

# CIELO: Progress, at WPEC May 2014

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& CIELO Collaboration  
*LANL*

*(Next CIELO collaboration with CSEWG, Nov 3-7 week, 2014)*

# <sup>1</sup>H updated Standards - WPEC May 2014 report

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- ◆ Work by Hale, Paris (Los Alamos)
- ◆ Builds on previous EDA R-matrix analysis used for ENDF & IAEA standards, but now:
  - ◆ Has an enhanced measurement database
  - ◆ Uses new data (e.g. from RPI, and from Ohio - 14.8 any diet)
  - ◆ Being extended from 20 to 200 MeV
- ◆ New file will be made later this year, including covariances
- ◆ (Preliminary results suggest only very small changes compared to the existing Standards.

## <sup>16</sup>O - WPEC May 2014 report

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- ◆ Work by Plompen, Lubitz, Kunieda, Hale, Paris, Leal, etc
- ◆ <sup>16</sup>O(n,α): R-matrix teams concluding a higher (n,α), more like ENDF/B-VI.8 is perhaps correct
  - ◆ Given by R-matrix & unitarity
  - ◆ Supported by ***newly-revised*** Geel (Georginis) data
- ◆ At least 2 files will be tested (which will use ~3% lower total cross section at low energies, as concluded by Plompen, Lubitz, *et al*:
  - ◆ *Hale file, & a Lubitz - Leal file variant*
- ◆ New files for testing will be distributed soon
  - ◆ Then, a suite of key integral experiments and crits for data testing will be defined
- ◆ We will need to focus on scattering angular distributions

## **$^{238}\text{U}$ : resonance analysis from Geel - WPEC May 2014 report**

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- ◆ Builds on previous work by Derrien et al, used in ENDF, JEFF, ...
- ◆ Uses new REFIT analysis of new data from:
  - ◆ Geel (Capture from Geel, Transmission from Dresden)
  - ◆ nTOF (BaF2 capture, + C6D6 data still being worked)
  - ◆ LANSCE/DANCE
- ◆ Uses much older data, e.g. from Oak Ridge
- ◆ Attention is paid to the capture cross section Standard eval.
- ◆ Unresolved data presently extends to 100 keV
- ◆ A file for testing will be provided to Trkov, to be combined with the IAEA higher energy data, for testing

## $^{238}\text{U}$ fast analysis from IAEA - WPEC May 2014 report

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- ◆ A test file has been made by Capote and Trkov (building upon ENDF/B-VII.1) - ib33.
  - ◆ overall, data testing looks encouraging. But a discrepancy for Bigten (with Kahler testing) needs to be resolved.
- ◆ Reaction rate testing has been done, for validation
  - ◆ Flattop-25  $^{31}\text{P}(n,p)$  &  $^{235}\text{f}$  ratios look pretty good - but they depend upon transport effect (i.e.  $^{238}\text{U}$  cross sections for transport have an effect on the results above 10-12 MeV, so one should be cautious in inferring information about PFNS there). Morgan White will motivate new flattop measurements.
- ◆ Fast region will be merged with new Geel evaluation when ready

## <sup>235</sup>U: resonance analysis from Oak Ridge, Cadatache - WPEC May 2014 report

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- ◆ SAMMY analysis to 2.25 keV. Builds on WPEC sg. 29 findings (that ENDF capture should be reduced near 1 keV). Uses new:
  - ◆ DANCE (Jandel) - lower resolution
  - ◆ RPI - in 500 eV to 3 keV, lower than ENDF.
- ◆ Fitting was also done for eta, and integral K1, Westcott factor, and capture resonance integral, into SAMMY
- ◆ Benchmarks FCA, Zeus, support these changes, & HMI-1 with iron. Noguere has updated unres. res. 2.25-25 keV & Profil data.
- ◆ IAEA working to make <sup>235</sup>U thermal PFNS a standard; work will be needed to see if this can be accommodated with other tweaks.
- ◆ A file for testing was made (fused with JENDL). We need to make merged file with ENDF, and with Romain's new high energy file.



◆ Need to see performance for sodium-void Japanese expts

## $^{235}\text{U}$ fast analysis from CEA/BIII - WPEC May 2014 report

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- ◆ Collaboration meeting held on inelastic scattering at BIII (with Kawano, Capote) for all actinides, including Pu. Part of the difference was traced to JEFF having a higher total cross section for  $^{239}\text{Pu}$ . More work is needed still, though, since this does not explain the inelastic differences (a Morillon Pu chi was tried too - somewhat maslovian -).
- ◆  $^{235}\text{U}$  inelastic is smaller than for ENDF, JENDL.
- ◆ Capture is being worked on
- ◆ Draft file will be available at the end of the summer.

239 **Pu resonance analysis from Cadarache, Oak Ridge, Cadatache - WPEC May 2014 report**

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- ◆ SG34: new resolved resonances to 2.5 keV & covariances; a better n,gf understanding was achieved, with implications on unbar fluctuations; PFNS was studied too
- ◆ Thermal values: cap 270.1, fiss 747.2, and nu-prompt=2.868. The SG 34=3.1.1 has a nubar slightly lower than ENDF, which was already one s.d. below the standard (& thus now 3.4 s.d below standards).
- ◆ New measurements are proposed - transmission for first 0.3 eV resonance; capture ... (new IRRM fission, & Los Alamos capture data). There may be a need to extend the unresolved range to higher energies owing to the fluctuating cross sections.
- ◆ PFNS: Using Kornilov/Maslov decreases the mean energy, and increases the crits by 800/400 pcm.
- ◆ Lubitz is considering whether some adjustments can be made; Noguere notes this was done already by them!

## $^{239}\text{Pu}$ : Fast region, & testing. WPEC May 2014 report

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- ◆ Kawano has been focusing on Pu inelastic scattering, in collaboration with CEA, IAEA. We also have new  $^{239}\text{Pu}$  capture data from LosAlamos. A trial file will be made later this year.
- ◆ CIELO starter file built that combines ENDF/B-VII.1 with SG34.
- ◆ Kahler testing CIELO-version0 (=TK1a) as expected reproduces SG34 for thermal systems: improved performance for solution criticals.
- ◆ Trial PFNS from Talou added for testing (version1=TK1). Thermals show a 100-400 pcm increase, reflecting something that is known, i.e. a softer thermal PFNS increases calculated criticality
- ◆ To investigate the potential sensitivity of threshold dosimetry calculations to scattering cross sections, we will calculate results for JEFF3.1 (which has v. different inelastic cf. ENDF)