

WPEC subgroup proposal

Thermal Scattering Kernel S(a,b): Measurement, Evaluation and Application

Justification for a Subgroup

The motivation for the subgroup is the recent interest throughout the world on revisiting and revising the existing thermal neutron scattering data in the existing cross section libraries such as the ENDF, JEFF, JENDL, etc. For the last 40 years new methodologies for measuring and evaluating double differential cross sections has emerged. Better-measured and evaluated data are produced nowadays.

Presently, in the US, developments in the field consist of measuring the double differential cross section at multiple temperatures and pressures using the Spallation Neutron Source (SNS) facility located at the Oak Ridge National Laboratory plus evaluation to develop new S(a,b) kernels.

In Europe, the Neutron Augmented S(a,b) in Cross Sections Alternative Assessment (NAUSICAA) is a Project to measure the double differential cross section and produce an evaluated S(a,b) kernel. The project includes the Institute Laue-Langevin (ILL), the Institut de Radioprotection et de sûreté Nucléaire (IRSN) and the University of Florence. Double differential cross section measurements are planned, starting in 2014, at the ILL.

The common methodology used for generating S(a,b) is based on the use of phonon spectrum which are derived using computer codes for solid state physics applications. While the procedure has been demonstrated acceptable for generating S(a,b) it does not related directly the information conveyed from the measured experimental cross section. Other approaches such as that based on molecular dynamic simulations have also been identified as a potential source for S(a,b) generation.

In addition to the double differential cross section data another subject of interest is the uncertainties (covariance) on the experimental data and their propagation for practical applications. Issues such as data generation, data storage and formats will be addressed by the subgroup.

Subgroup Monitor:

TBD

Subgroup Coordinator:

TBD

Subgroup Participants¹

TBD

¹ Tentative names only... The data projects will have to identify appropriate participants, which will have to check with their own institution the time that they can devote to this activity.

Project Definition

The project will be divided in the following phases:

- I) Assessing existing methodologies for generating $S(a,b)$;
- II) Explore other methodologies of potential use for $S(a,b)$ generation;
- III) Examining existing formats for uncertainty (covariance) generation;
- IV) Demonstrate the feasibility of generating $S(a,b)$ and uncertainty in a practical application;

Project Justification

The present interest of generating thermal data for reactor and criticality applications justify the creation of a new subgroup. An international collaboration thru a NEA/WPEC subgroup will be essential for leveraging efforts allowing sharing of resources needed for achieving the project goal.

Time Schedule and Deliverables

TBD