

Fission Product Evaluations

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Summary of Fission Product Evaluations ($Z = 31 - 68$)

ENDF/B-VI.8: 201 materials (197 isotopic, 4 elemental)

All materials in VI.8 were replaced!

ENDF/B-VII beta1: 219 materials (all isotopic)

FP evaluations are based on 4 activities

Cross Section Evaluation
Working Group



1. Review of all FP evaluations in 2001-2004 by SG21

VOLUME 21

ASSESSMENT OF NEUTRON CROSS-SECTION EVALUATIONS FOR THE BULK OF FISSION PRODUCTS

*A report by the Working Party
on International Evaluation Co-operation
of the NEA Nuclear Science Committee*

CO-ORDINATOR/MONITOR

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NUCLEAR ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

2. Evaluations for Atlas of Neutron Resonances, 2001-2005

Atlas of Neutron Resonances

Resonance Parameters and
Thermal Cross Sections

S.F. Mughabghab

Elsevier 2006

FP evaluations are based on 4 activities

3. EMPIRE improved & tested extensively in 2001-2004



Empire is powerful tool for cross-section evaluation, talk by Mike Herman.

4. Evaluations using EMPIRE in 2004-2005

- BNL
- BNL-KAERI
- BNL-JAERI
- LLNL (74,75-As)

Example of recent BNL evaluation: Gd isotopes, talk by Dimitri Rochman.

WPEC Subgroup 23: Create library and partly validate (2004–2006)

Complete library was created in 2004-2005 in 3 steps:

1. Initial library with 164 materials was created

- Dunford (NNDC) converted full files (mostly JENDL-3.3)
- Dunford merged mf2 (mostly Atlas) and fast region (mostly JENDL-3.3)
- Pronayev (Obninsk) reviewed 156 files, mostly mf2 and corrected 43 files
- Nakagawa (JAERI) reviewed remaining 8 files and corrected 5 files

SG23: Create library, validate (2004–2006)

2. New evaluations for 61 materials with EMPIRE

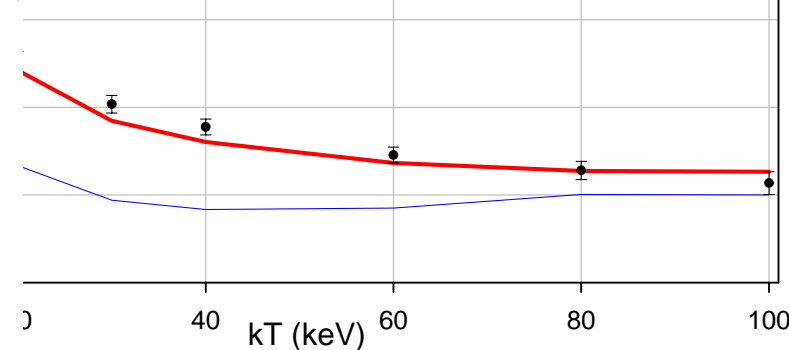
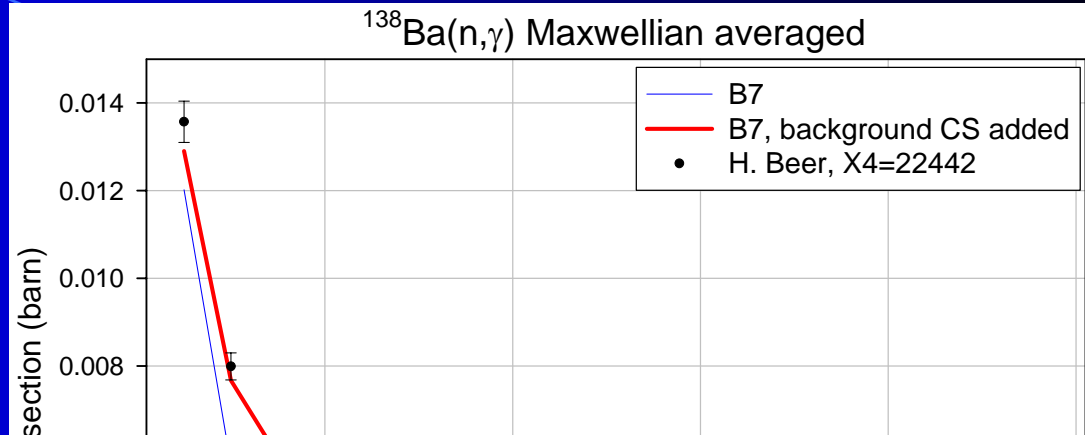
- Iwamoto (JAERI) evaluated 5 isotopes of Ge, focus on photon production
- Kim (KAERI) re-evaluated 20 priority isotopes, focus on total, (n,n'), photon production
- Rochman (NNDC) re-evaluated 8 isotopes of Gd, also Tc-99 and Eu-153
- Sarer (Turkey) evaluated 24 low priority materials
- Mughabghab (NNDC) reviewed mf2 (thermal, RRR, URR) for all files listed above
- Brown (LLNL) evaluated 2 isotopes of As

3. Complete library with 219 materials

- Herman (NNDC) put together, for 6 overlaps new evaluations were adopted
- Zajac (Bratislava) performed phase1 testing, NJOY-MCNP

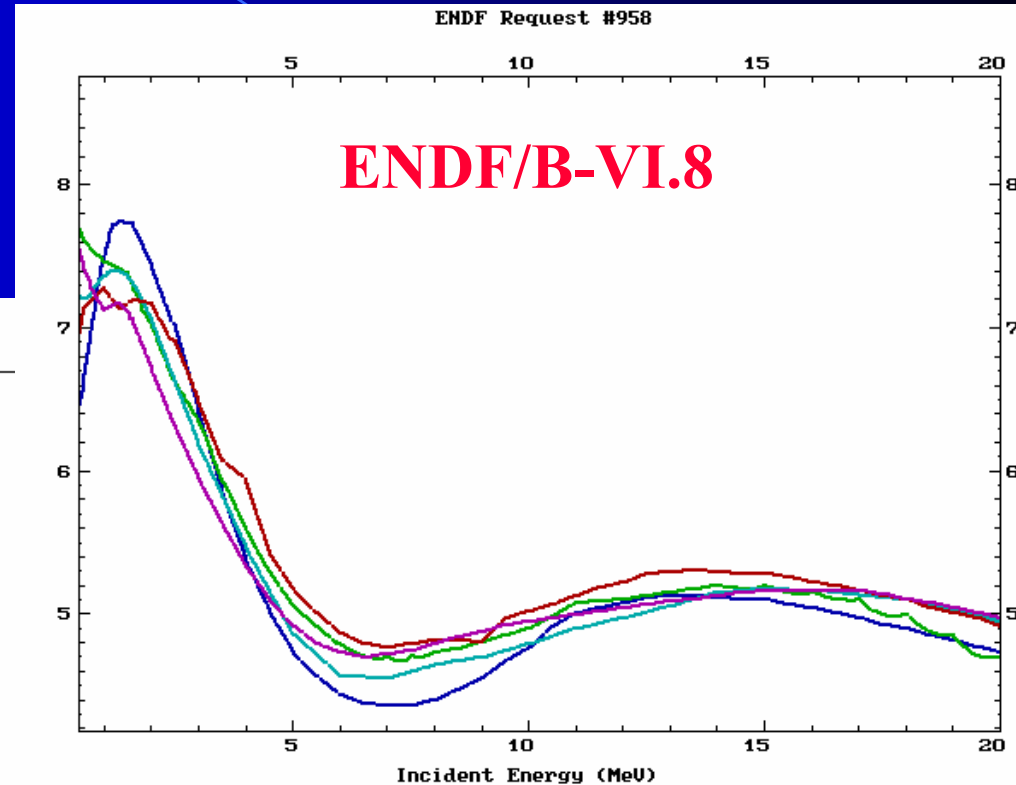
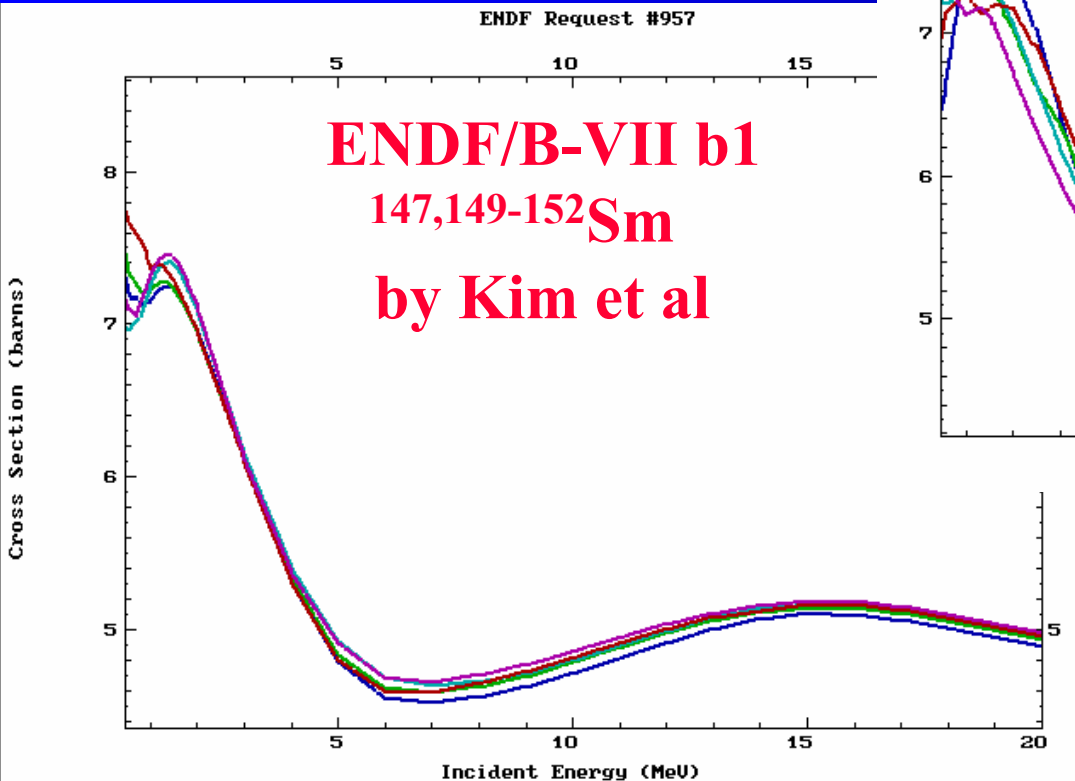
FP library testing

Corrections in 43 files by Pronayev, mostly in mf2.
Example: $^{138}\text{Ba}(n,\gamma)$



FP library testing: Consistency check

Compare isotopes with
given Z: Example, total
cross sections for 5
isotopes of Sm

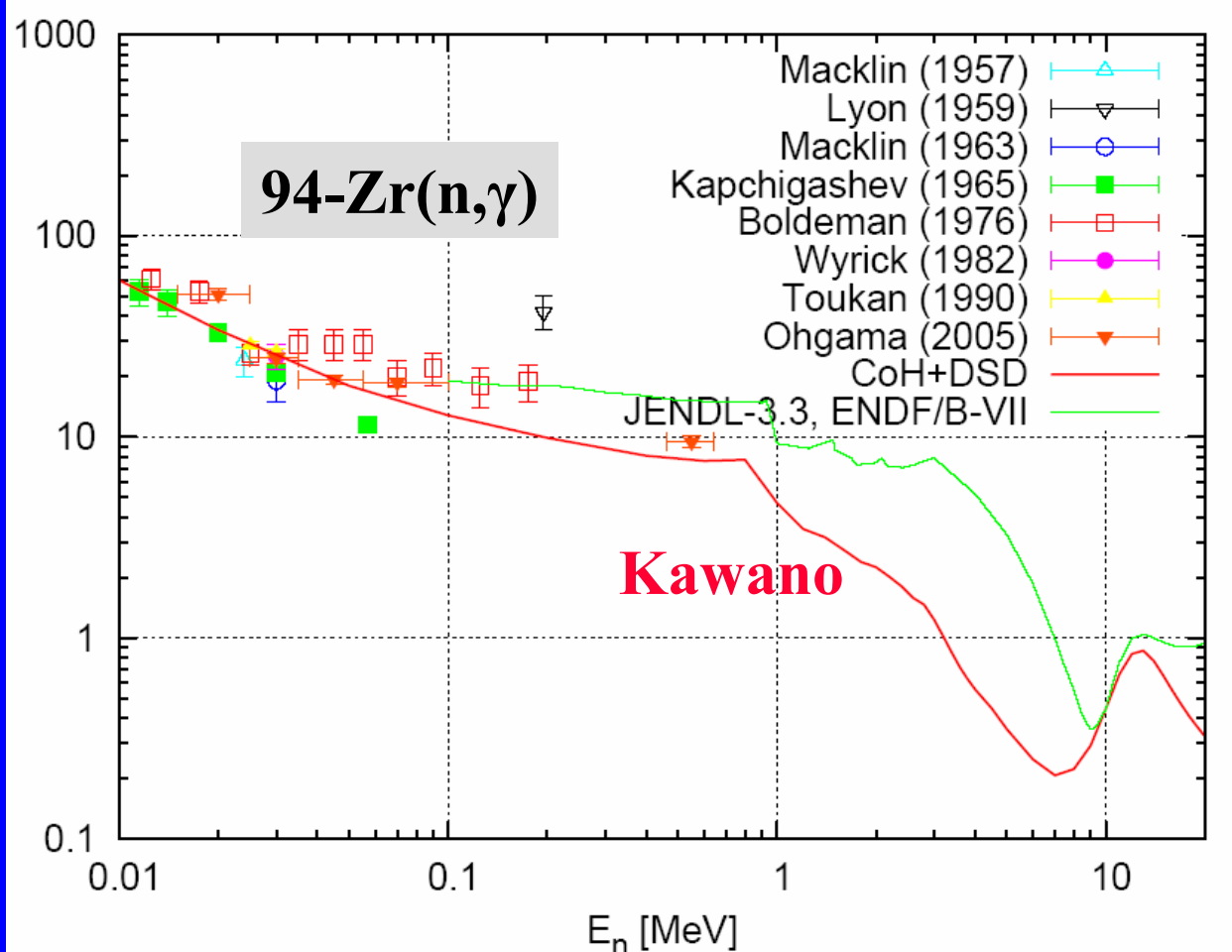


FP library testing: $^{90-96}\text{Zr}$

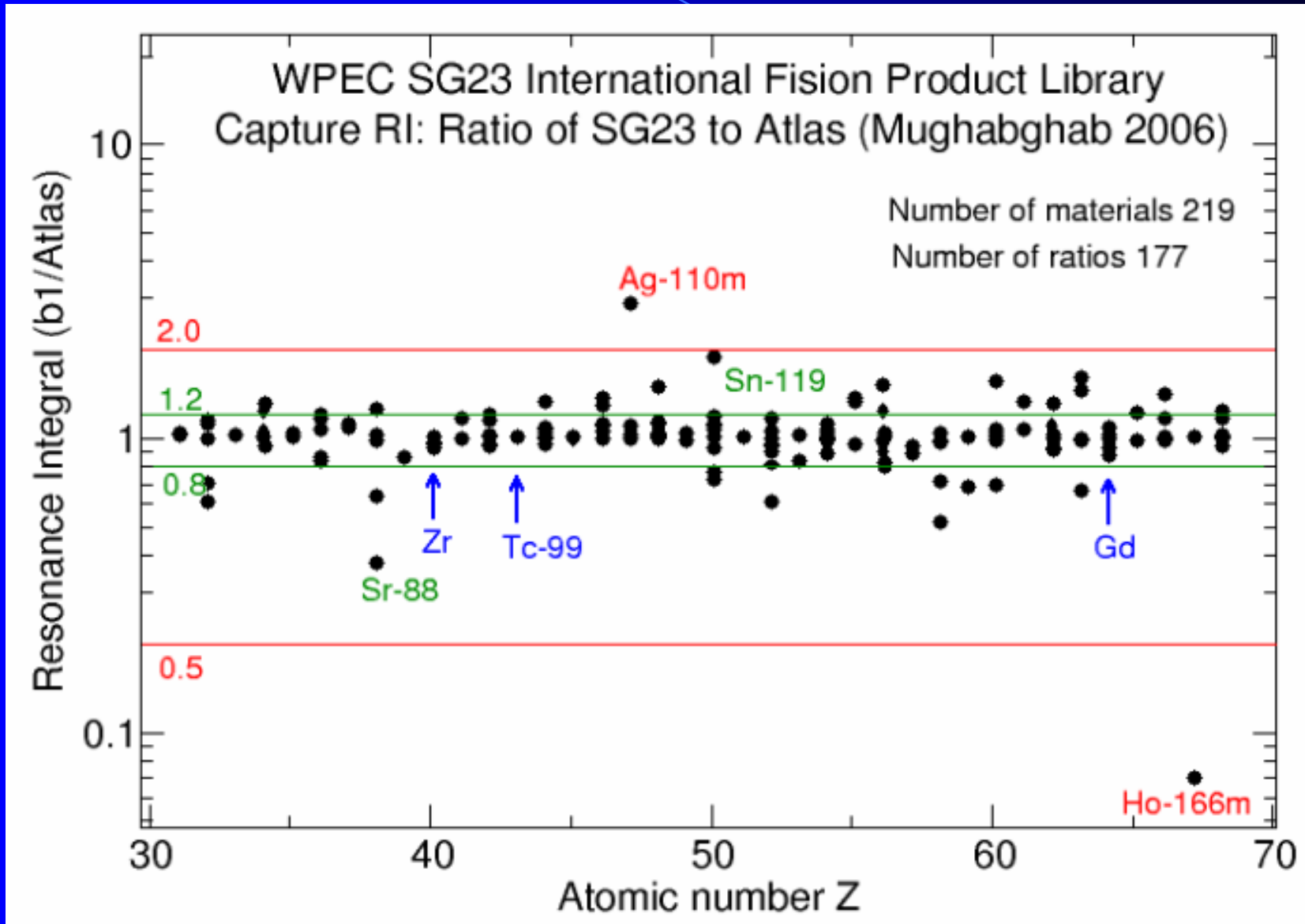
**Kawano: ENDF/B-VII
capture is too high**

**Lubitz: Capture RI
is too high. $^{91}\text{-Zr}$
should be adjusted.**

**Mughabhab: Needs
stronger evidence
from integral
benchmarking in
order to overwrite
microscopic data.**



FP library testing



FP library testing

SG23 testing

- **Trkov, IAEA: Comparison of capture with integral constants used for k_0 neutron prompt activation analysis**
- **Dunn, ORNL: Look into Rh-103 and few more**
- **Herman, NNDC: Compare thermal capture with Atlas**
- **Others?**

Feedback from Petten and Cadarache

- **Energy mismatch in mf2 for several materials (relict of merging 2 different evaluations)**
- **MT451 shows huge number of lines for 11 materials (STANEF needs bigger dimensions)**