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SUBJECT: Report on Foreign Travel 2022 WPEC meeting
DATE:
TO: Dr. Angela Chambers, Nuclear Criticality Safety Program Manager, National Nuclear Security Administration / NA-511
FROM: Yaron Danon

MEETING TITLE: 2022 WPEC meeting

MEETING LOCATION: NEA/OECD - Chateau de la Muette, OECD Conference Centre, Paris, France

MEETING DATES: May 10-13, 2022

ATTENDEES ON BEHALF OF NCSP: [Only 1 report from the institution for ALL attendees]
Yaron Danon

MEETING PURPOSE:
The purpose of WPEC and adjacent subgroup meetings is to promote the exchange of information on nuclear data evaluations, measurements, nuclear model calculations, validation, and related topics, and to provide a framework for co-operative activities between the participating projects. That includes the ENDF, JEFF, JENDL, and CENDL projects and other invited delegates.

MEETING BENEFITS TO THE NCSP:
WPEC and subgroup meetings include topics in which are supported by NCSP research and relate to work performed at RPI and other US labs. NCSP supported work was presented and highlighted and access to other latest data and resources was learned.

The meeting provides an opportunity to collaborate with other ND communities such as JENDL and JEFF. The collaboration allows better planning of NCSP (and NNL) related ND experiments and evaluation activities. In some cases, this meeting enables access to experimental and/or evaluated data obtained elsewhere (such was the case for Fe-45 measurements at n-TOF).

PURPOSE OF TRAVEL
The purpose of the travel is to participate in the WPEC meeting as an official member of the ENDF US delegation, to present a report on US experimental ND work during FY21-22, and to participate in subgroups SG-C (High Priority list), SG-50 (Developing an Automatically Readable, Comprehensive and Curated Experimental Reaction Database), and other subgroups. Prof. Emily Liu participated in Subgroup 48: Advances in Thermal Scattering Law Analysis.

Persons Contacted at virtual meeting

List of participants in WPEC 34:

ARG	MARQUEZ DAMIAN Jose Ignacio		JPN	KATABUCHI Tatsuya		USA	SIEFMAN Daniel
CHE	HURSIN Mathieu		JPN	KIMURA Atsushi		USA	WIARDA Dorothea
CHN	GE Zhigang		JPN	TADA Kenichi		USA	ZERKLE Michael L.
CHN	RUAN Xichao		USA	RAMIC Kemal			
ESP	CABELLOS DE FRANCISCO		USA	BROWN David		*International Organizations*	
ESP	CANO-OTT Daniel		USA	DANON Yaron			
ESP	GONZALEZ Enrique		USA	GERT Godfree		EC	PLOMPEN Arjan
FRA	BERNARD David		USA	HAECK Wim			
FRA	JACQMIN Robert		USA	HERMAN Michal Wladyslaw		IAEA	OKUMURA Shin
GBR	KODELI Ivan		USA	LEWIS Amanda		IAEA	KONING Arjan
GBR	MILLS Robert W.		USA	MATTERA Andrea			
ITA	MENGONI Alberto		USA	NEUDECKER Denise		OECD/NEA	FLEMING Michael
JPN	IWAMOTO Nobuyuki		USA	NOBRE Gustavo		OECD/NEA	FOLIGNO Daniela
JPN	IWAMOTO Osamu		USA	PALMIOTTI Giuseppe		OECD/NEA	HILL Ian

Presentations, Chair Responsibilities, Etc.:

Danon is the chair of the CSEWG measurement committee and in this capacity reported to WPEC on behalf of CSEWG in the May 13 2022 session on recent US experimental results. This presentation included summaries from:

1. LANL progress on LENZ, SPIDER, and SREFT, Hye Young Lee (LANL)
2. LANL progress on ChiNu and Scattering, Keegan Kelly (LANL)
3. ORNL neutron induced cross section experiments on Zr-90, Klaus Guber (ORNL)
4. Overview of Nuclear Data measurement and analysis at RPI, Yaron Danon, (RPI)
5. Gamma-ray spectroscopy of fission products for forensics: La-140 and I-130 beta decay, Andrea Mattera (NNDC/BNL)
6. Recent Work related to Neutron Standards, Dr Allan Carlson, (NIST)
7. Neutron and charged-particle cross section measurements, Josh Brown, (Berkley)

8. Differential cross section measurements of the $^{13}C(\alpha,n)^{16}O$ reaction at the University of Notre Dame, James deBoer, (UND)
9. The current status of the EXFOR project, Dr Boris Pritychenko (NNDC/BNL)

Danon is also a US representative to Subgroup C - High Priority list (HPRL), and participated in the meeting of this subgroup. The discussion in SG-C was about updates to different current entries on the list since no new entries were add in the last year. A new chair of SG-C (from CEA) started his role this year.

Highlights from the different subgroup meetings

SG 47 5/11/022

Discussion on formalizing SINBAD submissions by Buss. Define subgroups to work on different benchmarks. Topics like fusion reactors and accelerators are included. The database will be hosted on NEA gitlab. In the US current SINBAD can be obtained from RSICC. A talk from Valentine about using SINBAD for nuclear fusion, using mostly Serpent and OpenMC for radiation transport calculations. Work was done to interface the transport codes to CAD codes. Automated validation between codes and codes and experiments was discussed. Looking for photon data on different elements.
A priority of the subgroup is on benchmark data for applications in: fusion, fission, accelerators

SG-48 5/11/2022

France - Scattering kernel $S(\alpha,\beta)$ was generated with CINEL and Conrad. Generated $S(\alpha,\beta)$ for different Pu isotopes in $^{x}PuO_2$ and ThO_2. Looked at thermal effect above the thermal cutoff and use free gas with rejection modification similar to the DBRC correction to take care of low energy resonances.
A NCSU talk about using graphite slowing down spectrometer to compare experiment vs simulation with ENDF-8.0 graphite + 30% porosity.
NNL discussed measurements of thermal total cross sections of Be at RPI. Typicaly Be has some grain size that needs to be accounted for in calculations, ENDF alone will over predict the cross section at Bragg edges.
There was a discussion on U-metal Doppler broadening with crystalline effects.
LLNL presented on pulsed die-away measurements for thermal scattering benchmarking. Measure multiple sample size and fit the slope alpha to get D_0 and C (diffusion cooling) parameters of the buckling polynomial.
ORNL (Chapman) talked about mixed evaluation of actinides that need to be linked to the isotopic composition (which is what the French did).
NCSU discussed neural networks to store $S(\alpha,\beta,T)$.

HPRL 5/12/2022

Approved new entries for H-3 and Be-7, Er-167(n,γ) below 100 eV, and Cl-35(n,p)
Moltex Energy Canada – Discussed the Cl-35(n,p), currently available experimental data (LANL) needs to be evaluated. Another talk from Terra Power still using ENDF-8 for Cl-35(n,p) that they claim needs improvement.
Probably need Cl-35 integral data to constrain the uncertainty calculated from covariance.
There is a new HPRL web interface that will go online soon.

SG-46 5/12/2022

Target accuracy analysis for different systems. Use weighting to optimize the most cost effective to get the TAR. This provides a recommendation to which cross section needs improvement. The optimization

procedure includes some weights provided by experimentalists representing the difficulty to improve a certain reaction.

WPEC 5/13/2022

Late start due to COVID testing requirement of US participation flying back on Saturday 5/14/2022.

Measurement reports

Japan: ANARI installed beam filters (Fe, Si) for Am-243, Fission fragment measurements, ^{59}Fe(n,γ) using surrogate reaction, I-129 capture measurement, double differential (γ,xn) for different targets.

China

Discussed many new measurements including: Th(n,γ) 4-100 keV, Er-nat (n,γ) 1-100 eV, Ag-107 (n,γ) 1-60 eV, Se-nat (n,γ) 1-200 keV, Lu-nat(n,γ) 1-100 eV, Tb-159(n,γ) ev to 100keV, Li-na, Al

Low energy (0.008-0.1 eV), Th transmission, Th(n,f) 4-11.5 MeV, Rb-25(n,2n), Ir-191(n,2n), Co-59(n,2n)Co-58, Ga-nat scattering angular distributions at 8 MeV.

Europe

New measurements, Fe (n,n'γ), O(n,n'γ), U238(n,n'γ), W-183(n,γ). Gd-154 low energy capture and transmission, O(n,alpha)

New capability for transmission on heated samples (at Geel)

nTOF: U-235 fission in keV to 500 MeV and Ge-72(n,γ)

NSF started operation, neutron production by protons on Li. Planning for (n,2n) on Th-232 and U-235,238.

Fission neutron measured by Gd loaded plastic bars and E2E telescope for the fission fragments

Mo isotopes capture at nTOF (capture) and Geel (transmission) this is on the NCSP 5 year plan, maybe US measurements will not be needed.

Evaluations: discussed new JENDL 5. JENDL scattering kernel ACE file are very big but we could not get an answer about the physics reason behind it.

Jeff4T1 is a test version of the new test evaluation, looking at the impact on benchmarks including criticality safety. JEFF4T2 expected in July with various improvements.

ENDF 8.1 in 2/2024

(alpha,n) technical meeting at the IAEA has a report. Decay heat report is also available. Stopping database at the IAEA

NEA/OECD now have more emphasis on education and training. WPRS is a pilot in education.

Follow on discussion was a review in activity of subgroups.

Distribution:

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