

THE "BARN BOOK" ONLINE<sup>a</sup>

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## 1. Introduction

The "Barn Book" has been a standard reference for neutron cross section data from the first edition published in 1955 as BNL-325 [1] through the last edition published by Academic Press in 1988 [2]. With the development of electronic networks over the past decade, most users of nuclear data now have direct access to the most current data through the National Nuclear Data Center (NNDC) Online Data Service and similar services provided by other members of the Nuclear Data Centers Network [3] or through the WorldWideWeb pages maintained by the members of this Network.

A planned upgrade in the NNDC Online Data Service allows the user to plot the data in "Barn Book" format.

## 2. Operation

The Barn-Book Format will be accessed through the CSISRS database.

A preliminary version of the system is now available online, and allows the user to plot cross section data as a function of energy. The user selects the data and evaluated curves to be plotted, as well as the energy range. Some of the plotting options may be changed, e.g., grid lines.

For the initial implementation of the new system, the user will select the target and reaction to be plotted; the curve format and energy ranges will be selected by a control file produced by NNDC personnel. The experimental data for the reaction selected are plotted together with a pre-selected "eye-guide" curve.

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Future upgrades will allow other types of data to be plotted. Also planned are future upgrades to allow the user to select, interactively, which data sets will be plotted, and to insert his or her own curve for comparison. An option to allow the user to zoom in on a selected energy range, may also be provided.

### 3. Experimental Data

The CSISRS (Cross Section Storage and Retrieval System) database is the result of a cooperative effort by the members of the Nuclear Data Centers Network to compile nuclear reaction data and to exchange it on a regular basis and in a standard format (EXFOR). The CSISRS database now contains more than four million data points from about 8000 neutron data references, 3000 charged-particle references, and almost 600 photonuclear data references. Since the experimental data used in the plots are selected from the current CSISRS database, the user is provided with the best available information.

### 4. Curves

The "eye-guide" curves are taken from one of three sources. If there are evaluated data in the ENDF database, these are used. The ENDF database contains the latest release of ENDF/B-VI [4], as well as the Russian (BROND), Chinese (CENDL), Nuclear Energy Agency (JEF), and Japanese (JENDL) evaluated libraries. If evaluated data for the isotope to be plotted are contained in, or are easily calculated from, the ENDF/B-VI library, these data are plotted; if not, then data are taken from one of the other evaluated libraries. If no evaluated data exist, then cross section curves obtained from the recommended resonance parameters of Mughabghab [5] or from a least-squares spline fit to the experimental data are used as an eye-guide.

### 5. Summary

The "Barn-Book" plotting option will be available through the NNDC Online Data Service by the end of the year. One example of a plot is given in Figure 1. Since future upgrades will be driven by the needs of our users, the NNDC would like to hear all relevant comments on the form and content of the plots.

The authors would like to thank Eric Christopher and Susan Milne-Jones from San Jose State University for preparing the first-order control files.

### References

- [1] D. J. Hughes and J. A. Harvey, *Neutron Cross Sections*, Brookhaven National Laboratory report BNL-325 (1955).
- [2] V. McLane, C. L. Dunford, P. F. Rose, *Neutron Cross Sections, Volume 2, Neutron Cross Section Curves* (Academic Press, New York, 1988).
- [3] *The Nuclear Data Center Network*, H. D. Lemmel, ed., International Atomic Energy Agency report INDC(NDS)-359 (1996).
- [4] *ENDF-201, ENDF/B Summary Documentation*, 4<sup>th</sup> edition, suppl. 1, edited by V. McLane, Brookhaven National Laboratory report BNL-NCS-17541 (1996).

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- [5] S. F. Mughabghab, et al., *Neutron Cross Sections, Vol. 1. Neutron Resonance Parameters and Thermal Cross sections*; Part A: Z=1-60 (Academic Press, 1981); Part B: Z=61-100 (Academic Press, 1984).

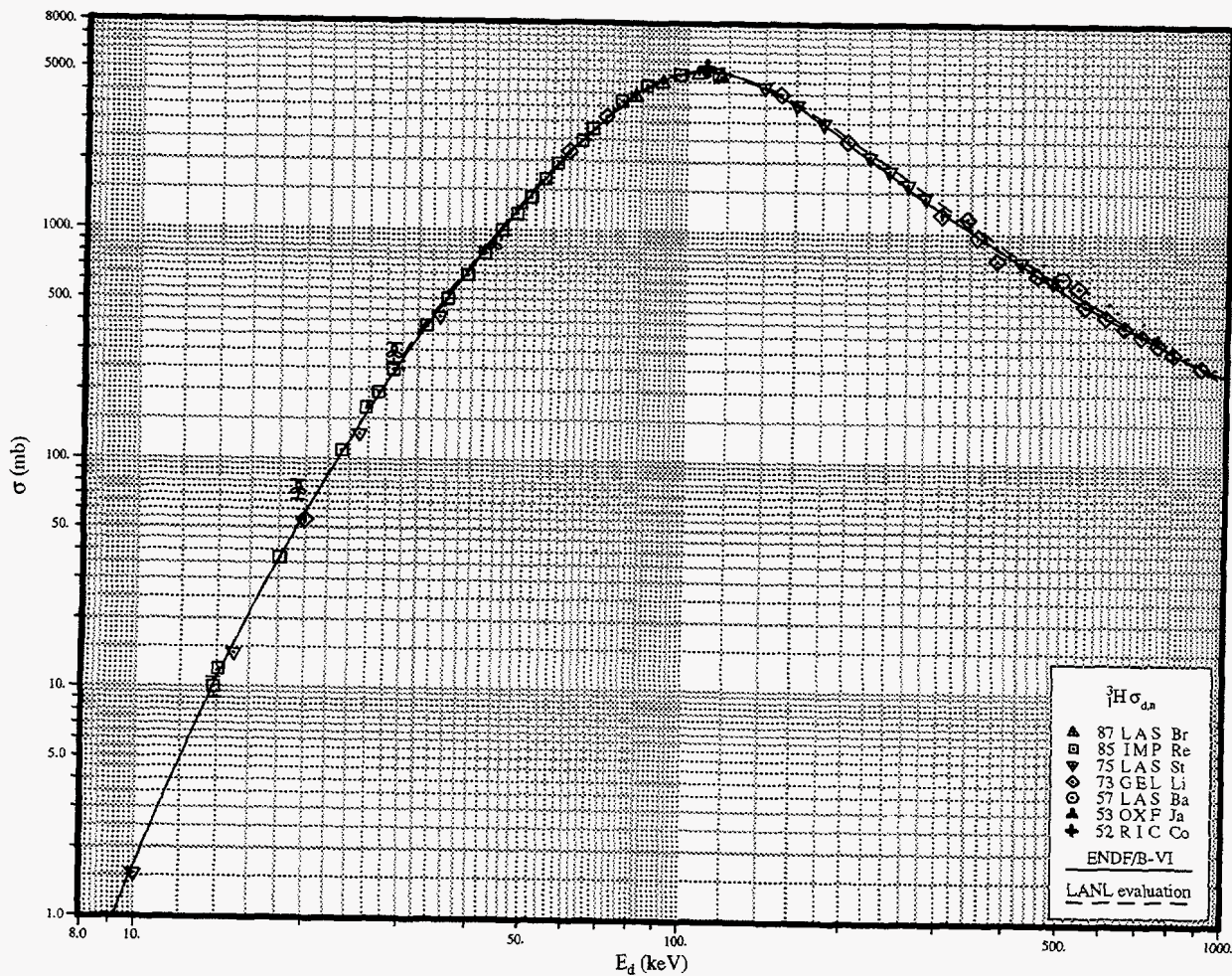


Figure 1.  $T(d,n)$  reaction, including plots of the current ENDF/B-VI evaluation and the proposed evaluation from Los Alamos National Laboratory.

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