.008	0 180	9.31	1.896	0.040	20.09	0.298	0.010
11.26	1.654	0 150	21.08	0.310	0.032	11.42	1.862	0 174	9.71	1.955	0.040	21.09	0.240	0.009
12.26	1.704	0.153	22.08	0.289	0.031	12 43	1.575	0.160	10.41	1 917	0 025	22.09	0 256	0.009
13.26	1.041	0.119	23.08	0.225	0.027	13 45	1.119	0.135	11.41	1.764	0.024	23.09	0.210	0.009
14.26	1.190	0 128	24.07	0 224	0.027	14 47	0.588	0 098	12.41	1.500	0.225	24.09	0.187	0 008
15 27	0.638	0.093	25.07	0.240	0.028	15.48	0.620	0.100	13.41	1.100	0.165	25.09	0.178	0.008
16.27	0.896	0 111	26 07	0.203	0.026	16.50	0.493	0.089	14.41	0.883	0 017	26.09	0 161	0.007
17.27	0.442	0.078	27.07	0.162	0.023	17.52	0.443	0.085	15.41	0.688	0 015	27.08	0.152	0.007
18.28	0.560	0 087	28 07	0.181	0.024	18.53	0 428	0.083	16.41	0 548	0.014	28.08	0.153	0.007
19.28	0.404	0.074	29.06	0.160	0.023	19.55	0.387	0.079	17.40	0.463	0.012	29 08	0 152	0.007
20.28	0 285	0.062	30 06	0 171	0.024	20.57	0.325	0.072	18 40	0.403	0.012	30.08	0.123	0.007
21.28	0.333	0.067	31.06	0.139	0.021	21 59	0.264	0.065	19 40	0 346	0.011	31.08	0 114	0.006
22.29	0 396	0.074	32.06	0.183	0.024	22 60	0.272	0.066	20.40	0.304	0 010	32.08	0.113	0.006
23.29	0.293	0.063	33.05	0.160	0.023	23 62	0.254	0.064	21 40	0 249	0.009	33 08	0.110	0.006
24.29	0.260	0.060	34.05	0.109	0.019	24 64	0.259	0 065	22 40	0.236	0.009	34.07	0 097	0 006
25 30	0 231	0.056	35.05	0.131	0.021	25.65	0.294	0.069	23.40	0.221	0.009	35.07	0.115	0.006
26.30	0.210	0.054	36.05	0.134	0.021	26.67	0.089	0.038	24 40	0.201	0.008	36.07	0.093	0.006
27.30	0.115	0 040	37.05	0.171	0.024	27.69	0.194	0.056	25 39	0.190	0.008	37.07	0.116	0.006
28.30	0 229	0.056	38.04	0 131	0.021	28 70	0.333	0.073	26.39	0 171	0.008	38.07	0.078	0.005
29.31	0 215	0.054	39.04	0.129	0.020	29.72	0.271	0.066	27.39	0.183	0 008	39.07	0 080	0 005
30.31	0 183	0.050	40.04	0 130	0.020	30 74	0 103	0 041	28.39	0 151	0.007	40.06	0.077	0.005
31.31	0.212	0.054	41.04	0.086	0.017	31.76	0.150	0.049	29.39	0.152	0 007	41.06	0.072	0.005
32.32	0.151	0 045	42.04	0.107	0.019	32 77	0.170	0.052	30.39	0 140	0.007	42.06	0.060	0.005
33.32	0.082	0.033	43.03	0.103	0.018	33.79	0 143	0 048	31.39	0.125	0.006	43.06	0.062	0.005
34.32	0 126	0.041	44.03	0 118	0.020	34 81	0.045	0.027	32.39	0.123	0.006	44.06	0.063	0.005
35.32	0.151	0.045	45.03	0.143	0.021	35.82	0.146	0.049	33.38	0.106	0.006	45 06	0.062	0 005
36.33	0.090	0.035	46.03	0.099	0.018	36 84	0.029	0 022	34.38	0.100	0.006	46.06	0.068	0.005
37.33	0.161	0.047	47.03	0.102	0.018	37 86	0.133	0 046	35 38	0.105	0 006	47 05	0 056	0.004
38.33	0.094	0.036	48 02	0.109	0.019	38.87	0.016	0.016	36.38	0.109	0.006	48.05	0.038	0.004
39.33	0.156	0.046	49 02	0 127	0.020	39.89	0.032	0 023	37.38	0.108	0.006	49 05	0.047	0.004
40.34	0 111	0.039	50.02	0.074	0.015	40.91	0 071	0.034	38.38	0.093	0.006	50.05	0 027	0.003
41.34	0.169	0.048	51 02	0.100	0.018	41.93	0.074	0 035	39.38	0.087	0.005	51.05	0.033	0.003
42.34	0.102	0.037	52.01	0.105	0.018	42.94	0.019	0.018	40.38	0.084	0.005	52 05	0.018	0.003
43 35	0 152	0.046	53.01	0.041	0.011	43.96	0.097	0.040	41.38	0.082	0.005	53.05	0.007	0.002
44.35	0.118	0.040	54.01	0.024	0.009	44.98	0.094	0.039	42.37	0.075	0 005	54.04	0.002	0.001
45.35	0.157	0.046	55 01	0.012	0.006	45.99	0.061	0.031	43.37	0.074	0.005	55 04	0.004	0 001
46.35	0.165	0.047	56.01	0.022	0.008	47.01	0.061	0.031	44.37	0.080	0.005	56 04	0 004	0.001
47.36	0 150	0 045	57.00	0.017	0.007	48.03	0.169	0.052	45.37	0.070	0.005	57 04	0.000	0.000
48.36	0 082	0.033	58.00	0.0	0.0	49.04	0.052	0.029	46.37	0.075	0.005	58 04	0.000	0.000
49.36	0.083	0.034	59.00	0.0	0.0	50.06	0.078	0.035	47.37	0.066	0.005	59.04	0.0	0.0
50 37	0.077	0 032	59.75	0.0	0.0	51.08	0.016	0.016	48.37	0.049	0 004	59.76	0.0	0.0
51.37	0.150	0.045	0.0	0.0	0.0	52.10	0 032	0.023	49.37	0 052	0.004	0.0	0.0	0 0
52 37	0.077	0 032	0.0	0.0	0.0	53.11	0.016	0.016	50 36	0.042	0.004	0 0	0 0	0.0
53.37	0.045	0.025	0.0	0.0	0.0	54.13	0.0	0 0	51.36	0 037	0.003	0.0	0.0	0 0
54.38	0.042	0.024	0.0	0.0	0.0	55.15	0.0	0.0	52.36	0.029	0.003	0.0	0.0	0 0
55.38	0.014	0.014	0.0	0 0	0.0	56 16	0.016	0.016	53.36	0.008	0.002	0.0	0.0	0.0
56.38	0.055	0 027	0.0	0.0	0.0	57.18	0.0	0.0	54.36	0.006	0.001	0.0	0.0	0 0
57.39	0.0	0.0	0.0	0.0	0.0	58.20	0.0	0.0	55.36	0.005	0.001	0.0	0.0	0.0
58.39	0.0	0.0	0.0	0.0	0.0	59.21	0.0	0.0	56.36	0.006	0.001	0.0	0 0	0 0
59.39	0 0	0.0	0 0	0 0	0.0	59.85	0.0	0.0	57.36	0.000	0.000	0.0	0.0	0 0
59.94	0.0	0.0	0.0	0.0	0 0	0.0	0 0	0.0	58 35	0.000	0 000	0.0	0.0	0 0
0.0	0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0	59.35	0.0	0.0	0.0	0.0	0 0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 0	59.93	0.0	0 0	0.0	0.0	0.0

Table 16 (Cont'd)

ALPHA FROM A = 54 BOMBARDED BY 62 MEV PROTONS

35 DEG - RUN 4021			45 DEG - RUN 4032			47 DEG - RUN 5042			50 DEG - RUN 5010			55 DEG - RUN 4025		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
7.66	1 01	0.08	7.60	1.02	0.08	5.43	0.13	0.01	14.10	0 68	0.02	7.66	1.13	0 06
8.07	1.29	0.09	8 00	1.22	0.08	5.83	0 21	0 02	15.10	0.58	0.02	8.07	1.32	0.07
8.48	1 55	0.10	8.41	1.61	0.10	6.23	0 35	0.02	16.10	0 43	0.01	8 48	1 62	0.08
8.88	1.75	0 11	8.81	1.69	0 10	6 63	0 48	0.03	17 10	0.36	0.01	8 89	1 60	0 08
9.29	1 89	0.11	9.22	1 75	0.10	7 03	0.78	0.03	18.10	0.24	0.01	9.29	1.72	0.08
9.70	2.06	0.12	9.62	1.96	0.11	7.43	0 96	0.04	19.10	0 25	0.01	9.70	1.76	0.08
10.41	2 00	0 07	10 33	1.83	0.06	7.83	1.28	0.04	20 09	0 19	0 01	10 41	1.66	0.05
11.43	1.72	0.07	11.34	1.61	0.06	8.23	1.47	0 05	21.09	0.19	0.01	11.43	1.38	0 04
12.45	1.59	0.07	12.35	1.52	0.06	8.64	1 70	0.05	22 09	0.16	0.01	12.45	1.21	0.04
13.47	1.11	0.06	13.36	1.03	0.05	9.04	1.84	0 05	23.09	0 13	0 01	13.47	0.91	0.04
14.48	0 87	0.05	14.37	0 76	0 04	9.44	1.86	0.05	24.09	0 12	0 01	14.49	0 61	0.03
15 50	0 59	0 04	15.38	0.56	0.04	10.14	1.76	0.03	25 09	0.12	0.01	15.51	0 48	0 03
16.52	0.502	0.037	16.39	0.398	0.030	11 14	1 531	0 029	26 08	0.096	0.007	16.52	0.353	0.022
17.54	0.434	0.034	17 40	0 360	0.029	12.14	1 196	0.026	27.08	0.086	0.007	17.54	0.323	0 021
18.56	0.398	0.033	18.41	0.244	0 024	13.14	0.930	0.023	28 08	0 084	0.007	18.56	0.224	0.018
19.57	0 277	0 028	19.42	0.244	0.024	14.14	0.701	0.020	29.08	0.085	0.007	19.58	0.182	0.016
20.59	0 293	0.028	20.43	0.243	0.024	15.14	0.547	0.018	30.08	0.069	0.006	20 60	0 187	0 016
21 61	0 245	0.026	21.44	0 201	0 021	16 14	0 450	0.016	31.08	0.066	0.006	21.62	0 194	0 017
22.63	0.180	0.022	22.45	0.135	0.018	17 15	0.346	0.014	32.07	0.073	0 006	22 63	0 121	0 013
23.65	0.149	0 020	23 46	0.184	0.021	18 15	0 317	0 013	33.07	0.062	0 006	23.65	0.108	0.012
24.67	0.221	0.025	24.47	0.150	0.019	19.15	0 258	0.012	34.07	0.057	0.006	24 67	0 099	0 012
25.68	0.164	0 021	25.48	0.133	0.017	20 15	0.221	0.011	35 07	0.048	0 005	25.69	0 128	0.013
26 70	0.136	0 019	26 49	0.138	0.018	21.15	0.189	0.010	36.07	0.043	0.005	26.71	0 086	0 011
27.72	0 132	0.019	27 50	0.115	0.016	22.15	0.155	0 009	37 07	0.060	0.006	27 73	0.084	0.011
28.74	0 145	0 020	28 51	0.092	0.015	23.15	0.146	0.009	38.07	0.047	0.005	28.74	0.074	0.010
29.76	0 168	0.021	29.52	0.126	0.017	24 15	0.139	0.009	39.06	0.045	0.005	29 76	0 042	0 008
30 78	0.093	0.016	30 53	0.118	0.016	25.16	0 106	0.008	40.06	0.040	0.005	30.78	0.064	0.010
31.79	0 131	0.019	31 54	0.105	0.016	26 16	0.106	0 008	41.06	0 032	0 004	31 80	0 055	0 009
32.81	0 080	0 015	32.55	0.078	0.013	27 16	0.107	0 008	42.06	0 023	0 003	32.82	0.049	0.008
33.83	0.076	0.014	33.56	0.078	0.013	28 16	0.096	0.007	43.06	0.022	0 003	33 84	0 041	0.008
34.85	0 089	0 016	34 57	0.072	0.013	29.16	0.082	0.007	44.06	0.026	0.004	34 85	0.050	0.008
35.87	0 106	0.017	35.58	0.051	0.011	30 16	0.092	0.007	45.05	0.029	0 004	35.87	0 033	0.007
36.88	0 077	0 015	36.59	0.053	0.011	31.16	0.079	0.007	46.05	0 021	0.003	36.89	0 033	0.007
37.90	0 073	0.014	37.60	0.064	0.012	32.16	0.059	0 006	47 05	0.015	0.003	37 91	0 030	0 007
38.92	0.047	0 011	38.61	0.047	0.010	33 16	0 058	0.006	48.05	0 016	0.003	38.93	0.034	0.007
39 94	0 059	0 013	39 62	0.028	0.008	34.17	0.054	0 006	49.05	0.009	0.002	39.95	0.037	0.007
40.96	0.066	0 013	40.63	0.023	0.007	35.17	0.050	0.005	50.05	0 007	0 002	40 97	0 018	0.005
41.98	0.047	0 011	41 64	0.023	0.007	36 17	0.048	0.005	51.05	0.012	0.002	41.98	0 021	0.005
42.99	0.039	0.010	42.65	0.024	0.007	37.17	0.057	0 006	52.04	0.003	0 001	43.00	0.014	0 004
44.01	0.051	0.012	43.66	0.039	0.010	38 17	0.042	0.005	53.04	0 000	0.001	44 02	0.019	0.005
45 03	0.038	0.010	44 67	0.017	0 006	39.17	0.032	0 004	54.04	0 000	0 001	45.04	0 017	0.005
46 05	0 028	0.009	45 68	0.019	0.007	40 17	0 043	0.005	55 04	0.000	0.001	46.06	0.012	0 004
47.07	0.033	0.010	46.69	0.014	0.006	41.17	0.037	0.005	56.04	0.0	0.0	47.08	0 013	0.004
48.08	0 022	0 008	47.70	0.014	0.006	42 18	0.032	0 004	57.04	0.0	0.0	48.09	0.010	0.004
49 10	0.019	0.007	48.71	0.006	0.004	43.18	0.032	0.004	58.03	0.0	0.0	49.11	0.013	0.004
50.12	0.015	0.006	49.72	0.010	0.005	44 18	0.029	0 004	58 93	0.0	0.0	50 13	0 005	0.003
51.14	0.009	0.005	50.73	0 009	0.005	45.18	0.029	0.004	0.0	0.0	0.0	51.15	0 008	0 003
52.16	0.008	0.005	51.74	0.0	0.0	46 18	0.027	0 004	0.0	0.0	0.0	52.17	0.0	0 0
53.18	0.004	0.003	52.75	0 0	0.0	47.18	0.024	0.004	0.0	0.0	0.0	53.19	0 003	0.002
54.19	0.008	0.005	53 76	0.002	0.002	48 18	0.015	0.003	0.0	0.0	0.0	54 20	0 0	0 0
55.21	0.0	0 0	54.77	0.0	0 0	49 18	0.016	0.003	0.0	0 0	0.0	55 22	0.0	0.0
56.23	0.0	0.0	55.78	0.0	0.0	50.19	0.008	0.002	0.0	0 0	0.0	56.24	0 0	0.0
57.25	0.0	0.0	56 79	0 0	0.0	51.19	0.016	0 003	0 0	0 0	0 0	57 26	0 0	0.0
58.27	0.0	0.0	57.80	0.0	0.0	52.19	0 003	0.001	0.0	0.0	0.0	58.28	0.0	0.0
59.28	0.0	0.0	58.81	0.0	0.0	53 19	0.0	0 0	0.0	0 0	0.0	59.30	0.0	0.0
59.92	0.0	0.0	59.62	0.0	0.0	54.19	0.001	0.001	0.0	0.0	0.0	0 0	0 0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	55.19	0 001	0.001	0.0	0 0	0.0	0.0	0 0	0.0
0.0	0 0	0.0	0.0	0.0	0.0	56.19	0 0	0.0	0.0	0.0	0.0	0.0	0 0	0.0
0.0	0.0	0.0	0 0	0.0	0.0	57.19	0 0	0.0	0.0	0.0	0.0	0 0	0 0	0 0
0.0	0 0	0.0	0.0	0.0	0.0	58.19	0.0	0.0	0.0	0 0	0.0	0.0	0.0	0.0
0.0	0 0	0.0	0.0	0 0	0.0	59.20	0.0	0.0	0.0	0 0	0.0	0.0	0 0	0.0

Table 16 (Cont'd)

ALPHA FROM A = 54 BOMBARDED BY 52 MEV. PROTONS.

60 DEG - RUN 5043			65 DEG - RUN 5011			70 DEG - RUN 5044			75 DEG - RUN 7100			80 DEG - RUN 5012		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
5.13	0.157	0.014	14.12	0.533	0.010	5.18	0.151	0.016	14.25	0.381	0.011	14.23	0.413	0.007
5.53	0.215	0.017	15.12	0.407	0.009	5.58	0.242	0.021	15.25	0.345	0.011	15 23	0.310	0.006
5.93	0.324	0.021	16.12	0.315	0.008	5.98	0.397	0.027	16.25	0.259	0.009	16.23	0.226	0.005
6.33	0.456	0.025	17.12	0.251	0.007	6.38	0.594	0.032	17.25	0.213	0.008	17.23	0.179	0.005
6.73	0.670	0.030	18.12	0.210	0.006	6.78	0.829	0 038	18 25	0.162	0 007	18.23	0.155	0.005
7.13	0 952	0.036	19.12	0.166	0.005	7.19	1.121	0.045	19.24	0.150	0.007	19.23	0.122	0 004
7.53	1 205	0.040	20.12	0.134	0.005	7 59	1.279	0.048	20.24	0.125	0.006	20.23	0.092	0.004
7.93	1.415	0.043	21.12	0.115	0.005	7.99	1.500	0.052	21.24	0 112	0.006	21.23	0.084	0 003
8.33	1.590	0.046	22.12	0.101	0.004	8 39	1.517	0.052	22.24	0.095	0.006	22.23	0.074	0.003
8.73	1.669	0.047	23.12	0.095	0.004	8.79	1.604	0.053	23.24	0.070	0.005	23.23	0.059	0.003
9.13	1.712	0.048	24 12	0.075	0.004	9.19	1.673	0.054	24.24	0.065	0.005	24 23	0.053	0 003
9.53	1.691	0.047	25.12	0.074	0.004	9.59	1.592	0.053	25.23	0 052	0.004	25.23	0.046	0.002
10.23	1.542	0.029	26.12	0.063	0.003	10 29	1.349	0 031	26.23	0.052	0.004	26 23	0.041	0.002
11.23	1.346	0.027	27.12	0.060	0.003	11 29	1.097	0.028	27.23	0.049	0.004	27.23	0.035	0 002
12.23	0.875	0.022	28 12	0.049	0.003	12.29	0.830	0 024	28.23	0 041	0.004	28.23	0.032	0 002
13.23	0.680	0 019	29.12	0.052	0.003	13 29	0.628	0 021	29.23	0.037	0.003	29.23	0.026	0.002
14.23	0.529	0.017	30.12	0.042	0.003	14.29	0 456	0 018	30.23	0.033	0.003	30 23	0 028	0.002
15.23	0.418	0 015	31.12	0.044	0.003	15.30	0.334	0.015	31.22	0.030	0.003	31.23	0.025	0.002
16.23	0.341	0.013	32 11	0.040	0.003	16 30	0.278	0 014	32.22	0.029	0.003	32 23	0.023	0.002
17.24	0.264	0.012	33.11	0.031	0.002	17 30	0.210	0.012	33.22	0.019	0.002	33.23	0.021	0.002
18.24	0.232	0.011	34.11	0.030	0.002	18.30	0.164	0.011	34.22	0 022	0.003	34 23	0 017	0 001
19.24	0.166	0.009	35.11	0.026	0.002	19 30	0.131	0.010	35.22	0.027	0.003	35.23	0.017	0.002
20.24	0.154	0.009	36.11	0.025	0.002	20 30	0.115	0.009	36.22	0.022	0.003	36.23	0.015	0.001
21.24	0 135	0.008	37.11	0.035	0.003	21.30	0.097	0.008	37.22	0.014	0.002	37.23	0.018	0.002
22.24	0.128	0.008	38.11	0.024	0.002	22.31	0.084	0 008	38.21	0.025	0.003	38.23	0.012	0.001
23 24	0.106	0.007	39.11	0.017	0.002	23.31	0.072	0.007	39.21	0.014	0 002	39.23	0.011	0 001
24.24	0.103	0.007	40.11	0.019	0.002	24.31	0.069	0.007	40.21	0.012	0 002	40.23	0.009	0 001
25.24	0.074	0.006	41.11	0.011	0.001	25.31	0.060	0.007	41.21	0 012	0.002	41.23	0.007	0.001
26.24	0.071	0.006	42.11	0.014	0.002	26.31	0.045	0.006	42.21	0.010	0.002	42.23	0.007	0.001
27.24	0 066	0.006	43.11	0.010	0.001	27.31	0.050	0 006	43.21	0.009	0.002	43.23	0.007	0.001
28.24	0.064	0.006	44.11	0.013	0.002	28.31	0.039	0.005	44.20	0 007	0.002	44.23	0.005	0.001
29.24	0 043	0.005	45.11	0.008	0.001	29.32	0 036	0.005	45.20	0.006	0.001	45.23	0 003	0.001
30.24	0.059	0.006	46.11	0.008	0.001	30.32	0.035	0.005	46.20	0.004	0.001	46.23	0.004	0.001
31.24	0.042	0.005	47.11	0.009	0.001	31.32	0.029	0.005	47.20	0.002	0.001	47.23	0 002	0.000
32.24	0.042	0.005	48.11	0.006	0.001	32 32	0.028	0.004	48.20	0.003	0.001	48.23	0.002	0.001
33.24	0.036	0.004	49.11	0.008	0.001	33 32	0.029	0.005	49.20	0.003	0 001	49.23	0.001	0 000
34.25	0 034	0.004	50.11	0.005	0.001	34.32	0.021	0.004	50.19	0.000	0.000	50.23	0.000	0.000
35.25	0 031	0.004	51.11	0 001	0.000	35 32	0.020	0.004	51.19	0.000	0.000	51.23	0 000	0 000
36.25	0 024	0.004	51 81	0.0	0.0	36.33	0.019	0.004	52.19	0.0	0.0	52.23	0.000	0 000
37.25	0.036	0.004	0.0	0.0	0.0	37.33	0.028	0 004	53.19	0.0	0.0	52.86	0.0	0 0
38 25	0.028	0.004	0.0	0.0	0.0	38.33	0.017	0.003	54.19	0 0	0.0	0.0	0.0	0 0
39.25	0.024	0.004	0.0	0.0	0.0	39.33	0.020	0.004	55.19	0.0	0 0	0.0	0.0	0 0
40.25	0.023	0.004	0.0	0.0	0.0	40.33	0.011	0.003	56.18	0.0	0.0	0.0	0 0	0 0
41.25	0.018	0 003	0.0	0 0	0.0	41.33	0.006	0.002	56 76	0.0	0.0	0.0	0.0	0.0
42.25	0.021	0.003	0.0	0.0	0.0	42.33	0.016	0.003	0.0	0.0	0.0	0.0	0.0	0.0
43.25	0.010	0 002	0.0	0.0	0.0	43.34	0.006	0.002	0.0	0.0	0.0	0.0	0.0	0 0
44.25	0.013	0.003	0.0	0.0	0.0	44 34	0.006	0.002	0.0	0.0	0 0	0.0	0.0	0.0
45.25	0.014	0.003	0.0	0.0	0.0	45.34	0.007	0.002	0.0	0 0	0.0	0.0	0.0	0.0
46 25	0 011	0.002	0.0	0.0	0.0	46.34	0.008	0.002	0.0	0.0	0 0	0.0	0.0	0.0
47.25	0.009	0.002	0.0	0.0	0.0	47.34	0.005	0.002	0.0	0.0	0.0	0 0	0.0	0.0
48.25	0.007	0.002	0 0	0.0	0.0	48.34	0.002	0.001	0.0	0.0	0.0	0.0	0.0	0.0
49.25	0.002	0.001	0.0	0.0	0.0	49.34	0.002	0.001	0.0	0.0	0.0	0 0	0.0	0.0
50 26	0.006	0 002	0 0	0.0	0.0	50.35	0.002	0 001	0.0	0.0	0.0	0 0	0 0	0 0
51.26	0.001	0.001	0.0	0.0	0.0	51.35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52 26	0.000	0 001	0.0	0.0	0.0	52.35	0.0	0.0	0.0	0 0	0.0	0.0	0.0	0 0
53.26	0.0	0.0	0.0	0.0	0.0	53.35	0.0	0.0	0.0	0.0	0 0	0 0	0.0	0.0
54.26	0.000	0.001	0.0	0.0	0.0	54.35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55 26	0.0	0.0	0.0	0.0	0.0	55 35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.26	0.0	0.0	0.0	0.0	0.0	56.35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 0
57.26	0.0	0.0	0.0	0 0	0.0	57.36	0.0	0.0	0.0	0 0	0.0	0.0	0.0	0.0
58.26	0.0	0.0	0.0	0.0	0.0	58.01	0 0	0.0	0.0	0.0	0.0	0 0	0.0	0.0
58.79	0.0	0.0	0.0	0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 16 (Cont'd)

ALPHA FROM A = 54 BOMBARDED BY 62 MEV. PROTONS

90 DEG - RUN 4010			100 DEG - RUN 2070			110 DEG - RUN 5015			120 DEG - RUN 7002			135 DEG - RUN 4011		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
14.33	0 330	0.006	5.27	0.275	0.027	14.40	0.240	0.005	5.04	0.359	0.018	14.18	0.197	0.004
15 33	0.249	0.005	5.68	0.424	0.034	15.41	0.183	0.005	5.44	0.615	0.024	15.18	0 139	0 003
16.33	0.180	0.004	6.08	0.608	0.040	16.41	0.127	0.004	5.84	0.866	0.028	16.18	0.099	0 003
17 33	0.144	0.004	6 49	0.862	0.048	17.41	0.093	0 003	6.24	1.048	0.031	17.19	0.069	0 002
18.33	0.121	0.004	6.90	1.192	0.057	18.41	0.081	0.003	6.64	1.337	0.035	18 19	0 051	0 002
19.33	0 085	0.003	7.31	1 389	0.061	19.41	0.060	0.003	7.05	1.527	0.038	19.19	0.041	0.002
20.33	0.073	0.003	7.71	1.591	0.065	20.42	0.049	0 002	7 45	1.634	0.039	20.19	0.030	0.001
21.33	0 056	0.003	8.12	1.664	0.067	21 42	0.038	0.002	7.85	1 617	0.039	21.19	0.026	0.001
22.33	0.050	0 002	8.53	1.673	0.067	22.42	0.030	0.002	8.25	1.587	0.039	22.19	0.021	0.001
23.33	0.043	0.002	8.94	1.538	0.064	23.42	0.025	0 002	8.65	1 522	0 038	23.19	0 018	0 001
24.33	0.037	0.002	9.34	1.621	0.066	24 42	0.019	0 002	9.05	1.379	0.036	24.19	0.014	0.001
25.33	0.035	0.002	9.75	1.303	0.059	25.43	0.021	0 002	9.45	1 261	0.034	25.19	0.010	0.001
26.33	0.031	0.002	10.46	1.202	0.036	26 43	0.014	0.001	10.16	1.005	0.019	26 19	0.009	0.001
27 33	0.026	0.002	11.48	0.874	0.031	27.43	0.015	0 001	11.16	0.800	0.017	27.19	0.008	0.001
28.33	0.025	0.002	12.50	0.666	0.027	28.43	0.012	0.001	12.16	0 482	0.013	28.19	0 006	0 001
29.33	0.019	0 001	13 52	0.553	0.024	29.43	0.008	0.001	13.16	0.278	0.010	29.19	0.005	0.001
30.33	0.017	0.001	14.54	0.351	0.019	30.44	0.009	0.001	14.17	0.247	0.010	30 19	0.005	0.001
31.33	0.016	0 001	15.56	0.207	0.015	31.44	0.008	0.001	15.17	0.186	0.008	31.19	0.004	0.001
32.33	0.013	0.001	16.57	0.133	0.012	32.44	0.007	0.001	16.17	0.128	0.007	32.19	0.002	0.000
33.33	0.013	0.001	17.59	0 121	0.011	33 44	0.006	0 001	17 18	0.089	0.006	33 19	0.003	0 000
34.33	0.009	0.001	18.61	0.113	0 011	34.44	0.005	0.001	18 18	0.083	0.006	34.20	0.002	0.000
35.33	0.011	0.001	19.63	0.072	0.009	35.45	0.005	0.001	19.18	0.053	0.004	35 20	0.002	0.000
36.33	0.005	0.001	20.65	0.056	0.008	36.45	0 004	0 001	20.19	0.049	0 004	36.20	0.001	0.000
37 33	0.006	0.001	21.67	0.064	0.008	37.45	0.003	0.001	21.19	0.037	0.004	37.20	0.001	0.000
38.33	0.005	0.001	22.68	0 048	0.007	38.45	0.003	0.001	22.19	0 033	0.004	38.20	0.000	0.000
39 33	0.005	0.001	23.70	0.028	0.005	39.45	0.002	0.000	23.19	0.017	0.003	39.20	0.000	0.000
40.33	0.003	0.001	24.72	0.030	0.006	40.46	0.002	0 001	24.20	0.021	0 003	40.20	0.000	0.000
41.33	0.003	0 001	25 74	0.020	0.005	41.46	0.001	0.000	25.20	0.019	0.003	41.20	0.000	0.000
42.33	0.004	0.001	26 76	0.018	0.004	42.46	0.001	0.000	26.20	0.013	0.002	42.20	0 000	0 000
43.33	0.002	0.001	27.78	0 012	0.004	43 46	0 001	0 000	27.21	0 010	0.002	43.20	0.0	0.0
44.33	0 002	0.000	28.80	0.011	0.003	44.46	0.001	0.000	28.21	0.007	0.002	44 20	0.0	0 0
45.33	0.002	0.000	29.81	0 008	0.003	45.47	0.001	0 000	29.21	0 009	0.002	45.20	0 0	0.0
46.33	0.001	0.000	30.83	0.015	0.004	46.47	0.000	0.000	30.22	0.004	0.001	46.20	0.000	0.000
47.33	0.001	0.000	31.85	0.006	0.003	47.47	0.000	0.000	31.22	0.006	0 001	47 20	0.0	0 0
48.33	0.001	0.000	32.87	0.005	0.002	48.47	0.0	0.0	32.22	0.006	0 001	48.20	0.0	0.0
49.33	0.000	0.000	33.89	0 010	0.003	49.47	0.0	0.0	33.22	0.002	0 001	49.20	0.0	0.0
50.34	0.0	0.0	34.91	0.011	0.003	0.0	0.0	0 0	34 23	0.003	0.001	50.21	0.0	0.0
51.34	0.0	0.0	35.92	0.001	0.001	0.0	0.0	0.0	35.23	0.003	0 001	51.21	0.0	0 0
52.34	0.0	0.0	36.94	0.007	0.003	0.0	0.0	0.0	36 23	0 002	0.001	52.21	0.0	0 0
53.34	0.0	0.0	37.96	0.002	0.002	0.0	0.0	0.0	37.24	0.004	0.001	53 01	0.0	0.0
54.34	0.0	0.0	38.98	0.006	0.002	0.0	0.0	0.0	38.24	0.001	0.000	0.0	0.0	0.0
55.34	0.0	0.0	40 00	0.003	0.002	0.0	0.0	0 0	39 24	0 002	0.001	0.0	0.0	0.0
56.04	0.0	0.0	41.02	0.002	0.001	0.0	0 0	0.0	40.25	0.001	0.001	0 0	0 0	0.0
0.0	0.0	0.0	42 03	0.005	0.002	0.0	0.0	0.0	41.25	0 001	0.001	0.0	0.0	0.0
0.0	0.0	0.0	43.05	0.002	0.002	0.0	0.0	0 0	42.25	0 001	0.001	0.0	0.0	0.0
0.0	0.0	0.0	44.07	0.0	0.0	0 0	0.0	0.0	43.25	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	45.09	0.0	0.0	0 0	0.0	0.0	44.26	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	46.11	0.0	0.0	0.0	0.0	0.0	45.26	0.0	0.0	0.0	0.0	0.0
0.0	0 0	0.0	47.13	0.0	0.0	0.0	0.0	0.0	46.26	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	48 14	0.0	0.0	0.0	0 0	0.0	47.27	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	49.16	0.001	0.001	0.0	0.0	0.0	48.27	0.0	0 0	0 0	0 0	0.0
0.0	0.0	0.0	49.85	0.0	0.0	0.0	0.0	0.0	49.27	0 0	0.0	0.0	0.0	0 0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.28	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0 0	0.0	0 0	51.28	0 0	0.0	0.0	0.0	0.0
0.0	0 0	0.0	0.0	0.0	0.0	0 0	0.0	0.0	52.28	0 0	0.0	0.0	0.0	0.0
0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0	0 0	53.28	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0	53.86	0.0	0.0	0.0	0.0	0 0

Table 16 (Cont'd)
ALPHA FROM A = 54 BOMBARDED BY 62 MEV. PROTONS

160 DEG - RUN 2067

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
4.67	0 48	0.04												
5.07	0.70	0.05												
5.47	0.97	0 05												
5.87	1.33	0.06												
6.27	1.49	0.07												
6.67	1.58	0.07												
7.07	1.73	0.07												
7.47	1.69	0.07												
7.87	1.54	0.07												
8.27	1.60	0.07												
8.67	1.38	0.06												
9.07	1.24	0.06												
9.47	1.13	0.06												
10.17	0.87	0.03												
11.17	0.64	0.03												
12 17	0.469	0.023												
13 17	0.334	0.020												
14.17	0.228	0.016												
15.17	0 143	0.013												
16.17	0.114	0.012												
17.17	0.064	0.009												
18.17	0.073	0.009												
19.17	0 040	0 007												
20.17	0.033	0.006												
21.17	0.012	0.004												
22.17	0.023	0.005												
23.17	0.015	0.004												
24.17	0.011	0.004												
25.17	0 013	0 004												
26.17	0.019	0 005												
27.17	0 011	0.004												
28.17	0.008	0.003												
29.17	0.002	0 002												
30.17	0.002	0.002												
31.17	0 005	0.002												
32.17	0.002	0.002												
33.17	0.001	0.001												
34.17	0.0	0.0												
35.17	0 001	0.001												
36.17	0.001	0.001												
37.17	0.0	0.0												
38.17	0.0	0.0												
39.17	0.0	0.0												
40.17	0.0	0.0												
41.17	0.0	0 0												
42.17	0.0	0.0												
43.17	0.0	0.0												
44.17	0.0	0.0												
45.17	0.0	0.0												
46.17	0.0	0.0												
47.17	0 0	0.0												
48.17	0.0	0.0												
49.17	0.0	0.0												
50.17	0.0	0.0												
51.17	0.0	0.0												
52.17	0.0	0.0												
53.17	0.0	0.0												
54.17	0.0	0.0												
55.17	0.0	0.0												
56.17	0.0	0.0												
57.17	0.0	0.0												
58.17	0.0	0.0												
59.17	0.0	0.0												
60.17	0.0	0 0												
61.17	0.0	0 0												
61.85	0.0	0.0												

Table 17

PROTON FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

15 DEG - RUN 6007			20 DEG - RUN 6006			30 DEG - RUN 6001			47 DEG - RUN 6005			60 DEG - RUN 6003		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
1.96	6.14	0.32	1.96	6.02	0.15	1.76	4 70	0.11	3.80	27 86	0.16	1 76	5.05	0.06
2.36	8 67	0 38	2.36	8.66	0.18	2.16	7.84	0 14	4.20	24.73	0.15	2.16	7.94	0.07
2.75	11 60	0 44	2.76	11 86	0.21	2 56	10.81	0.17	4.60	17.76	0.13	2.56	12.38	0.09
3.15	14 51	0 50	3.15	14.72	0.23	2.95	14.09	0.19	4.99	17 26	0.13	2.96	15.22	0.10
3 55	15.61	0.52	3.55	15.99	0.24	3.35	15.95	0 20	5.39	16.43	0 12	3.35	15.00	0.10
3 94	17 13	0.54	3.95	17 09	0 25	3 75	17.11	0.21	5.79	15 26	0.12	3.75	16.06	0.11
4 34	18.28	0.56	4.35	18 03	0.26	4.14	18 97	0.22	6.19	14.12	0.12	4 15	16.57	0.11
4.74	18 38	0.56	4.74	18 02	0.26	4 54	18.31	0 22	6 58	12.79	0.11	4.54	16.71	0.11
5.14	17 72	0 55	5 14	17.90	0.26	4.94	18.30	0.22	7 28	10.62	0.06	4.94	16.23	0.11
5 53	16.46	0.53	5.54	16.68	0.25	5 34	17.41	0 21	8.27	8.37	0.06	5 34	15.50	0.10
5.93	15 27	0.52	5.94	15 69	0.24	5 73	16 64	0 21	9.27	5 91	0.05	5.74	14.17	0.10
6 33	14.65	0.50	6.33	14.29	0.23	6.13	15 52	0.20	10.26	4.34	0.04	6 13	13 14	0.10
6.72	12.93	0.47	6 73	13.19	0.22	6.53	14.21	0.19	11.25	3.45	0.04	6.53	11.63	0.09
7.42	11.41	0.28	7 43	11.07	0.13	7 22	11 94	0.11	12.25	2.85	0.03	7.23	9.77	0.05
8.41	9.14	0 25	8.42	9.08	0.12	8.22	9.64	0.10	13.24	2.50	0.03	8.22	7.68	0.05
9 40	6 38	0.21	9.41	6.53	0.10	9.21	6.35	0.08	14 24	2.25	0 03	9.21	5.41	0.04
10 40	5.05	0 19	10.41	5.08	0.09	10.20	5.38	0.07	15.23	2.15	0.03	10.21	4.04	0.03
11.39	4 77	0 18	11.40	4.05	0.08	11.19	4.35	0.07	16.22	2.01	0 03	11.20	3.03	0.03
12.38	3.53	0.16	12.39	3 54	0.07	12.19	3.52	0 06	17.22	1.99	0.03	12.19	2.49	0.03
13 37	3.473	0.154	13 39	3.222	0.069	13.18	3 215	0.057	18.21	2.174	0.029	13.19	2.130	0.024
14.36	3.354	0.151	14.38	2.871	0.065	14.17	2.748	0.053	19.21	2.051	0.028	14.18	1.888	0.023
15.36	2.886	0 140	15 37	2.766	0.064	15.17	2.697	0 052	20.20	2.029	0.028	15.17	1.746	0.022
16 35	2.751	0 137	16 37	2 893	0.065	16 16	2.502	0.051	21.19	2.064	0 028	16.17	1.586	0.021
17 34	2.819	0 139	17.36	2.752	0.063	17.15	2 541	0.051	22 19	2.037	0 028	17 16	1.574	0.021
18.33	3.003	0.143	18.35	2 691	0.063	18 14	2.626	0.052	23 18	1.993	0 027	18.15	1.562	0.021
19 33	3.189	0.148	19 35	2 865	0.065	19.14	2.642	0.052	24.17	1.794	0 026	19.15	1.547	0.021
20.32	3.235	0.149	20.34	2.687	0.063	20 13	2.681	0.052	25 17	1 744	0 026	20.14	1.457	0.020
21 31	3.061	0.145	21 33	2.725	0.063	71.12	2.633	0 052	26.16	1.655	0.025	21 13	1.467	0.020
22.30	3 050	0.144	22.33	2.804	0.064	22.11	2.707	0.053	27.16	1.656	0.025	22.13	1 426	0.020
23.30	3 370	0.050	23 32	2.812	0.064	23.11	2.522	0.051	28.15	1 585	0.024	23.12	1.390	0.020
24 29	2 900	0.050	24 31	2 540	0.061	74.10	2 450	0.050	29.14	1.315	0.022	24.11	1.274	0.019
25.28	3.000	0.150	25.31	2.730	0.063	25.09	2.562	0.051	30.14	1.481	0.024	25.11	1.307	0.019
26.27	2.640	0.350	26.30	2.620	0.062	26.09	2.436	0.050	31.13	1.585	0.024	26.10	1.221	0.018
27.27	1 740	0.350	27 29	2 180	0.090	27.08	2.235	0.048	32.12	1.987	0.027	27.09	1.156	0.018
28.26	2.020	0.440	28.29	2.520	0.090	28.07	2.533	0.051	33.12	1.466	0.024	28.09	1 113	0.018
29.25	2.160	0.440	29 28	2.720	0.090	29 06	2 540	0.051	34.11	1.326	0.022	29.08	0.983	0.017
30.24	2.610	0.440	30 27	2.820	0.090	30.06	2 477	0.050	35.11	1.536	0.024	30.08	0.966	0.016
31.24	2.670	0.440	31.27	2.790	0.090	31.05	2.885	0.054	36.10	0.702	0.016	31.07	1.144	0.018
32.23	3.270	0.440	32.26	4 120	0.090	32.04	4.567	0 068	37.09	2.415	0.030	32.06	1.267	0.019
33 72	1.220	0 440	33.25	1.800	0.100	33.04	1.479	0.039	0.0	0.0	0.0	33.06	1.060	0.017
34.21	16.730	0.440	34.25	7.550	0.200	34.03	3.338	0.058	0.0	0 0	0.0	34.05	0.475	0.012
35 21	7.330	0.440	35.24	6.150	0 150	35.02	2.523	0.051	0.0	0.0	0.0	35.04	0.925	0.016
36 20	5 260	0.440	36.23	1.810	0.100	36.01	2.453	0.050	0.0	0.0	0.0	36.04	0.410	0.011
37.19	27.52	0.60	37.20	13 59	0.20	37.01	4.46	0.07	0 0	0.0	0.0	36 76	2.07	0.04
37.79	11 880	0.800	0.0	0.0	0.0	0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 17 (Cont'd)

PROTON FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

90 DEG - RUN 6004

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
3 96	15.06	0.09
4.35	15 16	0.10
4.75	14.89	0.09
5.15	14 00	0.09
5.55	13.07	0.09
5.95	11.84	0.08
6 34	10.73	0.08
6.74	9.11	0.07
7.44	6 60	0.04
8.43	4.36	0.03
9.43	3.60	0.03
10.42	2.26	0.02
11.42	1.76	0.02
12.42	1.47	0.02
13.41	1.27	0.02
14.41	1.05	0 02
15.40	0.96	0.02
16.40	0.90	0.01
17.39	0.832	0.014
18 39	0.751	0.013
19.38	0.721	0.013
20.38	0.665	0.013
21.37	0.633	0.012
22.37	0.556	0.012
23.36	0.562	0.012
24.36	0.544	0.011
25.35	0.469	0.011
26.35	0.437	0.010
27.34	0.401	0.010
28.34	0.351	0.009
29.33	0.355	0.009
30.33	0 314	0.009
31.32	0.374	0.009
32.32	0.373	0.009
33.31	0.233	0.007
34.31	0.291	0.008
35.30	0.239	0.008
36.30	0.395	0.010
36.87	0.047	0.009
0.0	0 0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0 0	0.0	0.0

120 DEG - RUN 6010

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
1.57	4.74	0.05
1.97	7.75	0.07
2.37	10.91	0.08
2.76	13.40	0.09
3.16	16.18	0.10
3.56	16.57	0.10
3.96	16.66	0.10
4.36	16.37	0 10
4.76	15.66	0.10
5.15	14.57	0.10
5 55	13 25	0.09
5.95	11.93	0.09
6.35	10.63	0.08
6.75	9.41	0.08
7.45	7 40	0.04
8.44	5.59	0.04
9.44	3.66	0.03
10.43	2.55	0.03
11.43	1.860	0.021
12.43	1.459	0.019
13.42	1.163	0.017
14.42	0.931	0 015
15.41	0.812	0.014
16.41	0.683	0.013
17.41	0.613	0.012
18.40	0.574	0.012
19 40	0.508	0 011
20.39	0 462	0.011
21.39	0.375	0.010
22.39	0.342	0.009
23.38	0.314	0.009
24.38	0.266	0.008
25.37	0.213	0.007
26.37	0.227	0.008
27 37	0 184	0.007
28.36	0.160	0.006
29.36	0.151	0.006
30.35	0.159	0.006
31 35	0.056	0.004
32.35	0.084	0.005
33.34	0.099	0.005
34.34	0.041	0.003
35.26	0.143	0.006

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

Table 18

DEUTERON FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

15 DEG – RUN 6007			20 DEG – RUN 6006			30 DEG – RUN 6001			47 DEG – RUN 6005			60 DEG – RUN 6003		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
4.94	0.122	0.046	3.15	0.094	0 018	3.55	0 083	0.015	4.65	0.285	0.016	2.76	0.080	0.007
5.33	0.237	0.064	3.55	0.090	0.018	3.95	0.129	0.018	5 04	0.335	0.018	3 15	0.068	0.007
5.73	0.302	0.072	3.95	0.130	0.022	4.34	0.234	0.024	5.44	0.256	0.016	3.55	0.132	0.010
6.13	0.354	0.078	4.35	0.240	0.030	4.74	0.218	0.024	5.84	0.277	0.016	3.95	0.153	0.010
6.53	0.182	0.056	4.74	0.223	0.029	5.14	0.279	0.027	6.24	0.270	0.016	4.35	0.166	0.011
7.72	0.442	0.055	5.14	0.294	0.033	5.53	0.313	0.028	6.63	0.244	0.015	4.74	0.216	0.012
8.21	0.325	0.047	5 54	0 325	0.034	5.93	0.279	0.027	7.33	0.254	0 010	5.14	0.234	0.013
9 20	0.303	0.045	5.94	0.271	0.031	6.33	0.330	0.029	8.32	0.253	0.010	5.54	0 226	0.013
10.20	0.416	0.053	6.33	0.324	0.034	6.73	0.287	0 027	9.32	0.250	0.010	5.94	0.250	0.013
11.19	0.403	0.052	6.73	0.318	0.034	7 42	0.314	0 018	10.31	0 229	0.009	6.33	0.242	0.013
12.18	0.387	0.051	7.43	0.354	0.023	8.41	0.321	0.018	11.30	0.248	0.010	6.73	0.219	0.012
13.17	0.403	0.052	8.42	0.349	0.023	9.41	0.306	0.018	12 30	0.221	0.009	7.43	0.227	0.008
14.17	0.390	0.052	9 41	0.357	0.023	10.40	0.325	0.018	13.29	0.246	0.010	8.42	0.217	0.008
15.16	0.356	0.049	10 41	0.382	0.024	11.39	0.356	0.019	14.29	0.242	0.010	9.41	0.205	0.008
16.15	0 400	0.052	11.40	0.394	0.024	12.39	0.365	0.019	15.28	0.231	0.009	10 41	0.208	0.008
17.14	0.444	0.055	12.39	0.450	0.026	13.38	0.370	0.019	16.27	0.260	0.010	11.40	0.194	0.007
18.14	0.427	0.054	13 39	0.428	0.025	14.37	0.375	0.020	17.27	0.231	0.009	12.39	0.203	0.008
19.13	0.504	0.059	14.38	0.401	0.024	15.36	0.350	0.019	18.26	0.221	0.009	13.39	0.183	0.007
20.12	1.154	0.089	15.37	0.436	0.025	16.36	0.340	0.019	19.25	0.456	0.013	14.38	0.178	0.007
21 11	0 513	0.059	16.37	0.469	0.026	17.35	0.416	0.021	20.25	0.313	0.011	15.37	0.163	0.007
22.11	0.480	0.057	17.36	0.516	0.027	18.34	0.368	0.019	21.24	0 150	0.008	16.37	0.192	0.007
23.10	1.436	0.099	18.35	0.506	0.027	19.33	0 467	0.022	22.24	0.496	0.014	17.36	0.148	0.006
24.09	2.380	0 127	19.35	0.613	0.030	20 33	0.592	0.025	23.23	0.421	0.013	18 35	0.156	0.007
25.08	0.488	0.058	20.34	1.121	0.040	21.32	0.300	0.017	24.22	0.533	0 014	19.35	0.211	0.008
26.08	0.171	0.034	21.33	0.440	0.025	22.31	0.572	0.024	25.22	0.040	0.004	20.34	0.113	0.006
27.07	3.878	0.163	22.33	0 406	0.024	23.31	1.575	0.040	26.21	0.187	0.008	21.33	0.105	0.005
28.06	0.107	0.027	23.32	1.984	0.054	24.30	0.989	0.032	27.21	0 730	0.017	22.33	0 279	0.009
28.66	0.112	0.062	24.31	2.526	0.061	25.29	0.132	0.012	28.00	0.012	0.003	23.32	0.289	0.009
0.0	0 0	0.0	25.31	0.155	0.015	26.28	0.121	0.011	0.0	0.0	0.0	24.31	0.044	0.004
0.0	0.0	0 0	26.30	0.115	0.013	27.28	2.544	0.051	0.0	0.0	0.0	25.31	0.033	0.003
0.0	0.0	0.0	27.29	4.126	0.078	28.20	0.085	0.010	0.0	0.0	0.0	26.30	0.470	0.011
0.0	0 0	0.0	28.26	0.159	0.016	0.0	0.0	0 0	0.0	0.0	0.0	27.29	0.014	0.002
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.89	0.001	0.001

Table 18 (Cont'd)

DEUTERON FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

90 DEG - RUN 6004

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
5.18	0.200	0.011
5.50	0 197	0.011
5 90	0.187	0.011
6.29	0 197	0.011
6.69	0.184	0.010
7.39	0.174	0.006
8.38	0.166	0.006
9.38	0.131	0.006
10.37	0.138	0.006
11.37	0.131	0.006
12 37	0.111	0.005
13.36	0.101	0.005
14.36	0.089	0.005
15.35	0.082	0.004
16.35	0.056	0.004
17.34	0.052	0 004
18.34	0.065	0.004
19.33	0.039	0.003
20.33	0.034	0.003
21.32	0.080	0.004
22.32	0.082	0.004
23.31	0.033	0.003
24.31	0.015	0.002
25.30	0.184	0.007
26.30	0.018	0.002
27.29	0.001	0.001
28.29	0.000	0.000
29.28	0.0	0.0
30.28	0.0	0.0
31.27	0.0	0.0
31.90	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0

120 DEG - RUN 6010

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
2.02	0.030	0.004
2.42	0.046	0.005
2.81	0.061	0.006
3.21	0.107	0.008
3.61	0.150	0.010
4.01	0.179	0.011
4.41	0.201	0.011
4.81	0.199	0.011
5.20	0.211	0.011
5.60	0.193	0.011
6.00	0.181	0.011
6.40	0.165	0.010
6.80	0.134	0.009
7.49	0.146	0.006
8.49	0.118	0.005
9.49	0.101	0.005
10.48	0.085	0.005
11.48	0.075	0.004
12.47	0.076	0.004
13.47	0.063	0.004
14 47	0.055	0.004
15.46	0.048	0.003
16.46	0.042	0.003
17.45	0.041	0.003
18.45	0.034	0.003
19.45	0.024	0.002
20.44	0.053	0.004
21.44	0.049	0.003
22.43	0.024	0.002
23.43	0.010	0.002
24.43	0.053	0.004
25.42	0.022	0.002
26.14	0.001	0.001

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

Table 19

TRITON FROM A = 54 BOMBARDED BY 39 MEV. PROTONS

15 DEG - RUN 6007			20 DEG - RUN 6006			30 DEG - RUN 6001			47 DEG - RUN 6005			60 DEG - RUN 6003		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.48	0.031	0 023	6.48	0 022	0.009	6.48	0.021	0.007	6.43	0.013	0.004	6.43	0.016	0 003
7.17	0.022	0 012	7.18	0.033	0 007	7.17	0.036	0.006	7.13	0 020	0 003	7.13	0.018	0.002
8.16	0.046	0 018	8.17	0.043	0.008	8 17	0 028	0.005	8 12	0.026	0.003	8.12	0.017	0.002
9.15	0 078	0.023	9.16	0 034	0.007	9.16	0 036	0 006	9 12	0.031	0 003	9.11	0.019	0.002
10.15	0.045	0.017	10.16	0.043	0.008	10.15	0.033	0.006	10.11	0.024	0.003	10.11	0 021	0.002
11.14	0.041	0 017	11.15	0.043	0.008	11.14	0.052	0.007	11.11	0 024	0.003	11.10	0.020	0.002
12.13	0 055	0.019	12.14	0.056	0.009	12 14	0.039	0.006	12.10	0 027	0.003	12.09	0.019	0.002
13 12	0 050	0 018	13 14	0 044	0.008	13.13	0.025	0.005	13.09	0 026	0.003	13.09	0 018	0.002
14 12	0 079	0.023	14.13	0 092	0.012	14.12	0 055	0.007	14.09	0.034	0 004	14 08	0.014	0.002
15.11	0.070	0 022	15.12	0.044	0.008	15.12	0.032	0.006	15.08	0.021	0 003	15 07	0.015	0.002
16.10	0.073	0.022	16.12	0.089	0.011	16.11	0.071	0.009	16.07	0 026	0.003	16.07	0 024	0.003
17 09	0 029	0 014	17 11	0.058	0.009	17.10	0.036	0.006	17.07	0.024	0.003	17.06	0.015	0 002
18 09	0 046	0.018	18.10	0.056	0.009	18.09	0.045	0.007	18.06	0.020	0.003	18 06	0.005	0.001
19.08	0 0	0.0	19.10	0.013	0.004	19 09	0 013	0.004	19 06	0.005	0.001	19 05	0.003	0.001
20.07	0 007	0 007	20.09	0.020	0.005	20.08	0 007	0.003	20.05	0.008	0.002	20.04	0.002	0.001
21.06	0 015	0.010	21.08	0.018	0.005	21.07	0.019	0.004	21.04	0.011	0.002	21.04	0.013	0.002
22 06	0 157	0.033	22.08	0.244	0.019	22.06	0.079	0.009	22.04	0 080	0.006	22 03	0 007	0.001
23 05	0 101	0.026	23 07	0.143	0.014	23.06	0.012	0.003	23.03	0.0	0.0	23.02	0.000	0.000
23.97	0 008	0.008	23.97	0 006	0 003	23.88	0.002	0.002	23 70	0 0	0.0	0.0	0.0	0.0

Table 19 (Cont'd)

TRITON FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

90 DEG - RUN 6004

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.64	0.008	0.002
7.34	0 009	0 001
8.33	0.011	0.002
9.33	0.010	0.002
10.33	0.007	0.001
11.32	0.009	0.002
12.32	0.008	0.001
13.31	0.009	0 002
14.31	0.007	0.001
15.30	0 009	0.001
16 30	0 008	0.001
17.29	0.001	0.001
18.29	0 001	0 001
19.28	0.002	0 001
20 28	0.004	0.001
21.27	0.001	0.001
22.27	0.000	0 000
23.26	0.0	0.0
24.26	0 001	0 000
25.25	0.0	0.0
26.25	0.000	0.000
26.90	0.000	0.000

120 DEG - RUN 6010

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6.60	0.008	0.002
7 30	0.005	0.001
8.29	0.005	0.001
9.29	0.006	0.001
10 28	0 005	0.001
11 28	0.006	0.001
12.28	0.004	0.001
13.27	0 002	0.001
14.27	0.005	0.001
15.26	0 003	0.001
16.26	0.003	0.001
17.26	0.000	0.000
18.25	0.001	0.000
19.25	0.001	0.001
20.24	0 001	0.001
21.21	0.0	0.0
0 0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR

Table 20

HELIUM-3 FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

15 DEG - RUN 6007			20 DEG - RUN 6006			30 DEG - RUN 6001			47 DEG - RUN 6005			60 DEG - RUN 6003		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12 73	0 294	0.045	7.33	0.012	0.007	12.73	0.230	0.015	7.28	0 009	0.003	12.74	0.138	0.006
13 72	0.202	0.037	7.72	0.012	0.007	13.73	0.186	0 014	7.68	0.013	0.003	13.73	0.104	0.005
14.71	0.149	0.032	8.12	0.026	0 010	14.72	0.151	0.012	8.07	0.007	0.003	14.73	0.076	0.005
15.70	0.142	0.031	8.52	0.011	0.006	15.71	0.126	0.011	8.47	0.007	0.003	15.72	0.069	0.004
16 70	0.166	0.034	8.92	0.036	0.011	16.70	0.105	0.010	8.87	0.001	0 001	16.71	0.054	0.004
17.69	0.150	0 032	9.31	0.035	0.011	17 70	0.084	0 009	9.27	0 002	0.001	17.71	0.048	0.004
18.68	0.110	0.027	9.71	0.047	0.013	18.69	0.084	0.009	9.66	0.004	0.002	18.70	0.034	0.003
19.67	0.078	0.023	10.41	0.029	0.007	19.68	0.087	0.009	10.36	0.011	0 002	19.69	0.038	0.003
20.67	0.139	0.031	11.40	0.153	0.015	20.68	0.111	0.011	11.35	0 106	0.006	20.69	0.042	0.003
21.66	0.230	0.040	12.39	0.232	0.018	21.67	0.156	0.013	12.35	0.199	0.009	21.68	0.030	0.003
22.65	0.144	0.031	13.39	0.197	0.017	22.66	0.067	0.008	13 34	0.142	0 007	22.67	0.016	0.002
23.64	0.016	0.010	14 38	0.166	0.016	23.65	0.064	0.008	14.34	0.106	0 006	23.67	0.028	0.003
24.64	0.120	0 029	15 37	0.148	0.015	24.65	0.053	0.007	15 33	0.092	0.006	24.66	0.011	0.002
25.63	0.056	0.020	16.37	0.158	0.015	25.64	0.041	0 006	16.32	0.077	0.005	25 51	0.009	0.002
26.45	0.062	0.026	17 36	0.126	0.014	26.36	0.024	0.007	17.32	0.064	0.005	0.0	0.0	0.0
0.0	0.0	0.0	18.35	0.128	0.014	0.0	0.0	0.0	18.31	0.045	0.004	0.0	0.0	0.0
0.0	0.0	0 0	19.35	0.113	0.013	0.0	0.0	0.0	19.30	0.051	0 004	0.0	0.0	0.0
0.0	0.0	0.0	20.34	0.151	0.015	0.0	0.0	0.0	20 30	0.051	0.004	0.0	0.0	0.0
0.0	0.0	0.0	21.33	0.150	0.015	0.0	0.0	0.0	21.29	0.087	0.006	0.0	0.0	0.0
0.0	0 0	0.0	22.33	0.258	0.019	0.0	0.0	0.0	22.29	0.044	0.004	0.0	0.0	0.0
0 0	0 0	0.0	23.32	0.045	0.008	0.0	0.0	0.0	23.28	0.046	0.004	0.0	0.0	0.0
0.0	0 0	0.0	24.31	0.098	0.012	0.0	0 0	0.0	24.27	0.038	0.004	0.0	0.0	0 0
0.0	0.0	0.0	25.31	0.030	0.007	0.0	0.0	0.0	25.27	0.015	0.002	0.0	0.0	0.0
0.0	0.0	0.0	26.28	0.034	0.007	0.0	0.0	0.0	25.99	0.018	0.004	0.0	0.0	0.0

Table 20 (Cont'd)

HELIUM-3 FROM A = 54 BOMBARDED BY 39 MEV PROTONS.

90 DEG - RUN 6004			120 DEG - RUN 6010								
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
13.06	0.073	0.004	12.87	0.060	0.004									
14.06	0.047	0.003	13.87	0.043	0.003									
15.05	0 043	0.003	14.87	0.030	0.003									
16.05	0.028	0.003	15.86	0.022	0.002									
17.04	0.022	0.002	16.86	0.015	0.002									
18.04	0.019	0 002	17.85	0.011	0.002									
19 03	0.015	0.002	18.85	0.011	0.002									
20.03	0.019	0.002	19.85	0.009	0.002									
21.02	0.012	0 002	20.84	0.004	0.001									
22.02	0.010	0.002	21.84	0.006	0.001									
23.01	0.007	0.001	22.83	0.002	0.001									
24 01	0.004	0.001	23.63	0.002	0.001									
25.00	0.004	0 001	0 0	0.0	0.0									
26.00	0.002	0.001	0.0	0.0	0.0									
26.99	0.000	0.000	0.0	0.0	0.0									
27 99	0.002	0 001	0.0	0.0	0.0									
28.99	0.000	0.000	0.0	0.0	0.0									
29.98	0.0	0.0	0.0	0.0	0.0									
30.98	0.000	0.000	0.0	0.0	0.0									
31.97	0 0	0.0	0.0	0.0	0.0									
32.97	0 0	0.0	0.0	0.0	0.0									
33 96	0 0	0.0	0.0	0.0	0 0									
34.73	0.0	0.0	0.0	0.0	0.0									

Table 21

ALPHA FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

15 DEG - RUN 6007			20 DEG - RUN 6006			30 DEG - RUN 6001			47 DEG - RUN 6005			60 DEG - RUN 6003		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
4 44	0.040	0.076	4.59	0.081	0.017	7 32	1.126	0.054	5.19	0.073	0 008	4.74	0.085	0 008
4 84	0 057	0.031	4.99	0.072	0.016	7.72	1.434	0.060	5.59	0.089	0.009	5.14	0.123	0.009
5 23	0.106	0.043	5.39	0.154	0.024	8.12	1.687	0.066	5.99	0.099	0 010	5.54	0.190	0.012
5 63	0.113	0.044	5.79	0.167	0.025	8.51	2.002	0.071	6.39	0 124	0.011	5.94	0.323	0.015
6 03	0.152	0.051	6.18	0.331	0.035	8.91	2 123	0.074	6.78	0.199	0.014	6.33	0.622	0.021
6.43	0.319	0.074	6.58	0.483	0.042	9.31	2.159	0.074	7.18	0.313	0.017	6.73	0.839	0.024
6.82	0.52	0 09	6.98	0.72	0.05	9 70	2.03	0.07	7.58	0.48	0.02	7.13	1.12	0.03
7 22	0 71	0 11	7.38	1.06	0.06	10.40	1 83	0.04	7.98	0.78	0.03	7.53	1.40	0.03
7 62	1.00	0.13	7 77	1.26	0.07	11 39	1.30	0.04	8.37	1.08	0.03	7.92	1 64	0.03
8 01	1 30	0.15	8.17	1.60	0.08	12.39	0.81	0.03	8.77	1.37	0.04	8.32	1 73	0.03
8.41	1.62	0.17	8.57	1.88	0.08	13 38	0.52	0 02	9.17	1.63	0.04	8.72	1.79	0.04
8.81	1.97	0.18	8.97	2.03	0.09	14.37	0 47	0.02	9.57	1.87	0.04	9.11	1.73	0.03
9.20	2.08	0.19	9.36	2.07	0.09	15 36	0 31	0.02	10.26	1.86	0.03	9.51	1.64	0.03
9.60	2 103	0.189	9.76	2.082	0 087	16.36	0.244	0.016	11.25	1.621	0 025	10.21	1.429	0.020
10.30	1.931	0 115	10.46	1.955	0.053	17.35	0.264	0.016	12 25	1.525	0.024	11.20	1.029	0.017
11.29	1.491	0.101	11 45	1.311	0.044	18.34	0.222	0.015	13.24	1.059	0.020	12.19	0.632	0.013
12.28	0.955	0.081	12.44	0.816	0.035	19 33	0.185	0.014	14.24	0.365	0.012	13.19	0.344	0.010
13.27	0.575	0.063	13.44	0.615	0.030	20 33	0.167	0.013	15.23	0.279	0.010	14.18	0.262	0.009
14.27	0.452	0 056	14.43	0.458	0.026	21.32	0.157	0 013	16.22	0.216	0.009	15.17	0.196	0 007
15 26	0.376	0.051	15.42	0.320	0.022	22.31	0.122	0.011	17.22	0.165	0 008	16.17	0.159	0.007
16.25	0 303	0 045	16 42	0.378	0.022	23.31	0.135	0.012	18.21	0.141	0.007	17.16	0.135	0.006
17 24	0.324	0.047	17.41	0 236	0.019	24.30	0.138	0.012	19.21	0.116	0 007	18.15	0.108	0.005
18.24	0 244	0 041	18.40	0.255	0.019	25.29	0.103	0.010	20.20	0.116	0.007	19.15	0.085	0.005
19.23	0.188	0.036	19.40	0 216	0.018	26.28	0.100	0.010	21.19	0.087	0.006	20.14	0.079	0.005
20.22	0.208	0.038	20.39	0 202	0.017	27.28	0.143	0.012	22.19	0.091	0.006	21.13	0.078	0.005
21.21	0.178	0 035	21 38	0 176	0.016	28.27	0.083	0.009	23.18	0.082	0 006	22.13	0.064	0 004
22.20	0.135	0 030	22.38	0 179	0.016	29.26	0.070	0.008	24.17	0.090	0 006	23.12	0.066	0.004
23 20	0.176	0.035	23.37	0.148	0.015	30.26	0.128	0.011	25 17	0.070	0 005	24.11	0.051	0.004
24 19	0.193	0 036	24 36	0.161	0.015	31 25	0.034	0.006	26 16	0.055	0.005	25.11	0.051	0.004
25.18	0.214	0 038	25.36	0.172	0.016	32.24	0.022	0 005	27.16	0 055	0 005	26.10	0.050	0 004
26 17	0.209	0.038	26.35	0.128	0 014	33.23	0.006	0.002	28.15	0.039	0.004	27.09	0 033	0.003
27.17	0.247	0.041	27.34	0 202	0 017	34.23	0.038	0.006	29.14	0.052	0.004	28 09	0 029	0.003
28.16	0.165	0.034	28 34	0.122	0.013	34.87	0 003	0.003	30.14	0.024	0 003	29.08	0.035	0.003
29.15	0 074	0.023	29.33	0.079	0.011	0.0	0.0	0.0	31.13	0.009	0 002	30.08	0.007	0.001
30.14	0.201	0.037	30.32	0.148	0.015	0 0	0.0	0.0	32.12	0.009	0.002	31.07	0.002	0 001
31.14	0.064	0.021	31.32	0 026	0.006	0.0	0.0	0.0	33.12	0.009	0.002	32.06	0.003	0 001
32.13	0.055	0.019	32.31	0.052	0.009	0.0	0 0	0.0	34.11	0.001	0.001	33.06	0.006	0.001
33.12	0.049	0.018	33.30	0 011	0 004	0.0	0.0	0.0	34.81	0.0	0.0	34.05	0 0	0.0
34 11	0.061	0.020	34 30	0.038	0.007	0.0	0.0	0.0	0.0	0.0	0.0	34 77	0.0	0.0
34.81	0.0	0 0	34 89	0 007	0 007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 21 (Cont'd)

ALPHA FROM A = 54 BOMBARDED BY 39 MEV. PROTONS.

90 DEG - RUN 6004			120 DEG - RUN 6010								
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
14.36	0.133	0.006	4.06	0.081	0.007									
15.35	0.099	0.005	4.46	0.178	0.011									
16 35	0.077	0.004	4.86	0.298	0.014									
17.34	0.058	0.004	5.25	0.460	0.017									
18.34	0.051	0.004	5.65	0.747	0.022									
19.33	0.04	0 00	6 05	1.04	0.03									
20.33	0 04	0.00	6 45	1.26	0.03									
21.32	0.03	0.00	6 85	1 46	0 03									
22.32	0 03	0.00	7.25	1.58	0.03									
23.31	0.02	0.00	7.64	1.68	0.03									
24 31	0.01	0 00	8 04	1.60	0.03									
25.30	0.02	0.00	8.44	1.51	0.03									
26 30	0 01	0.00	8.84	1.36	0.03									
27.29	0.01	0.00	9.24	1.15	0.03									
28.29	0.01	0.00	9.64	1.02	0.03									
29 28	0 002	0.001	10.33	0 800	0.014									
30 28	0 002	0.001	11.33	0.478	0.011									
31.27	0.000	0.000	12 33	0.257	0.008									
32.27	0.001	0.001	13.32	0.158	0.006									
33.26	0 0	0.0	14.32	0.112	0.005									
34.26	0 0	0.0	15.31	0.080	0.004									
34.88	0 0	0.0	16 31	0 062	0.004									
0.0	0 0	0.0	17.31	0.042	0.003									
0.0	0 0	0.0	18.30	0.036	0.003									
0 0	0 0	0.0	19.30	0 029	0.003									
0.0	0.0	0.0	20.29	0.021	0.002									
0 0	0 0	0.0	21 29	0 018	0.002									
0.0	0.0	0.0	22.29	0.013	0.002									
0.0	0.0	0 0	23.28	0.012	0.002									
0 0	0 0	0 0	24.28	0.010	0.002									
0 0	0.0	0.0	25.27	0.007	0.001									
0.0	0.0	0.0	26.27	0.005	0.001									
0.0	0.0	0.0	27.27	0.004	0.001									
0 0	0.0	0 0	28.26	0.0	0.0									
0 0	0 0	0.0	29.26	0.001	0.000									
0.0	0 0	0.0	30.25	0 000	0.000									
0.0	0.0	0 0	31.25	0.0	0.0									
0.0	0.0	0 0	32.25	0.0	0.0									
0.0	0.0	0 0	33.24	0.0	0.0									
0.0	0.0	0.0	33.96	0.0	0.0									

Table 22

PROTON FROM A = 54 BOMBARDED BY 29 MEV. PROTONS.

15 DEG - RUN 10			30 DEG - RUN 1			60 DEG - RUN 14			90 DEG - RUN 15			125 DEG - RUN 17		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERCY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
2 78	8 34	0.33	1.89	4.37	0.08	2.08	4.97	0.07	1.68	3.87	0.07	1.58	3.38	0.06
3.18	14.52	0.43	2 30	6.23	0.09	2.48	6.65	0 08	2.09	5.65	0.08	1.99	5.23	0.08
3.58	17.74	0.48	2.70	8.01	0.10	2.88	9 45	0.10	2.49	7.42	0.09	2.39	7.17	0 09
3.99	19.96	0.51	3.10	13.61	0.14	3.29	15.04	0.12	2.89	10.29	0.11	2.79	9 76	0.10
4.39	22.80	0.54	3.51	14.44	0.14	3.69	15.16	0.12	3.29	15.88	0.14	3.19	15.21	0.13
4.79	22.48	0.54	3.91	16.32	0.15	4.09	16 45	0.13	3.69	15.75	0.14	3.59	15.51	0.13
5.19	21.18	0 52	4.31	17.82	0.15	4.49	17.23	0.13	4.10	16.57	0.14	4.00	15.83	0.13
5.59	20.88	0 52	4.72	18.12	0.16	4.89	16.90	0.13	4.50	16.65	0.14	4.40	15.79	0.13
5.99	19.93	0.51	5.12	17.86	0.15	5.29	16.41	0.13	4.90	15.99	0.14	4.80	15.31	0.13
6.39	18.80	0 49	5 52	17.37	0.15	5.69	15.72	0.12	5.30	15.26	0.13	5.20	14.27	0.13
6.79	18 80	0.49	5.93	16.51	0.15	6.09	14.07	0.12	5.71	14.08	0.13	5.60	13.08	0.12
7.49	15.56	0.28	6.33	15.01	0.14	6.50	12.73	0.11	6.11	12.38	0.12	6.01	11.43	0.11
8.50	14.29	0.27	6 74	13.42	0 13	7.20	10.54	0.06	6.51	11.34	0.11	6.41	10.17	0.11
9.50	8 73	0.21	7.44	10.94	0.08	8.20	7.69	0.05	7.21	8.73	0.06	7.11	7.75	0.06
10.50	9.16	0.22	8.45	8.69	0.07	9.20	4.60	0.04	8.22	6.35	0.05	8.12	5.36	0.05
11.50	7.77	0.20	9.46	5.30	0.05	10.21	4.19	0.04	9.22	3.78	0.04	9.12	3.24	0.04
12.51	7.58	0.20	10.47	4.93	0.05	11.21	3.11	0.03	10.23	3.19	0.04	10 13	2.64	0.03
13 51	7 31	0.19	11.48	3.81	0.05	12.21	2.51	0.03	11.24	2.25	0.03	11.13	1.82	0.03
14.51	6.423	0.181	12.49	3.234	0 042	13.22	2.158	0 029	12.24	1.741	0.028	12.14	1.340	0.025
15 52	6.255	0.180	13.50	2.735	0.038	14.22	1.840	0.027	13.25	1.391	0.025	13.14	1.002	0.021
16 52	5.639	0.171	14.50	2.471	0.036	15.22	1.652	0.025	14.25	1.147	0.023	14.15	0.851	0.020
17.52	5.990	0.176	15.51	2.411	0.036	16.23	1.519	0.024	15.26	1.040	0.022	15.15	0.662	0.017
18 52	5.948	0.175	16.52	2 204	0.034	17.23	1.464	0.024	16.26	0.875	0.020	16.16	0.587	0.016
19.53	6 007	0.176	17.53	2.220	0.035	18.23	1.419	0.024	17.27	0.836	0.020	17.16	0.498	0.015
20.53	6.035	0.177	18.54	2.281	0.035	19.24	1.178	0.022	18.27	0 726	0.018	18.17	0.461	0.014
21.53	5.795	0.173	19.55	2.248	0.035	20.24	1.271	0.022	19.28	0.672	0.018	19.17	0.379	0.013
22.53	6.423	0.182	20.56	2.529	0.037	21.24	1.347	0 023	20.28	0.730	0.018	20.18	0.403	0.013
23.54	5.443	0.168	21.57	2.836	0.039	22.25	1.645	0.025	21.29	0.873	0.020	21.18	0.415	0.014
24.54	5.801	0.173	22.58	3.488	0.043	23.25	1.236	0 022	22.29	0.387	0.013	22.19	0.235	0.010
25.54	8.035	0 204	23.59	2.739	0.038	24.25	0.748	0.017	23.30	0.462	0.015	23.19	0.182	0.009
26.54	3.016	0 125	24.59	2.074	0.033	25.26	1.309	0.023	24.31	0 474	0.015	24.20	0.299	0.012
27.45	10.590	0.262	25.60	4.112	0.047	26.26	0.355	0.012	25.31	0.634	0.017	25.21	0.057	0.005
0 0	0.0	0.0	26.61	0.554	0.017	27.09	2.587	0.040	26.32	0.720	0.018	26.21	0.288	0.011
0 0	0 0	0.0	27.37	8.847	0.097	0.0	0.0	0.0	27.02	0.158	0.014	0.0	0.0	0.0

Table 23

DEUTERON FROM A = 54 BOMBARDED BY 29 MEV. PROTONS.

15 DEG - RUN 10			30 DEG - RUN 1			60 DEG - RUN 4			90 DEG - RUN 7			125 DEG - RUN 17		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
3.48	0.266	0 059	2 75	0.151	0.014	3.14	0.039	0.005	2.54	0 021	0.004	2.44	0.015	0.004
3.89	0.253	0.057	3.15	0.097	0.011	3.54	0.052	0.006	2.94	0.029	0.005	2.84	0.033	0.006
4.29	0 345	0.067	3.56	0.071	0 010	3.94	0.109	0.009	3.35	0.056	0.007	3.24	0.054	0.008
4.69	0.224	0.054	3.96	0.112	0.012	4.35	0.159	0.010	3.75	0.089	0.009	3.64	0.075	0.009
5.09	0.196	0.050	4.36	0.161	0.015	4.75	0.152	0.010	4.15	0.142	0.011	4.05	0.118	0.012
5.49	0.158	0.045	4.77	0.191	0.016	5.15	0.155	0.010	4 55	0.147	0.011	4.45	0.123	0.012
5.89	0.278	0.060	5.17	0.203	0.016	5.55	0.184	0.011	4.96	0.152	0.011	4.85	0.152	0.013
6.29	0.286	0.061	5.57	0.233	0.018	5.95	0.219	0.012	5.36	0.143	0.011	5.25	0.114	0.011
6.69	0 227	0.054	5.98	0.246	0.018	6.36	0.188	0.011	5.76	0.148	0.011	5.65	0.094	0.010
7.39	0.289	0.039	6.38	0.251	0.018	6.76	0.187	0.011	6.16	0.154	0.012	6.06	0.123	0.012
8.40	0.350	0.043	6.79	0.274	0.019	7.46	0.183	0.007	6.57	0.148	0.011	6.46	0.111	0.011
9.40	0.357	0.043	7.49	0.259	0.012	8.47	0.161	0.007	7.27	0.118	0.006	7.16	0.081	0.006
10 40	0 826	0.065	8.50	0.272	0.012	9.47	0.213	0.008	8.28	0.124	0.007	8.17	0.069	0.006
11.40	0.363	0.043	9.51	0.317	0 013	10.48	0.143	0.006	9.28	0.132	0.007	9.17	0.077	0.006
12.41	0.201	0.032	10.52	0.384	0.014	11.48	0.112	0.005	10.29	0.078	0.005	10.18	0.048	0.005
13.41	0.841	0.066	11.53	0.256	0.012	12.49	0.306	0 009	11.29	0.102	0.006	11.18	0.072	0.006
14.41	1.774	0.096	12.54	0.204	0.010	13.49	0.267	0.008	12.30	0.117	0.006	12.19	0.055	0.005
15.41	0.527	0.052	13.55	1.516	0.029	14.50	0.211	0.007	13.31	0.168	0.008	13.19	0.066	0.005
16.42	0.287	0.039	14.55	0.904	0.022	15.50	0.025	0.003	14.31	0.039	0.004	14.20	0.014	0.003
17.42	1.662	0.093	15.56	0.124	0.008	16.51	0.604	0.013	15.32	0.025	0.003	15.20	0.032	0.004
18.42	0.046	0.016	16.57	0.100	0.007	17.51	0.077	0.005	16.33	0.238	0.009	16.21	0.066	0.005
19 05	0.002	0.007	17.58	3.057	0.040	18.34	0.005	0.001	17.33	0.008	0.002	17.04	0.000	0.001
0.0	0.0	0.0	18.59	0.081	0.007	0.0	0.0	0.0	17.96	0.002	0.002	0.0	0.0	0.0
0.0	0.0	0.0	19.15	0.071	0.019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 24

TRITON FROM A = 54 BOMBARDED BY 29 MEV. PROTONS.

15 DEG – RUN 10			30 DEG – RUN 1			60 DEG – RUN 4			90 DEG – RUN 7			125 DEG – RUN 17		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
6 59	0 041	0 023	6 63	0.020	0.005	6.66	0.017	0.003	6.72	0.006	0.002	6.66	0.006	0.003
7 29	0.031	0 013	7.34	0 028	0.004	7.36	0.009	0.002	7 42	0.010	0.002	7 36	0.001	0.001
8.30	0 051	0.016	8.35	0.031	0.004	8.37	0 015	0.002	8.43	0.005	0 001	8.37	0.003	0.001
9 30	0 026	0.012	9.36	0.006	0.002	9.37	0 007	0.001	9.43	0.003	0.001	9.37	0.001	0.001
10.30	0.026	0 012	10 37	0.013	0.003	10.38	0 004	0.001	10.44	0.010	0.002	10.38	0.001	0.001
11 30	0 031	0 013	11.38	0 006	0.002	11.38	0.018	0.002	11.45	0.008	0.002	11.38	0.007	0.002
12 31	0 047	0 016	12.39	0.060	0 006	12.39	0.011	0.002	12.45	0.001	0.001	12.39	0.0	0.0
13.31	0 274	0 038	13.39	0 004	0 001	13.39	0.002	0.001	13.28	0.000	0.001	0.0	0.0	0.0
14.31	0 037	0 014	14.33	0 001	0.001	14.07	0.0	0.0	0.0	0.0	0 0	0.0	0.0	0.0

Table 25

HELIUM-3 FROM A = 54 BOMBARDED BY 29 MEV PROTONS.

15 DEG - RUN 10			30 DEG - RUN 1			60 DEG - RUN 4			90 DEG - RUN 7			125 DEG - RUN 17		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
12.96	0 087	0.021	13.04	0.030	0.004	12.99	0.006	0.001	13 21	0 017	0.002	12.99	0.003	0.001
13 96	0 044	0.015	14.05	0.027	0.004	13.99	0 021	0.002	14.21	0.002	0.001	14.00	0.000	0.000
14.96	0 044	0.015	15.06	0.028	0.004	15.00	0.005	0.001	15.22	0.001	0.000	14.83	0.0	0.0
15.97	0.0	0 0	16.07	0.002	0.001	16.00	0 0	0.0	15.82	0.0	0.0	0.0	0.0	0.0
16.84	0.014	0.010	16.88	0.002	0.001	16.56	0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 26

ALPHA FROM A = 54 BOMBARDED BY 29 MEV. PROTONS.

15 DEG - RUN 10			30 DEG - RUN 1			60 DEG - RUN 4			90 DEG - RUN 7			125 DEG - RUN 17		
ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR	ENERGY (MEV)	SIGMA (MB/SR-MEV)	ERROR
4.69	0.336	0.066	4 06	0.093	0.011	4 30	0.079	0.007	4.50	0.091	0 009	4.25	0.074	0.009
5.09	0 485	0.079	4.46	0.105	0.012	4.70	0.083	0.007	4.91	0.132	0.011	4.65	0.130	0.012
5.49	0.529	0.083	4.87	0.107	0.012	5.10	0.124	0.009	5 31	0.207	0.013	5.05	0.227	0.016
5.89	0.382	0.070	5 27	0.149	0.014	5 50	0.169	0.011	5.71	0.329	0.017	5.45	0.360	0.020
6.29	0.486	0.079	5.68	0.212	0.017	5.90	0.226	0.012	6 11	0.486	0.021	5.86	0.551	0.025
6.69	0.60	0.09	6.08	0.23	0.02	6.31	0.38	0.02	6.52	0.70	0.02	6.26	0.80	0.03
7 09	0 58	0.09	6 48	0.37	0 02	6.71	0.55	0.02	6.92	0.96	0.03	6.66	1.00	0.03
7.49	0.79	0.10	6.89	0.56	0.03	7.11	0.79	0.02	7.32	1.21	0 03	7.06	1.20	0.04
7 90	1.15	0.12	7.29	0.73	0.03	7.51	1.02	0.03	7.72	1.39	0.03	7.46	1.36	0.04
8.30	1.44	0.14	7.69	1 03	0.04	7.91	1.24	0.03	8.13	1.29	0 03	7.87	1.34	0.04
8.70	1.69	0.15	8.10	1.27	0.04	8.32	1.46	0.03	8.53	1.11	0 03	8.27	1.29	0.04
9 10	1.94	0.16	8.50	1.52	0.05	8.72	1.46	0.03	8.93	0.96	0.03	8.67	1.16	0.04
9.50	1.96	0.16	8.90	1.68	0.05	9.12	1.50	0.03	9.33	0.83	0.03	9.07	0.98	0.03
10.70	1 66	0.09	9 31	1.78	0.05	9.52	1.47	0 03	9.73	0.73	0.03	9.47	0.91	0.03
11.20	1.337	0.083	9.71	1.674	0.047	10.23	1.232	0.018	10.44	0.563	0.014	10 18	0.687	0.018
12.21	1.128	0.076	10 42	1.553	0.029	11.23	0 876	0 015	11 45	0.355	0.011	11.18	0.461	0.014
13.21	0.845	0.066	11.43	1.157	0.025	12.24	0.620	0.013	12.45	0.308	0.010	12.19	0.294	0.012
14.21	0.689	0.060	12.44	0.937	0.022	13.24	0.433	0 011	13.46	0.216	0.009	13.19	0.172	0.009
15.21	0.449	0.048	13.44	0.627	0.018	14.25	0.248	0.008	14.46	0.134	0.007	14.20	0.086	0.006
16.22	0.339	0.042	14.45	0.430	0.015	15.25	0.191	0.007	15.47	0.101	0.006	15.20	0.074	0.006
17.22	0.338	0.042	15 46	0.348	0.014	16.26	0.142	0.006	16.48	0.088	0.006	16.21	0.044	0.004
18.27	0.421	0.047	16.47	0.238	0.011	17.26	0.136	0.006	17.48	0.054	0.004	17.21	0 026	0.003
19.22	0.312	0.040	17.48	0.301	0.013	18.27	0.075	0.004	18.49	0.050	0.004	18.22	0.021	0.003
20.23	0.308	0.040	18 49	0.199	0 010	19.27	0.088	0.005	19.50	0.022	0.003	19.22	0.013	0.002
21.23	0.123	0.025	19.50	0.135	0.009	20 28	0.062	0.004	20.50	0.008	0.002	20.23	0.003	0.001
22.23	0.089	0.021	20.51	0.219	0.011	21.28	0.021	0.002	21.51	0.009	0.002	21.23	0.003	0.001
23.24	0.091	0.022	21.52	0.073	0.006	22.29	0.025	0.003	22.51	0.008	0.002	22.24	0.005	0.001
24.24	0.049	0.016	22.53	0.069	0.006	23 29	0.013	0.002	23 52	0.001	0.001	23.25	0.0	0.0
25.24	0.017	0.009	23 53	0.052	0.005	24.30	0.006	0.001	24.53	0.0	0.0	24.25	0.0	0.0
26.24	0.005	0.005	24.54	0.078	0.006	25.30	0.000	0.000	25.53	0.0	0 0	25.21	0.0	0.0
26.87	0.0	0 0	25.55	0.000	0.001	26.31	0.000	0.000	26.54	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0 0	26.54	0.003	0.001	26.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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