International Atomic Energy Agency

Neutron cross-section evaluations IAEA-NDS

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IAEA-NDS

CSEWG meeting, NNDC, Nov. 2007

Neutron cross-sections IAEA-NDS

1.02: Nuclear Data Standards and Evaluation Methods

CRP on Improvement of Cross-Section Standards (completed)

Outputs:

- **cross-section files in ENDF-6 format, November 2005 - covariance data added in 2006**
- **technical document at final proofs stage**

Database available online

http://www-nds.iaea.org/standards/

Maintenance and updating work:

- **V. Pronyaev IAEA NDS 1-25 Oct 2007 DEC Alpha to PC**

  updated GMA database, EMPIRE capture σ for ^{197}Au and ^{238}U

1.02: Nuclear Data Standards and Evaluation Methods

CRP RIPL-3 near completion

Achievements:

- new OMPs for n,p induced reactions on deformed nuclei
- discrete level database updated using the latest ENSDF release
- phenomenological LD parameterizations have been refitted
- assessment of the uncertainties of OMP and LD parameters
- Sub-group has actively worked on the fission parameters – new HFB level densities and HFB fission barriers derived

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Evaluation of tungsten isotopes in the fast neutron range including cross-section covariance estimation

R. Capote, A. Trkov, I. Kodeli, L.C. Leal, E. Soukhovitskii, D.W. Muir

Motivation

- **Criticality safety - discrepancies in ICSBEP benchmarks containing tungsten.**
- **Reactor Dosimetry material 186W(n,γ)**
  – discrepancies between differential and integral data.
- **First wall material in fusion reactor**
  – accurate data needed
- **Accelerator target material.**

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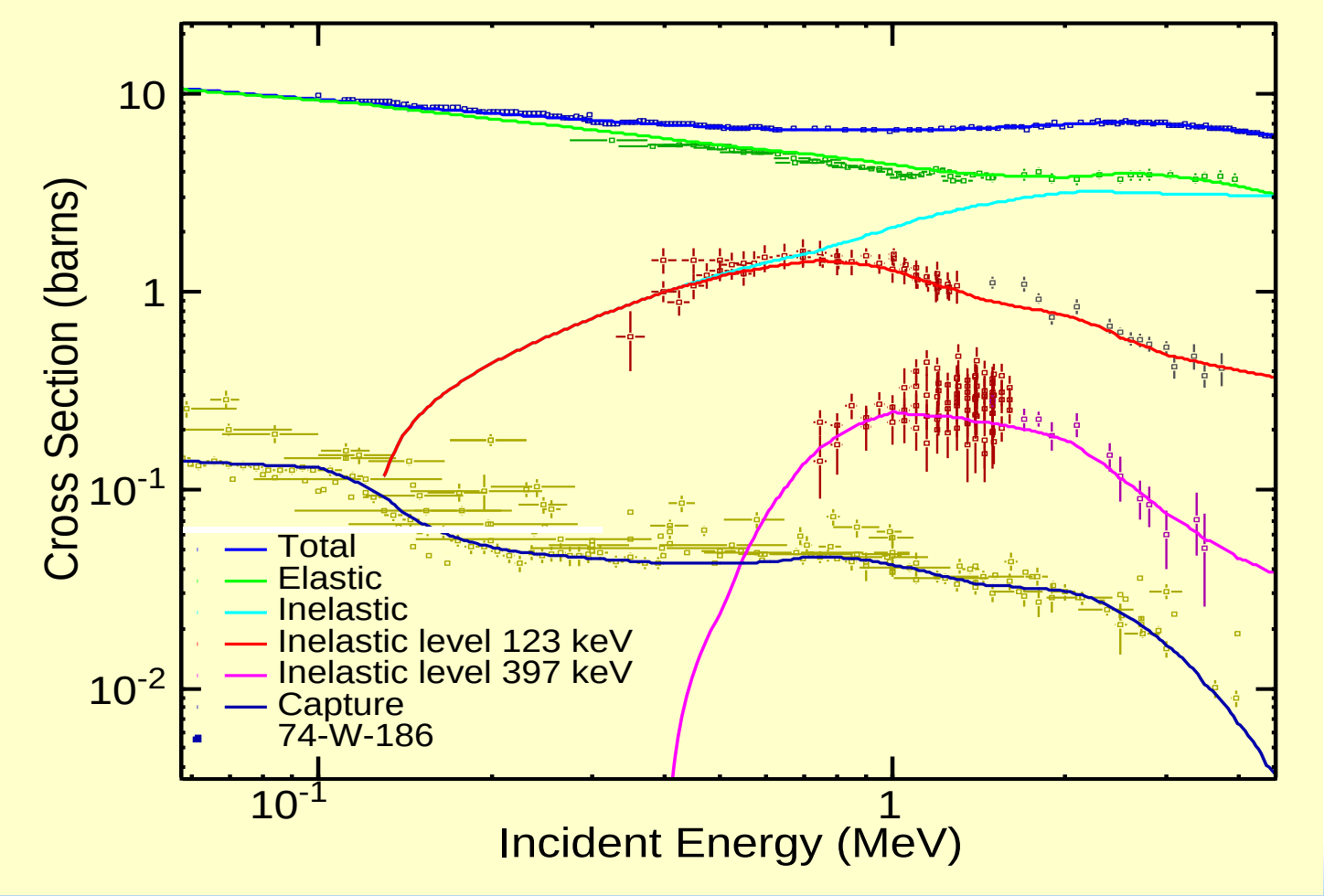
Resonance analysis – see L. Leal presentation

Fast neutron range – A new evaluation undertaken



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1.07: Nuclear Data for Advanced Nuclear Facilities

Minor Actinide Nuclear Reaction Data (MANREAD)

Agreed list of Minor Actinides (MAs)

Uranium	**^{234,236}U**
Neptunium	**^{237}Np**
Plutonium	**^{238,240,241,242}Pu**
Americium	**^{241,242m,243}Am**
Curium	**^{243,244,245,246,247,248}Cm**

- assess accuracy of neutron reaction cross-sections for MA
- report measurements of neutron-induced reaction cross section on MA completed or planned in the period of activity of the CRP, at research laboratories worldwide (e.g. GELINA, LANCSE, n_TOF, TIT, etc.)
- assess quality and uncertainties of MA data in evaluated nuclear data libraries (ENDF/B-VII, JEFF3.1, BROND-2.2, JENDL-3.3, etc.)

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Nuclear Data Libraries for Advanced Systems: Fusion Devices (FENDL library)

FENDL-2.1 (released in 2003) contains 71 materials for $E_n \leq 20$ MeV. It is based on data from other major libraries

FENDL-2.1 has been validated by several benchmark experiments (ITER Project Management and Quality Program: Quality Assurance in Neutronic Analyses)

The International Fusion Materials Irradiation Facility (IFMIF) will involve accelerating high currents (up to 250 mA) of deuterons to 40 MeV and impinging them on a liquid lithium target to produce neutrons

- Nuclear Data for incident d- and p- are missing in FENDL-2.1
- Energy range is not adequate for IFMIF
- Uncertainties needed for design studies

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Nuclear Data Libraries for Advanced Systems: Fusion Devices (FENDL library)

A Technical Meeting was held at IAEA on November 2007
in which the following recommendations have been put forward:

Extend FENDL library to

1. cover high energy necessary for IFMIF (in fact, up to 150 MeV)
2. include p-, and d- as well as n-induced reaction libraries
3. include uncertainties (covariances)
4. Production of activation libraries using existing evaluated data (e.g. EAF-2007)

Item 1. should be performed maintaining all the validated FENDL-2.1 features

A CRP with these three main objectives is planned to start in 2008 and run for 3-4 years.

The FENDL-3.0 library will be released as outcome of the CRP