Meeting Summary

SG42
Thermal Scattering Kernel $S(\alpha,\beta)$: Measurement, Evaluation and Application

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SG42 Final Report

Thermal Scattering Kernel $S(\alpha,\beta)$
Measurement, Evaluation and Application

1) Context

2) Theory: evaluation methods and tools
   2.1) Thermal Scattering Law definition
   2.2) Main physics approximations used in LEAPR
   2.3) Improved TSL libraries using atomistic simulations
   2.4) A step forward for future TSL evaluations

3) Experimental validation
   3.1) Material properties
   3.2) Microscopic data
   3.3) Semi-integral data
   3.4) Integral data
   3.5) Facilities for TSL experiments
   3.6) Capability gaps

4) Evaluation: progress on various materials and recent contributions to databases
   - Reactor applications
   - Criticality applications
   - Neutron beam applications
   - Cold neutron sources

5) Data format issues
   5.1) TSL library format
   5.2) TSL uncertainties

6) Summary and recommendations

APPENDIX if needed, such as LEAPR inputs and MCNP inputs of interest for this work
The major development over the past 20 years is the implementation of atomistic simulation methods to support TSL evaluation.
Development of evaluation methods and tools

NCSU

One-Phonon $S(\alpha, \beta)$ for Aluminum with Coherent Interference (calculated with MeDeA and FLASSH)

Calculated Phonon DOS for UH$_3$

Theory-Measurements Connections

⇒ Experimental validation of the double-differential neutron cross sections using TOF chopper spectrometers (inelastic measurements)

⇒ Experimental validation of the neutron total cross section using transmission technique

⇒ Experimental validation using pulsed slowing down and die away experiments

⇒ Experimental validation using integral benchmarks
Data covariance information and formats

**Agenda**

**WPEC Subgroup 42**
Thermal Scattering Kernel \(S(\alpha, \beta)\):
Measurement, Evaluation and Application
and

**WPEC Subgroup 44**
Investigation of Covariance Data
in General Purpose Nuclear Data Libraries
and

**WPEC Expert Group GNDS**
Expert Group on the Recommended Definition of a
General Nuclear Database Structure (GNDS)

OECD Headquarters
Conference Center
2 Rue André Pascal,
Paris 75016

Room Chateau E
Starting at 2:00 pm – Ending at 18:00 pm

**GNDS-1.9 & future TSL formats**

**Incoherent approximation of**
\(S(\alpha, \beta)\) **supported as in ENDF-6**

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    <scatteringAtom label="0" numberPerMolecule="1">
      <mass value="236.0058" unit="amu"/>
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      <e_max value="5.000001" unit="eV"/>
      <T_effective>=
    </scatteringAtom>
  </scatteringAtoms>
</incoherentInelastic>
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Proposal: A **new subgroup on Advanced Thermal Scattering Law Analysis**

⇒ Continued growth in the area of thermal neutron scattering data motivates the formation of a new subgroup within the WPEC nuclear data collaboration.

⇒ The subgroup would be essential to continue international coordination on advanced TSL methods.

⇒ Act as the focal point with other WPEC subgroups (SG44, SG45, GNDS, etc.) in relation to data validation, covariance generation, and data formats, ...