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USE OF SAMMY FOR NUCLEAR DATA EVALUATIONS FOR CRITICALITY SAFETY

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Evaluation of nuclear data plays a significant role in the quest for nuclear criticality safety. If calculations/predictions of such crucial quantities as reactivities or k-effectives are to be accurate, those calculations must be based on accurate cross section values.

A tool which has long played a central role in the evaluation of nuclear data in the resolved resonance region (RRR) is the computer code SAMMY,¹ developed over the course of more than two decades at Oak Ridge National Laboratory. With the incorporation in the 1990's of Fritz Fröhner's FITACS program² into the code, SAMMY's role was extended into evaluations in the unresolved resonance region (URR) as well. Recently, new options have been added to SAMMY's URR capabilities to provide increased flexibility to evaluators, and to increase compatibility with formats and procedures of the Evaluated Nuclear Data Files (ENDF). It is the purpose of this paper to report those new options.

The fundamental features of FITACS's (and SAMMY's) URR treatment will be briefly summarized in the full paper. Emphasis will, however, be given to the new features now available in SAMMY: Any available experimental data sets may be included in an evaluation, with no artificial limitations on how many data sets of which type are to be included. Total, capture, fission, elastic, or inelastic cross section data can be fitted. Data sets may be analyzed either simultaneously or sequentially. Energy-dependent normalizations can be used for each data set. Different average resonance parameters may be used in different energy regions. Upon completion of an evaluation, output can be produced in ENDF File 2 format (average resonance parameters) or in File 3 format (point-wise cross sections).

Additional options are in the planning stages, and may be available by the time of this conference. Among these are the ability to include certain integral quantities within the fitting procedure (in a similar fashion as is currently available for the RRR), and the output of uncertainty and covariance information in ENDF formats.

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REFERENCES

¹ "Updated Users' Guide for SAMMY: Multilevel R-Matrix Fits to Neutron Data Using Bayes' Equations," N. M. Larson, ORNL/TM-9179/R5, Oak Ridge National Laboratory, Oak Ridge, TN (November, 2000).

² F. H. Fröhner, "Evaluation of the Unresolved Resonance Range of ²³⁸U," *Nucl. Sci. Eng.* **103**, 119-128 (1989).