OECD/NEA Meeting: WPEC SG42
"Thermal Scattering Kernel S(α,β): Measurement, Evaluation and Application"
May 15 – 18, 2018 • Paris, France

SG42 Meeting Preliminaries

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Agenda

Organisation for Economic Co-operation and Development
Nuclear Energy Agency
WPEC 2017 Meetings

Draft Agenda

Thermal Scattering Kernel S(α,β)

Measurement, Evaluation and Application

SG-42

OECD Headquarters
Conference Center
2 Rue André Pascal,
Paris 75016

Please note: *Only registered participants with a valid ID card or passport will be allowed access to OECD premises.*

Tuesday, May 15, 2018

10:00 – 12:00	**SG42 meeting**	**Room CC 20**
10:00 – 10:30	Welcome	Ayman I. HAWARI Gilles NOGUERE
10:30 – 11:00	NNL TSL evaluation work for ENDF/B-VIII.1	Michael L. ZERKLE
11:00 – 11:30	Thermal Scattering Physics Methods with Modeling Tools and Experiments	Jesse HOLMES
11:30 – 12:00	Contribution of Thermal Scattering Libraries from the Nuclear Data Group at Centro Atomico Bariloche	Florencia CANTARGI
12:00 – 12:30	GNDS-1.9 & future TSL format	David BROWN
12:30 – 14:00	**Lunch Break**	
14:00 – 18:00	**Joint session SG44/SG42/GNDS**	

Wednesday, May 16, 2018

9:00 – 18:00	**SG42 meeting**	
9:00 – 9:30	Investigation of frequency spectrum of light water to generate thermal scattering law	Vaibhav JAISWAL
9:30 – 10:00	The new thermal neutron scattering measurements and analysis	Emily LIU
10:00 – 10:30	Recent Developments in Thermal Scattering Data and Methods at NCSU	Ayman I. HAWARI
10:30 – 11:00	**Coffee Break**	
11:00 – 11:30	TSL activities in the frame of the NAUSICAA collaboration	Gilles NOGUERE
11:30 – 12:30	Preparation of the final report	all
12:30 – 14:00	**Lunch Break**	
14:00 – 16:00	Preparation of the final report	all
16:00 – 16:30	**Coffee Break**	
16:30 – 18:00	Preparation of the final report	all

SG42 Final Report

Draft version, SG42 report, 04/2018

SG42 Report Outline

1) **Introduction/context**

2) **Theory: Development of evaluation methods and tools**

   Discussions of the different approaches, given that the major development over the past 20 years is the implementation of atomistic simulation methods to support TSL evaluation.

3) **Experiments: Theory-Measurement connections**

- Microscopic data ⇒ Transmission experiments, inelastic scattering experiments …
- Semi-integral data ⇒ slowing down experiments
- Integral data ⇒ ICSBEP, IRPhE, non public benchmarks …

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 - GND format**

- TSL library format
- TSL uncertainties

6) **Summary and recommendations**

APPENDIX if needed, such as LEAPR inputs and MCNP inputs of interest for this work.

Discussions : Development of evaluation methods and tools

⇒ **The major development over the past 20 years is the implementation of atomistic simulation methods to support TSL evaluation**

- Recommendations to correctly use these methods
- Limits/advantages
- Others ….

TABLE XLVII: Summary of the origins of and recent changes to the thermal neutron scattering (`thermal_scatt`) sublibrary. Evaluations modified for ENDF/B-VIII.0 are given in bold. Note all files were modified to correct the MAT numbering of the sublibrary.

File name	Main source	Last mod.	Lab.	Year	Note
tsl-ortho-D.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-para-D.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-ortho-H.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-para-H.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-013_Al_027.endf	ENDF/B-VII.0	2016	LANL	2005	
tsl-026_Fe_056.endf	ENDF/B-VII.0	2016	LANL	2005	
tsl-Be-metal.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	DFT/AILD
tsl-BeinBeO.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	
tsl-OinBeO.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	DFT/AILD
tsl-HinH2O.endf	**ENDF/B-VIII.0**	**2016**	**CAB (Argentina)**	**2016**	MD
tsl-HinIceIh.endf	**ENDF/B-VIII.0**	**2016**	**BAPL**	**2016**	
tsl-OinIceIh.endf	**ENDF/B-VIII.0**	**2016**	**BAPL**	**2016**	DFT/AILD
tsl-DinD2O.endf	**ENDF/B-VIII.0**	**2016**	**CAB (Argentina)**	**2016**	
tsl-OinD2O.endf	**ENDF/B-VIII.0**	**2016**	**CAB (Argentina)**	**2016**	MD
tsl-benzene.endf	**ENDF-269**	**2017**	**GA**	**1969**	**Corrected spelling; No LEAPR inputs available**
tsl-HinC5O2H8.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2015**	MD
tsl-HinCH2.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2015**	MD
tsl-l-CH4.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-s-CH4.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-graphite.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	
tsl-reactor-graphite.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	DFT/AILD
tsl-CinSiC.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2014**	
tsl-SiinSiC.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2014**	DFT/AILD
tsl-SiO2-alpha.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2011**	
tsl-SiO2-beta.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2011**	DFT/AILD

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File name	Main source	Last mod.	Lab.	Year	Note
tsl-HinYH2.endf	**ENDF/B-VIII.0**	**2016**	**BAPL**	**2016**	DFT/AILD
tsl-YinYH2.endf	**ENDF/B-VIII.0**	**2016**	**BAPL**	**2016**	
tsl-HinZrH.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-ZrinZrH.endf	ENDF/B-VII.0	2016	LANL	1993	
tsl-OinUO2.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	DFT/AILD
tsl-UinUO2.endf	**ENDF/B-VIII.0**	**2016**	**NCSU**	**2016**	
tsl-NinUN.endf	**ENDF/B-VIII.0**	**2017**	**NCSU**	**2017**	DFT/AILD
tsl-UinUN.endf	**ENDF/B-VIII.0**	**2017**	**NCSU**	**2017**	

⇒ **However, final results are still accommodated to LEAPR formalism**

- How to improve this approach
  - New evaluation tools
  - Improved theoretical treatment
- Accuracy of the results (VVUQ)
- Others …

Discussions : Theory-Measurements Connections

⇒ **Experimental validation of the calculated DOS (vDOS vs. gDOS)**

- To be discussed

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

- Difficult to achieve good agreement between calculated and experimental results
- Origin of the discrepancies are difficult to identify (Simulation or LEAPR ?)
- Others …

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

- Easy to perform
- Limited number of facilities
- Difficult to get experimental results below 1 meV
- Others ….

⇒ **Experimental validation using slowing down experiments**

- To be discussed

⇒ **Experimental validation using integral benchmarks**

- They only give trends
- Sensitivity studies are needed to identify the various contributions
- Others …

Discussions : Data Format Issues

⇒ **Data format requirements for LEAPR parameters**

- Make clear the LEAPR input parameter files
- Others ….

⇒ **Data format requirements for MF=7**

- To be discussed

⇒ **Data format requirements for covariance matrix**

- LEPAR parameter covariance
- Covariance matrix for MTs in MF=7