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MEASUREMENT OF THE NEUTRON-INDUCED FISSION CROSS-SECTION OF ^{243}Am
RELATIVE TO ^{235}U FROM 0.1 MeV TO 30 MeV

J. W. Behrens

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ABSTRACT

Continuing our studies of fission cross-section ratios at Lawrence Livermore Laboratory, we have measured the $^{243}\text{Am}/^{235}\text{U}$ fission cross-section ratio from 0.1 MeV to 30 MeV. Using the threshold method, we obtained a value of 1.429 ± 0.037 for the average cross-section ratio from 1.75 to 4.00 MeV.

PRELIMINARY RESULTS

We measured the fission cross section of ^{243}Am relative to that of ^{235}U , using ionization fission chambers at the Lawrence Livermore Laboratory's 100-MeV electron linear accelerator. The time-of-flight technique was used to measure the cross-section ratio as a function of neutron energy over the range 1 keV to 30 MeV. Using the threshold method,^{1,2} we obtained a value of 1.429 ± 0.037 for the average cross-section ratio from 1.75 to 4.00 MeV. We made this measurement at the 15.7-m time-of-flight station. Further details of our experimental method appear in Ref. 1.

Figures 1 and 2 show and Table 1 lists our preliminary data for the $^{243}\text{Am}/^{235}\text{U}$ fission cross-section ratio from 0.1 MeV to 30 MeV. The lines shown in Figs. 1 and 2 were obtained by using files of evaluated fission cross sections.³

The Cross Section Evaluation Working Group (CSEWG) responsible for the upcoming ENDF/B-V evaluations requested this brief report. We plan a more complete and formal presentation of this measurement.

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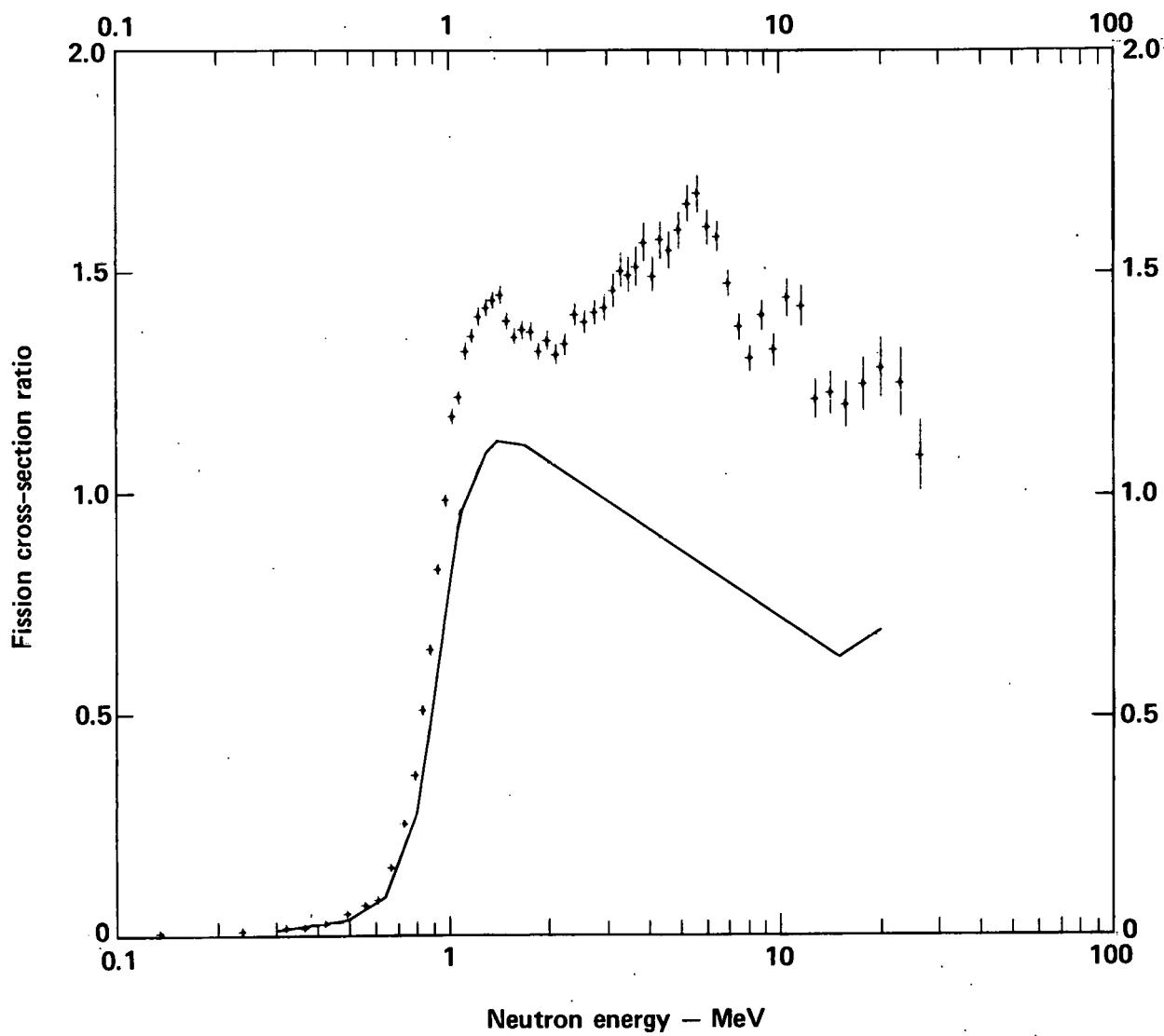


Fig. 1. Ratio of ^{243}Am to ^{235}U fission cross sections in the energy range 0.1 to 30 MeV. The line denotes the $^{243}\text{Am}/^{235}\text{U}$ ratio obtained by using the ENDF/B-TV fission cross-section files.

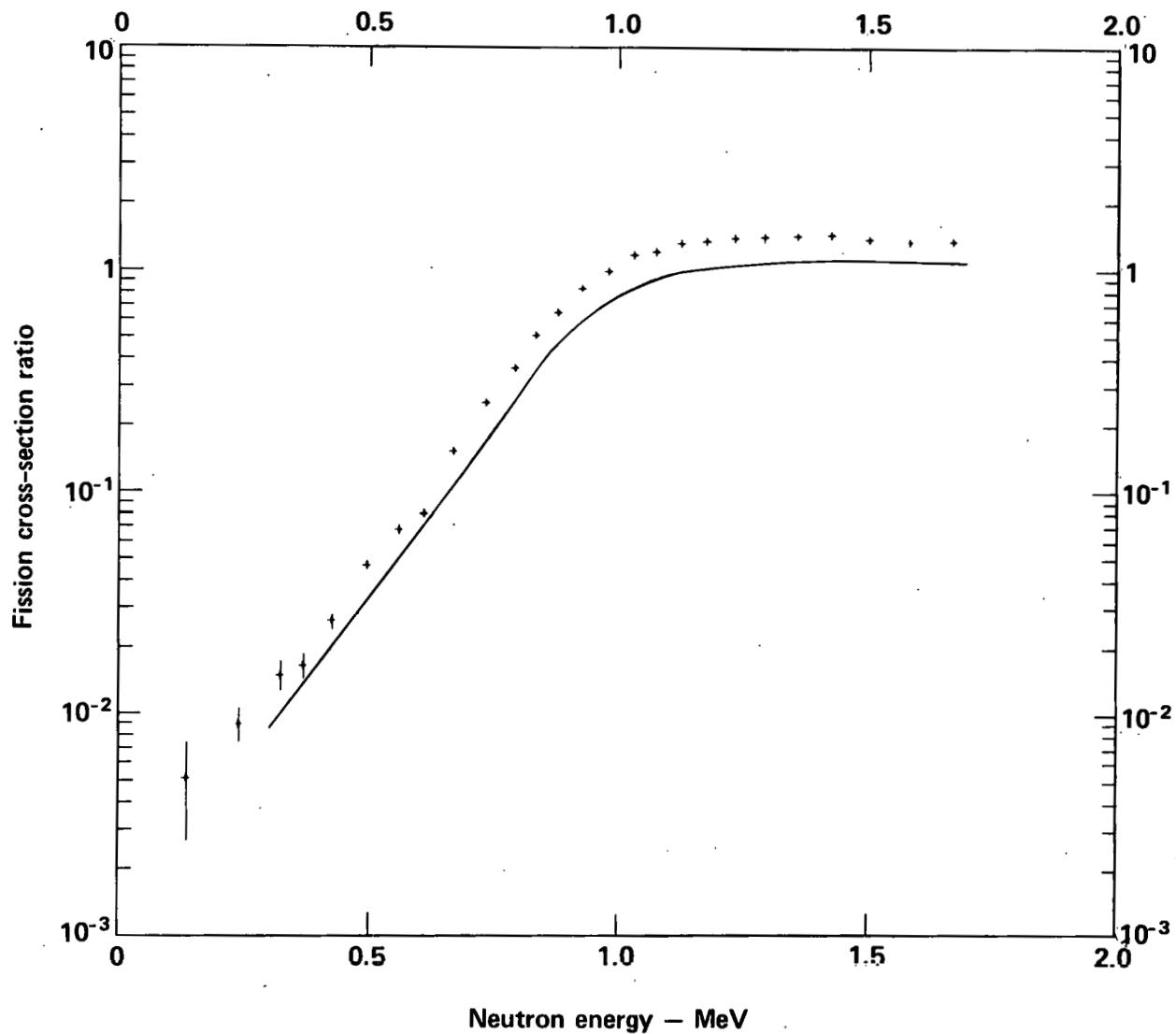


Fig. 2. Ratio of ^{243}Am to ^{235}U fission cross sections in the energy range 0.1 to 1.7 MeV. The line denotes the $^{243}\text{Am}/^{235}\text{U}$ ratio obtained by using the ENDF/B-IV-evaluated fission cross-section files.

Table 1. Fission cross-section ratio of ^{243}Am to ^{235}U .

Neutron energy (MeV)	Ratio	Statistical uncertainty ^a (%)	Neutron energy (MeV)	Ratio	Statistical uncertainty ^a (%)
0.1349	0.0051	47.6	2.560	1.386	2.0
0.2395	0.0089	18.3	2.744	1.407	2.1
0.3226	0.0149	16.0	2.947	1.417	2.2
0.3684	0.0165	13.9			
0.4248	0.0262	9.1	3.135	1.456	2.6
			3.299	1.501	2.7
0.4951	0.0470	5.2	3.476	1.490	2.8
0.5600	0.0681	5.7	3.667	1.511	3.0
0.6107	0.0804	4.9	3.874	1.565	2.8
0.6685	0.1521	3.3			
0.7349	0.2535	2.5	4.100	1.489	2.8
			4.346	1.570	2.8
0.7915	0.3621	2.8	4.616	1.547	2.8
0.8329	0.5102	2.4	4.910	1.592	2.7
0.8777	0.6458	2.0	5.235	1.652	2.6
0.9261	0.8279	1.7			
0.9787	0.9830	1.6	5.592	1.675	2.6
			5.988	1.600	2.5
1.028	1.172	1.7	6.427	1.578	2.3
1.074	1.215	1.6	6.916	1.473	2.2
1.123	1.320	1.6	7.464	1.375	2.3
1.175	1.352	1.5			
1.231	1.397	1.5	8.080	1.304	2.4
			8.776	1.401	2.5
1.292	1.418	1.5	9.567	1.323	2.8
1.356	1.435	1.5	10.47	1.442	3.0
1.426	1.446	1.5	11.51	1.423	3.4
1.501	1.388	1.5			
1.582	1.351	1.6	12.71	1.212	3.8
			14.11	1.227	4.0
1.670	1.368	1.7	15.76	1.199	4.4
1.766	1.364	1.6	17.72	1.246	4.9
1.870	1.319	1.7	20.07	1.283	5.4
1.984	1.345	1.7			
2.108	1.313	1.8	22.93	1.249	6.3
			26.45	1.084	7.5
2.244	1.335	1.9	30.88	1.169	8.4
2.394	1.401	1.9			

^aThis indicates a counting error expressed as one standard deviation. Total errors may be estimated by combining the normalization error of 2.6% and the estimated overall systematic error of 2.0% with the counting errors in the table.

REFERENCES

1. J. W. Behrens and G. W. Carlson, Nucl. Sci. Eng. 63, 250 (1977).
2. J. W. Behrens, *Determination of Absolute Fission Cross Section Ratios Using the Method of Threshold Cross Sections*, Lawrence Livermore Laboratory, Rept. UCRL-51478 (1973).
3. Evaluated Nuclear Data File/Format B - Version IV. This evaluation (ENDF/B-IV) originates at Brookhaven National Laboratory, Upton, N.Y.

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