LOAN COPY
Return to
TECHNICAL LIBRARY

DDO-16956
April 1964

MASTER

THE TOTAL NEUTRON CROSS SECTION OF $^{115}\text{DAY Ta-182}$ BELOW 3.0 eV

G. E. Stokes, J. R. Berreth, R. P. Schuman,
O. D. Simpson and T. E. Young

PHILLIPS
PETROLEUM
COMPANY

ATOMIC ENERGY DIVISION

NATIONAL REACTOR TESTING STATION
U.S. ATOMIC ENERGY COMMISSION

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

PRICE \$3.75

AVAILABLE FROM THE
OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damage resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

PRINTED IN USA

IDO-16956
AEC Research and Development Report

Physics

TID-4500 (27th Ed.)

Issued: April 1, 1964

THE TOTAL NEUTRON CROSS SECTION OF 115-DAY Ta-182 BELOW 3.0 eV

by

G. E. Stokes, J. R. Berreth, R. P. Schuman,
O. D. Simpson and T. E. Young

Nuclear Physics Branch

PHILLIPS
PETROLEUM
COMPANY

Atomic Energy Division

Contract AT(10-1)-205

Idaho Operations Office

U. S. ATOMIC ENERGY COMMISSION

THE TOTAL NEUTRON CROSS SECTION OF 115-DAY Ta-182 BELOW 3.0 eV

by

G. E. Stokes, J. R. Berreth, R. P. Schuman,
O. D. Simpson and T. E. Young

ABSTRACT

The total cross section for Ta-182 was measured from 0.01 to 3.0 eV using the Materials Testing Reactor (MTR) fast chopper. Curves and tables of the total cross section as a function of energy are given. The resonance parameters for the 0.147 and 1.82 eV resonances are presented. The thermal cross section is $8,200 \pm 500$ barns and the 0.147 eV resonance peaks at $46,000 \pm 3,000$ barns.

CONTENTS

	<u>Page</u>
Abstract	ii
I. Introduction	1
II. Sample Preparation	1
III. Experimental Procedure	2
IV. Results	3
V. Discussion of Results	4
VI. Acknowledgments	5
VII. References	6

LIST OF TABLES

Table Number

I. Instrument Resolution	7
II. Ta-182 Resonance Parameters	7

LIST OF FIGURES

1. Conversion of Ta-181 to Ta-182 in an Unshielded Capsule.	8
2. Conversion of Ta-181 to Ta-182 in a Cadmium Shielded Capsule.	8
3. Total Neutron Cross Section of Ta-182 from .01 to 10 eV.	9
4. Breit-Wigner Single Level Fit to the 0.147 eV Resonance.	10
5. Breit-Wigner Single Level Fit to the 1.82 eV Resonance	10
6. Comparison of the Ta-182 Deviation from 1/v Cross Section Factor With Lu-176, as a Function of Neutron Temperature	10
7. Ta-183/Ta-182 Ratio as a Function of Irradiation Time.	10

APPENDIX

Page

A. Tables of the Total Cross Section of Ta-182 from 0.01 to 3.0 eV.	11
--	----

THE TOTAL NEUTRON CROSS SECTION OF 115-DAY Ta-182 BELOW 3.0 eV

by

G. E. Stokes, J. R. Berreth, R. P. Schuman,
O. D. Simpson and T. E. Young

I. Introduction

Energy dependent neutron cross section studies of odd-odd nuclei are limited to a small number of isotopes because most of these nuclei are radioactive. New developments at the Materials Testing Reactor (MTR) fast chopper make possible measurements on radioactive nuclei. Therefore, it is of interest to measure the total neutron cross section of Ta-182 in order to provide additional information on the odd-odd nuclei. Transmission measurements of samples of Ta-182 produced in the Engineering Test Reactor (ETR) have been made with the MTR fast chopper, (1) and the total neutron cross section has been calculated from these data from 0.01 to 3 eV. A brief account of this work was presented at the American Physical Society meeting in New York in January of 1963, (2) and at the American Nuclear Society meeting in Salt Lake City, Utah in June of 1963. (3)

II. Sample Preparation

The Ta-182 in this experiment was produced by the irradiation of Ta-181 in the ETR. In the production of Ta-182 for cross section measurements it is necessary to minimize the burnout of Ta-182 and the consequent production of Ta-183. Figures 1 and 2 show the calculated formation of Ta-182 and Ta-183 after various irradiation times for an unshielded sample and a cadmium shielded sample of Ta-181 in the form of a thick foil. The amount of Ta-182 produced is increased and the formation of Ta-183 is significantly reduced if the Ta-181 sample is cadmium shielded. The chopper Ta-182 samples were made by irradiating tantalum in a cadmium shield.

The tantalum sample was prepared from a 0.010" thick sheet of the natural metal. The isotopic composition of tantalum is 99.988% Ta-181 and 0.012% Ta-180. The metal was 99.9% nominal purity. The tantalum was cut into strips 0.051 wide by 1.14" long in order to fit the MTR chopper sample holder. These strips were stacked around four ten-sided spools to minimize self shielding during irradiation. The spools were then placed end to end inside the cadmium shield, and the complete assembly sealed in an aluminum tube. The cadmium shield had a wall thickness of 0.196". This was of sufficient thickness to allow 0.039" of unconverted cadmium after an irradiation of 28 days in the ETR at a thermal flux of approximately 8×10^{14} n/cm²/sec. The resonance flux was approximately 5×10^{13} n/cm²/sec.

After irradiation the capsule was transferred to the hot alpha cave⁽⁴⁾ for decapsulation and subsequent loading of the tantalum strips into special sample holders for cross section measurements. Three combinations of samples were prepared; one containing only 1 strip, one containing 13 strips, and one containing 39 strips. These samples allowed a detailed investigation of the tantalum with various neutron transmissions.

In order to determine the amount of Ta-182 produced, two tantalum strips 0.010" by 0.051" wide, were placed between the ends of the spools. These monitor strips were the same thickness and width as the sample strips used to measure the cross section so that the flux and self shielding would be the same. The amount of Ta-182 activity produced in the strips was determined by gamma counting aliquots of the dissolved tantalum monitors.

The errors in the determination of the amount of Ta-182 arise from uncertainties in the following: aliquoting, absolute gamma counting, flux gradient along the capsule, decay properties of Ta-182, impurity activities, and difference between the flux seen by the monitors and sample. The aliquoting and non-systematic counting errors were about + 1%, as shown by the agreement between six different counting aliquots. The monitors showed a flux gradient of about 4.3% along the capsule. The error in absolute gamma counting is estimated conservatively as + 5%. The aliquots were counted on two standardized gamma spectrometers and gave Ta-182 contents that agreed within + 2%. No active impurity which would interfere with the counting has been seen in the tantalum, either by gamma spectra or decay. The activity was determined by summing all the gamma ray peaks in the 1.2 MeV region of the spectrum; these gamma rays have a total abundance of 100%. The overall error in the Ta-182 abundance of 1.13% is estimated to be + 6% (standard deviation). This error causes the major uncertainty in the Ta-182 cross sections.

III. Experimental Procedure

The MTR fast chopper is well suited for measuring the neutron transmissions of small samples under conditions of moderately high neutron intensity. The rotor used for the present measurements was the divergent beam design of Seidl.⁽⁵⁾ The present rotor, which was designed and constructed by Brookhaven National Laboratory, differs from the original design in that it contains a K-Monel center section to reduce fast neutron leakage through the rotor. The sample was cycled automatically in the radioactive sample changer⁽⁶⁾ that sits between the reactor and the rotor. The beam is collimated to a rectangle of width 0.023" and height 1.006" at the sample changer position. This makes it practical to take measurements on radioactive samples such as Ta-182.

The transmission measurements were taken at the 13 meter flight station. The detectors were an array of B^{10}F_3 ⁽⁷⁾ proportional counters with an efficiency of approximately 25% at 1 eV.

The energies of the neutrons were obtained from the neutron time of flight as measured with a 4096-channel time-of-flight analyzer. The sample data were stored in the first 1024 channels of the analyzer and the open beam data in the second 1024 channels. The open consisted of Ta-181 foils that were matched to the irradiated foils before they were irradiated. The third 1024 channels were used to record the fast neutron background⁽⁸⁾ that leaks through the rotor and the final 1024 channels carried the room background. The open, sample and backgrounds were cycled alternately into the beam with emphasis being placed on the open and the sample.

Three different samples were used. The 13 foil sample with a target thickness of 1.8×10^{-4} atoms/barn had a transmission of 19% at thermal, 0.05% at the peak of the 0.147 eV resonance and 99% in the valleys between resonances. The 1 foil sample with a thickness of 1.4×10^{-5} atoms/barn improved the data over the peak of the 0.147 eV resonance with a transmission of 52% at the peak. The 39 foil sample had a thickness of 5.6×10^{-4} atoms/barn and was used to improve the 13 foil data between resonances.

IV. Results

Figure 3 shows the total cross section as a function of energy from 0.01 to 10.0 eV. The data were analyzed to 3 eV but further irradiations are planned to improve the data above 3 eV. There was more Ta-181 in the open than in the sample due to the Ta-181 atoms converted in the irradiation. A correction was made for this condition when the data were processed. These data were taken with resolutions shown in Table I. The measured thermal cross section at 0.0253 eV is $8,200 \pm 500$ barns. The observed resonances up to 3 eV account for a thermal cross section of 8,180 barns. The 0.147 eV resonance contributes 8,150 barns to this cross section. Figures 4 and 5 show a Breit-Wigner single level fit to the data for the 0.147 and 1.8 eV resonances on a $\sigma\sqrt{E}$ versus energy plot. Doppler broadening and instrument resolution corrections have been made to the fit. The solid line represents the calculated fit and the points are the data taken with the MTR fast chopper. The Breit-Wigner parameters used to obtain this fit are shown in Table II.

The data presented are in good agreement with the effective average cross section for reactor spectrum obtained by R. R. Smith et al⁽⁹⁾ and a recent reactor measurement made by R. P. Schuman at the MTR. To check this agreement it was necessary to take into consideration the flux spectrum and the neutron temperature. The large low energy resonance makes the "effective" cross section vary greatly with neutron temperature.

V. Discussion of Results

The cross section shown in Fig. 3 is derived from experimental neutron transmission measurements made at a temperature of approximately 300°K. If these data are to be used at any other temperature the appropriate Doppler corrections should be made.

The occurrence of a large resonance at 0.147 eV in Ta-182 suggests that this isotope may be useful in neutron temperature measurements. Figure 6 shows a plot of "g" versus neutron temperature. The quantity "g", defined by Westcott,⁽¹⁰⁾ gives the deviation from the 1/v cross section. This quantity was calculated using the experimental values for the Ta-182 cross section and multiplying them by a Maxwellian velocity distribution peaked at the various temperatures. The slope of the curve is an indication of the temperature sensitivity. The steeper the slope the more sensitive the isotope is to temperature. The Lu-176 curve for the "g" factor is put in for comparison. Schmid and Stinson⁽¹¹⁾ have demonstrated that Lu-176 is 7 times more sensitive to temperature change below 400°C than the commonly used Pu-239/U-235 fission activity ratio.

The Ta-182 may have a place in temperature measurements where the Lu-176 is not practical. Ta-181 can be irradiated as a natural metal with a thermal absorption cross section of $21 + 1$ barn and a resonance integral of 590 barns. A fraction of the Ta-182 produced is converted to Ta-183 giving a Ta-183 to Ta-182 ratio which is a function of the effective cross section of Ta-182. Figure 7 shows the variation of this Ta-183/Ta-182 ratio for different times of irradiation as a function of neutron temperature. The σ effective for Ta-182 used to calculate this ratio was 8,200 barns (the thermal value), multiplied by the "g" factor for the various temperatures. As one can see from the graph the ratio seems to remain good for long irradiations.

Figure 1 shows that after a 100-day irradiation of an unshielded sample of Ta-181 in a thermal flux of 10^{14} neutrons/cm²/sec there should be a 1% conversion of Ta-181 atoms to Ta-183 and about 0.2% conversion to Ta-182 indicating that this method may be useful where temperature measurements are desired for long irradiations.

VI. Acknowledgments

The authors wish to express appreciation to Drs. R. G. Fluharty and M. S. Moore and Mr. F. B. Simpson for their guidance and assistance during this work. Thanks are also due to Mrs. H. J. Oestreich and Miss C. F. McBride for their assistance in processing the data on the IBM-650 computer and to G. R. Newton and D. B. Hansen for their maintenance of the fast chopper equipment.

VII. References

1. R. G. Fluharty, F. B. Simpson, and O. D. Simpson, Phys. Rev. 103, 1778 (1956).
2. G. E. Stokes, J. R. Berreth, R. P. Schuman, and O. D. Simpson, Bull. Am. Phys. Soc., pp. 82, January 1963.
3. G. E. Stokes, J. R. Berreth, R. P. Schuman, O. D. Simpson, and T. E. Young, "Total Neutron Cross Section of 115-Day Ta-182," Transactions, American Nuclear Society, pp. 41, June 1963.
4. J. R. Berreth and R. P. Schuman, "A Chemistry Hot Cell for Handling Alpha-Gamma Activities," Proceedings of the Ninth Conference on Hot Laboratories and Equipment, pp. 22-26, November 1961.
5. F. B. P. Seidl, Brookhaven National Laboratory Report (BNL), No. 278 (T-46) 1954.
6. F. B. Simpson and R. P. Schuman, "Cross Section Measurements on Radioactive Samples," Proceedings of the Symposium on Neutron Time-of-Flight Methods, Saclay, France, Session II, pp. 85-91, July 1961.
7. O. D. Simpson, R. G. Fluharty, and L. W. McClellan, High Resolution Fast Chopper Detector Using BF₃ Counters, U. S. Atomic Energy Commission Report, IDO-16355 (1956) (Unpublished).
8. O. D. Simpson, M. S. Moore, and F. B. Simpson, Nuclear Sci. and Eng. 7, 187 (1960).
9. R. R. Smith, S. D. Reeder, and R. H. Lewis, "Successive Neutron Capture in Tantalum," U. S. Atomic Energy Commission Report, IDO-16238, September 1955.
10. C. H. Westcott, "Effective Cross Section Values for Well-Moderated Thermal Reactor Spectra," CRRP 787 (1958).
11. L. C. Schmid and W. P. Stinson, "Calibration of Lutetium for Measurements of Effective Neutron Temperatures," Nuc. Sci. and Eng. 7, 477-478 (1960).

TABLE I

Instrument Resolution (Full Width at Half Maximum)

Energy Region (eV)	Rotor Speed (rpm)	Channel Width (μ sec)	Flight Path (Meters)	Resolution ^(a) (μ sec/meter)
.01 - 1 eV	300	16	13	3.6 - 3.2
.9 - 3 eV	3000	1	13	.45 - .36

(a) The following assumptions were made:

A triangular neutron burst with full width at half maximum of 2.8 μ sec at 3000 rpm, a rectangular effective counter thickness that varies with the energy of the neutrons, and a Maxwellian distribution of 0.5 μ sec width at half maximum for the counter jitter.

TABLE II

Ta-182 Resonance Parameters

E_o (eV)	Γ_γ (mV)	$2g \Gamma_n^o$ (mV)
0.147 ± 0.002	67 ± 3	0.94 ± 0.06
1.82 ± 0.01	67 ± 3	0.86 ± 0.06

Figure 1

Figure 2

The calculated formation of Ta-182 and Ta-183 after various irradiation times for an unshielded sample and a cadmium shielded sample. This illustrates the advantage of cadmium shielding the Ta-181 sample for the production of Ta-182.

Figure 3 - The total neutron cross section of Ta-182 from 0.01 to 10 eV. The data were analyzed to 3 eV. Above 3 eV the resolution was poor and the data were not considered accurate enough for analysis.

Figure 4

Figure 5

A Breit-Wigner single level fit to the 0.147 eV resonance and the 1.82 eV resonance. Doppler broadening and instrument resolution correction have been made to the fit.

Figure 6 - Westcott's "g" factor⁽¹⁰⁾ for Ta-182. The slope of curve indicates the temperature sensitivity. The Lu-176⁽¹¹⁾ curve is put in for comparison to the Ta-182.

Figure 7 - Calculated variation of the Ta-183/Ta-182 ratio for different times of irradiation as a function of neutron temperature.

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1405

SAMPLE THICKNESS

13 foils

4,907 barns/atom Ta-182

Flight path of 13 meters

Rotor speed of 316 rev/minute

Channel width of 16 μ sec

1.1 - inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION (Full width at half-maximum)

E (eV)	Width (μ sec)
.01	46.7
1.00	42.0

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182004	01	101862	1405	920.0	.987	1.04367	63.07	84.438	.042	4.144	14328	31041
73182004	01	101862	1405	936.0	.988	1.00825	57.73	57.968	.008	4.055	14193	30773
73182004	01	101862	1405	952.0	.989	.97464	53.50	52.819	.025	3.979	14017	30418
73182004	01	101862	1405	968.0	.987	.94269	46.94	44.417	.059	4.465	14121	30635
73182004	01	101862	1405	984.0	.967	.91278	43.80	43.659	.091	5.098	14346	30440
73182004	01	101862	1405	1000.0	.981	.88332	39.34	43.974	.124	4.492	14188	30565
73182004	01	101862	1405	1016.0	.960	.85572	38.28	43.425	.155	5.289	14418	30378
73182004	01	101862	1405	1032.0	.966	.82940	36.64	43.586	.187	5.127	14119	29929
73182004	01	101862	1405	1048.0	.964	.80426	35.36	43.960	.217	5.183	14175	29988
73182004	01	101862	1405	1064.0	.978	.78025	34.13	44.637	.248	4.674	13937	29916
73182004	01	101862	1405	1080.0	.960	.75721	32.97	43.765	.277	5.296	14119	29741
73182004	01	101862	1405	1096.0	.960	.73535	31.83	43.362	.307	5.297	14033	29560
73182004	01	101862	1405	1112.0	.981	.71435	30.32	43.344	.336	4.503	13871	29877
73182004	01	101862	1405	1128.0	.978	.69423	28.75	43.614	.364	4.689	13778	29566
73182004	01	101862	1405	1144.0	.982	.67494	27.27	43.235	.393	4.434	13625	29383
73182004	01	101862	1405	1160.0	.977	.65645	25.82	43.977	.420	4.731	13643	29247
73182004	01	101862	1405	1176.0	.964	.63871	24.36	44.591	.448	5.177	13818	29241
73182004	01	101862	1405	1192.0	.955	.62168	22.91	44.543	.475	5.416	13868	29061
73182004	01	101862	1405	1208.0	.961	.60537	21.48	45.078	.501	5.262	13827	29168
73182004	01	101862	1405	1224.0	.937	.58960	20.05	45.563	.528	5.759	14057	28911
73182004	01	101862	1405	1240.0	.947	.57448	18.62	46.023	.554	5.584	13745	28565
73182004	01	101862	1405	1256.0	.961	.55994	17.29	46.485	.579	5.259	13661	28822
73182004	01	101862	1405	1272.0	.949	.54594	15.89	46.947	.605	5.544	13540	28200
73182004	01	101862	1405	1288.0	.936	.53246	14.51	47.409	.630	5.770	13771	28305
73182004	01	101862	1405	1304.0	.947	.51947	13.14	47.871	.654	5.586	13586	28234
73182004	01	101862	1405	1320.0	.943	.50696	11.76	48.332	.679	5.661	13617	28179
73182004	01	101862	1405	1336.0	.941	.49489	10.38	48.793	.703	5.696	13738	28372
73182004	01	101862	1405	1352.0	.911	.48324	9.00	49.254	.727	6.121	13739	27477
73182004	01	101862	1405	1368.0	.926	.47201	7.62	49.715	.750	5.927	13507	27461
73182004	01	101862	1405	1384.0	.929	.46115	6.24	50.176	.774	5.887	13431	27388
73182004	01	101862	1405	1400.0	.907	.45067	4.86	50.637	.797	6.166	13601	27086
73182004	01	101862	1405	1416.0	.928	.44055	3.47	51.098	.819	5.898	13215	26927
73182004	01	101862	1405	1432.0	.916	.43076	2.08	51.559	.842	6.064	13243	26625
73182004	01	101862	1405	1448.0	.896	.42129	0.69	52.020	.864	6.288	13584	26715
73182004	01	101862	1405	1464.0	.900	.41213	-0.70	52.481	.886	6.243	13442	26562
73182004	01	101862	1405	1480.0	.889	.40327	-2.10	52.942	.908	6.350	13517	26397
73182004	01	101862	1405	1496.0	.874	.39469	-3.50	53.403	.929	6.486	13482	25883
73182004	01	101862	1405	1512.0	.894	.38628	-4.90	53.864	.950	6.305	13244	25995
73182004	01	101862	1405	1528.0	.874	.37823	-6.30	54.325	.971	6.487	13337	25602
73182004	01	101862	1405	1544.0	.852	.37053	-7.70	54.786	.992	6.664	13443	25145
73182004	01	101862	1405	1560.0	.850	.36297	-9.10	55.247	1.013	6.677	13385	24987
73182004	01	101862	1405	1576.0	.827	.35564	-10.50	55.708	1.033	6.835	13552	24607
73182004	01	101862	1405	1592.0	.819	.34852	-11.90	56.169	1.054	6.881	13518	24326
73182004	01	101862	1405	1608.0	.814	.34162	-13.30	56.630	1.074	6.912	13399	23962
73182004	01	101862	1405	1624.0	.809	.33492	-14.70	57.091	1.093	6.945	13439	23866
73182004	01	101862	1405	1640.0	.792	.32844	-16.10	57.552	1.113	7.019	13400	23310
73182004	01	101862	1405	1656.0	.764	.32211	-17.50	58.013	1.132	7.160	13607	22969
73182004	01	101862	1405	1672.0	.759	.31597	-18.90	58.474	1.152	7.207	13657	22766
73182004	01	101862	1405	1688.0	.745	.31001	-20.30	58.935	1.171	7.271	13784	22560
73182004	01	101862	1405	1704.0	.733	.30421	-21.70	59.396	1.190	7.328	13802	22206
73182004	01	101862	1405	1720.0	.715	.29858	-23.10	59.857	1.208	7.405	13861	21753
73182004	01	101862	1405	1736.0	.690	.29310	-24.50	60.318	1.227	7.503	14003	21230
73182004	01	101862	1405	1752.0	.669	.28777	-25.90	60.779	1.245	7.584	14175	20836
73182004	01	101862	1405	1768.0	.651	.28257	-27.30	61.240	1.263	7.651	14382	20557
73182004	01	101862	1405	1784.0	.627	.27754	-28.70	61.701	1.281	7.735	14716	20265
73182004	01	101862	1405	1800.0	.605	.27263	-30.10	62.162	1.299	7.809	14548	19321
73182004	01	101862	1405	1816.0	.571	.26785	-31.50	62.623	1.317	7.916	15057	18897
73182004	01	101862	1405	1832.0	.552	.26319	-32.90	63.084	1.334	7.975	15118	18342
73182004	01	101862	1405	1848.0	.527	.25865	-34.30	63.545	1.352	8.050	15600	18070
73182004	01	101862	1405	1864.0	.498	.25423	-35.70	64.006	1.369	8.135	15641	17122
73182004	01	101862	1405	1880.0	.468	.24977	-37.10	64.467	1.386	8.222	16200	16650
73182004	01	101862	1405	1896.0	.447	.24552	-38.50	64.928	1.403	8.281	16232	15927
73182004	01	101862	1405	1912.0	.412	.24163	-39.90	65.389	1.420	8.376	16715	15143
73182004	01	101862	1405	1928.0	.386	.23763	-41.30	65.850	1.437	8.446	16973	14413
73182004	01	101862	1405	1944.0	.352	.23374	-42.70	66.311	1.453	8.539	17507	13559
73182004	01	101862	1405	1960.0	.320	.22994	-44.10	66.772	1.469	8.626	17701	12471
73182004	01	101862	1405	1976.0	.288	.22623	-45.50	67.233	1.486	8.715	18433	11682
73182004	01	101862	1405	1992.0	.261	.22261	-46.90	67.694	1.502	8.793	18869	10816
73182004	01	101862	1405	2008.0	.224	.21907	-48.30	68.155	1.518	8.900	19377	9722
73182004	01	101862	1405	2024.0	.197	.21562	-49.70	68.616	1.534	8.982	20196	8756
73182004	01	101862	1405	2040.0	.171	.21226	-51.10	69.077	1.549	9.064	20808	7849
73182004	01	101862	1405	2056.0	.142	.20896	-52.50	69.538	1.565	9.164	21285	6665
73182004	01	101862	1405	2072.0	.124	.20575	-53.90	70.000	1.581	9.234	21860	5954
73182004	01	101862	1405	2088.0	.100	.20261	-55.30	70.461	1.596	9.331	22592	4972
73182004	01	101862	1405	2104.0	.081	.19954	-56.70	70.922	1.611	9.419	23483	4184
73182004	01	101862	1405	2120.0	.065	.19654	-58.10	71.383	1.626	9.502	24340	3487
73182004	01	101862	1405	2136.0	.052	.19360	-59.50	71.844	1.641	9.576	24688	2864
73182004	01	101862	1405	2152.0	.038	.19074	-60.90	72.305	1.656	9.677	25746	2190
73182004	01	101862	1405	2168.0	.030	.18793	-62.30	72.766	1.671	9.750	26581	1766
73182004	01	101862	1405	2184.0	.021	.18519	-63.70	73.227	1.686	9.839	27595	1323

Ident.	Avg. Pto.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182004	01	101862	1405	2200.0	.015	.18250	20634.73	8729.723	1.701-	9.924	28509	973
73182004	01	101862	1405	2216.0	.012	.17988	21680.39	9195.146	1.715-	9.984	29199	772
73182004	01	101862	1405	2232.0	.008	.17731	23476.58	9885.564	1.729-	10.063	30383	558
73182004	01	101862	1405	2248.0	.005	.17479	25422.46	10678.598	1.744-	10.143	31299	386
73182004	01	101862	1405	2264.0	.004	.17233	26434.86	10973.814	1.758-	10.182	32132	322
73182004	01	101862	1405	2280.0	.002	.16992	29279.72	12069.500	1.772-	10.284	33176	187
73182004	01	101862	1405	2296.0	.002	.16755	28357.12	11689.601	1.786-	10.259	34023	221
73182004	01	101862	1405	2312.0	.001	.16525	30774.32	12591.359	1.800-	10.340	35283	141
73182004	01	101862	1405	2328.0	.000	.16299	33469.81	13714.301	1.814-	10.433	36543	79
73182004	01	101862	1405	2344.0	.000	.16077	34239.74	13728.813	1.827-	10.441	37537	76
73182004	01	101862	1405	2360.0	.000	.15860	34993.39	13936.066	1.841-	10.462	38768	68
73182004	01	101862	1405	2376.0	.001	.15647	33327.02	13182.936	1.854-	10.414	39180	96
73182004	01	101862	1405	2392.0	.000	.15438	35597.96	13903.291	1.868-	10.474	40740	65
73182004	01	101862	1405	2408.0	.000	.15234	36834.41	13986.442	1.881-	10.486	41561	62
73182004	01	101862	1405	2424.0	.000	.15031	34108.10	13224.536	1.894-	10.437	42808	91
73182004	01	101862	1405	2440.0	.000	.14817	35327.73	13569.309	1.908-	10.469	43286	72
73182004	01	101862	1405	2456.0	.000	.14644	34600.40	13240.703	1.921-	10.451	45017	86
73182004	01	101862	1405	2472.0	.000	.14455	34677.51	13184.298	1.934-	10.453	45730	85
73182004	01	101862	1405	2488.0	.000	.14270	34202.64	12920.274	1.947-	10.440	46834	97
73182004	01	101862	1405	2504.0	.000	.14088	36910.27	13516.092	1.959-	10.491	47693	67
73182004	01	101862	1405	2520.0	.000	.13910	37842.86	14113.918	1.972-	10.541	49171	48
73182004	01	101862	1405	2536.0	.000	.13735	36576.88	13555.671	1.985-	10.507	50077	63
73182004	01	101862	1405	2552.0	.000	.13563	36073.75	13285.235	1.997-	10.493	51431	73
73182004	01	101862	1405	2568.0	.000	.13395	36784.85	13462.954	2.010-	10.512	52245	63
73182004	01	101862	1405	2584.0	.000	.13229	35318.91	12846.087	2.022-	10.472	53452	87
73182004	01	101862	1405	2600.0	.001	.13067	33823.70	12226.696	2.035-	10.428	55177	123
73182004	01	101862	1405	2616.0	.000	.12908	34274.71	12314.118	2.047-	10.442	55088	113
73182004	01	101862	1405	2632.0	.000	.12751	34722.29	12398.824	2.059-	10.455	56799	105
73182004	01	101862	1405	2648.0	.001	.12597	32602.09	11571.219	2.071-	10.392	57612	164
73182004	01	101862	1405	2664.0	.001	.12447	33967.73	11666.398	2.083-	10.406	58279	152
73182004	01	101862	1405	2680.0	.001	.12298	34065.24	11946.172	2.095-	10.436	58996	126
73182004	01	101862	1405	2696.0	.001	.12153	31918.90	11127.299	2.107-	10.370	60149	197
73182004	01	101862	1405	2712.0	.001	.12010	30831.26	10684.713	2.119-	10.336	61042	250
73182004	01	101862	1405	2728.0	.002	.11869	28800.74	10266.779	2.131-	10.302	62066	314
73182004	01	101862	1405	2744.0	.002	.11731	29476.27	10095.785	2.142-	10.291	63376	343
73182004	01	101862	1405	2760.0	.003	.11596	28348.86	9653.612	2.154-	10.252	63927	435
73182004	01	101862	1405	2776.0	.003	.11463	27447.94	9293.065	2.166-	10.220	64759	529
73182004	01	101862	1405	2792.0	.004	.11332	26755.63	9006.760	2.177-	10.194	65105	613
73182004	01	101862	1405	2808.0	.004	.11203	26438.30	8849.136	2.188-	10.182	66059	663
73182004	01	101862	1405	2824.0	.004	.11076	26132.18	8696.954	2.200-	10.170	66585	711
73182004	01	101862	1405	2840.0	.005	.10952	25494.24	8304.641	2.211-	10.130	67197	888
73182004	01	101862	1405	2856.0	.006	.10829	24405.32	8031.170	2.222-	10.102	67935	1032
73182004	01	101862	1405	2872.0	.008	.10709	23475.69	7662.695	2.234-	10.061	68523	1273
73182004	01	101862	1405	2888.0	.009	.10591	23072.97	7508.828	2.245-	10.046	69960	1395
73182004	01	101862	1405	2904.0	.010	.10474	22418.38	7255.388	2.256-	10.017	70286	1602
73182004	01	101862	1405	2920.0	.011	.10360	21821.29	7023.609	2.267-	9.990	70514	1815
73182004	01	101862	1405	2936.0	.013	.10247	21116.75	6759.671	2.278-	9.957	71510	2124
73182004	01	101862	1405	2952.0	.015	.10136	20602.49	6559.234	2.289-	9.933	71587	2361
73182004	01	101862	1405	2968.0	.016	.10027	20147.10	6379.668	2.299-	9.910	71979	2606
73182004	01	101862	1405	2984.0	.018	.09920	19579.93	6166.902	2.310-	9.882	72989	2966
73182004	01	101862	1405	3000.0	.019	.09815	19276.32	6039.061	2.321-	9.866	73438	3173
73182004	01	101862	1405	3016.0	.021	.09711	18753.09	5843.927	2.331-	9.839	73091	3514
73182004	01	101862	1405	3032.0	.024	.09609	18265.38	5661.976	2.342-	9.812	74117	3936
73182004	01	101862	1405	3048.0	.025	.09508	17971.16	5541.416	2.353-	9.796	74361	4193
73182004	01	101862	1405	3064.0	.027	.09409	17557.29	5385.540	2.363-	9.773	75471	4630
73182004	01	101862	1405	3080.0	.030	.09311	17163.00	5237.109	2.373-	9.750	76516	5088
73182004	01	101862	1405	3096.0	.031	.09215	16929.08	5139.031	2.384-	9.736	76556	5355
73182004	01	101862	1405	3112.0	.034	.09121	16459.56	4970.952	2.394-	9.708	76774	5892
73182004	01	101862	1405	3128.0	.037	.09028	16160.19	4855.593	2.404-	9.690	76970	6279
73182004	01	101862	1405	3144.0	.038	.08936	16001.67	4783.405	2.415-	9.680	77522	6531
73182004	01	101862	1405	3160.0	.040	.08846	15744.41	4682.740	2.425-	9.664	77942	6919
73182004	01	101862	1405	3176.0	.044	.08713	15262.74	4505.225	2.440-	9.633	78589	75269
73182004	01	101862	1405	3192.0	.049	.08583	14764.89	4325.635	2.455-	9.600	77862	8440
73182004	01	101862	1405	3208.0	.050	.08494	14603.87	4257.274	2.465-	9.589	79114	8863
73182004	01	101862	1405	3224.0	.053	.08415	14373.70	4169.324	2.475-	9.573	78392	9204
73182004	01	101862	1405	3240.0	.056	.08332	14103.72	4071.068	2.485-	9.554	78780	9771
73182004	02	101862	1405	3256.0	.060	.08211	13798.30	3953.883	2.499-	9.532	79742	20787
73182004	01	101862	1405	3272.0	.063	.08092	13521.47	3846.380	2.514-	9.512	79136	11054
73182004	01	101862	1405	3288.0	.066	.08014	13291.83	3762.786	2.523-	9.494	78670	11514
73182004	02	101862	1405	3304.0	.069	.07899	13101.75	3682.270	2.538-	9.480	79730	23997
73182004	01	101862	1405	3320.0	.073	.07787	12817.73	3576.814	2.552-	9.458	78416	12643
73182004	01	101862	1405	3336.0	.076	.07714	12639.97	3510.639	2.562-	9.444	77900	13023
73182004	02	101862	1405	3352.0	.079	.07605	12411.43	3422.723	2.576-	9.426	75472	27108
73182004	01	101862	1405	3368.0	.082	.07499	12258.08	3356.790	2.590-	9.413	78317	14511
73182004	02	101862	1405	3384.0	.086	.07396	11913.49	3239.944	2.604-	9.385	75456	29942
73182004	01	101862	1405	3400.0	.090	.07294	11797.56	3186.216	2.618-	9.375	77578	15398
73182004	02	101862	1405	3416.0	.094	.07194	11590.34	3108.721	2.631-	9.357	75412	31917
73182004	01	101862	1405	3432.0	.097	.07097	11429.43	3044.824	2.645-	9.343	77034	16481
73182004	02	101862	1405	3448.0	.100	.07001	11254.92	2977.985	2.659-	9.328	752917	33904
73182004	01	101862	1405	3464.0	.103	.06908	11134.57	2926.508	2.672-	9.317	76371	17352

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma/\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182004	02	101862	1405	3600.0	.107	.06816	10927.76	2851.658	2.685-	9.298	151541	35952
73182004	02	101862	1405	3632.0	.111	.06696	10771.22	2787.229	2.703-	9.294	148541	36344
73182004	01	101862	1405	3696.0	.114	.06609	10643.24	2736.163	2.716-	9.272	134443	18446
73182004	02	101862	1405	3680.0	.117	.06523	10526.85	2688.577	2.729-	9.261	163357	37386
73182004	02	101862	1405	3712.0	.120	.06411	10386.84	2624.881	2.741-	9.246	145482	36658
73182004	02	101862	1405	3744.0	.122	.06302	10241.68	2583.603	2.764-	9.239	146447	39916
73182004	02	101862	1405	3776.0	.128	.06195	10096.78	2503.109	2.781-	9.216	143367	40583
73182004	02	101862	1405	3808.0	.132	.06092	9909.01	2445.889	2.798-	9.201	140314	40928
73182004	02	101862	1405	3840.0	.134	.05990	9804.74	2409.206	2.815-	9.194	138852	41050
73182004	02	101862	1405	3872.0	.137	.05892	9725.77	2360.781	2.831-	9.182	135452	41019
73182004	02	101862	1405	3904.0	.141	.05796	9603.06	2311.927	2.848-	9.169	133395	41420
73182004	02	101862	1405	3936.0	.142	.05702	9553.16	2281.188	2.864-	9.164	131660	41299
73182004	02	101862	1405	3968.0	.146	.05610	9417.83	2230.635	2.880-	9.150	128985	41595
73182004	02	101862	1405	4000.0	.146	.05521	9408.95	2210.803	2.896-	9.149	128602	41545
73182004	03	101862	1405	4040.0	.152	.05412	9215.87	2143.955	2.918-	9.128	187220	62913
73182004	02	101862	1405	4080.0	.154	.05308	9145.73	2106.697	2.936-	9.121	122740	41670
73182004	03	101862	1405	4120.0	.156	.05204	9110.98	2078.423	2.955-	9.117	179105	61488
73182004	03	101862	1405	4160.0	.162	.05104	8917.19	2014.575	2.975-	9.095	115631	41298
73182004	03	101862	1405	4200.0	.164	.05007	8857.60	1982.006	2.994-	9.089	169775	61381
73182004	02	101862	1405	4240.0	.164	.04913	8844.64	1960.220	3.011-	9.087	110564	40085
73182004	03	101862	1405	4280.0	.167	.04822	8763.83	1924.455	3.031-	9.078	161473	59506
73182004	03	101862	1405	4328.0	.170	.04716	8675.14	1883.925	3.054-	9.068	155048	58182
73182004	03	101862	1405	4376.0	.171	.04613	8642.27	1856.178	3.076-	9.064	142270	56392
73182004	03	101862	1405	4424.0	.175	.04513	8529.48	1811.990	3.098-	9.051	144428	55831
73182004	03	101862	1405	4472.0	.177	.04417	8493.28	1785.006	3.119-	9.047	140459	54703
73182004	04	101862	1405	4528.0	.178	.04308	8459.61	1755.855	3.144-	9.043	182705	71647
73182004	03	101862	1405	4584.0	.179	.04204	8430.05	1728.470	3.169-	9.039	132140	52133
73182004	03	101862	1405	4632.0	.182	.04117	8352.08	1694.671	3.190-	9.030	128938	51687
73182004	04	101862	1405	4688.0	.182	.04019	8343.88	1672.736	3.214-	9.029	164953	66237
73182004	04	101862	1405	4752.0	.183	.03912	8328.19	1647.215	3.241-	9.027	157281	63359
73182004	04	101862	1405	4816.0	.186	.03808	8235.13	1607.012	3.268-	9.016	148729	61064
73182004	04	101862	1405	4880.0	.185	.03709	8261.92	1591.145	3.294-	9.019	141379	57734
73182004	04	101862	1405	4944.0	.186	.03614	8228.02	1564.190	3.320-	9.015	133212	54776
73182004	05	101862	1405	5016.0	.186	.03511	8251.33	1546.108	3.349-	9.018	156508	64052
73182004	04	101862	1405	5088.0	.187	.03412	8217.09	1517.829	3.377-	9.013	171077	48255
73182004	05	101862	1405	5160.0	.190	.03318	8128.20	1480.583	3.405-	9.003	140120	58810
73182004	05	101862	1405	5240.0	.190	.03217	8137.86	1459.607	3.436-	9.004	129600	54299
73182004	06	101862	1405	5328.0	.190	.03112	8135.33	1434.791	3.469-	9.003	143855	60321
73182004	05	101862	1405	5416.0	.191	.03011	8100.67	1405.648	3.502-	8.999	113050	47720
73182004	06	101862	1405	5504.0	.189	.02916	8156.64	1392.852	3.534-	9.006	127941	53398
73182004	07	101862	1405	5608.0	.190	.02809	8145.20	1365.142	3.572-	9.005	135258	56586
73182004	06	101862	1405	5712.0	.188	.02707	8179.82	1345.824	3.609-	9.009	105779	43945
73182004	07	101862	1405	5816.0	.186	.02611	8234.95	1330.653	3.645-	9.016	112148	46074
73182004	07	101862	1405	5928.0	.186	.02514	8230.83	1305.049	3.683-	9.015	101640	41795
73182004	08	101862	1405	6048.0	.185	.02415	8265.52	1284.484	3.723-	9.019	105670	43151
73182004	09	101862	1405	6184.0	.182	.02310	8309.57	1262.945	3.767-	9.025	103806	42010
73182004	09	101862	1405	6328.0	.178	.02206	8445.60	1254.541	3.813-	9.041	92693	36487
73182004	09	101862	1405	6472.0	.177	.02109	8488.09	1232.675	3.858-	9.046	79483	31025
73182004	10	101862	1405	6624.0	.173	.02013	8594.09	1219.332	3.905-	9.058	76084	29061
73182004	12	101862	1405	6800.0	.171	.01910	8648.73	1195.279	3.958-	9.065	79972	30212
73182004	12	101862	1405	6922.0	.165	.01807	8821.53	1185.828	4.013-	9.084	67096	24476
73182004	13	101862	1405	7192.0	.163	.01708	8878.37	1160.318	4.069-	9.091	62419	22510
73182004	14	101862	1405	7408.0	.159	.01610	8997.74	1141.686	4.128-	9.104	53839	18949
73182004	16	101862	1405	7648.0	.154	.01510	9178.19	1127.836	4.193-	9.124	48787	16554
73182004	18	101862	1405	7920.0	.148	.01408	9364.40	1111.173	4.263-	9.144	42044	13736
73182004	19	101862	1405	8216.0	.141	.01309	9601.81	1098.558	4.335-	9.169	35219	10969
73182004	22	101862	1405	8544.0	.142	.01210	9769.84	1052.683	4.414-	9.166	30294	9496
73182004	25	101862	1405	8920.0	.126	.01110	10130.87	1067.354	4.500-	9.223	24371	6812
73182004	15	101862	1405	9240.0	.129	.01035	10116.01	1018.979	4.570-	9.211	9817	2808

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1407

SAMPLE THICKNESS

13 foils

4,937 barns/atom Ta-182

Flight path of 13 meters

Rotor speed of 316 rev/minute

Channel width of 16 μ sec

1.08-inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION (Full width at half-maximum)

E (eV)	Width (μ sec)
0.01	46.7
1.00	42.1

Ident.	Avg. Ptu.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (burns)	σ√E	Δn E	Δn σ	(Open -Bgd.)	(Sample -Bgd.)
73182006	01	101962	1407	904.0	.983	1.00809	81.43	84.665	.077	4.399	22311	43985
73182006	01	101962	1407	920.0	.971	1.04462	140.72	143.255	.042	4.943	22461	43757
73182006	01	101962	1407	936.0	.974	1.00825	129.29	129.827	.008	4.862	22438	43800
73182006	01	101962	1407	952.0	.990	.97464	48.38	47.764	.075	3.879	22047	43756
73182006	01	101962	1407	968.0	.985	.96269	71.38	69.308	.059	4.268	22083	43624
73182006	01	101962	1407	984.0	.980	.91228	97.25	92.888	.091	4.577	21691	43019
73182006	01	101962	1407	1000.0	.973	.88332	134.40	126.376	.124	4.901	22145	43193
73182006	01	101962	1407	1016.0	.979	.85577	102.10	94.455	.145	4.626	21837	42871
73182006	01	101962	1407	1032.0	.977	.82940	114.68	104.449	.187	4.742	21818	42725
73182006	01	101962	1407	1048.0	.983	.80426	80.73	72.407	.217	4.391	21762	42910
73182006	01	101962	1407	1064.0	.961	.78025	196.18	173.295	.248	5.279	21895	42174
73182006	01	101962	1407	1080.0	.968	.75731	55.46	48.268	.277	4.015	21572	42755
73182006	01	101962	1407	1096.0	.957	.73535	213.32	182.931	.307	5.362	21826	41897
73182006	01	101962	1407	1112.0	.965	.71435	174.73	147.680	.336	5.163	21741	42061
73182006	01	101962	1407	1128.0	.983	.69423	80.23	66.854	.364	4.384	21463	42326
73182006	01	101962	1407	1144.0	.971	.67494	141.35	116.127	.393	4.951	21541	41958
73182006	01	101962	1407	1160.0	.957	.65645	413.15	172.701	.420	5.362	21488	41250
73182006	01	101962	1407	1176.0	.971	.63871	163.28	114.515	.448	4.964	21324	41519
73182006	01	101962	1407	1192.0	.968	.62168	155.93	122.952	.475	5.069	21356	41475
73182006	01	101962	1407	1208.0	.968	.60532	156.69	121.908	.501	5.054	21159	41086
73182006	01	101962	1407	1224.0	.960	.58260	197.71	151.816	.528	5.286	21347	41109
73182006	01	101962	1407	1240.0	.970	.57448	147.32	111.660	.554	4.992	21123	41095
73182006	01	101962	1407	1256.0	.946	.55944	274.05	205.076	.579	5.613	21645	40665
73182006	01	101962	1407	1272.0	.944	.54594	282.19	208.505	.605	5.642	21150	40041
73182006	01	101962	1407	1288.0	.951	.53246	247.62	180.694	.630	5.511	21075	40180
73182006	01	101962	1407	1304.0	.939	.51947	306.29	220.757	.654	5.724	21345	40214
73182006	01	101962	1407	1320.0	.938	.50696	314.51	223.939	.679	5.751	21209	39892
73182006	01	101962	1407	1336.0	.934	.49489	332.70	234.051	.703	5.807	21191	39714
73182006	01	101962	1407	1352.0	.934	.48324	336.57	233.968	.727	5.818	21077	39470
73182006	01	101962	1407	1368.0	.939	.47201	310.04	213.007	.750	5.736	20799	39161
73182006	01	101962	1407	1384.0	.930	.46115	355.46	241.387	.774	5.873	20700	38619
73182006	01	101962	1407	1400.0	.916	.45067	431.01	289.347	.797	6.066	20921	38440
73182006	01	101962	1407	1416.0	.927	.44055	371.44	246.545	.819	5.917	20572	38260
73182006	01	101962	1407	1432.0	.899	.43076	523.22	343.407	.842	6.260	21132	38113
73182006	01	101962	1407	1448.0	.908	.42129	473.38	307.260	.864	6.159	20518	37379
73182006	01	101962	1407	1464.0	.896	.41213	538.72	345.847	.886	6.289	20817	37424
73182006	01	101962	1407	1480.0	.891	.40327	564.93	358.751	.908	6.336	20939	37444
73182006	01	101962	1407	1496.0	.880	.39469	628.19	394.657	.929	6.442	21033	37132
73182006	01	101962	1407	1512.0	.867	.38638	703.94	437.565	.950	6.556	21003	36515
73182006	01	101962	1407	1528.0	.878	.37833	639.46	393.324	.971	6.460	20496	36101
73182006	01	101962	1407	1544.0	.856	.37053	762.23	463.978	.992	6.636	20788	35716
73182006	01	101962	1407	1560.0	.852	.36297	786.98	474.134	1.013	6.668	20862	35664
73182006	01	101962	1407	1576.0	.845	.35564	827.43	493.445	1.033	6.718	20874	35395
73182006	01	101962	1407	1592.0	.826	.34852	941.94	556.085	1.054	6.847	20933	34680
73182006	01	101962	1407	1608.0	.821	.34162	971.40	567.769	1.074	6.878	20900	34419
73182006	01	101962	1407	1624.0	.813	.33492	1021.16	590.971	1.093	6.928	20942	34143
73182006	01	101962	1407	1640.0	.780	.32842	1225.70	702.425	1.113	7.111	21310	33332
73182006	01	101962	1407	1656.0	.780	.32211	1223.16	694.202	1.132	7.109	20948	32784
73182006	01	101962	1407	1672.0	.771	.31597	1279.52	719.236	1.152	7.154	21195	32794
73182006	01	101962	1407	1688.0	.743	.31001	1464.21	819.254	1.171	7.289	21298	31743
73182006	01	101962	1407	1704.0	.736	.30421	1507.68	831.568	1.190	7.318	21409	31628
73182006	01	101962	1407	1720.0	.707	.29858	1705.62	931.993	1.208	7.441	21820	30969
73182006	01	101962	1407	1736.0	.682	.29310	1888.43	1022.373	1.227	7.543	21938	30006
73182006	01	101962	1407	1752.0	.667	.28777	1992.38	1068.799	1.245	7.597	22047	29527
73182006	01	101962	1407	1768.0	.644	.28259	2170.98	1154.077	1.263	7.682	22513	29080
73182006	01	101962	1407	1784.0	.627	.27754	2303.34	1213.448	1.281	7.742	23045	28979
73182006	01	101962	1407	1800.0	.613	.27263	2414.91	1260.921	1.299	7.789	22859	28104
73182006	01	101962	1407	1816.0	.570	.26785	2767.63	1432.370	1.317	7.925	23338	26714
73182006	01	101962	1407	1832.0	.557	.26319	2888.49	1481.858	1.334	7.968	23832	26620
73182006	01	101962	1407	1848.0	.527	.25865	3155.72	1604.929	1.352	8.056	24157	25563
73182006	01	101962	1407	1864.0	.510	.25423	3318.04	1672.998	1.369	8.107	24373	24957
73182006	01	101962	1407	1880.0	.474	.24992	3685.06	1842.240	1.386	8.212	24982	23747
73182006	01	101962	1407	1896.0	.444	.24572	4002.21	1983.905	1.403	8.294	25670	22884
73182006	01	101962	1407	1912.0	.415	.24163	4336.89	2131.841	1.420	8.374	26084	21729
73182006	01	101962	1407	1928.0	.381	.23763	4754.06	2317.480	1.437	8.466	26675	20421
73182006	01	101962	1407	1944.0	.352	.23374	5147.74	2486.765	1.453	8.546	27174	19208
73182006	01	101962	1407	1960.0	.321	.22994	5605.50	2687.956	1.469	8.631	28068	18084
73182006	01	101962	1407	1976.0	.289	.22623	6112.24	2907.207	1.486	8.718	28874	16789
73182006	01	101962	1407	1992.0	.258	.22261	6682.92	3153.109	1.502	8.807	29555	15309
73182006	01	101962	1407	2008.0	.227	.21907	7302.10	3417.742	1.518	8.895	30410	13895
73182006	01	101962	1407	2024.0	.201	.21562	7896.86	3666.900	1.534	8.974	31021	12566
73182006	01	101962	1407	2040.0	.174	.21226	8625.84	3974.072	1.549	9.062	32204	11255
73182006	01	101962	1407	2056.0	.147	.20896	9451.24	4320.366	1.565	9.153	33018	9763
73182006	01	101962	1407	2072.0	.127	.20575	10178.47	4616.925	1.581	9.228	33747	8611
73182006	01	101962	1407	2088.0	.102	.20261	11235.83	5057.500	1.596	9.326	35605	7334
73182006	01	101962	1407	2104.0	.085	.19954	12169.49	5436.101	1.611	9.406	36477	6220
73182006	01	101962	1407	2120.0	.065	.19654	13488.81	5979.973	1.626	9.509	37863	4941
73182006	01	101962	1407	2136.0	.052	.19360	14589.39	6419.335	1.641	9.588	39272	4102
73182006	01	101962	1407	2152.0	.040	.19074	15891.46	6940.406	1.656	9.673	40424	3244
73182006	01	101962	1407	2168.0	.032	.18793	16968.20	7555.868	1.671	9.739	41290	2664

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182006	01	101962	1407	2186.0	.021	.18519	18886.28	8127.469	1.686-	9.846	47965	1880
73182006	01	101962	1407	2200.0	.016	.18750	20231.67	8651.521	1.701-	9.815	44198	1467
73182006	01	101962	1407	2216.0	.013	.17988	21337.13	9049.569	1.717-	9.968	45801	1219
73182006	01	101962	1407	2232.0	.008	.17711	21718.98	9986.177	1.729-	10.073	47078	775
73182006	01	101962	1407	2248.0	.006	.17479	25119.19	10501.804	1.744-	10.131	48617	602
73182006	01	101962	1407	2264.0	.001	.17213	27779.89	11449.062	1.758-	10.224	49883	375
73182006	01	101962	1407	2280.0	.003	.16992	28391.66	11706.252	1.772-	10.253	51589	329
73182006	01	101962	1407	2296.0	.002	.16756	30373.36	12433.063	1.786-	10.321	53551	229
73182006	01	101962	1407	2312.0	.001	.16525	31739.31	12902.335	1.800-	10.465	55133	179
73182006	01	101962	1407	2328.0	.002	.16299	30284.76	12226.571	1.814-	10.418	56751	246
73182006	01	101962	1407	2344.0	.000	.16077	34463.61	13818.575	1.827-	10.447	58085	109
73182006	01	101962	1407	2360.0	.000	.15860	37049.51	14754.825	1.841-	10.520	59932	67
73182006	01	101962	1407	2376.0	.000	.15647	35312.92	13968.483	1.854-	10.472	61323	97
73182006	01	101962	1407	2392.0	.001	.15438	33144.90	13023.036	1.868-	10.409	63410	155
73182006	01	101962	1407	2408.0	.000	.15234	34569.79	13492.853	1.881-	10.450	64843	118
73182006	01	101962	1407	2424.0	.001	.15033	33538.38	13003.640	1.894-	10.420	66887	150
73182006	01	101962	1407	2440.0	.001	.14837	33992.39	13093.470	1.908-	10.433	68441	140
73182006	01	101962	1407	2456.0	.000	.14644	37921.56	14167.222	1.921-	10.519	70429	78
73182006	01	101962	1407	2472.0	.000	.14455	35853.17	13631.280	1.934-	10.487	71265	100
73182006	01	101962	1407	2488.0	.000	.14270	35902.41	12562.373	1.947-	10.488	73419	103
73182006	01	101962	1407	2504.0	.000	.14088	34713.72	13029.444	1.959-	10.454	74682	132
73182006	01	101962	1407	2520.0	.000	.13910	36753.73	13707.712	1.972-	10.511	76973	90
73182006	01	101962	1407	2536.0	.001	.13735	33091.93	12264.124	1.985-	10.407	78213	192
73182006	01	101962	1407	2552.0	.000	.13563	34696.93	12778.180	1.997-	10.454	80067	143
73182006	01	101962	1407	2568.0	.000	.13395	38700.45	14164.049	2.010-	10.563	81194	64
73182006	01	101962	1407	2584.0	.000	.13229	41668.22	15155.437	2.022-	10.637	83313	37
73182006	01	101962	1407	2600.0	.000	.13067	34546.95	12488.139	2.035-	10.450	84235	155
73182006	01	101962	1407	2616.0	.001	.12908	33541.31	11978.771	2.047-	10.414	85693	201
73182006	01	101962	1407	2632.0	.000	.12751	35811.51	12787.768	2.059-	10.486	87626	124
73182006	01	101962	1407	2648.0	.000	.12597	35445.62	12580.451	2.071-	10.475	89241	137
73182006	01	101962	1407	2664.0	.001	.12447	32638.62	11515.007	2.083-	10.393	91419	246
73182006	01	101962	1407	2680.0	.001	.12298	32246.93	11308.519	2.095-	10.381	92685	271
73182006	01	101962	1407	2696.0	.001	.12153	32550.97	11347.643	2.107-	10.390	93461	256
73182006	01	101962	1407	2712.0	.001	.12010	31469.16	10905.778	2.119-	10.356	95597	327
73182006	01	101962	1407	2728.0	.002	.11869	30124.00	10378.145	2.131-	10.313	96914	436
73182006	01	101962	1407	2744.0	.001	.11731	31389.07	10750.928	2.142-	10.354	98098	342
73182006	01	101962	1407	2760.0	.002	.11596	28796.36	9805.997	2.154-	10.268	99660	586
73182006	01	101962	1407	2776.0	.003	.11463	28115.96	9519.238	2.166-	10.244	100211	677
73182006	01	101962	1407	2792.0	.004	.11332	27925.86	9097.727	2.177-	10.204	101340	852
73182006	01	101962	1407	2808.0	.005	.11203	26939.47	8715.541	2.188-	10.167	102904	1058
73182006	01	101962	1407	2824.0	.005	.11076	25785.12	8581.452	2.200-	10.157	103857	1123
73182006	01	101962	1407	2840.0	.006	.10952	24924.85	8248.582	2.211-	10.123	105166	1355
73182006	01	101962	1407	2856.0	.007	.10829	24472.15	8053.162	2.222-	10.105	105618	1490
73182006	01	101962	1407	2872.0	.008	.10709	23566.65	7712.096	2.234-	10.067	107207	1817
73182006	01	101962	1407	2888.0	.009	.10591	23206.59	7552.310	2.245-	10.052	108467	1979
73182006	01	101962	1407	2904.0	.010	.10474	22411.02	7253.005	2.256-	10.017	109459	2345
73182006	01	101962	1407	2920.0	.012	.10360	21798.68	7016.332	2.267-	9.989	111331	2701
73182006	01	101962	1407	2936.0	.013	.10247	21199.16	6786.051	2.278-	9.961	111493	3054
73182006	01	101962	1407	2952.0	.014	.10136	20776.95	6614.777	2.289-	9.941	112173	3348
73182006	01	101962	1407	2968.0	.016	.10027	20297.91	6427.425	2.299-	9.918	113030	3717
73182006	01	101962	1407	2984.0	.017	.09920	19859.96	6255.101	2.310-	9.896	113209	4067
73182006	01	101962	1407	3000.0	.020	.09815	19237.23	6026.814	2.321-	9.864	113972	4645
73182006	01	101962	1407	3016.0	.022	.09711	18792.32	5856.155	2.331-	9.841	114498	5108
73182006	01	101962	1407	3032.0	.023	.09609	18415.28	5708.442	2.342-	9.820	115666	5568
73182006	01	101962	1407	3048.0	.026	.09508	17885.09	5514.877	2.353-	9.791	116205	6229
73182006	01	101962	1407	3064.0	.028	.09409	17572.59	5390.233	2.363-	9.774	117195	6693
73182006	01	101962	1407	3080.0	.030	.09311	17163.53	5237.268	2.373-	9.750	118227	7335
73182006	01	101962	1407	3096.0	.033	.09215	16741.84	5082.191	2.384-	9.725	118111	7981
73182006	01	101962	1407	3112.0	.035	.09121	16414.09	4957.219	2.394-	9.705	119112	8601
73182006	01	101962	1407	3128.0	.038	.09028	16118.95	4843.203	2.404-	9.687	120420	9232
73182006	01	101962	1407	3144.0	.039	.08936	15924.98	4760.478	2.415-	9.675	121494	9687
73182006	01	101962	1407	3160.0	.041	.08846	15668.59	4660.190	2.425-	9.659	121941	10241
73182006	01	101962	1407	3176.0	.044	.08757	15354.78	4543.822	2.435-	9.639	122822	10813
73182006	01	101962	1407	3192.0	.047	.08669	15039.87	4428.216	2.445-	9.618	122074	11640
73182006	01	101962	1407	3208.0	.050	.08541	14716.55	4300.911	2.450-	9.596	124026	12454
73182006	01	101962	1407	3224.0	.055	.08415	14411.49	4151.567	2.455-	9.568	122495	13543
73182006	01	101962	1407	3240.0	.057	.08332	14087.11	4066.273	2.465-	9.553	122893	14220
73182006	01	101962	1407	3256.0	.058	.08251	13976.86	4014.792	2.474-	9.545	123424	14603
73182006	02	101962	1407	3272.0	.063	.08131	13597.17	3877.222	2.509-	9.517	124000	31179
73182006	01	101962	1407	3320.0	.067	.08014	13331.68	3774.067	2.523-	9.497	123338	16632
73182006	01	101962	1407	3336.0	.069	.07937	13167.13	3709.535	2.533-	9.485	121944	17001
73182006	01	101962	1407	3352.0	.072	.07862	12962.80	3634.673	2.543-	9.469	121738	17690
73182006	02	101962	1407	3376.0	.075	.07750	12758.97	3551.948	2.557-	9.453	124324	36862
73182006	01	101962	1407	3400.0	.079	.07641	12508.48	3457.641	2.571-	9.434	121858	19414
73182006	02	101962	1407	3424.0	.083	.07534	12251.30	3362.755	2.585-	9.413	123197	40818
73182006	01	101962	1407	3448.0	.085	.07430	12153.81	3312.889	2.599-	9.405	121220	20751
73182006	02	101962	1407	3472.0	.089	.07328	11899.15	3221.134	2.613-	9.384	124566	43544
73182006	01	101962	1407	3496.0	.094	.07227	11629.04	3126.245	2.627-	9.361	119761	28801
73182006	02	101962	1407	3520.0	.097	.07129	11482.84	3065.942	2.640-	9.348	123688	47009
73182006	01	101962	1407	3544.0	.100	.07033	11328.47	3004.289	2.654-	9.335	119225	24126

Ident.	Pts.	Avg. Date	Run No.	Time-of-Flight	Trans.	E (ev)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182006	02	101962	1407	3568.0	.103	.06949	11193.56	2748.606	2.668-	9.323	218007	49497
73182006	01	101962	1407	3592.0	.107	.06846	11008.07	2880.247	2.681-	9.306	118390	25564
73182006	02	101962	1407	3616.0	.110	.06756	10861.29	2823.100	2.694-	9.292	233851	52020
73182006	02	101962	1407	3648.0	.113	.06638	10739.35	2766.971	2.712-	9.281	231025	52676
73182006	02	101962	1407	3680.0	.117	.06523	10558.83	2696.744	2.729-	9.264	227068	53708
73182006	01	101962	1407	3704.0	.120	.06438	10446.77	2650.689	2.742-	9.254	113351	27424
73182006	02	101962	1407	3728.0	.123	.06356	10342.97	2607.578	2.755-	9.244	228323	56415
73182006	02	101962	1407	3760.0	.127	.06248	10180.55	2544.732	2.772-	9.228	225211	57511
73182006	02	101962	1407	3792.0	.129	.06143	10072.65	2496.516	2.789-	9.217	221527	57820
73182006	02	101962	1407	3824.0	.134	.06041	9905.99	2436.739	2.806-	9.200	217773	58793
73182006	02	101962	1407	3856.0	.137	.05941	9811.70	2391.521	2.823-	9.191	213201	58669
73182006	02	101962	1407	3888.0	.140	.05843	9681.60	2340.267	2.839-	9.177	209376	59156
73182006	02	101962	1407	3920.0	.142	.05748	9614.46	2305.068	2.856-	9.171	205924	58979
73182006	02	101962	1407	3952.0	.146	.05656	9495.76	2258.316	2.872-	9.158	202565	59431
73182006	03	101962	1407	3992.0	.149	.05563	9378.17	2207.957	2.892-	9.146	199506	60994
73182006	02	101962	1407	4032.0	.153	.05433	9240.60	2153.874	2.912-	9.131	195098	60278
73182006	02	101962	1407	4064.0	.154	.05348	9211.23	2130.168	2.928-	9.128	193185	60046
73182006	03	101962	1407	4104.0	.159	.05245	9074.28	2078.189	2.947-	9.113	180426	69614
73182006	02	101962	1407	4144.0	.159	.05144	8968.55	2056.784	2.967-	9.112	183288	58641
73182006	03	101962	1407	4184.0	.162	.05046	8862.22	2019.212	2.986-	9.100	168727	87852
73182006	03	101962	1407	4232.0	.167	.04932	8723.37	1959.505	3.009-	9.085	160289	87524
73182006	02	101962	1407	4272.0	.168	.04840	8788.25	1933.416	3.028-	9.081	168534	57077
73182006	03	101962	1407	4312.0	.172	.04751	8675.88	1891.065	3.046-	9.068	144124	84582
73182006	03	101962	1407	4360.0	.173	.04647	8634.93	1861.425	3.060-	9.063	235019	82107
73182006	03	101962	1407	4408.0	.174	.04546	8614.40	1836.707	3.090-	9.061	227906	79957
73182006	03	101962	1407	4456.0	.177	.04449	8525.69	1798.296	3.112-	9.050	220665	78823
73182006	04	101962	1407	4512.0	.178	.04339	8494.55	1769.439	3.137-	9.047	287477	103341
73182006	03	101962	1407	4568.0	.180	.04233	8454.68	1739.489	3.162-	9.042	207121	75062
73182006	03	101962	1407	4616.0	.182	.04146	8406.81	1711.772	3.183-	9.036	202372	74058
73182006	04	101962	1407	4672.0	.184	.04047	8352.33	1680.253	3.207-	9.030	259910	96171
73182006	04	101962	1407	4736.0	.185	.03938	8317.74	1650.606	3.234-	9.026	247221	92124
73182006	04	101962	1407	4800.0	.187	.03834	8268.67	1619.056	3.261-	9.020	235915	88792
73182006	04	101962	1407	4864.0	.188	.03734	8231.98	1590.713	3.287-	9.015	222671	84435
73182006	04	101962	1407	4928.0	.187	.03637	8265.60	1576.327	3.314-	9.019	211816	79775
73182006	04	101962	1407	4992.0	.189	.03545	8206.16	1545.071	3.339-	9.012	198413	75638
73182006	05	101962	1407	5064.0	.189	.03445	8221.63	1525.994	3.368-	9.014	231764	88077
73182006	05	101962	1407	5144.0	.190	.03338	8181.41	1494.760	3.399-	9.009	220821	84611
73182006	05	101962	1407	5224.0	.192	.03237	8138.14	1464.187	3.430-	9.004	204733	79140
73182006	05	101962	1407	5304.0	.192	.03140	8136.90	1441.863	3.460-	9.004	190285	73578
73182006	06	101962	1407	5392.0	.191	.03038	8169.76	1423.978	3.493-	9.008	213520	82018
73182006	06	101962	1407	5468.0	.192	.02933	8131.33	1392.572	3.529-	9.003	201580	78042
73182006	06	101962	1407	5584.0	.191	.02833	8171.03	1375.310	3.563-	9.008	184535	70872
73182006	06	101962	1407	5680.0	.190	.02738	8195.69	1356.133	3.597-	9.011	169601	64818
73182006	07	101962	1407	5784.0	.188	.02640	8236.63	1338.294	3.634-	9.016	180098	68261
73182006	07	101962	1407	5896.0	.188	.02541	8245.37	1314.354	3.672-	9.017	160611	60774
73182006	08	101962	1407	6016.0	.186	.02441	8299.07	1296.623	3.712-	9.023	169162	63322
73182006	08	101962	1407	6144.0	.184	.02340	8333.90	1274.842	3.755-	9.028	151028	56144
73182006	09	101962	1407	6280.0	.182	.02240	8393.75	1256.264	3.798-	9.035	149131	54771
73182006	09	101962	1407	6424.0	.179	.02140	8482.40	1240.869	3.844-	9.045	130640	47130
73182006	11	101962	1407	6584.0	.174	.02038	8610.37	1229.205	3.893-	9.060	133796	47037
73182006	10	101962	1407	6752.0	.174	.01938	8617.28	1199.630	3.943-	9.061	107071	37594
73182006	12	101962	1407	6928.0	.170	.01840	8728.94	1184.031	3.995-	9.074	110440	37913
73182006	13	101962	1407	7128.0	.167	.01739	8818.43	1162.898	4.051-	9.084	101589	34254
73182006	14	101962	1407	7344.0	.162	.01638	8956.11	1146.242	4.111-	9.100	89522	29357
73182006	15	101962	1407	7576.0	.156	.01539	9162.70	1136.693	4.174-	9.122	75863	23859
73182006	17	101962	1407	7832.0	.154	.01440	9415.53	1105.864	4.240-	9.128	66682	20750
73182006	19	101962	1407	8120.0	.147	.01340	9449.36	1093.843	4.312-	9.153	60119	17845
73182006	22	101962	1407	8448.0	.142	.01238	9611.17	1069.392	4.391-	9.170	51508	14802
73182006	24	101962	1407	8816.0	.133	.01137	9957.71	1061.794	4.476-	9.206	40200	10773
73182006	25	101962	1407	9193.3	.126	.01045	10211.22	1043.845	4.561-	9.231	25451	6479

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1410

SAMPLE THICKNESS

1 foil

70,521 barns/atom Ta-182

Flight path of 12.99 meters

Rotor speed of 335 rev/minute

Channel width of 16 μ sec

0.8 - inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION

(Full width at half-maximum)

E (eV)	Width (μ sec)
.01	42.6
1.00	39.9

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182009	110362	1410	944.0	.995	.98967	989.67	334.61	332.890	.010	5.812	15310	14224
73182009	110362	1410	960.0	1.016	.98698	986.98	1001.00	979.234	.043	6.008	14937	14143
73182009	110362	1410	976.0	.992	.92506	925.06	920.75	901.074	.077	6.255	15149	14037
73182009	110362	1410	992.0	.984	.89623	896.23	1104.31	1044.452	.109	7.006	15153	13925
73182009	110362	1410	1008.0	.984	.86801	868.01	1070.41	997.277	.141	6.975	15098	13881
73182009	110362	1410	1024.0	.978	.84109	841.09	1530.46	1403.604	.173	7.333	15065	13761
73182009	110362	1410	1040.0	1.009	.81541	815.41	633.28	971.860	.204	6.450	14695	13841
73182009	110362	1410	1056.0	.997	.79089	790.89	176.73	157.172	.234	5.174	14968	13937
73182009	110362	1410	1072.0	.988	.76746	767.46	839.00	735.004	.264	6.732	14833	13683
73182009	110362	1410	1088.0	.976	.74505	745.05	1666.70	1438.641	.294	7.418	14960	13639
73182009	110362	1410	1104.0	.998	.72361	723.61	130.83	111.296	.323	4.873	14813	13802
73182009	110362	1410	1120.0	.993	.70308	703.08	479.68	402.219	.352	6.173	14818	13739
73182009	110362	1410	1136.0	.988	.68343	683.43	848.03	701.062	.380	6.742	14930	13770
73182009	110362	1410	1152.0	1.004	.66457	664.57	516.29	237.029	.408	5.757	14627	13715
73182009	110362	1410	1168.0	.996	.64648	646.48	252.61	303.116	.436	5.531	14668	13643
73182009	110362	1410	1200.0	.988	.61246	612.46	742.54	620.247	.490	6.675	14715	13583
73182009	110362	1410	1184.0	1.003	.62911	629.11	215.99	171.310	.463	5.375	14833	13889
73182009	110362	1410	1216.0	.969	.59665	596.65	2181.07	1684.447	.516	7.687	14955	13535
73182009	110362	1410	1232.0	1.007	.58106	581.06	147.45	112.404	.542	4.993	14576	13635
73182009	110362	1410	1268.0	1.000	.56676	566.76	2.12	1.602	.568	.755	14860	13853
73182009	110362	1410	1264.0	.980	.55201	552.01	1373.22	1020.266	.594	7.224	14649	13411
73182009	110362	1410	1280.0	.979	.53810	538.10	1466.53	1075.984	.619	7.290	14848	13573
73182009	110362	1410	1296.0	1.023	.52509	525.09	1032.22	1182.762	.644	7.397	14694	13847
73182009	110362	1410	1312.0	.994	.51216	512.16	290.53	279.544	.668	5.967	14779	13720
73182009	01 080363	1410	1328.0	.990	.50010	500.10	696.07	492.251	.692	6.345	14661	13552
73182009	01 080363	1410	1344.0	1.000	.48826	488.26	62.55	43.709	.716	4.135	14649	13647
73182009	01 080363	1410	1360.0	.990	.47684	476.84	695.49	480.267	.740	6.544	14775	13657
73182009	01 080363	1410	1376.0	.983	.46581	465.81	1148.27	783.704	.763	7.046	14736	13534
73182009	01 080363	1410	1392.0	.991	.45517	455.17	589.89	397.980	.787	6.379	14766	13670
73182009	01 080363	1410	1408.0	1.009	.44488	444.88	681.36	454.465	.809	6.524	14523	13689
73182009	01 080363	1410	1424.0	.994	.43494	434.94	379.99	250.605	.832	5.940	14887	13823
73182009	01 080363	1410	1440.0	.993	.42533	425.33	429.77	280.288	.854	6.063	14813	13744
73182009	01 080363	1410	1456.0	.988	.41603	416.03	648.62	547.369	.876	6.743	14651	13726
73182009	01 080363	1410	1472.0	.950	.40704	407.04	3584.36	2286.911	.898	8.184	14892	13213
73182009	01 080363	1410	1488.0	1.001	.39833	398.33	105.04	66.299	.920	4.654	14758	13797
73182009	01 080363	1410	1504.0	.981	.38990	389.90	1292.75	807.219	.941	7.164	14644	13422
73182009	01 080363	1410	1520.0	.983	.38174	381.74	1191.90	736.422	.963	7.083	14917	13692
73182009	01 080363	1410	1536.0	.973	.37382	373.82	1921.54	1174.846	.983	7.560	15067	13687
73182009	01 080363	1410	1552.0	.981	.36616	366.16	1339.79	810.727	1.004	7.200	14719	13482
73182009	01 080363	1410	1568.0	1.018	.35872	358.72	1261.98	755.842	1.025	7.140	14621	13695
73182009	01 080363	1410	1584.0	.989	.35151	351.51	719.09	426.341	1.045	6.577	14884	13754
73182009	01 080363	1410	1600.0	.975	.34452	344.52	1731.87	1016.541	1.065	7.456	15087	13742
73182009	01 080363	1410	1616.0	.988	.33773	337.73	840.21	488.289	1.085	6.733	15029	13684
73182009	01 080363	1410	1632.0	.977	.33114	331.14	1595.26	917.989	1.105	7.374	15022	13710
73182009	01 080363	1410	1648.0	1.003	.32474	324.74	212.23	120.945	1.124	5.357	14930	13979
73182009	01 080363	1410	1664.0	.990	.31853	318.53	642.01	382.345	1.144	6.464	15117	13984
73182009	01 080363	1410	1680.0	.980	.31249	312.49	1416.75	791.977	1.163	7.236	15184	13893
73182009	01 080363	1410	1696.0	.975	.30662	306.62	1761.66	975.489	1.182	7.474	15362	13967
73182009	01 080363	1410	1712.0	.986	.30092	300.92	979.59	537.369	1.200	6.887	15513	14282
73182009	01 080363	1410	1728.0	.979	.29537	295.37	1432.48	778.526	1.219	7.267	15566	14239
73182009	01 080363	1410	1744.0	.972	.28997	289.97	1975.28	1063.666	1.237	7.588	15966	14493
73182009	01 080363	1410	1760.0	.975	.28472	284.72	1714.51	914.851	1.256	7.446	16029	14604
73182009	01 080363	1410	1776.0	.971	.27962	279.62	2403.13	1059.241	1.274	7.602	16247	14742
73182009	01 080363	1410	1792.0	.954	.27465	274.65	3292.17	1729.330	1.292	8.099	16597	14787
73182009	01 080363	1410	1808.0	.950	.26981	269.81	3252.84	1845.462	1.310	8.175	16934	15031
73182009	01 080363	1410	1824.0	.964	.26509	265.09	2228.50	1301.850	1.327	7.835	17036	15343
73182009	01 080363	1410	1840.0	.949	.26050	260.50	3082.81	1879.678	1.345	8.211	17275	15306
73182009	01 080363	1410	1856.0	.951	.25603	256.03	3530.63	1766.479	1.362	8.169	17857	15855
73182009	01 080363	1410	1872.0	.940	.25167	251.67	4319.32	2166.864	1.379	8.370	18330	16094
73182009	01 080363	1410	1888.0	.941	.24743	247.43	4233.98	2106.083	1.396	8.550	18448	16218
73182009	01 080363	1410	1904.0	.910	.24329	243.29	6641.40	3275.835	1.413	8.801	19126	16250
73182009	01 080363	1410	1920.0	.931	.23925	239.25	5013.94	2452.480	1.430	8.519	19525	16976
73182009	01 080363	1410	1936.0	.920	.23531	235.31	5845.27	2835.472	1.446	8.673	20127	17295
73182009	01 080363	1410	1952.0	.923	.23147	231.47	5844.93	2686.988	1.463	8.627	20449	17636
73182009	01 080363	1410	1968.0	.900	.22406	224.06	7420.47	3512.482	1.495	8.911	21727	18425
73182009	01 080363	1410	2000.0	.907	.22049	220.49	7215.03	3387.917	1.511	8.883	22406	18882
73182009	01 080363	1410	2016.0	.901	.21700	217.00	7305.72	3403.243	1.527	8.896	22843	19226
73182009	01 080363	1410	2032.0	.891	.21360	213.60	8104.53	3745.661	1.543	9.000	23442	19508
73182009	01 080363	1410	2048.0	.871	.21028	210.28	9708.24	4451.839	1.559	9.180	24695	20089
73182009	01 080363	1410	2064.0	.849	.20703	207.03	11465.38	5216.811	1.574	9.347	25551	20274
73182009	01 080363	1410	2080.0	.844	.20386	203.86	11887.23	5367.189	1.590	9.383	26347	20781
73182009	01 080363	1410	2096.0	.836	.20076	200.76	12598.84	5645.069	1.605	9.441	26888	20994
73182009	01 080363	1410	2112.0	.832	.19773	197.73	12927.51	5748.459	1.620	9.667	27810	21613
73182009	01 080363	1410	2128.0	.820	.19476	194.76	13965.35	6163.138	1.635	9.544	28755	22021
73182009	01 080363	1410	2144.0	.796	.19187	191.87	16465.48	7037.159	1.650	9.684	29687	22068
73182009	01 080363	1410	2160.0	.785	.18904	189.04	17443.79	7410.426	1.665	9.743	30662	22478
73182009	01 080363	1410	2176.0	.775	.18627	186.27	17955.84	7749.563	1.680	9.795	31630	22890
73182009	01 080363	1410	2192.0	.753	.18356	183.56	19973.44	8957.573	1.695	9.902	33188	23340
73182009	01 080363	1410	2208.0	.739	.18091	180.91	21313.14	9065.228	1.709	9.967	34172	23581
73182009	01 080363	1410	2224.0	.703	.17831	178.31	24761.23	10455.871	1.724	10.117	35434	23284

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma/\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182009	01	080363	1410	2240.0	.691	.17577	26057.91	10924.787	1.738-	10.168	36510	23568
73182009	01	080363	1410	2256.0	.678	.17329	27368.99	11193.176	1.757-	10.217	37472	23730
73182009	01	080363	1410	2272.0	.654	.17086	29914.86	12365.375	1.766-	10.306	38877	23747
73182009	01	080363	1410	2288.0	.635	.16848	31964.18	13120.170	1.780-	10.372	40102	23793
73182009	01	080363	1410	2304.0	.620	.16614	33617.16	13702.447	1.794-	10.422	41372	23978
73182009	01	080363	1410	2320.0	.607	.16386	35159.05	14230.646	1.808-	10.467	42564	24137
73182009	01	080363	1410	2336.0	.590	.16162	37182.93	14948.281	1.822-	10.523	43844	24157
73182009	01	080363	1410	2352.0	.578	.15943	38648.84	15431.977	1.836-	10.562	45378	24489
73182009	01	080363	1410	2368.0	.561	.15729	40742.31	16148.373	1.849-	10.615	46545	24379
73182009	01	080363	1410	2384.0	.547	.15518	42722.17	16711.322	1.863-	10.665	47686	24394
73182009	01	080363	1410	2400.0	.544	.15312	44851.60	16768.068	1.876-	10.665	48798	24811
73182009	01	080363	1410	2416.0	.529	.15110	46811.38	17418.893	1.889-	10.710	50579	25011
73182009	01	080363	1410	2432.0	.519	.14917	48441.87	17856.788	1.901-	10.741	51706	25055
73182009	01	080363	1410	2448.0	.521	.14717	49902.31	17609.386	1.916-	10.734	52886	25251
73182009	01	080363	1410	2464.0	.519	.14527	51159.60	17593.411	1.929-	10.739	54688	25532
73182009	01	080363	1410	2480.0	.522	.14340	52807.48	17346.468	1.942-	10.732	55260	25943
73182009	01	080363	1410	2496.0	.522	.14157	54728.49	17205.709	1.956-	10.730	56929	27788
73182009	01	080363	1410	2512.0	.527	.13977	56461.53	16846.626	1.967-	10.715	58102	28630
73182009	01	080363	1410	2528.0	.547	.13801	58751.51	16251.556	1.980-	10.686	59175	29705
73182009	01	080363	1410	2544.0	.540	.13628	61277.86	16087.256	1.993-	10.682	60751	30572
73182009	01	080363	1410	2560.0	.540	.13458	64443.25	15937.220	2.005-	10.679	62584	31554
73182009	01	080363	1410	2576.0	.542	.13291	68277.80	15749.090	2.018-	10.641	64178	32592
73182009	01	080363	1410	2592.0	.559	.13127	72995.73	14854.087	2.030-	10.621	66765	33808
73182009	01	080363	1410	2608.0	.567	.12967	78996.18	14402.513	2.042-	10.596	69423	35168
73182009	01	080363	1410	2624.0	.576	.12809	86869.05	13911.104	2.055-	10.567	72440	36281
73182009	01	080363	1410	2640.0	.588	.12654	97432.01	13315.490	2.067-	10.530	76778	37764
73182009	01	080363	1410	2656.0	.596	.12502	106429.16	12880.683	2.079-	10.503	80986	38977
73182009	01	080363	1410	2672.0	.602	.12353	118777.59	12539.545	2.091-	10.482	84988	40245
73182009	01	080363	1410	2688.0	.618	.12207	133881.15	11837.571	2.103-	10.430	89175	41899
73182009	01	080363	1410	2704.0	.627	.12062	152449.69	11408.829	2.115-	10.399	93321	42960
73182009	01	080363	1410	2720.0	.642	.11921	17444.76	10753.291	2.126-	10.346	97226	44555
73182009	01	080363	1410	2736.0	.659	.11782	19970.47	10081.391	2.138-	10.287	10177	46337
73182009	01	080363	1410	2752.0	.655	.11645	22813.53	10173.801	2.150-	10.302	10646	46750
73182009	01	080363	1410	2768.0	.667	.11511	25940.58	9666.246	2.161-	10.257	11186	48296
73182009	01	080363	1410	2784.0	.680	.11379	29147.39	9157.568	2.173-	10.209	11815	49878
73182009	01	080363	1410	2800.0	.684	.11250	32682.48	8949.579	2.184-	10.191	12586	50893
73182009	01	080363	1410	2816.0	.699	.11122	36554.82	8389.049	2.196-	10.132	13452	52574
73182009	01	080363	1410	2832.0	.699	.10997	40869.17	8346.533	2.207-	10.133	14453	53543
73182009	01	080363	1410	2848.0	.707	.10874	45450.71	8062.806	2.218-	10.104	15580	54638
73182009	01	080363	1410	2864.0	.714	.10752	50399.42	7784.216	2.230-	10.074	16803	56067
73182009	01	080363	1410	2880.0	.719	.10633	55555.97	7583.354	2.241-	10.054	18293	56587
73182009	01	080363	1410	2896.0	.728	.10516	61263.01	7251.785	2.252-	10.015	19974	58247
73182009	01	080363	1410	2912.0	.734	.10401	6732.64	7008.903	2.263-	9.986	21897	59335
73182009	01	080363	1410	2928.0	.736	.10287	73612.59	6931.883	2.274-	9.981	23974	60176
73182009	01	080363	1410	2944.0	.745	.10176	80734.22	6614.185	2.285-	9.939	26239	61463
73182009	01	080363	1410	2960.0	.753	.10066	88777.69	6338.317	2.296-	9.902	28692	61952
73182009	01	080363	1410	2976.0	.762	.09958	97105.31	6028.932	2.306-	9.857	31362	63200
73182009	01	080363	1410	2992.0	.761	.09852	10653.19	6043.173	2.317-	9.865	34292	63728
73182009	01	080363	1410	3008.0	.768	.09748	11685.49	5802.723	2.328-	9.830	37498	64770
73182009	01	080363	1410	3024.0	.772	.09645	12821.17	5658.841	2.338-	9.810	40989	65603
73182009	01	080363	1410	3040.0	.781	.09543	14091.34	5372.490	2.349-	9.763	44839	67000
73182009	01	080363	1410	3056.0	.773	.09444	15411.01	5174.931	2.359-	9.805	49264	68887
73182009	01	080363	1410	3072.0	.786	.09346	16835.34	5177.344	2.370-	9.737	54300	68434
73182009	01	080363	1410	3088.0	.787	.09249	18340.49	5121.561	2.380-	9.731	59968	68943
73182009	01	080363	1410	3104.0	.795	.09154	19915.73	4875.609	2.390-	9.687	66206	69878
73182009	01	080363	1410	3120.0	.793	.09060	21678.30	4899.743	2.401-	9.697	73092	70255
73182009	01	080363	1410	3136.0	.796	.08968	23537.12	4802.577	2.411-	9.682	80440	70977
73182009	01	080363	1410	3152.0	.810	.08877	25487.33	4417.698	2.421-	9.604	88453	72139
73182009	01	080363	1410	3168.0	.798	.08788	27541.07	4696.018	2.431-	9.670	96661	72085
73182009	02	080363	1410	3192.0	.809	.08656	29727.12	4391.720	2.446-	9.610	105302	145282
73182009	01	080363	1410	3216.0	.824	.08527	32017.89	3976.565	2.461-	9.519	114712	74433
73182009	01	080363	1410	3232.0	.812	.08443	34330.17	4251.067	2.471-	9.590	12437	73870
73182009	01	080363	1410	3248.0	.822	.08360	36768.94	3981.106	2.481-	9.530	13473	75082
73182009	01	080363	1410	3264.0	.818	.08278	39246.70	4070.720	2.491-	9.557	14544	74842
73182009	02	080363	1410	3280.0	.823	.08158	41731.44	3922.004	2.506-	9.527	15693	150571
73182009	01	080363	1410	3296.0	.830	.08040	44261.99	3703.999	2.520-	9.477	16803	76085
73182009	01	080363	1410	3312.0	.832	.07963	46811.33	3657.531	2.530-	9.464	18040	76239
73182009	02	080363	1410	3328.0	.835	.07850	49370.12	3559.142	2.544-	9.449	193402	158134
73182009	01	080363	1410	3376.0	.837	.07738	51941.77	3488.778	2.559-	9.436	20727	76529
73182009	01	080363	1410	3392.0	.840	.07665	54524.26	3391.277	2.568-	9.413	22174	76570
73182009	02	080363	1410	3416.0	.844	.07558	57109.64	3274.179	2.582-	9.385	236205	153923
73182009	01	080363	1410	3440.0	.838	.07453	59700.53	3199.018	2.596-	9.429	25171	76498
73182009	02	080363	1410	3464.0	.848	.07350	62302.25	3151.979	2.610-	9.361	26703	155413
73182009	01	080363	1410	3488.0	.850	.07249	64914.85	3081.408	2.624-	9.345	28226	77092
73182009	02	080363	1410	3512.0	.843	.07151	67542.96	3207.082	2.637-	9.392	29756	152837
73182009	01	080363	1410	3536.0	.844	.07054	70193.62	3171.088	2.651-	9.387	31287	76805
73182009	02	080363	1410	3560.0	.856	.06959	72859.91	2873.542	2.665-	9.295	32819	154792
73182009	01	080363	1410	3584.0	.855	.06866	75540.71	2893.003	2.678-	9.309	34350	77044
73182009	02	080363	1410	3608.0	.853	.06775	78211.11	2899.922	2.691-	9.318	35881	153383
73182009	02	080363	1410	3640.0	.863	.06657	80869.09	2675.347	2.709-	9.246	37412	152394

Ident.	Avg. Pts.	Date	Run No.	Time-of- Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182009	02	080363	1410	3672.0	.863	.06541	10362.54	2650.260	3.727-	9.245	187748	151330
73182009	01	080363	1410	3696.0	.866	.06456	10123.69	2572.246	3.740-	9.222	93526	75640
73182009	02	080363	1410	3720.0	.870	.06373	9746.26	2460.426	3.753-	9.184	186576	151705
73182009	07	080363	1410	3752.0	.870	.06264	9806.53	2454.574	3.770-	9.190	185214	150469
73182009	02	080363	1410	3784.0	.863	.06160	10363.50	2572.154	3.787-	9.246	183232	147687
73182009	02	080363	1410	3816.0	.861	.06057	10499.04	2583.918	3.803-	9.259	181036	145637
73182009	02	080363	1410	3848.0	.873	.05946	9515.29	2322.200	3.820-	9.160	176808	144234
73182009	02	080363	1410	3880.0	.871	.05859	9664.20	2339.256	3.837-	9.176	174568	142107
73182009	02	080363	1410	3912.0	.875	.05763	9390.38	2254.279	3.853-	9.147	172179	140709
73182009	07	080363	1410	3944.0	.878	.05670	9155.03	2179.975	3.869-	9.122	170625	139905
73182009	03	080363	1410	3984.0	.872	.05557	9640.26	2272.528	3.890-	9.173	252190	205366
73182009	01	080363	1410	4032.0	.874	.05425	9491.86	2210.811	3.914-	9.158	82807	67574
73182009	02	080363	1410	4056.0	.879	.05361	9016.84	2087.745	3.926-	9.106	102601	133587
73182009	03	080363	1410	4096.0	.881	.05257	8859.18	2031.248	3.945-	9.089	238026	195992
73182009	02	080363	1410	4136.0	.874	.05156	9455.41	2147.025	3.965-	9.154	155898	127286
73182009	03	080363	1410	4176.0	.886	.05057	8532.28	1918.721	3.984-	9.051	228122	188709
73182009	02	080363	1410	4216.0	.888	.04962	8337.61	1857.249	3.003-	9.078	148654	123312
73182009	03	080363	1410	4256.0	.881	.04869	8857.65	1954.514	3.022-	9.089	174659	179071
73182009	03	080363	1410	4304.0	.889	.04761	8231.16	1796.017	3.044-	9.015	209186	173787
73182009	03	080363	1410	4352.0	.885	.04657	8583.40	1852.306	3.066-	9.057	203266	168029
73182009	03	080363	1410	4400.0	.885	.04556	8607.38	1837.223	3.088-	9.060	196953	162756
73182009	03	080363	1410	4448.0	.882	.04458	8849.00	1867.331	3.110-	9.087	193227	159140
73182009	03	080363	1410	4496.0	.887	.04363	8426.58	1760.128	3.132-	9.039	190069	157471
73182009	04	080363	1410	4552.0	.887	.04256	8377.87	1728.361	3.156-	9.033	246031	203974
73182009	03	080363	1410	4608.0	.892	.04154	8013.63	1633.289	3.181-	8.988	176845	147376
73182009	04	080363	1410	4664.0	.889	.04054	8266.19	1664.361	3.205-	9.019	226143	187784
73182009	03	080363	1410	4720.0	.884	.03959	8639.73	1719.069	3.229-	9.064	163496	135046
73182009	04	080363	1410	4776.0	.887	.03867	8387.05	1649.289	3.252-	9.034	209926	174021
73182009	04	080363	1410	4840.0	.894	.03765	7889.27	1530.804	3.279-	8.973	200698	167550
73182009	04	080363	1410	4904.0	.894	.03667	7857.07	1504.584	3.305-	8.969	191042	159563
73182009	05	080363	1410	4976.0	.891	.03562	8123.92	1533.249	3.334-	9.002	225483	187618
73182009	04	080363	1410	5048.0	.893	.03461	7946.65	1478.376	3.363-	8.980	169873	141703
73182009	04	080363	1410	5124.0	.896	.03359	7681.80	1407.888	3.393-	8.946	162529	136087
73182009	05	080363	1410	5200.0	.898	.03262	7577.99	1368.662	3.422-	8.933	191657	160713
73182009	05	080363	1410	5280.0	.894	.03164	7863.62	1398.753	3.453-	8.970	181111	151257
73182009	06	080363	1410	5368.0	.888	.03061	8366.56	1463.791	3.486-	9.031	204743	169777
73182009	06	080363	1410	5464.0	.886	.02954	8216.46	1463.741	3.522-	9.049	194633	161053
73182009	06	080363	1410	5560.0	.889	.02853	8234.04	1394.176	3.556-	9.018	177803	147675
73182009	06	080363	1410	5656.0	.891	.02757	8136.18	1350.950	3.591-	9.004	162069	134832
73182009	06	080363	1410	5752.0	.890	.02666	8139.21	1328.962	3.624-	9.004	148343	123409
73182009	08	080363	1410	5992.0	.891	.02456	8115.70	1271.864	3.706-	9.001	165371	137621
73182009	07	080363	1410	6128.0	.890	.02349	8161.00	1250.792	3.751-	9.007	131690	109523
73182009	08	080363	1410	6248.0	.891	.02259	8114.33	1219.582	3.790-	9.001	134493	111928
73182009	10	080363	1410	6392.0	.891	.02159	8103.16	1190.642	3.835-	9.000	147639	122888
73182009	10	080363	1410	6552.0	.887	.02054	8037.55	1209.252	3.885-	9.040	126262	104600
73182009	10	080363	1410	6712.0	.892	.01958	8031.58	1123.848	3.933-	8.991	110569	92128
73182009	12	080363	1410	6888.0	.891	.01859	8071.44	1100.502	3.985-	8.996	113262	94321
73182009	12	080363	1410	7080.0	.886	.01759	8520.09	1129.998	4.040-	9.050	96614	79944
73182009	14	080363	1410	7288.0	.884	.01660	8028.01	1111.642	4.098-	9.062	94053	77710
73182009	15	080363	1410	7520.0	.887	.01560	8426.81	1052.509	4.160-	9.039	80298	66530
73182009	17	080363	1410	7776.0	.877	.01459	9188.18	1109.833	4.227-	9.125	71857	58906
73182009	18	080363	1410	8056.0	.883	.01359	8770.67	1022.452	4.298-	9.079	62909	51876
73182009	21	080363	1410	8369.0	.876	.01260	9259.04	1039.325	4.374-	9.133	57485	47069
73182009	24	080363	1410	8728.0	.873	.01158	9537.33	1026.317	4.458-	9.162	47164	38474
73182009	27	080363	1410	9136.0	.870	.01057	9783.52	1005.849	4.549-	9.188	34453	28010
73182009	31	080363	1410	9600.0	.862	.00957	10414.09	1018.773	4.649-	9.250	26623	21442

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1412

SAMPLE THICKNESS

1 foil

71,326 barns/atom Ta-182

Flight path of 13.01 meters

Rotor speed of 327 rev/minute

Channel width of 16 μ sec

0.785-inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION

(Full width at half-maximum)

E (eV)	Width (μ sec)
0.01	43.3
1.00	40.7

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182011	00	110562	1412	688.0	.929	1.86898	5412.15	7125.573	.625	8.598	24378	22460
73182011	00	110562	1412	704.0	.969	1.78499	2643.23	2997.033	.579	7.715	24321	23360
73182011	00	110562	1412	720.0	.985	1.70654	1057.18	1381.046	.534	6.963	24472	23899
73182011	00	110562	1412	736.0	1.000	1.63315	2.87-	3.673-	.490	1.055	24247	24034
73182011	00	110562	1412	752.0	.993	1.56439	499.48	624.728	.447	6.213	24503	24117
73182011	00	110562	1412	768.0	1.007	1.49909	346.13-	668.845-	.405	6.302	24205	24175
73182011	00	110562	1412	784.0	1.004	1.43929	336.01-	403.119-	.364	5.817	24155	24054
73182011	00	110562	1412	800.0	1.001	1.38230	112.07-	131.764-	.323	4.719	24207	24031
73182011	00	110562	1412	816.0	.986	1.32862	344.83	1077.546	.284	6.840	24104	23560
73182011	00	110562	1412	832.0	1.008	1.27801	612.19-	692.081-	.245	6.417	24022	24015
73182011	00	110562	1412	848.0	.987	1.23024	924.30	1025.208	.207	6.829	24223	23700
73182011	00	110562	1412	864.0	.990	1.18510	689.17	750.254	.169	6.535	24431	23982
73182011	00	110562	1412	880.0	.997	1.14219	491.13	704.294	.133	5.253	23862	23948
73182011	00	110562	1412	896.0	.985	1.10196	1050.32	1102.780	.097	6.997	23496	23436
73182011	00	110562	1412	912.0	.999	1.06363	8.58	8.849	.081	2.149	23869	23635
73182011	00	110562	1412	928.0	.990	1.02727	678.24	607.446	.026	0.519	23755	23522
73182011	00	110562	1412	944.0	.997	.99274	149.98	148.846	.007-	5.006	23850	23570
73182011	00	110562	1412	960.0	.993	.95994	413.79	425.013	.040-	6.072	23722	23370
73182011	00	110562	1412	976.0	.981	.92871	1550.36	1301.529	.073-	7.208	23875	23220
73182011	00	110562	1412	992.0	.990	.89899	705.46	668.890	.106-	6.528	23760	23318
73182011	00	110562	1412	1008.0	.992	.87068	539.54	503.448	.138-	6.290	23870	23481
73182011	00	110562	1412	1024.0	.993	.84369	683.53	444.139	.169-	6.181	23661	23293
73182011	00	110562	1412	1040.0	.993	.81793	496.13	448.704	.200-	6.206	23492	23123
73182011	00	110562	1412	1056.0	.987	.79333	901.78	809.207	.231-	6.804	23628	23125
73182011	00	110562	1412	1072.0	.987	.76922	933.05	818.652	.261-	6.838	23533	23022
73182011	00	110562	1412	1088.0	1.006	.74735	441.15-	381.379-	.291-	6.089	23230	23167
73182011	00	110562	1412	1104.0	.986	.72584	340.67	801.421	.320-	6.846	23265	22757
73182011	00	110562	1412	1120.0	1.001	.70525	86.53-	72.673-	.349-	4.460	23176	22999
73182011	00	110562	1412	1136.0	1.005	.68552	395.19-	327.208-	.377-	5.979	23236	23158
73182011	00	110562	1412	1152.0	.999	.66661	18.13	14.805	.405-	2.897	22982	22773
73182011	00	110562	1412	1168.0	.998	.64848	135.22	108.898	.433-	4.906	23163	22915
73182011	00	110562	1412	1184.0	.998	.63107	98.82	78.510	.460-	4.593	23008	22773
73182011	00	110562	1412	1200.0	1.008	.61435	604.69-	473.959-	.487-	6.404	23147	23138
73182011	00	110562	1412	1216.0	.976	.59829	1689.55	1306.859	.513-	7.432	23059	22320
73182011	00	110562	1412	1232.0	.993	.58265	472.26	360.547	.539-	6.157	22861	22509
73182011	00	110562	1412	1248.0	.996	.56800	243.77	183.725	.565-	5.496	23143	22860
73182011	00	110562	1412	1264.0	.984	.55371	180.21	803.804	.591-	6.984	23015	22469
73182011	00	110562	1412	1280.0	1.001	.53996	71.44-	52.496-	.616-	4.268	22935	22755
73182011	00	110562	1412	1296.0	.981	.52671	1319.01	957.272	.641-	7.184	23141	22516
73182011	00	110562	1412	1312.0	.995	.51394	295.78	212.049	.665-	5.689	22973	22676
73182011	01	080363	1412	1328.0	.993	.50164	470.28	333.089	.689-	6.153	22977	22624
73182011	01	080363	1412	1344.0	1.006	.48976	449.21-	314.371-	.713-	6.107	23109	23049
73182011	01	080363	1412	1360.0	.976	.47831	1664.15	1180.929	.737-	7.417	23112	22380
73182011	01	080363	1412	1376.0	.997	.46725	207.15	141.604	.760-	5.333	23102	22831
73182011	01	080363	1412	1392.0	.994	.45657	395.48	267.231	.784-	5.980	22968	22639
73182011	01	080363	1412	1408.0	.982	.44625	1273.01	850.400	.806-	7.149	23121	22511
73182011	01	080363	1412	1424.0	.979	.43628	1459.13	963.777	.829-	7.285	23013	22348
73182011	01	080363	1412	1440.0	1.003	.42664	240.78-	157.272-	.851-	5.483	22771	22647
73182011	01	080363	1412	1456.0	.992	.41731	529.27	341.909	.873-	6.271	23130	22756
73182011	01	080363	1412	1472.0	.991	.40829	583.60	372.909	.895-	6.369	22948	22560
73182011	01	080363	1412	1488.0	.986	.39956	970.56	613.502	.917-	6.877	22789	22282
73182011	01	080363	1412	1504.0	.994	.39110	420.01	262.666	.938-	6.040	22993	22656
73182011	01	080363	1412	1520.0	1.000	.38291	68.98-	42.690-	.959-	4.233	22734	22555
73182011	01	080363	1412	1536.0	.985	.37498	1035.10	633.855	.980-	6.942	22974	22443
73182011	01	080363	1412	1552.0	.996	.36729	279.02	169.104	1.001-	5.631	22795	22505
73182011	01	080363	1412	1568.0	.991	.35983	644.41	386.557	1.022-	6.468	22904	22497
73182011	01	080363	1412	1584.0	.973	.35259	1903.72	1130.420	1.042-	7.551	23009	22205
73182011	01	080363	1412	1600.0	1.000	.34558	9.33-	5.488-	1.062-	2.233	22918	22718
73182011	01	080363	1412	1616.0	1.001	.33877	135.73-	79.001-	1.082-	4.910	23099	22938
73182011	01	080363	1412	1632.0	.990	.33216	698.14	402.366	1.102-	6.548	23305	22874
73182011	01	080363	1412	1648.0	.984	.32574	1126.81	643.115	1.121-	7.027	23287	22719
73182011	01	080363	1412	1664.0	.979	.31951	1202.43	849.252	1.140-	7.314	23412	22721
73182011	01	080363	1412	1680.0	.992	.31345	544.79	305.010	1.160-	6.300	23525	23140
73182011	01	080363	1412	1696.0	.972	.30756	2408.01	1113.607	1.179-	7.604	23559	22703
73182011	01	080363	1412	1712.0	.982	.30184	1425.69	673.395	1.197-	7.111	23947	23331
73182011	01	080363	1412	1728.0	.979	.29628	1479.81	805.486	1.216-	7.299	24107	23404
73182011	01	080363	1412	1744.0	.960	.29087	2941.52	1532.503	1.234-	7.952	24606	23437
73182011	01	080363	1412	1760.0	.968	.28560	2457.00	1206.179	1.253-	7.721	24849	23863
73182011	01	080363	1412	1776.0	.971	.28048	2426.70	1073.352	1.271-	7.614	24844	23935
73182011	01	080363	1412	1792.0	.959	.27549	2970.50	1959.134	1.289-	7.996	25618	24357
73182011	01	080363	1412	1808.0	.971	.27064	2095.69	1090.247	1.306-	7.647	25730	24765
73182011	01	080363	1412	1824.0	.960	.26591	2850.86	1470.089	1.324-	7.955	26186	24938
73182011	01	080363	1412	1840.0	.968	.26131	2467.54	1159.133	1.342-	7.726	26525	25468
73182011	01	080363	1412	1856.0	.965	.25682	2918.82	1276.475	1.359-	7.831	26918	25735
73182011	01	080363	1412	1872.0	.963	.25245	2632.46	1322.668	1.376-	7.875	27239	26020
73182011	01	080363	1412	1888.0	.937	.24819	4609.63	2296.459	1.393-	8.435	28394	26382
73182011	01	080363	1412	1904.0	.934	.24404	4329.67	2385.878	1.410-	8.482	29051	26909
73182011	01	080363	1412	1920.0	.932	.23999	4900.16	2400.528	1.427-	8.497	29596	27388
73182011	01	080363	1412	1936.0	.947	.23603	3878.83	1884.449	1.443-	8.263	30210	28359
73182011	01	080363	1412	1952.0	.934	.23218	4622.54	2323.747	1.460-	8.481	30928	28652

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma/\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182011	01	080363	1412	1984.0	.924	.22475	5597.86	2653.825	1.492-	8.630	32776	30035
73182011	01	080363	1412	2000.0	.926	.22117	5422.41	2550.090	1.508-	8.598	33454	30732
73182011	01	080363	1412	2016.0	.903	.21767	7262.22	3388.202	1.524-	8.890	34998	31332
73182011	01	080363	1412	2032.0	.895	.21426	7911.73	3662.201	1.540-	8.976	36412	32302
73182011	01	080363	1412	2048.0	.889	.21092	8313.04	3817.851	1.556-	9.025	36677	32355
73182011	01	080363	1412	2064.0	.869	.20767	10552.83	4581.161	1.571-	9.215	38407	33064
73182011	01	080363	1412	2080.0	.860	.20448	10718.05	4846.647	1.587-	9.279	39549	33731
73182011	01	080363	1412	2096.0	.853	.20137	11335.76	5086.843	1.602-	9.335	41152	34796
73182011	01	080363	1412	2112.0	.837	.19834	12631.95	5625.090	1.617-	9.443	42457	35254
73182011	01	080363	1412	2128.0	.832	.19536	13052.69	5769.234	1.632-	9.476	43610	35998
73182011	01	080363	1412	2144.0	.803	.19246	15566.77	6829.184	1.647-	9.652	45340	36130
73182011	01	080363	1412	2160.0	.804	.18962	15553.49	6772.827	1.662-	9.652	46472	37038
73182011	01	080363	1412	2176.0	.784	.18684	17330.97	7491.312	1.677-	9.760	48133	37618
73182011	01	080363	1412	2192.0	.760	.18412	19232.21	8381.119	1.692-	9.879	49902	37614
73182011	01	080363	1412	2208.0	.753	.18146	20187.42	8599.464	1.706-	9.912	51403	38391
73182011	01	080363	1412	2224.0	.723	.17886	23044.04	9745.750	1.721-	10.045	53183	38161
73182011	01	080363	1412	2240.0	.711	.17632	24253.77	10184.277	1.735-	10.096	55072	38853
73182011	01	080363	1412	2256.0	.686	.17382	26805.89	11175.839	1.749-	10.196	56570	38507
73182011	01	080363	1412	2272.0	.669	.17138	28860.40	11864.854	1.763-	10.263	58371	38713
73182011	01	080363	1412	2288.0	.650	.16900	30694.06	12618.212	1.777-	10.331	60599	39061
73182011	01	080363	1412	2304.0	.642	.16666	31524.36	12869.511	1.791-	10.358	62144	39593
73182011	01	080363	1412	2320.0	.612	.16437	34949.93	14169.000	1.805-	10.461	64635	39249
73182011	01	080363	1412	2336.0	.609	.16212	35247.68	14232.436	1.819-	10.472	66262	40013
73182011	01	080363	1412	2352.0	.581	.15992	38712.24	15481.027	1.833-	10.563	68659	39550
73182011	01	080363	1412	2368.0	.569	.15777	40124.34	15937.498	1.846-	10.599	70855	40015
73182011	01	080363	1412	2384.0	.554	.15566	42947.46	16589.309	1.860-	10.646	72090	39630
73182011	01	080363	1412	2400.0	.545	.15359	44283.89	16963.199	1.873-	10.675	74189	40083
73182011	01	080363	1412	2416.0	.532	.15156	44889.17	17475.672	1.886-	10.711	76692	40513
73182011	01	080363	1412	2432.0	.534	.14958	46671.41	17276.927	1.899-	10.707	78067	41366
73182011	01	080363	1412	2448.0	.528	.14763	45250.89	17501.860	1.913-	10.726	79920	41829
73182011	01	080363	1412	2464.0	.523	.14572	46112.21	17602.548	1.926-	10.738	82487	42834
73182011	01	080363	1412	2480.0	.527	.14384	45577.11	17285.688	1.939-	10.727	84000	43947
73182011	01	080363	1412	2496.0	.522	.14200	46267.98	17435.114	1.951-	10.742	86304	44717
73182011	01	080363	1412	2512.0	.528	.14020	45497.84	17035.891	1.964-	10.725	88231	46213
73182011	01	080363	1412	2528.0	.528	.13843	45488.12	16924.396	1.977-	10.725	90817	47574
73182011	01	080363	1412	2544.0	.536	.13670	44433.96	16428.552	1.989-	10.701	92382	49115
73182011	01	080363	1412	2560.0	.542	.13499	43064.63	16042.817	2.002-	10.684	94556	50815
73182011	01	080363	1412	2576.0	.545	.13332	43266.69	15797.972	2.015-	10.675	97049	52446
73182011	01	080363	1412	2592.0	.558	.13168	41512.54	15063.965	2.027-	10.633	98344	54470
73182011	01	080363	1412	2608.0	.562	.13007	41460.12	14808.423	2.039-	10.622	100820	56196
73182011	01	080363	1412	2624.0	.572	.12849	39746.61	14247.373	2.051-	10.590	102294	58078
73182011	01	080363	1412	2640.0	.584	.12693	38322.22	13653.149	2.064-	10.553	104353	60443
73182011	01	080363	1412	2656.0	.601	.12541	36244.64	12835.416	2.076-	10.498	105443	62878
73182011	01	080363	1412	2672.0	.612	.12391	35015.23	12325.662	2.088-	10.463	107327	65115
73182011	01	080363	1412	2688.0	.619	.12244	34136.67	11944.910	2.100-	10.438	109599	67317
73182011	01	080363	1412	2704.0	.627	.12100	32454.59	11567.628	2.111-	10.411	111467	69317
73182011	01	080363	1412	2720.0	.637	.11958	32164.66	11122.650	2.123-	10.378	112731	71182
73182011	01	080363	1412	2736.0	.646	.11818	31163.33	10713.120	2.135-	10.346	114639	73551
73182011	01	080363	1412	2752.0	.653	.11681	30354.18	10374.296	2.147-	10.320	116987	75769
73182011	01	080363	1412	2768.0	.667	.11547	28679.26	9813.426	2.158-	10.270	117954	77725
73182011	01	080363	1412	2784.0	.677	.11414	27755.94	9377.239	2.170-	10.231	119372	80182
73182011	01	080363	1412	2800.0	.687	.11284	26706.83	8971.271	2.181-	10.192	120581	82194
73182011	01	080363	1412	2816.0	.691	.11156	26326.49	8793.207	2.193-	10.178	122646	84049
73182011	01	080363	1412	2832.0	.699	.11031	25492.01	8466.651	2.204-	10.146	124123	86063
73182011	01	080363	1412	2848.0	.704	.10907	25010.83	8260.016	2.215-	10.127	125471	87566
73182011	01	080363	1412	2864.0	.718	.10786	23922.21	7748.167	2.226-	10.068	126973	90415
73182011	01	080363	1412	2880.0	.720	.10666	23370.20	7632.437	2.238-	10.059	127998	91429
73182011	01	080363	1412	2896.0	.728	.10548	22603.48	7341.089	2.249-	10.025	129426	93448
73182011	01	080363	1412	2912.0	.739	.10433	21403.04	6957.469	2.260-	9.977	130750	95822
73182011	01	080363	1412	2928.0	.739	.10319	21334.27	6917.498	2.271-	9.977	131889	96665
73182011	01	080363	1412	2944.0	.748	.10207	20708.24	6615.951	2.282-	9.938	133119	98703
73182011	01	080363	1412	2960.0	.755	.10097	19998.92	6354.815	2.292-	9.903	134269	100551
73182011	01	080363	1412	2976.0	.755	.09989	20441.84	6234.301	2.303-	9.905	135812	101645
73182011	01	080363	1412	2992.0	.761	.09882	19406.02	6100.467	2.314-	9.873	136794	103297
73182011	01	080363	1412	3008.0	.771	.09778	18492.58	5782.595	2.325-	9.825	136590	104472
73182011	01	080363	1412	3024.0	.773	.09674	18284.30	5666.978	2.335-	9.813	138152	105976
73182011	01	080363	1412	3040.0	.780	.09573	17654.80	5462.444	2.346-	9.778	138990	107564
73182011	01	080363	1412	3056.0	.778	.09473	17878.68	5502.745	2.356-	9.791	140663	108517
73182011	01	080363	1412	3072.0	.788	.09374	16951.35	5189.994	2.367-	9.738	141186	110347
73182011	01	080363	1412	3088.0	.791	.09278	16712.01	5090.449	2.377-	9.723	141948	111315
73182011	01	080363	1412	3104.0	.801	.09182	15777.47	4780.861	2.387-	9.666	142165	112956
73182011	01	080363	1412	3120.0	.795	.09088	16315.21	4918.435	2.398-	9.699	143579	113223
73182011	01	080363	1412	3136.0	.800	.08996	15848.37	4753.457	2.408-	9.670	144046	114337
73182011	01	080363	1412	3152.0	.803	.08905	15589.15	4651.997	2.418-	9.654	145248	115711
73182011	01	080363	1412	3168.0	.807	.08815	15288.49	4539.164	2.428-	9.634	145378	116304
73182011	01	080363	1412	3184.0	.807	.08727	15207.50	4492.523	2.438-	9.629	145614	116625
73182011	01	080363	1412	3200.0	.812	.08639	14842.70	4362.595	2.448-	9.605	146169	117670
73182011	02	080363	1412	3224.0	.817	.08511	14401.24	4201.365	2.463-	9.575	147300	123904
73182011	01	080363	1412	3248.0	.822	.08386	13980.11	4048.443	2.476-	9.545	147171	119919
73182011	01	080363	1412	3264.0	.821	.08304	14011.49	4037.645	2.488-	9.547	147680	120281

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182011	01	080363	1412	3280.0	.823	.08223	13841.55	3969.172	7.498-	9.535	148601	121319
73182011	02	080363	1412	3304.0	.831	.08104	13152.84	3744.303	2.512-	9.434	296316	244203
73182011	01	080363	1412	3328.0	.828	.07988	13415.91	3791.748	2.527-	9.504	149024	122393
73182011	01	080363	1412	3344.0	.839	.07911	12480.46	3510.317	2.536-	9.431	148015	123169
73182011	01	080363	1412	3360.0	.837	.07836	12646.05	3539.992	2.546-	9.445	147017	122055
73182011	02	080363	1412	3384.0	.840	.07725	12429.22	3454.364	2.560-	9.427	295771	246300
73182011	01	080363	1412	3408.0	.843	.07617	12165.90	3357.658	2.574-	9.406	147557	123332
73182011	02	080363	1412	3432.0	.849	.07511	11821.35	3184.971	2.588-	9.360	293219	246957
73182011	01	080363	1412	3456.0	.844	.07407	12057.80	3281.629	2.602-	9.397	147523	123490
73182011	02	080363	1412	3480.0	.849	.07305	11654.47	3149.943	2.616-	9.363	294727	248113
73182011	01	080363	1412	3504.0	.848	.07205	11681.07	3135.451	2.630-	9.365	147038	123736
73182011	02	080363	1412	3528.0	.856	.07108	11063.87	2969.722	2.643-	9.311	291450	247394
73182011	01	080363	1412	3552.0	.849	.07012	11644.86	3083.530	2.657-	9.362	145932	122868
73182011	02	080363	1412	3576.0	.861	.06918	10662.80	2804.542	2.671-	9.274	290588	248055
73182011	02	080363	1412	3608.0	.861	.06796	10651.56	2776.770	2.688-	9.273	289611	247260
73182011	01	080363	1412	3632.0	.860	.06706	10882.48	2766.340	2.702-	9.276	143076	122101
73182011	02	080363	1412	3656.0	.863	.06610	10467.45	2699.007	2.715-	9.256	28513	242679
73182011	02	080363	1412	3688.0	.862	.06504	10569.58	2695.554	2.742-	9.263	280614	239855
73182011	02	080363	1412	3720.0	.869	.06393	9969.90	2520.830	2.749-	9.207	280690	241946
73182011	01	080363	1412	3764.0	.865	.06311	10247.14	2584.305	2.762-	9.238	139894	120030
73182011	02	080363	1412	3768.0	.873	.06231	9660.69	2411.301	2.775-	9.173	275609	238600
73182011	02	080363	1412	3800.0	.872	.06127	9713.17	2404.280	2.792-	9.181	272365	235617
73182011	02	080363	1412	3832.0	.874	.06025	9566.55	2348.196	2.809-	9.166	268685	232912
73182011	02	080363	1412	3864.0	.875	.05925	9452.20	2300.792	2.825-	9.154	263738	228993
73182011	02	080363	1412	3896.0	.878	.05828	9226.71	2227.444	2.842-	9.129	258179	224875
73182011	03	080363	1412	3936.0	.874	.05711	9559.32	2284.458	2.862-	9.165	381950	331134
73182011	02	080363	1412	3976.0	.875	.05596	9458.16	2237.411	2.883-	9.154	249781	216857
73182011	02	080363	1412	4000.0	.883	.05529	8817.40	2073.308	2.895-	9.084	123988	108617
73182011	01	080363	1412	4040.0	.882	.05420	8891.22	2069.957	2.915-	9.092	242680	212373
73182011	02	080363	1412	4080.0	.884	.05315	8721.93	2010.779	2.934-	9.073	357301	313424
73182011	02	080363	1412	4120.0	.889	.05212	8335.19	1902.908	2.954-	9.028	230917	203661
73182011	03	080363	1412	4160.0	.885	.05112	8695.83	1966.105	2.973-	9.070	339830	298209
73182011	02	080363	1412	4200.0	.888	.05015	8424.96	1886.703	2.992-	9.038	220914	194595
73182011	03	080363	1412	4240.0	.887	.04921	8487.71	1882.858	3.011-	9.046	324437	285535
73182011	03	080363	1412	4288.0	.888	.04811	8416.68	1846.116	3.034-	9.037	311904	274778
73182011	03	080363	1412	4336.0	.886	.04706	8598.02	1865.196	3.056-	9.059	301198	264674
73182011	03	080363	1412	4384.0	.892	.04603	8139.64	1746.329	3.078-	9.004	289444	255985
73182011	03	080363	1412	4432.0	.889	.04504	8345.55	1771.146	3.100-	9.029	281145	247928
73182011	03	080363	1412	4480.0	.892	.04408	8078.81	1696.167	3.121-	8.997	274123	242643
73182011	03	080363	1412	4528.0	.892	.04315	8106.92	1684.017	3.143-	9.000	270033	238929
73182011	04	080363	1412	4584.0	.888	.04210	8407.74	1725.125	3.167-	9.036	347173	305891
73182011	03	080363	1412	4640.0	.891	.04109	8186.59	1659.477	3.191-	9.010	248425	219566
73182011	04	080363	1412	4696.0	.896	.04012	7788.08	1559.951	3.215-	8.960	316058	280908
73182011	04	080363	1412	4760.0	.892	.03905	8138.00	1608.157	3.242-	9.004	301370	266543
73182011	04	080363	1412	4824.0	.894	.03802	7933.13	1546.860	3.269-	8.978	289109	256435
73182011	04	080363	1412	4888.0	.891	.03703	8214.18	1580.678	3.296-	9.013	274931	242901
73182011	04	080363	1412	4952.0	.897	.03608	7676.14	1458.063	3.322-	8.945	259331	230855
73182011	04	080363	1412	5016.0	.895	.03516	7872.20	1476.116	3.347-	8.971	245931	218334
73182011	05	080363	1412	5088.0	.894	.03417	7925.36	1465.014	3.376-	8.977	289662	256957
73182011	05	080363	1412	5168.0	.897	.03312	7741.30	1408.832	3.407-	8.954	275309	244856
73182011	05	080363	1412	5246.0	.896	.03212	7786.98	1395.588	3.438-	8.960	256763	228216
73182011	05	080363	1412	5328.0	.896	.03116	7794.88	1375.967	3.468-	8.961	240289	213550
73182011	06	080363	1412	5416.0	.891	.03016	8225.56	1428.504	3.501-	9.015	272185	240442
73182011	06	080363	1412	5512.0	.895	.02912	7865.91	1342.286	3.536-	8.970	253865	225394
73182011	06	080363	1412	5608.0	.894	.02813	7954.10	1334.063	3.570-	8.981	229852	203823
73182011	07	080363	1412	5712.0	.897	.02712	7698.06	1267.730	3.607-	8.948	240324	213876
73182011	07	080363	1412	5824.0	.893	.02608	8060.11	1301.653	3.646-	8.994	214510	189938
73182011	07	080363	1412	5936.0	.890	.02511	8251.53	1307.549	3.684-	9.018	196235	173292
73182011	07	080363	1412	6054.8	.888	.02413	8393.30	1303.801	3.724-	9.035	180777	159322
73182011	08	080363	1412	6184.0	.897	.02313	7701.06	1171.221	3.766-	8.949	187170	166568
73182011	09	080363	1412	6320.0	.896	.02215	7775.24	1157.180	3.809-	8.958	185934	165298
73182011	10	080363	1412	6472.0	.897	.02112	7753.33	1126.727	3.857-	8.955	178176	158451
73182011	10	080363	1412	6632.0	.884	.02011	8749.30	1240.736	3.906-	9.076	153368	134501
73182011	11	080363	1412	6800.0	.888	.01913	8651.17	1168.892	3.956-	9.042	145779	131020
73182011	12	080363	1412	6984.0	.887	.01814	8252.05	1151.631	4.009-	9.053	130072	119662
73182011	13	080363	1412	7184.0	.887	.01714	8228.05	1116.491	4.066-	9.051	112740	112137
73182011	15	080363	1412	7408.0	.888	.01612	8456.27	1073.647	4.127-	9.042	119061	104846
73182011	15	080363	1412	7648.0	.888	.01512	8467.13	1041.148	4.191-	9.043	94930	83587
73182011	18	080363	1412	7912.0	.882	.01413	8944.00	1063.171	4.259-	9.098	89858	78590
73182011	19	080363	1412	8208.0	.873	.01311	9638.72	1104.465	4.332-	9.173	78843	68294
73182011	22	080363	1412	8536.0	.883	.01214	8824.56	972.305	4.411-	9.085	66776	58500
73182011	25	080363	1412	8912.0	.873	.01114	9640.56	1017.525	4.497-	9.173	50504	43744
73182011	29	080363	1412	9344.0	.860	.01013	10725.63	1079.513	4.592-	9.280	35906	30637
73182011	34	080363	1412	9848.0	.856	.00912	11084.77	1058.581	4.697-	9.313	26088	22131

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1408

SAMPLE THICKNESS

13 foils

4,960 barns/atom Ta-182

Flight path of 13 meters

Rotor speed of 3015 rev/minute

Channel width of 1 μ sec

Two-inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION (Full width at half-maximum)

E (eV)	Width (μ sec)
0.9	5.8
3.00	4.8

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182007	16	102062	1408	525.0	.990	3.20480	47.39	84.850	1.164	3.858	57306	56987
73182007	18	102062	1408	542.0	.996	3.00691	15.81	27.424	1.100	2.760	67537	67550
73182007	20	102062	1408	561.0	.986	2.80668	69.51	116.453	1.072	4.241	77102	76253
73182007	23	102062	1408	582.5	.984	2.60332	79.90	128.927	.956	4.380	89231	88041
73182007	25	102062	1408	606.5	.981	2.40136	93.78	145.334	.876	4.541	95511	93953
73182007	29	102062	1408	633.5	.979	2.20103	104.73	155.389	.788	4.651	107632	105635
73182007	01	102062	1408	648.5	1.011	2.10039	54.39	78.827	.742	3.996	3537	3584
73182007	01	102062	1408	649.5	.977	2.09293	111.21	160.928	.739	4.711	3563	3492
73182007	01	102062	1408	650.5	.973	2.08749	134.23	193.943	.735	4.899	3548	3471
73182007	01	102062	1408	651.5	.974	2.08109	128.40	185.234	.732	4.855	3600	3516
73182007	01	102062	1408	652.5	.960	2.07472	200.90	289.380	.729	5.302	3673	3540
73182007	01	102062	1408	653.5	.946	2.06817	271.17	389.997	.726	5.602	3496	3318
73182007	01	102062	1408	654.5	.923	2.06208	392.09	563.042	.723	5.971	3697	3424
73182007	01	102062	1408	655.5	.902	2.05577	510.65	732.174	.720	6.235	3690	3337
73182007	01	102062	1408	656.5	.953	2.04951	234.64	335.918	.717	5.458	3571	3414
73182007	01	102062	1408	657.5	.934	2.04328	336.05	480.374	.714	5.817	3572	3346
73182007	01	102062	1408	658.5	.936	2.03708	327.27	467.110	.711	5.790	3602	3350
73182007	01	102062	1408	659.5	.922	2.03091	401.80	572.611	.708	5.995	3624	3350
73182007	01	102062	1408	660.5	.926	2.02476	379.09	539.427	.705	5.937	3615	3357
73182007	01	102062	1408	661.5	.956	2.01864	220.22	312.895	.702	5.394	3546	3400
73182007	01	102062	1408	662.5	.904	2.01255	495.85	703.439	.699	6.206	3721	3375
73182007	01	102062	1408	663.5	.908	2.00649	478.44	677.718	.696	6.170	3654	3326
73182007	01	102062	1408	664.5	.876	2.00046	655.49	927.121	.693	6.485	3635	3192
73182007	01	102062	1408	665.5	.885	1.99445	605.24	854.759	.690	6.405	3691	3274
73182007	01	102062	1408	666.5	.889	1.98847	582.86	821.922	.687	6.367	3716	3312
73182007	01	102062	1408	667.5	.903	1.98252	503.89	709.497	.684	6.222	3561	3224
73182007	01	102062	1408	668.5	.840	1.97659	864.59	1215.546	.681	6.762	3607	3037
73182007	01	102062	1408	669.5	.879	1.97069	636.80	893.961	.678	6.456	3602	3175
73182007	01	102062	1408	670.5	.838	1.96482	875.03	1226.552	.675	6.774	3648	3065
73182007	01	102062	1408	671.5	.906	1.95897	485.51	679.541	.672	6.185	3421	3109
73182007	01	102062	1408	672.5	.837	1.95315	877.09	1225.788	.669	6.776	3671	3083
73182007	01	102062	1408	673.5	.805	1.94735	1071.12	1494.728	.666	6.976	3568	2882
73182007	01	102062	1408	674.5	.822	1.94158	969.65	1351.124	.663	6.876	3576	2948
73182007	01	102062	1408	675.5	.762	1.93584	1344.08	1870.088	.660	7.203	3623	2769
73182007	01	102062	1408	676.5	.737	1.93012	1507.13	2093.837	.657	7.317	3698	2735
73182007	01	102062	1408	677.5	.778	1.92442	1241.19	1721.833	.654	7.123	3460	2700
73182007	01	102062	1408	678.5	.709	1.91876	1702.00	2357.607	.651	7.439	3608	2566
73182007	01	102062	1408	679.5	.684	1.91311	1880.36	2600.835	.648	7.539	3613	2479
73182007	01	102062	1408	680.5	.677	1.90749	1934.55	2671.854	.645	7.567	3697	2509
73182007	01	102062	1408	681.5	.634	1.90190	2256.19	3111.506	.642	7.721	3412	2170
73182007	01	102062	1408	682.5	.629	1.89633	2298.49	3165.193	.639	7.740	3535	2229
73182007	01	102062	1408	683.5	.556	1.89079	2904.79	3994.262	.636	7.974	3542	1976
73182007	01	102062	1408	684.5	.527	1.88527	3169.46	4351.842	.634	8.061	3541	1873
73182007	01	102062	1408	685.5	.503	1.87977	3404.65	4667.946	.631	8.132	3409	1720
73182007	01	102062	1408	686.5	.432	1.87430	4154.17	5687.282	.628	8.331	3466	1503
73182007	01	102062	1408	687.5	.369	1.86885	4943.09	6757.508	.625	8.505	3538	1309
73182007	01	102062	1408	688.5	.334	1.86342	5426.74	7407.892	.622	8.599	3539	1188
73182007	01	102062	1408	689.5	.288	1.85802	6172.35	8413.486	.619	8.727	3464	1000
73182007	01	102062	1408	690.5	.239	1.85264	7090.47	9650.973	.616	8.866	3592	862
73182007	01	102062	1408	691.5	.225	1.84729	7388.80	10042.498	.613	8.907	3482	787
73182007	01	102062	1408	692.5	.199	1.84196	7997.04	10853.496	.610	8.986	3490	698
73182007	01	102062	1408	693.5	.193	1.83665	8152.21	11048.127	.607	9.006	3425	663
73182007	01	102062	1408	694.5	.171	1.83137	8741.29	11829.430	.605	9.075	3519	605
73182007	01	102062	1408	695.5	.149	1.82610	9411.59	12718.189	.602	9.149	3528	530
73182007	01	102062	1408	696.5	.166	1.82086	8904.77	12016.041	.599	9.094	3378	562
73182007	01	102062	1408	697.5	.161	1.81565	9044.37	12186.935	.596	9.109	3493	565
73182007	01	102062	1408	698.5	.165	1.81045	8921.39	12003.998	.593	9.096	3486	578
73182007	01	102062	1408	699.5	.173	1.80528	8675.32	11656.222	.590	9.068	3484	607
73182007	01	102062	1408	700.5	.184	1.80013	8390.09	11256.905	.587	9.034	3463	639
73182007	01	102062	1408	701.5	.224	1.79500	7411.44	9929.672	.585	8.910	3440	774
73182007	01	102062	1408	702.5	.227	1.78989	7352.64	9836.860	.582	8.902	3580	815
73182007	01	102062	1408	703.5	.249	1.78481	6883.19	9195.722	.579	8.836	3461	866
73182007	01	102062	1408	704.5	.333	1.77974	5446.28	7265.716	.576	8.602	3499	1170
73182007	01	102062	1408	705.5	.335	1.77470	5423.63	7225.756	.573	8.598	3401	1108
73182007	01	102062	1408	706.5	.419	1.76968	4308.98	5732.215	.570	8.368	3440	1446
73182007	01	102062	1408	707.5	.445	1.76468	4009.98	5326.915	.567	8.296	3442	1497
73182007	01	102062	1408	708.5	.475	1.75970	3682.27	4884.614	.565	8.211	3451	1599
73182007	01	102062	1408	709.5	.510	1.75475	3334.00	4416.436	.562	8.111	3445	1763
73182007	01	102062	1408	710.5	.528	1.74981	3165.06	4186.760	.559	8.059	3500	1853
73182007	01	102062	1408	711.5	.588	1.74490	2632.48	3477.370	.556	7.875	3499	2063
73182007	01	102062	1408	712.5	.648	1.74000	2149.12	2334.891	.553	7.672	3316	2155
73182007	01	102062	1408	713.5	.657	1.73513	2083.31	2244.238	.551	7.641	3321	2187
73182007	01	102062	1408	714.5	.689	1.73027	1840.83	2421.431	.548	7.517	3393	2346
73182007	01	102062	1408	715.5	.693	1.72544	1818.63	2388.881	.545	7.505	3336	2317
73182007	01	102062	1408	716.5	.745	1.72063	1456.15	1910.074	.542	7.283	3345	2499
73182007	01	102062	1408	717.5	.734	1.71584	1529.64	2003.683	.539	7.332	3512	2586
73182007	01	102062	1408	718.5	.728	1.71106	1572.83	2057.391	.537	7.360	3426	2500
73182007	01	102062	1408	719.5	.763	1.70631	1338.13	1747.944	.534	7.199	3544	2712
73182007	01	102062	1408	720.5	.798	1.70158	1116.47	1456.378	.531	7.017	3334	2668
73182007	01	102062	1408	721.5	.804	1.69686	1078.20	1404.502	.528	6.983	3373	2720

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182007	01	102062	1408	722.5	.813	1.69217	1025.16	1333.577	.520	6.432	3390	2763
73182007	01	102062	1408	723.5	.821	1.68749	975.61	1267.363	.523	6.483	3377	2780
73182007	01	102062	1408	724.5	.848	1.68284	914.78	1056.970	.520	6.102	3294	2801
73182007	01	102062	1408	725.5	.871	1.67810	884.88	887.747	.517	6.529	3272	2856
73182007	01	102062	1408	726.5	.839	1.67359	870.18	1125.716	.514	6.168	3418	2874
73182007	01	102062	1408	727.5	.879	1.66899	835.95	821.584	.512	6.455	3324	2930
73182007	01	102062	1408	728.5	.848	1.66441	815.47	1052.054	.509	6.703	3364	2860
73182007	01	102062	1408	729.5	.909	1.65985	467.79	602.687	.506	6.148	3311	3020
73182007	01	102062	1408	730.5	.868	1.65531	696.88	996.599	.503	6.546	3456	3010
73182007	01	102062	1408	731.5	.909	1.65079	469.70	603.486	.501	6.157	3265	2976
73182007	01	102062	1408	732.5	.908	1.64628	477.95	613.249	.498	6.169	3381	3032
73182007	01	102062	1408	733.5	.880	1.64180	629.56	806.679	.495	6.445	3364	2969
73182007	01	102062	1408	734.5	.892	1.63733	564.47	722.292	.493	6.335	3356	3001
73182007	01	102062	1408	735.5	.936	1.63288	326.67	417.442	.490	5.788	3326	3121
73182007	01	102062	1408	736.5	.902	1.62845	509.28	649.902	.487	6.233	3351	3031
73182007	01	102062	1408	737.5	.895	1.62404	545.18	694.768	.484	6.301	3276	2941
73182007	01	102062	1408	738.5	.916	1.61964	430.74	548.189	.482	6.065	3258	2993
73182007	01	102062	1408	739.5	.920	1.61526	409.58	520.547	.479	6.015	3293	3039
73182007	01	102062	1408	740.5	.908	1.61090	478.44	607.246	.476	6.170	3306	3008
73182007	01	102062	1408	741.5	.938	1.60656	315.52	399.931	.474	5.754	3245	3052
73182007	01	102062	1408	742.5	.929	1.60224	362.06	458.302	.471	5.891	3253	3031
73182007	01	102062	1408	743.5	.934	1.59793	335.66	424.308	.468	5.816	3301	3092
73182007	01	102062	1408	744.5	.899	1.59364	526.45	664.598	.466	6.366	3277	2953
73182007	01	102062	1408	745.5	.978	1.58937	105.43	132.921	.463	4.658	3138	3079
73182007	01	102062	1408	746.5	.960	1.58511	200.72	252.710	.460	5.301	3177	3056
73182007	01	102062	1408	747.5	.924	1.58087	386.73	486.247	.457	5.957	3213	2978
73182007	01	102062	1408	748.5	.937	1.57665	322.22	404.596	.455	5.775	3291	3091
73182007	01	102062	1408	749.5	.948	1.57245	260.49	326.648	.452	5.562	3225	3067
73182007	01	102062	1408	750.5	.914	1.56826	441.11	552.403	.449	6.089	3314	3039
73182007	01	102062	1408	751.5	.952	1.56409	243.45	304.474	.447	5.494	3236	3086
73182007	01	102062	1408	752.5	.913	1.55993	451.14	563.471	.444	6.111	3278	2999
73182007	01	102062	1408	753.5	.921	1.55580	407.81	508.676	.441	6.010	3332	3076
73182007	01	102062	1408	754.5	.915	1.55168	438.97	546.814	.439	6.084	3294	3021
73182007	01	102062	1408	755.5	.969	1.54757	154.96	192.776	.436	5.043	3186	3095
73182007	01	102062	1408	756.5	.936	1.54348	327.60	407.007	.434	5.791	3223	3023
73182007	01	102062	1408	757.5	.992	1.53941	37.28	46.263	.431	3.618	3071	3055
73182007	01	102062	1408	758.5	.965	1.53535	175.70	217.710	.428	5.168	3333	3224
73182007	01	102062	1408	759.5	.909	1.53131	471.37	583.309	.426	6.155	3276	2985
73182007	01	102062	1408	760.5	.959	1.52729	203.83	251.903	.423	5.317	3204	3082
73182007	01	102062	1408	761.5	.942	1.52328	291.13	359.327	.420	5.673	3175	3000
73182007	01	102062	1408	762.5	.963	1.51929	183.46	226.142	.418	5.212	3277	3165
73182007	01	102062	1408	763.5	.997	1.51531	14.61	17.985	.415	2.681	3060	3057
73182007	01	102062	1408	764.5	.924	1.51135	387.31	476.158	.413	5.959	3195	2961
73182007	01	102062	1408	765.5	.988	1.50740	59.30	72.810	.410	4.082	3029	2999
73182007	01	102062	1408	766.5	1.005	1.50347	29.64	36.346	.407	3.389	3003	3027
73182007	26	102062	1408	780.0	.977	1.45188	112.05	135.021	.372	4.718	80130	78502
73182007	30	102062	1408	808.0	.982	1.35300	86.91	101.097	.302	4.464	87851	86505
73182007	34	102062	1408	840.0	.981	1.25187	94.16	105.357	.224	4.545	95025	93440
73182007	38	102062	1408	876.0	.979	1.15109	102.83	110.326	.140	4.633	99081	97248
73182007	43	102062	1408	916.5	.988	1.05161	59.52	61.046	.050	4.086	102346	101340
73182007	03	102062	1408	939.5	1.004	1.00075	24.09	24.103	.000	3.181	6777	6825
73182007	02	102062	1408	942.0	.966	.99545	168.83	168.449	.004	5.128	4512	4311
73182007	02	102062	1408	944.0	1.031	.99123	152.96	152.294	.008	5.030	4438	4587
73182007	03	102062	1408	946.5	.946	.98600	271.36	269.456	.014	5.603	6743	6397
73182007	02	102062	1408	949.0	.971	.98081	143.91	142.523	.019	4.969	4406	4250
73182007	03	102062	1408	951.5	.991	.97567	41.03	40.528	.024	3.714	6555	6516
73182007	02	102062	1408	954.0	.967	.97056	165.46	163.011	.029	5.108	4328	4194
73182007	03	102062	1408	956.5	.981	.96549	90.76	89.180	.035	4.508	6563	6458
73182007	02	102062	1408	959.0	.989	.96047	51.53	50.501	.040	3.942	4354	4319
73182007	03	102062	1408	961.5	.985	.95548	71.62	70.013	.045	4.271	6417	6338
73182007	02	102062	1408	964.0	.979	.95053	101.93	99.380	.050	4.624	4777	4199
73182007	01	102062	1408	966.5	.940	.94562	103.70	294.842	.054	5.714	6442	6072
73182007	02	102062	1408	969.0	.962	.94074	190.99	185.252	.061	5.252	4262	4109
73182007	03	102062	1408	971.5	.980	.93591	96.26	93.132	.066	4.567	6451	6340
73182007	02	102062	1408	974.0	.954	.93111	230.62	222.541	.071	5.440	4204	4071
73182007	03	102062	1408	976.5	.935	.92635	329.76	317.488	.076	5.798	6343	5947
73182007	03	102062	1408	979.5	.983	.92068	81.73	78.423	.082	4.403	6180	6091
73182007	02	102062	1408	982.0	.975	.91600	123.68	118.376	.087	4.817	4101	4008
73182007	03	102062	1408	984.5	1.007	.91136	35.74	34.121	.092	3.576	6084	6140
73182007	03	102062	1408	987.5	.992	.90583	35.00	33.317	.098	3.555	5972	5942
73182007	03	102062	1408	990.5	1.007	.90035	37.28	35.378	.104	3.618	5964	6022
73182007	01	102062	1408	993.5	.989	.89492	50.15	47.444	.111	3.915	1988	1972
73182007	03	102062	1408	995.5	.950	.89133	251.89	237.810	.115	5.528	6099	5809
73182007	03	102062	1408	998.5	.970	.88598	147.52	138.858	.121	4.993	6040	5875
73182007	03	102062	1408	1001.5	.971	.88068	145.88	136.900	.127	4.982	5900	5741
73182007	03	102062	1408	1004.5	.959	.87543	205.88	192.631	.133	5.327	5952	5722
73182007	03	102062	1408	1007.5	.974	.87022	129.19	120.524	.139	4.861	5795	5658
73182007	02	102062	1408	1010.0	.982	.86592	89.10	82.916	.143	4.489	3707	3649
73182007	02	102062	1408	1012.0	.950	.86250	254.00	235.897	.147	5.537	3826	3643

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1409

SAMPLE THICKNESS

13 Foils

5,063 barns/atom Ta-182

Flight path of 13 meters

Rotor speed of 3,124 rev/minute

Channel width of 1 μ sec.

Two-inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION
(Full width at half-maximum)

E (eV)	Width (μ sec)
0.9	5.1
3.00	4.7

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma/\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182008	16	102362	1409	525.0	.990	1.20480	47.21	84.528	1.164	3.854	80938	80295
73182008	18	102362	1409	542.0	.908	3.00691	60.91	109.628	1.100	4.109	102265	99140
73182008	20	102362	1409	561.0	.996	2.80668	18.57	31.126	1.032	2.922	116300	107914
73182008	23	102362	1409	582.5	.996	2.60332	18.61	30.027	.996	2.923	134102	124398
73182008	25	102362	1409	606.5	.984	2.40136	76.94	119.229	.876	4.343	144017	132039
73182008	29	102362	1409	633.5	.976	2.20103	122.52	181.776	.788	4.808	162487	147625
73182008	01	102362	1409	648.5	.955	2.10039	230.06	333.431	.742	5.438	8470	8865
73182008	01	102362	1409	649.5	.965	2.09393	175.92	244.574	.739	5.170	5505	4948
73182008	01	102362	1409	650.5	.960	2.08749	204.12	294.916	.735	5.318	5217	4932
73182008	01	102362	1409	651.5	.993	2.08109	33.13	47.796	.732	3.500	5366	4961
73182008	01	102362	1409	652.5	.935	2.07472	339.39	418.858	.729	5.827	5537	4819
73182008	01	102362	1409	653.5	.952	2.06837	248.51	357.404	.726	5.515	5449	4829
73182008	01	102362	1409	654.5	.951	2.06205	250.25	359.355	.723	5.522	5495	4868
73182008	01	102362	1409	655.5	.922	2.05577	410.05	587.935	.720	6.016	5630	4832
73182008	01	102362	1409	656.5	.943	2.04951	292.53	418.802	.717	5.678	5397	4741
73182008	01	102362	1409	657.5	.952	2.04328	249.02	355.968	.714	5.517	5438	4818
73182008	01	102362	1409	658.5	.962	2.03708	195.77	279.422	.711	5.276	5352	4792
73182008	01	102362	1409	659.5	.936	2.03091	329.48	469.552	.708	5.797	5444	4748
73182008	01	102362	1409	660.5	.944	2.02476	288.34	410.299	.705	5.664	5401	4749
73182008	01	102362	1409	661.5	.954	2.01864	236.34	335.742	.702	5.465	5350	4752
73182008	01	102362	1409	662.5	.895	2.01255	556.44	789.400	.699	6.321	5563	4638
73182008	01	102362	1409	663.5	.909	2.00649	482.92	684.063	.696	6.179	5507	4659
73182008	01	102362	1409	664.5	.929	2.00046	368.32	520.952	.693	5.908	5316	4600
73182008	01	102362	1409	665.5	.899	1.99445	534.98	755.535	.690	6.282	5455	4568
73182008	01	102362	1409	666.5	.907	1.98847	490.35	691.458	.687	6.195	5460	4612
73182008	01	102362	1409	667.5	.907	1.98252	493.65	695.070	.684	6.201	5436	4589
73182008	01	102362	1409	668.5	.889	1.97659	591.55	831.672	.681	6.382	5423	4491
73182008	01	102362	1409	669.5	.879	1.97069	647.43	908.875	.678	6.473	5415	4435
73182008	01	102362	1409	670.5	.902	1.96482	521.40	730.865	.675	6.256	5416	4457
73182008	01	102362	1409	671.5	.857	1.95897	776.77	1087.196	.672	6.655	5484	4378
73182008	01	102362	1409	672.5	.875	1.95315	672.10	939.300	.669	6.510	5470	4458
73182008	01	102362	1409	673.5	.845	1.94735	851.92	1188.837	.666	6.747	5411	4256
73182008	01	102362	1409	674.5	.836	1.94158	904.34	1260.125	.663	6.807	5392	4197
73182008	01	102362	1409	675.5	.823	1.93584	983.01	1367.709	.660	6.890	5355	4104
73182008	01	102362	1409	676.5	.793	1.93012	1170.38	1626.001	.657	7.065	5320	3930
73182008	01	102362	1409	677.5	.761	1.92442	1377.92	1911.500	.654	7.228	5368	3805
73182008	01	102362	1409	678.5	.773	1.91876	1303.53	1805.645	.651	7.172	5454	3924
73182008	01	102362	1409	679.5	.734	1.91311	1559.49	2157.022	.648	7.352	5398	3692
73182008	01	102362	1409	680.5	.742	1.90749	1504.18	2077.455	.645	7.316	5338	3691
73182008	01	102362	1409	681.5	.683	1.90190	1928.64	2659.781	.642	7.564	5294	3366
73182008	01	102362	1409	682.5	.642	1.89633	2242.59	3088.220	.639	7.715	5329	3185
73182008	01	102362	1409	683.5	.595	1.89079	2627.87	3613.487	.636	7.873	5300	2935
73182008	01	102362	1409	684.5	.581	1.88527	2747.38	3772.294	.634	7.918	5344	2891
73182008	01	102362	1409	685.5	.535	1.87977	3166.53	4341.470	.631	8.060	5295	2636
73182008	01	102362	1409	686.5	.473	1.87430	3784.42	5181.071	.628	8.238	5277	2326
73182008	01	102362	1409	687.5	.458	1.86885	3943.12	5390.484	.625	8.279	5262	2247
73182008	01	102362	1409	688.5	.411	1.86342	4490.61	6130.012	.622	8.409	5222	2002
73182008	01	102362	1409	689.5	.357	1.85802	5203.68	7093.098	.619	8.557	5232	1742
73182008	01	102362	1409	690.5	.316	1.85264	5827.04	7931.294	.616	8.670	5358	1578
73182008	01	102362	1409	691.5	.269	1.84729	6633.74	9016.259	.613	8.799	5353	1344
73182008	01	102362	1409	692.5	.250	1.84196	7014.87	9520.500	.610	8.855	5140	1197
73182008	01	102362	1409	693.5	.215	1.83665	7766.73	10525.710	.607	8.957	5221	1048
73182008	01	102362	1409	694.5	.190	1.83137	8385.65	11348.145	.605	9.034	5334	947
73182008	01	102362	1409	695.5	.181	1.82610	8626.27	11656.963	.602	9.062	5198	880
73182008	01	102362	1409	696.5	.175	1.82086	8807.82	11885.209	.599	9.083	5234	855
73182008	01	102362	1409	697.5	.155	1.81565	9425.87	12700.999	.596	9.151	5032	728
73182008	01	102362	1409	698.5	.150	1.81045	9589.25	12902.622	.593	9.168	5310	744
73182008	01	102362	1409	699.5	.166	1.80528	9086.47	12208.656	.590	9.114	5139	795
73182008	01	102362	1409	700.5	.186	1.80013	8503.58	11409.164	.587	9.048	5154	894
73182008	01	102362	1409	701.5	.196	1.79500	8231.36	11028.186	.585	9.015	5118	937
73182008	01	102362	1409	702.5	.207	1.78989	7952.75	10639.731	.582	8.981	5325	1030
73182008	01	102362	1409	703.5	.255	1.78481	6901.77	9220.555	.579	8.839	5089	1212
73182008	01	102362	1409	704.5	.277	1.77974	6484.37	8650.608	.576	8.777	5111	1321
73182008	01	102362	1409	705.5	.317	1.77470	5811.64	7742.150	.573	8.667	5181	1530
73182008	01	102362	1409	706.5	.361	1.76968	5154.04	6856.391	.570	8.547	5109	1718
73182008	01	102362	1409	707.5	.412	1.76468	4483.71	5956.225	.567	8.408	5067	1945
73182008	01	102362	1409	708.5	.446	1.75970	4074.78	5410.661	.565	8.313	5152	2142
73182008	01	102362	1409	709.5	.463	1.75475	3898.12	5163.726	.562	8.268	5196	2239
73182008	01	102362	1409	710.5	.508	1.74981	3426.10	4532.062	.559	8.139	5365	2538
73182008	01	102362	1409	711.5	.548	1.74490	3042.98	4019.621	.556	8.020	5171	2638
73182008	01	102362	1409	712.5	.587	1.74000	2693.13	3552.486	.553	7.898	5173	2828
73182008	01	102362	1409	713.5	.631	1.73513	2323.54	3060.669	.551	7.750	5081	2988
73182008	01	102362	1409	714.5	.658	1.73027	2118.55	2786.742	.548	7.658	5004	3064
73182008	01	102362	1409	715.5	.677	1.72544	1974.89	2594.140	.545	7.588	5090	3207
73182008	01	102362	1409	716.5	.728	1.72063	1605.19	2105.583	.542	7.381	4965	3365
73182008	01	102362	1409	717.5	.750	1.71584	1452.13	1902.158	.539	7.280	4989	3485
73182008	01	102362	1409	718.5	.769	1.71106	1325.02	1733.225	.537	7.189	5016	3593
73182008	01	102362	1409	719.5	.796	1.70631	1149.29	1501.269	.534	7.046	4939	3663
73182008	01	102362	1409	720.5	.769	1.70158	1325.66	1729.287	.531	7.189	5131	3675
73182008	01	102362	1409	721.5	.787	1.69686	1206.81	1572.034	.528	7.095	5149	3776

Ident.	Avg. Pts.	Date	Run No.	Time-of-Flight	Trans.	E (eV)	σ (barns)	$\sigma\sqrt{E}$	$\ln R$	$\ln u$	(Open-Bgd.)	(Sample-Bgd.)
73182008	01	102362	1409	722.5	.779	1.69217	1461.99	1661.652	.520	7.140	5208	3177
73182008	01	102362	1409	723.5	.812	1.68749	1068.46	1361.906	.523	6.985	5127	3879
73182008	01	102362	1409	724.5	.833	1.68284	922.08	1196.170	.520	6.876	5021	3894
73182008	01	102362	1409	725.5	.822	1.67820	991.59	1284.565	.517	6.899	5060	3871
73182008	01	102362	1409	726.5	.837	1.67359	900.26	1164.646	.514	6.802	5089	3964
73182008	01	102362	1409	727.5	.835	1.66899	909.82	1175.391	.512	6.813	5028	3909
73182008	01	102362	1409	728.5	.868	1.66441	719.60	923.219	.509	6.573	4977	4021
73182008	01	102362	1409	729.5	.881	1.65985	638.34	822.410	.506	6.458	4947	4058
73182008	01	102362	1409	730.5	.858	1.65531	772.66	994.099	.503	6.649	5080	4056
73182008	01	102362	1409	731.5	.864	1.65079	736.54	946.341	.501	6.601	5089	4095
73182008	01	102362	1409	732.5	.930	1.64628	362.42	465.013	.498	5.892	4806	4164
73182008	01	102362	1409	733.5	.908	1.64180	485.70	622.341	.495	6.185	4832	4086
73182008	01	102362	1409	734.5	.910	1.63733	473.80	606.269	.493	6.160	4970	4212
73182008	01	102362	1409	735.5	.890	1.63288	508.80	752.400	.490	6.378	4955	4105
73182008	01	102362	1409	736.5	.928	1.62845	578.18	482.605	.487	5.935	4974	4296
73182008	01	102362	1409	737.5	.917	1.62404	438.31	558.573	.484	6.082	4956	4230
73182008	01	102362	1409	738.5	.916	1.61964	439.98	559.943	.482	6.086	4962	4233
73182008	01	102362	1409	739.5	.926	1.61526	384.31	488.432	.479	5.951	4925	4248
73182008	01	102362	1409	740.5	.900	1.61090	532.53	675.895	.476	6.277	4948	4145
73182008	01	102362	1409	741.5	.887	1.60656	606.95	769.320	.474	6.408	5010	4136
73182008	01	102362	1409	742.5	.941	1.60224	303.06	383.616	.471	5.713	4974	4360
73182008	01	102362	1409	743.5	.935	1.59793	338.26	427.997	.468	5.823	4905	4270
73182008	01	102362	1409	744.5	.907	1.59364	489.87	618.421	.466	6.194	4912	4150
73182008	01	102362	1409	745.5	.920	1.58937	420.63	520.301	.463	6.041	4917	4211
73182008	01	102362	1409	746.5	.900	1.58511	528.73	665.685	.460	6.270	4901	4108
73182008	01	102362	1409	747.5	.941	1.58087	303.57	381.689	.457	5.715	4880	4277
73182008	01	102362	1409	748.5	.948	1.57665	268.34	336.945	.455	5.592	4843	4274
73182008	01	102362	1409	749.5	.965	1.57245	177.70	222.837	.452	5.180	4842	4350
73182008	01	102362	1409	750.5	.931	1.56826	361.05	452.151	.449	5.889	4809	4167
73182008	01	102362	1409	751.5	.938	1.56409	320.22	400.481	.447	5.769	4748	4148
73182008	01	102362	1409	752.5	.969	1.55993	158.36	197.791	.444	5.064	4871	4393
73182008	01	102362	1409	753.5	.990	1.55580	49.88	62.219	.441	3.909	4692	4323
73182008	01	102362	1409	754.5	.957	1.55168	221.63	276.077	.439	5.401	4763	4243
73182008	01	102362	1409	755.5	.965	1.54757	178.79	222.422	.436	5.186	4813	4323
73182008	01	102362	1409	756.5	.936	1.54348	332.66	413.295	.434	5.807	4659	4234
73182008	01	102362	1409	757.5	.960	1.53941	202.37	251.088	.431	5.310	4696	4199
73182008	01	102362	1409	758.5	.941	1.53535	306.68	380.010	.428	5.725	4900	4292
73182008	01	102362	1409	759.5	.991	1.53131	44.51	55.083	.426	3.795	4684	4321
73182008	01	102362	1409	760.5	.909	1.52729	481.22	594.714	.423	6.176	4941	4181
73182008	01	102362	1409	761.5	.998	1.52328	8.78	10.844	.420	2.173	4616	4286
73182008	01	102362	1409	762.5	.955	1.51929	228.17	281.241	.418	5.430	4811	4280
73182008	01	102362	1409	763.5	1.006	1.51531	32.29	39.756	.415	3.474	4688	4390
73182008	01	102362	1409	764.5	.970	1.51135	151.76	186.575	.413	5.022	4707	4251
73182008	01	102362	1409	765.5	.973	1.50740	135.58	166.460	.410	4.909	4655	4218
73182008	01	102362	1409	766.5	.940	1.50347	312.61	383.317	.407	5.744	4743	4149
73182008	26	102362	1409	780.0	.968	1.45188	160.64	193.571	.372	5.079	119718	107921
73182008	30	102362	1409	808.0	.975	1.35300	123.52	143.686	.302	4.816	131976	119846
73182008	34	102362	1409	840.0	.981	1.25187	92.62	103.640	.224	4.528	140384	128268
73182008	38	102362	1409	876.0	.984	1.15109	81.52	87.466	.140	4.400	145684	133397
73182008	43	102362	1409	916.5	.986	1.05161	66.58	68.276	.050	4.198	151866	139470
73182008	51	102362	1409	963.5	.982	.95152	88.57	86.398	.049	4.483	163189	149221
73182008	03	102362	1409	990.5	1.002	.90035	11.41	10.829	.104	2.434	8862	8264
73182008	02	102362	1409	993.0	.967	.89582	166.07	157.183	.110	5.112	5950	5358
73182008	03	102362	1409	995.5	1.013	.89133	66.78	63.053	.115	4.201	8736	8236
73182008	03	102362	1409	998.5	1.015	.88598	77.21	72.684	.121	4.346	8654	8176
73182008	03	102362	1409	1004.5	.979	.87543	103.41	96.761	.133	4.638	8507	7757
73182008	03	102362	1409	1007.5	.988	.87022	60.26	56.214	.139	4.098	8452	7772
73182008	02	102362	1409	1010.0	.993	.86592	34.79	32.381	.143	3.549	5694	5262
73182008	02	102362	1409	1012.0	.969	.86250	155.76	144.664	.147	5.048	5611	5064

APPENDIX A

TABULATION OF THE TOTAL NEUTRON CROSS SECTION OF Ta-182

OPERATING CONDITIONS
FOR IBM RUN NUMBER 1655 *

SAMPLE THICKNESS

39 foils

1,855 barns/atom Ta-182

Flight path of 12.88 meters

Rotor speed of 3,240 rev/minute

Channel width of 2 μ sec

10-inch effective $B^{10}F_3$ detector thickness

INSTRUMENT RESOLUTION (Full width at half-maximum)

E (eV)	Width (μ sec)
0.6	26.7
3.00	11.7

Ident.	Avg. Pts.	Date	Run No.	Time-of- Flight	Trans.	E (eV)	σ (barns)	$\sigma/\sqrt{E}$	$\ln E$	$\ln \sigma$	(Open -Bgd.)	(Sample -Bgd.)
73182000	08	052562	1655	516.8	.975	3.24616	45.30	81.630	1.177	3.813	164372	157827
73182000	08	052562	1655	532.8	.973	3.05412	49.90	87.218	1.116	3.910	199808	191077
73182000	10	052562	1655	550.8	.971	2.85778	54.53	92.191	1.050	3.998	279557	266321
73182000	11	052562	1655	571.8	.965	2.65173	64.28	104.686	.975	4.163	327665	310222
73182000	12	052562	1655	594.8	.958	2.45063	79.33	124.198	.896	4.373	366132	343657
73182000	14	052562	1655	620.8	.939	2.24967	116.67	174.992	.810	4.759	423833	389767
73182000	01	052562	1655	635.8	.919	2.14478	155.35	227.523	.763	5.045	29674	26725
73182000	01	052562	1655	637.8	.899	2.13135	196.36	286.675	.756	5.279	29588	26065
73182000	01	052562	1655	639.8	.902	2.11805	189.73	276.130	.750	5.245	29591	26101
73182000	01	052562	1655	641.8	.891	2.10486	213.85	310.268	.744	5.365	28965	25269
73182000	01	052562	1655	643.8	.883	2.09181	228.95	331.132	.738	5.433	28981	25074
73182000	01	052562	1655	645.8	.864	2.07887	269.58	388.688	.731	5.596	28863	24438
73182000	01	052562	1655	647.8	.848	2.06606	305.14	438.614	.725	5.720	28797	23917
73182000	01	052562	1655	649.8	.848	2.05336	309.18	437.321	.719	5.720	29255	24299
73182000	01	052562	1655	651.8	.838	2.04070	327.64	468.054	.713	5.791	28782	23621
73182000	01	052562	1655	653.8	.813	2.02831	382.40	544.622	.707	5.946	29320	23358
73182000	01	052562	1655	655.8	.782	2.01596	455.10	646.180	.701	6.120	29086	22279
73182000	01	052562	1655	657.8	.740	2.00372	556.06	787.129	.695	6.320	29721	21561
73182000	01	052562	1655	659.8	.725	1.99159	594.77	839.361	.688	6.388	29197	20744
73182000	01	052562	1655	661.8	.680	1.97997	715.54	1006.470	.682	6.572	29677	19761
73182000	01	052562	1655	663.8	.638	1.96764	832.46	1167.728	.676	6.724	29401	18370
73182000	01	052562	1655	665.8	.589	1.95588	980.77	1371.638	.670	6.888	29393	16954
73182000	01	052562	1655	667.8	.512	1.94416	1241.35	1730.855	.664	7.123	29821	14946
73182000	01	052562	1655	669.8	.451	1.93257	1475.38	2051.040	.658	7.296	29549	13055
73182000	01	052562	1655	671.8	.357	1.92108	1908.77	2645.616	.652	7.554	29429	10293
73182000	01	052562	1655	673.8	.296	1.90969	2452.71	3113.060	.646	7.719	29176	8479
73182000	01	052562	1655	675.8	.216	1.89841	2837.34	3909.367	.641	7.950	29308	6219
73182000	01	052562	1655	677.8	.152	1.88722	3492.91	4798.425	.635	8.158	29263	4353
73182000	01	052562	1655	679.8	.099	1.87613	4276.15	5857.133	.629	8.360	29036	2832
73182000	01	052562	1655	681.8	.061	1.86514	5167.77	7057.632	.623	8.550	28974	1747
73182000	01	052562	1655	683.8	.035	1.85425	6215.02	8463.058	.617	8.734	29085	999
73182000	01	052562	1655	685.8	.027	1.84345	6664.07	9048.059	.611	8.804	28769	776
73182000	01	052562	1655	687.8	.017	1.83275	7488.55	10137.936	.605	8.921	28950	502
73182000	01	052562	1655	689.8	.017	1.82213	7491.33	10112.271	.600	8.921	28426	488
73182000	01	052562	1655	691.8	.026	1.81161	6732.75	9062.027	.594	8.814	29138	759
73182000	01	052562	1655	693.8	.042	1.80118	5866.44	7875.244	.588	8.677	28781	1193
73182000	01	052562	1655	695.8	.063	1.79085	5108.96	6836.948	.582	8.538	28384	1771
73182000	01	052562	1655	697.8	.109	1.78059	4108.83	5482.773	.576	8.320	28318	3029
73182000	01	052562	1655	699.8	.157	1.77043	3426.90	4559.759	.571	8.139	28386	4382
73182000	01	052562	1655	701.8	.214	1.76036	2857.70	3791.557	.565	7.957	28250	5928
73182000	01	052562	1655	703.8	.284	1.75036	2331.62	3084.762	.559	7.754	28198	7855
73182000	01	052562	1655	705.8	.364	1.74046	1870.80	2468.093	.554	7.534	28057	10018
73182000	01	052562	1655	707.8	.422	1.73064	1599.54	2104.267	.548	7.377	28314	11703
73182000	01	052562	1655	709.8	.492	1.72090	1313.59	1723.212	.542	7.180	27895	13446
73182000	01	052562	1655	711.8	.546	1.71124	1121.69	1467.334	.537	7.022	27797	14863
73182000	01	052562	1655	713.8	.584	1.70167	997.20	1300.835	.531	6.904	28059	16044
73182000	01	052562	1655	715.8	.626	1.69217	867.14	1128.017	.526	6.765	27629	16939
73182000	01	052562	1655	717.8	.668	1.68276	748.09	970.434	.520	6.617	27477	17968
73182000	01	052562	1655	719.8	.706	1.67342	643.64	832.628	.514	6.467	27553	19059
73182000	01	052562	1655	721.8	.739	1.66416	560.59	723.181	.509	6.328	27276	19733
73182000	01	052562	1655	723.8	.748	1.65497	536.55	690.253	.503	6.285	27495	20148
73182000	01	052562	1655	725.8	.757	1.64587	514.51	660.084	.498	6.243	27363	20295
73182000	01	052562	1655	727.8	.784	1.63683	449.80	575.474	.492	6.108	27424	21063
73182000	01	052562	1655	729.8	.814	1.62787	381.06	486.189	.487	5.942	26780	21337
73182000	01	052562	1655	731.8	.810	1.61899	388.81	494.724	.481	5.963	27177	21563
73182000	01	052562	1655	733.8	.829	1.61016	347.63	441.121	.476	5.851	26871	21803
73182000	01	052562	1655	735.8	.826	1.60143	353.87	447.825	.470	5.868	26958	21789
73182000	01	052562	1655	737.8	.840	1.59277	321.73	406.048	.465	5.773	26778	22027
73182000	01	052562	1655	739.8	.851	1.58417	298.18	375.301	.460	5.697	26857	22384
73182000	01	052562	1655	741.8	.852	1.57563	296.77	372.525	.454	5.692	26636	22213
73182000	01	052562	1655	743.8	.855	1.56717	289.28	362.140	.449	5.667	26663	22332
73182000	01	052562	1655	745.8	.883	1.55878	229.62	286.688	.443	5.436	26376	22803
73182000	01	052562	1655	747.8	.874	1.55045	248.54	309.485	.438	5.515	26268	22479
73182000	01	052562	1655	749.8	.892	1.54219	210.28	261.146	.433	5.348	25930	22654
73182000	01	052562	1655	751.8	.891	1.53400	212.69	263.438	.427	5.359	25957	22653
73182000	13	052562	1655	755.8	.906	1.47842	182.44	221.834	.390	5.206	330925	293483
73182000	14	052562	1655	792.8	.935	1.37945	123.55	145.120	.321	4.816	339360	310663
73182000	16	052562	1655	822.8	.940	1.28069	113.48	128.423	.247	4.731	365224	336173
73182000	18	052562	1655	856.8	.949	1.18107	96.60	104.982	.166	4.570	380507	353416
73182000	21	052562	1655	895.8	.954	1.08047	86.78	90.205	.077	4.463	402475	375831
73182000	11	052562	1655	927.8	.952	1.00723	89.76	90.089	.007	4.497	194248	181079
73182000	13	052562	1655	951.8	.950	.95707	94.85	92.800	.043	4.552	211852	196967
73182000	13	052562	1655	977.8	.948	.90685	97.45	92.809	.097	4.579	190144	176520
73182000	15	052562	1655	1005.8	.942	.85707	109.18	101.079	.154	4.693	187982	173409
73182000	16	052562	1655	1036.8	.937	.80658	120.30	108.049	.214	4.790	161661	148265
73182000	18	052562	1655	1070.8	.935	.75617	123.99	107.821	.279	4.820	136907	125298
73182000	19	052562	1655	1107.8	.923	.70651	146.74	123.345	.347	4.988	96753	87465
73182000	22	052562	1655	1148.8	.922	.65698	150.58	122.057	.420	5.014	60894	54933
73182000	20	052562	1655	1200.9	.869	.60121	260.18	201.742	.508	5.561	25942	22060