

Fission Cross Section of U^{235} from 6 to 2000 ev

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The fission cross section of U^{235} from 6 to 2000 ev has been measured with a large fission chamber in the KAPL neutron velocity selector. Improved resolution makes it possible to observe fluctuations in the previously unresolved range above 60 ev.

MEASUREMENTS have been made of the fission cross section of U^{235} in the range below 50 ev,¹ plus additional measurements for energies to 2000 ev.

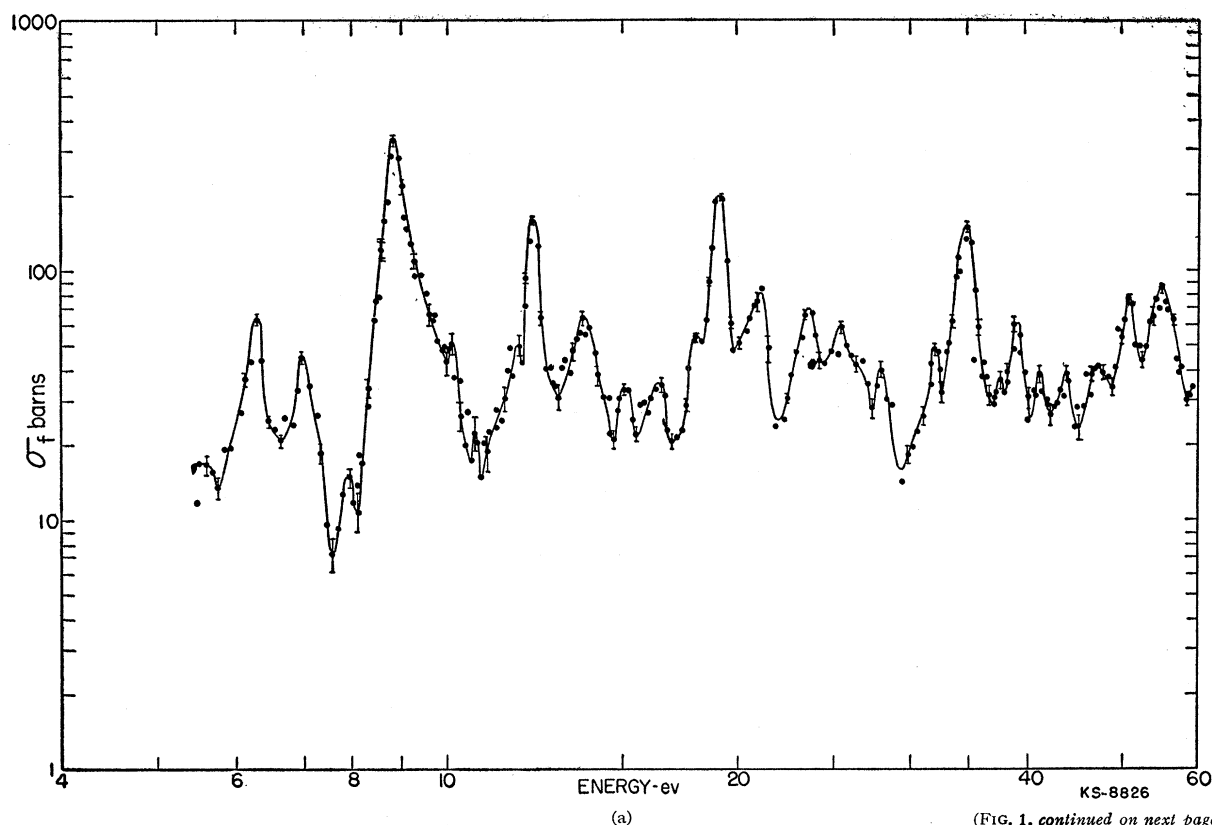
The KAPL velocity selector operates with 0.11-microsecond primary neutron bursts from the General Electric 100-Mev betatron. For the experiments reported here, the time channels were varied in length from 1.3 microseconds in the low-energy range to 0.3 microsecond in the high-energy range. The flight path was 7.4 meters.

The fission chamber is a parallel-plate ionization chamber containing approximately 10 grams of U^{235} . The plates are coated to a thickness of approximately

$\frac{1}{2}$ mg/cm² over a diameter of approximately 10 $\frac{1}{2}$ inches.² The alternate plates are connected to separate output channels, each with its own amplifier and discriminator, to minimize the effects of alpha pile-up.

The relative fission data were corrected for the neutron spectrum (by measurements taken with an assembly of BF_3 detectors) and were normalized to the Columbia University fission data³ in the neighborhood of 0.5 ev.

The normalized fission cross-section curve is shown in Fig. 1. In the low-energy range, the values of $\sigma_0\Gamma_f$ have been calculated from the areas under a few of the prominent resonances; curve-fitting was used to sepa-



(a) (FIG. 1. continued on next page.)

* Operated for the U. S. Atomic Energy Commission by the General Electric Company.

¹ Yeater, McMillan, Mills, and Gaertner, *Bull. Am. Phys. Soc. Ser. II*, **1**, 8 (1956).

² These plates were electroplated by W. Havens' group at Columbia University.

³ D. J. Hughes and J. A. Harvey, *Neutron Cross Sections*, Brookhaven National Laboratory Report BNL-325 (Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 1955).

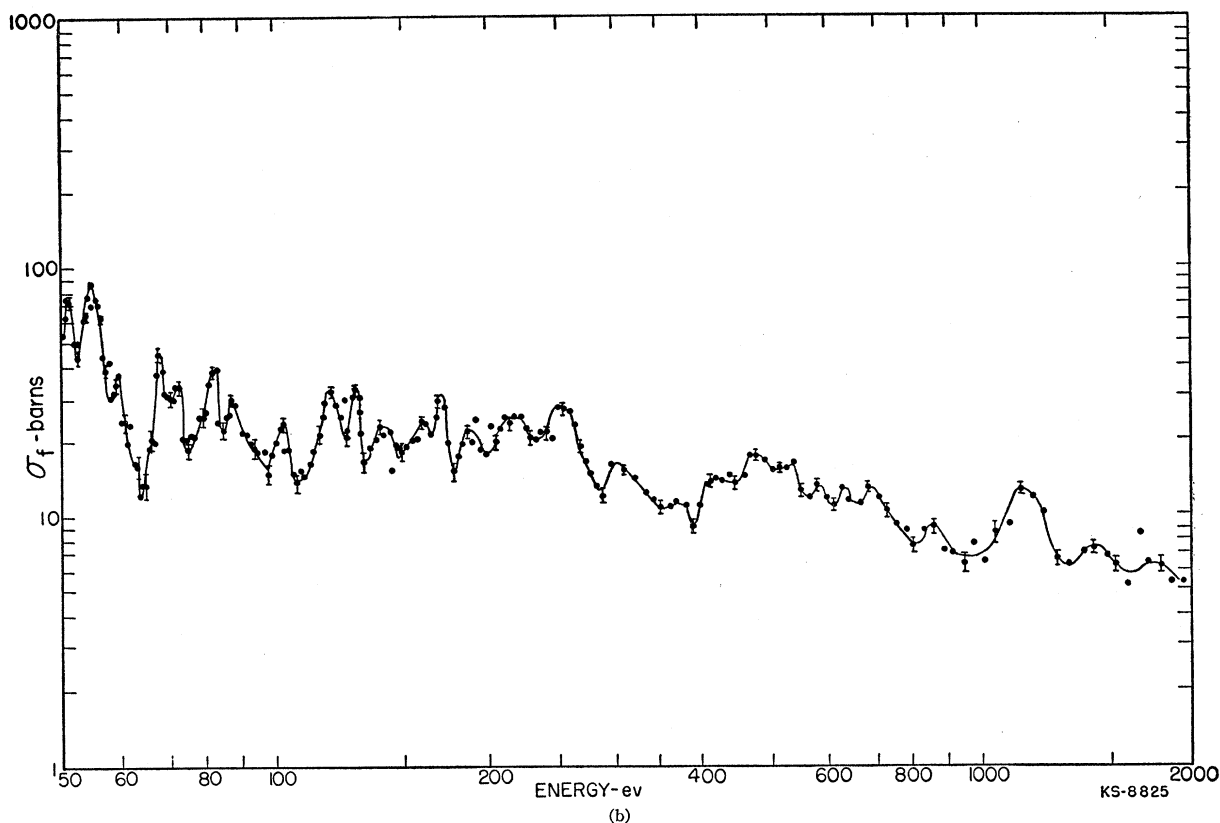


FIG. 1. Fission cross section of U^{235} (a) in the energy range from 6 to 60 electron volts; (b) in the energy range from 50 to 2000 electron volts. The flags indicate standard deviation based on statistics.

TABLE I. U^{235} fission level strength.

$E(\text{ev})$	$\sigma_0\Gamma_f(\text{ev-b})$
8.8	113 ± 10
11.7	11.8 ± 3
12.3	50 ± 5
19.3	111 ± 10

rate overlapping areas. The values are given in Table I.

At higher energies, where individual levels cannot be identified, there are fluctuations encompassing many levels. The maximum in the vicinity of 1200 ev is an

example of the higher energy effects; this was observed with poorer resolution in our previous measurements,⁴ which the present data overlap.

ACKNOWLEDGMENTS

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⁴ Yeater, Kelley, and Gaerttner, Knolls Atomic Power Laboratory Report KAPL-1109 (unpublished).