

WPEC sub-group proposal

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Title

Advances in Thermal Scattering Law Analysis

Justification for a Subgroup

Evaluation of the Thermal Scattering Law (TSL) was the subject of sub-group WPEC/SG42, which closed in 2018. The continued growing interest in the area of thermal neutron scattering data motivates the formation of a follow-up sub-group within the WPEC nuclear data collaboration. Such a sub-group is essential to continue the coordination of the international effort in advanced TSL methods, in relation with other WPEC subgroups (SG44, SG45, GNDS, etc.).

Subgroup Monitor(s)

TBD

Subgroup Coordinator

TBD

Subgroup Participants¹

The persons listed below already expressed interest in the proposed activities, pending confirmation by the data projects and/or their home institutes.

ENDF	Michael Zerkel, Jesse Holmes, Dave Heinrichs, Ayman Hawari, Danila Roubtsov, Emily Liu, Yaron Danon
JEFF	Leal C. Luiz, Günter Muhrer, Yoann Calzavara, Emmanuel Farhi, Jose Ignacio Marquez Damian, Florencia Cantargi, Vaibhav Jaiswal, Claude Mounier, David Bernard, Gilles Noguere

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.

JENDL	TBD
BROND	TBD
CENDL	TBD
IAEA-NDS	Andrej Trkov (TBC)

Definition of the project and proposed activities

Over the past 20 years, there was renewed interest in the development of thermal scattering law libraries to support the needs of the nuclear science and engineering community. The participants of the WPEC subgroup SG42 presented major theoretical contributions, produced a wealth of new experimental data for validation of scattering kernels and proposed methodologies for the quantification of uncertainties. In parallel, SG42 made the single largest contribution to the thermal scattering sub-library in the history of evaluated nuclear data libraries, with 33 new and updated evaluations incorporated in the latest releases of ENDF/B and JEFF.

With this in mind, the proposed activities will follow the recommendations suggested by sub-group SG42:

- 1) Support the development of open source tools for thermal scattering data evaluation and processing with focus on providing nuclear data on demand at operational conditions.
- 2) Strengthen the collaboration with the neutron science and advanced neutron source communities (SNS, ESS, ILL, ISIS, etc.) in each country to establish joint experimental programs.
- 3) Support the data collection effort by EXFOR both in thermal scattering nuclear reaction data and supplementary material.
- 4) Identify and select sets of benchmark experiments that are most appropriate for supporting the TSL evaluation process.
- 5) Converge on a modern format for TSL data in consultation with the GNDS effort.
- 6) Study the accuracy requirements for TSL evaluations, data processing and utilization.

Relevance to Evaluated Data Files

Among the contributions of SG42 was the identification and development of new computational tools (e.g., aClimax/oClimax (ISIS), *FLASSH* (North Carolina State University), nCrystal (ESS), NJOY2016/NJOY21 (LANL)) that will help in solving future needs in thermal scattering data, and in the collaboration with sub-group SG38 for the initial specification of the GNDS nuclear data format for storing the data.

The new subgroup will extend this contribution further by considering developments that impact emerging and modern nuclear science and technology analysis approaches. In addition, it will continue to address the community's TSL evaluation needs.

Furthermore, as recommended by SG42, all aspects that support TSL evaluations including validation and benchmarks, uncertainty analysis, and data formats (driven by the modern evaluation techniques), will be addressed.

Time-Schedule and Deliverables:

2020-2021: Review and documentation of advances in TSL evaluation methods and tools. Consideration will be given to emerging modern nuclear science and technology analysis modalities.

2021-2022: Review and documentation of TSL data validation, uncertainties and formats.

2022-2023: Summary and formulation of the new SG findings, conclusions and recommendations.

During the 3-year period, discussion of new and upcoming TSL evaluations, that are being considered for release into the databases (ENDF, JEFF, etc.), will continue. In addition, coordination with other WPEC subgroups will be ongoing.