LANL Report

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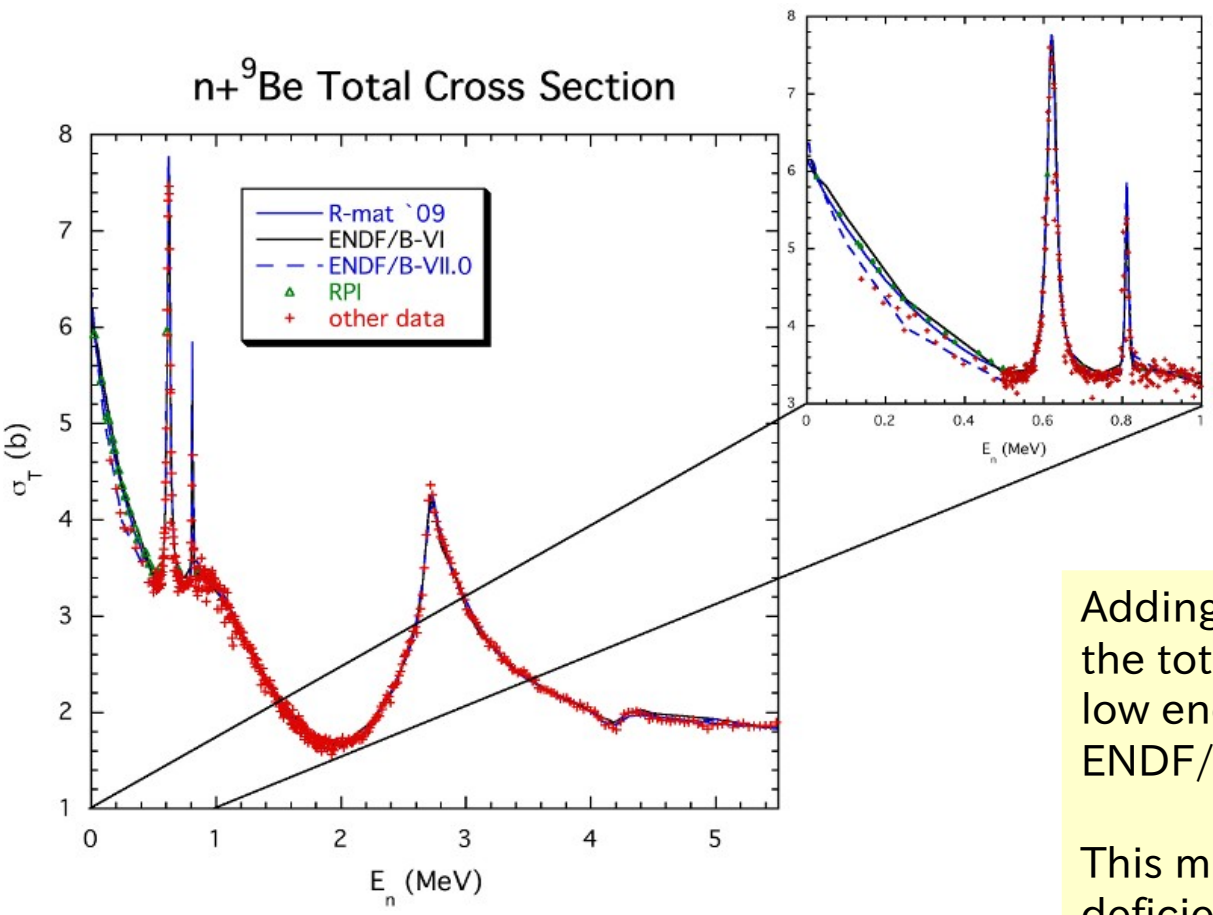
Light Element R-Matrix Analysis

- ^{3}H
  - fix (n,2n) cross section completed (to be sent to BNL)
- ^{6}Li
  - new evaluation completed
  - what about (n,n'αd) break-up format ?
    - can be processed by NJOY
    - pseudo-level format is awkward
- ^{9}Be
  - analysis performed by adding new RPI data
  - benchmark testing underway
- ^{16}O
  - several new evaluations made - to be decided
  - total cross section change small, near the first resonance
  - some new measurements of (n,α) and (α,n) higher than ENDF/B-VII.0

Be-9 Total Cross Section



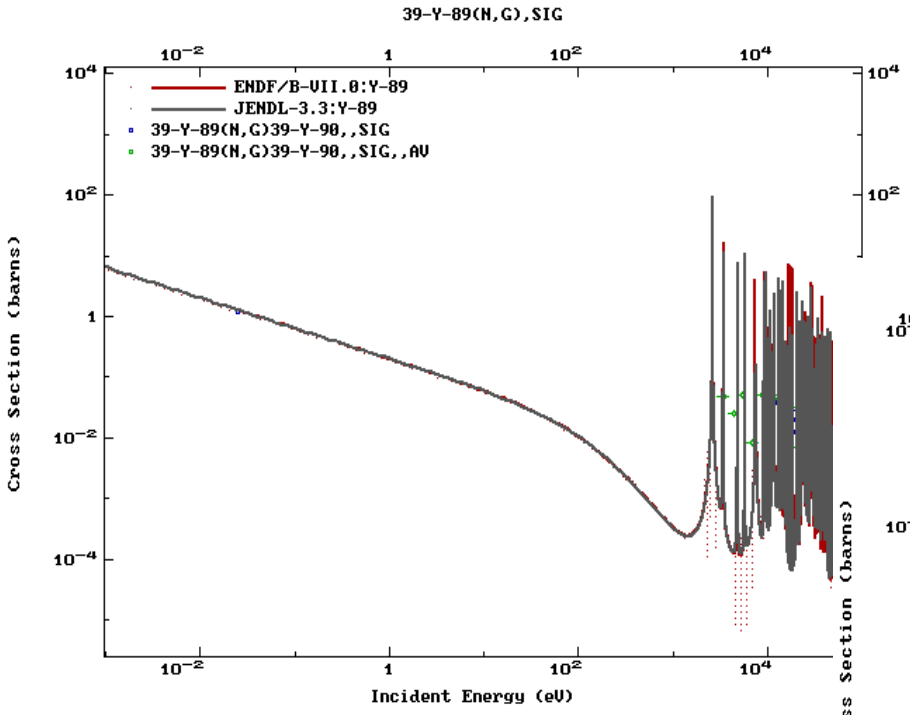
Adding the RPI data moves the total cross section at low energies back up to the ENDF/B-VI values.

This may produce the same deficiencies ENDF/B-VI had.

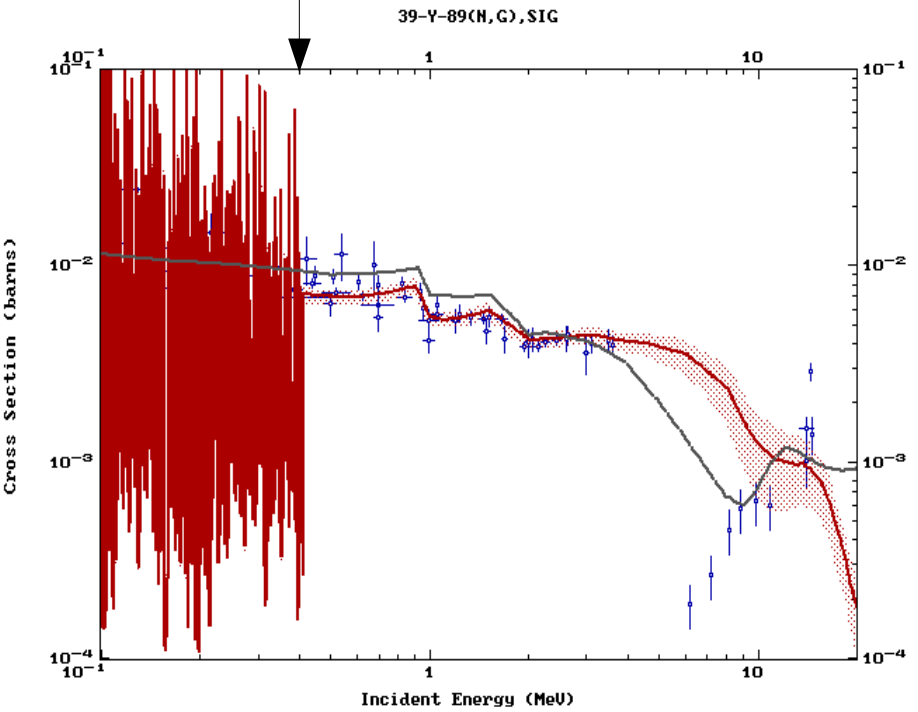
Elements in Medium Mass Range

- Ti isotopes
  - issues remain
    - new resonance parameter covariances from ORNL
    - γ-production for some isotopes (^{47}Ti fixed by LLNL)
- V
  - postponed
- ^{58}Ni(n,α),^{56}Fe(n,α)
  - work in progress (Holloway, Kawano), not yet completed
- ^{63,65}Cu
  - Mosteller tested new CENDL-3 data
    - benchmark testing not so satisfactory (See Kahler's talk)
    - new evaluations by Shibata being tested
- ^{89}Y
  - capture data problem - too low at low energies ?

Y-89 Capture Cross Section in Resonance Range

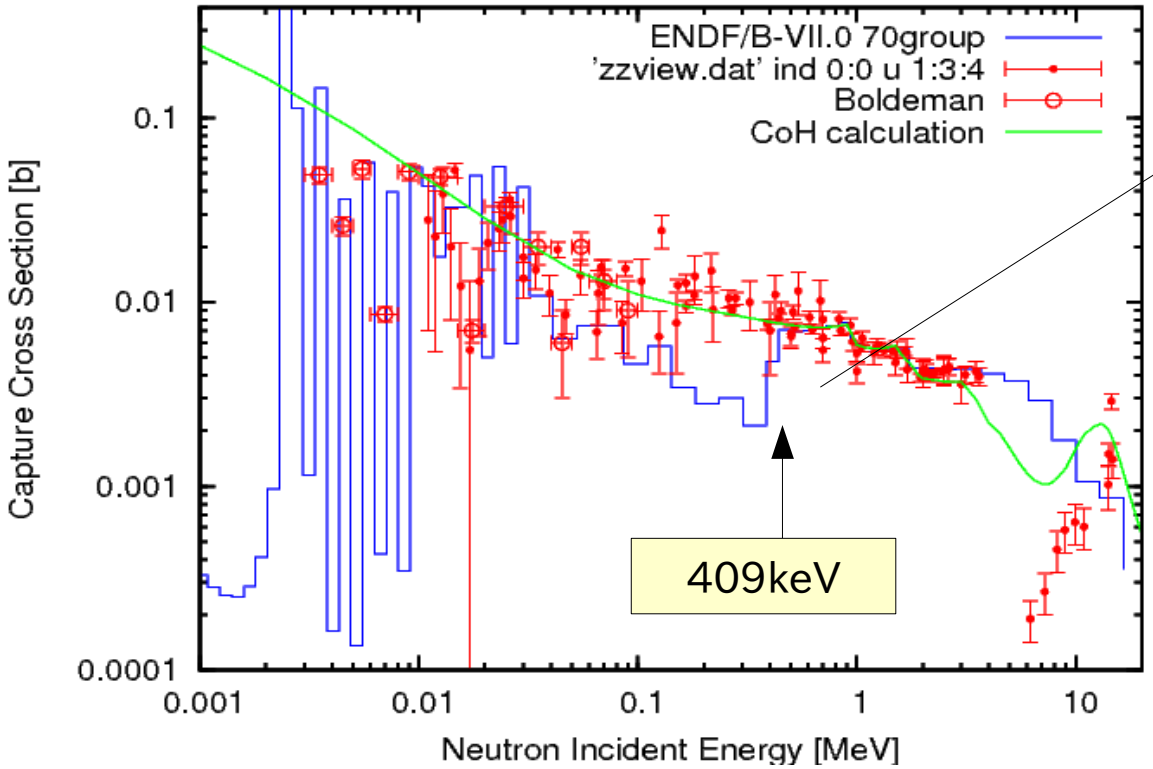


Resolved Resonance
Upper Limit 409keV



Ignatyuk's comment:
capture cross section
at low energies too low

Y-89 Capture 70 Group Cross Section

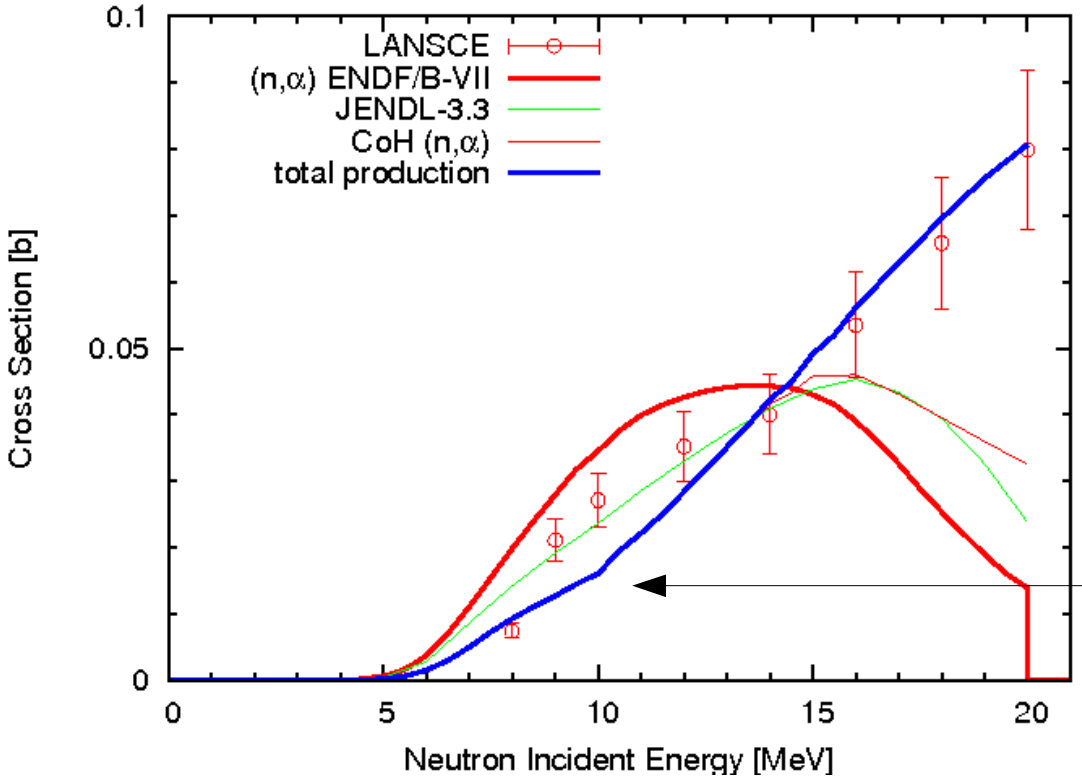


d- f-wave contributions are missing ?

Gamma width
ENDF 134meV
RIPL-3 130meV
D0
ENDF 4.4keV (approx)
RIPL-3 3.7keV

Change the upper limit to 30keV or so, or
Increase the radiative width to match the Hauser-Feshbach calculation

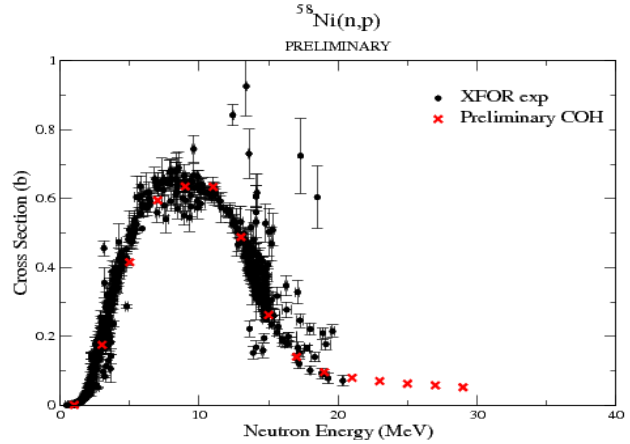
Fe-56 Alpha-Particle Production Cross Section

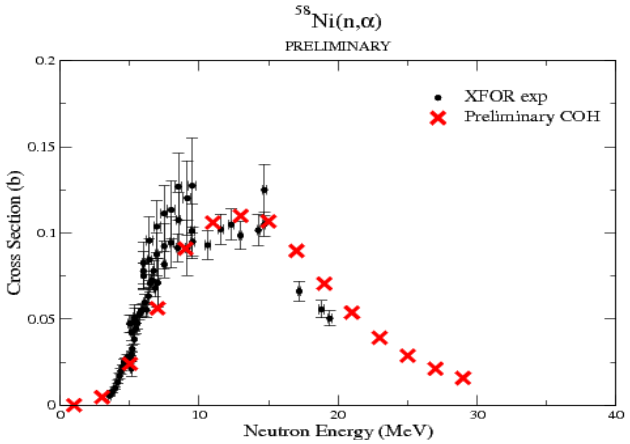


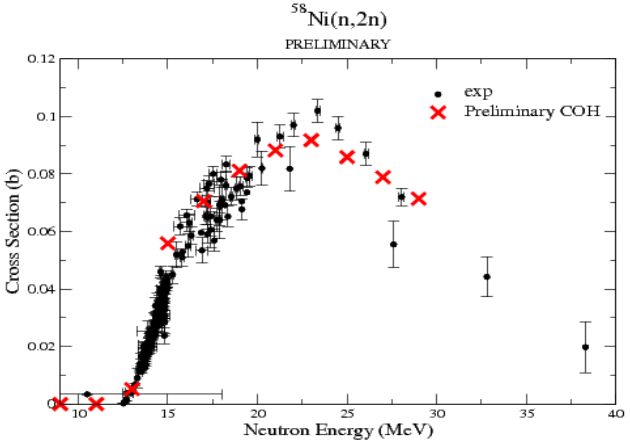
New Hauser-Feshbach calculations made

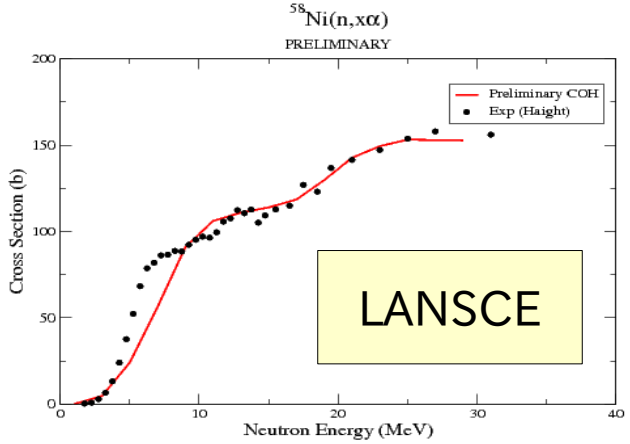
Still need to improve the calculation to reproduce LANSCE data, as well as other channels

Ni-58 Alpha-Production Cross Section







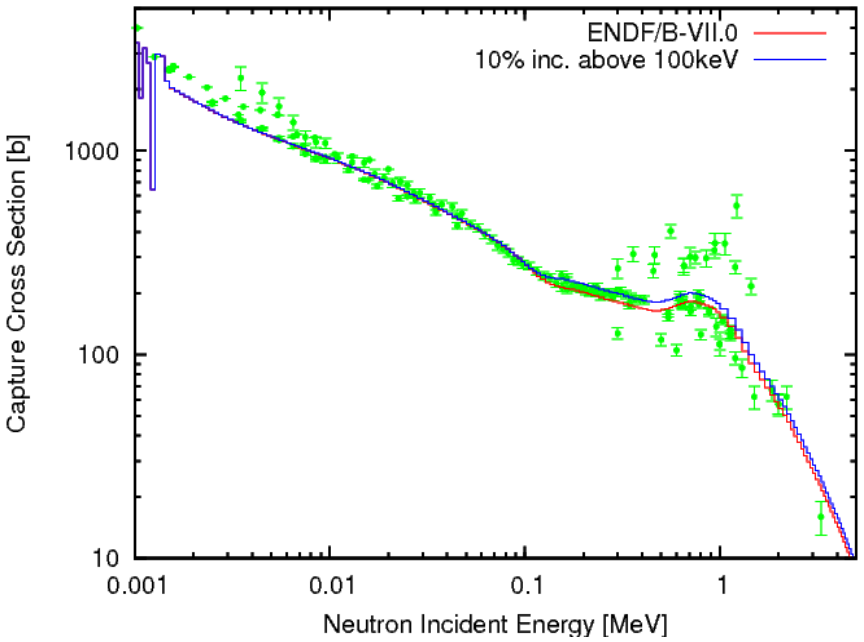


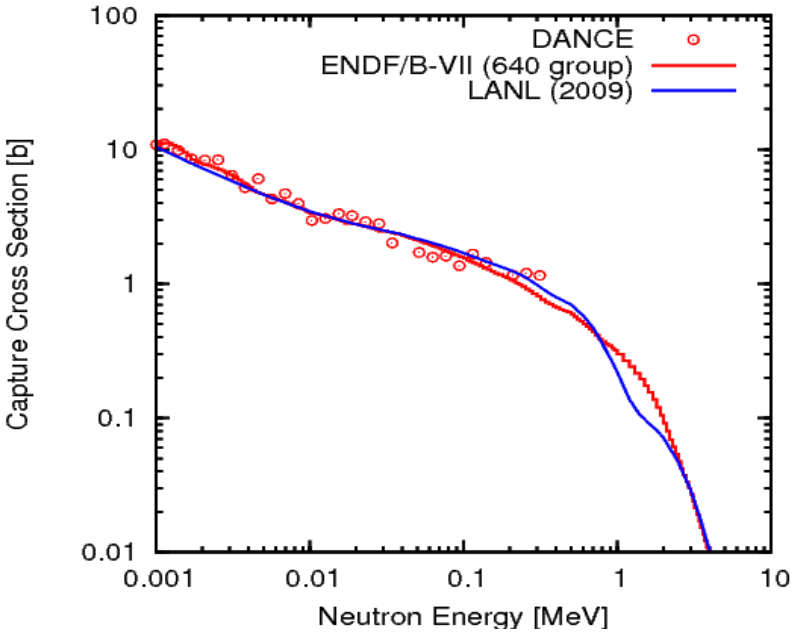
Preliminary

Actinides

- ^{233}U
  - delayed neutron typo, E-02 -> E-03, confirmed
- ^{236}U ^{241}Am
  - small adjustment of fission cross sections in the sub-threshold region
  - capture calculated for better production of integral data
- ^{240}Pu
  - adopt LANL new evaluation
    - comparison of resonance region reported by R. Cullen
    - P. Young and O. Bouland will review this again
- ^{237}U
  - adopt LLNL new evaluation
- ^{237}Np
  - (n,2n) new evaluation by Holloway underway, taking account of isomeric state production cross section
- ^{236}Np ^{238}Np
  - evaluations in JENDL/AC reviewed (Holloway, Chadwick), adopt ?
- ^{243}Am
  - likely no change
- ^{238}Pu
  - plan

U-236 and Am-241 Capture Cross Section

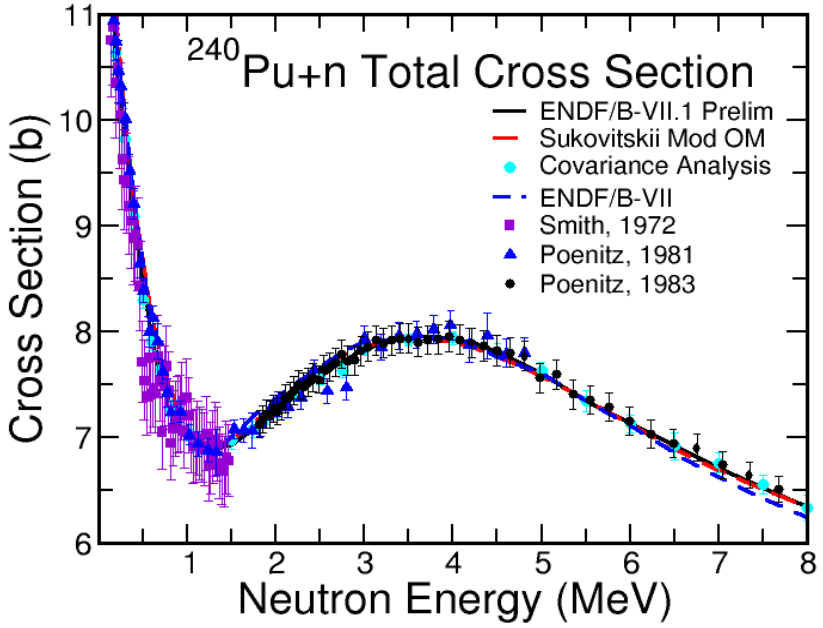




M. Jandel et al.
Phys. Rev. C, 78 034609 (2008)

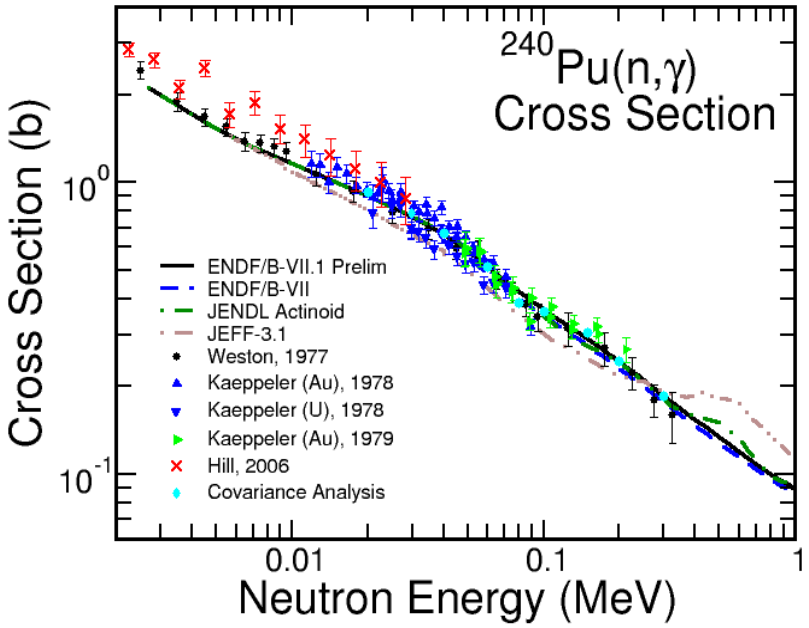
Increase capture cross sections slightly for better reproduction of critical assembly data (See Kahler's talk)

Pu-240 LANL Evaluation - Total and Capture



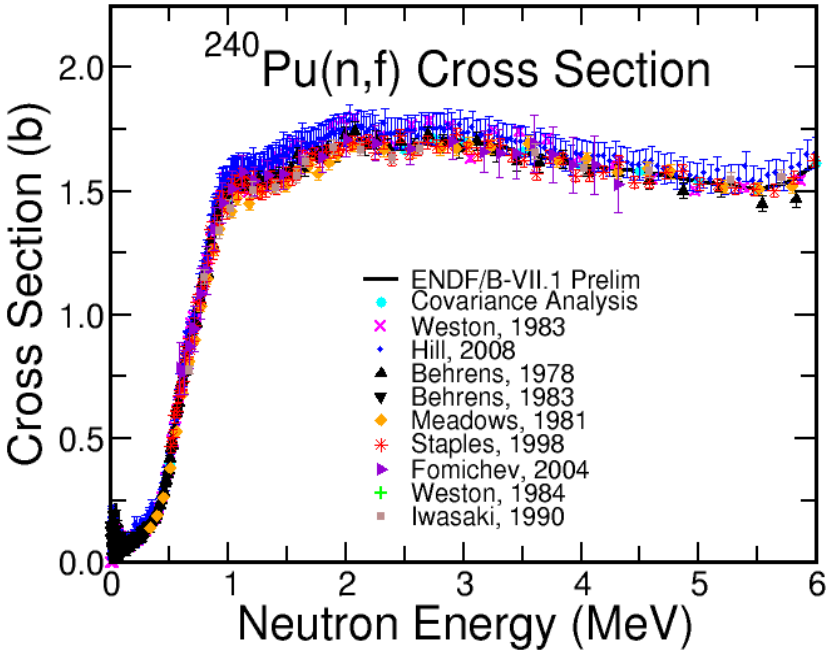
Total Cross Section
modified Sukovitskii optical poten

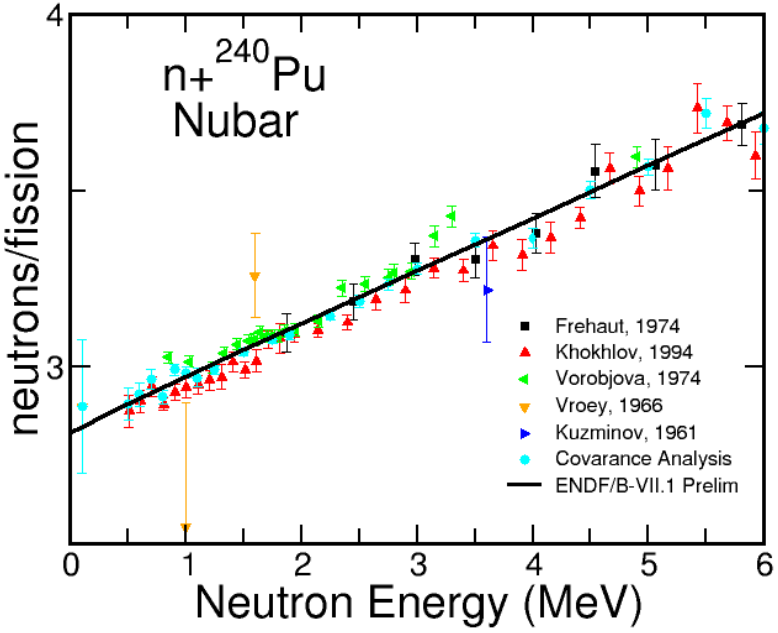
Fission Cross Section
GLUCS analysis
and JENDL/AC (up to 30keV)



Pu-240 LANL Evaluation, Fission

Fission Cross Section
GLUCS analysis
and JENDL/AC (upto 550keV)





Covariance data are also provided

Pu-240 Resonance Region

Thermal Cross Section

	Mughabghab (06)	Bouland (97)	7.0 (Weston 86)	7.1 (JENDL/AC)
Capture	289.5	289.5	288.6	289.3
Elastic	1.73	2.7	0.96	2.7
Fission	0.056	0.059	0.064	0.036
Upper Limit		5.7keV	5.7keV	2.7keV

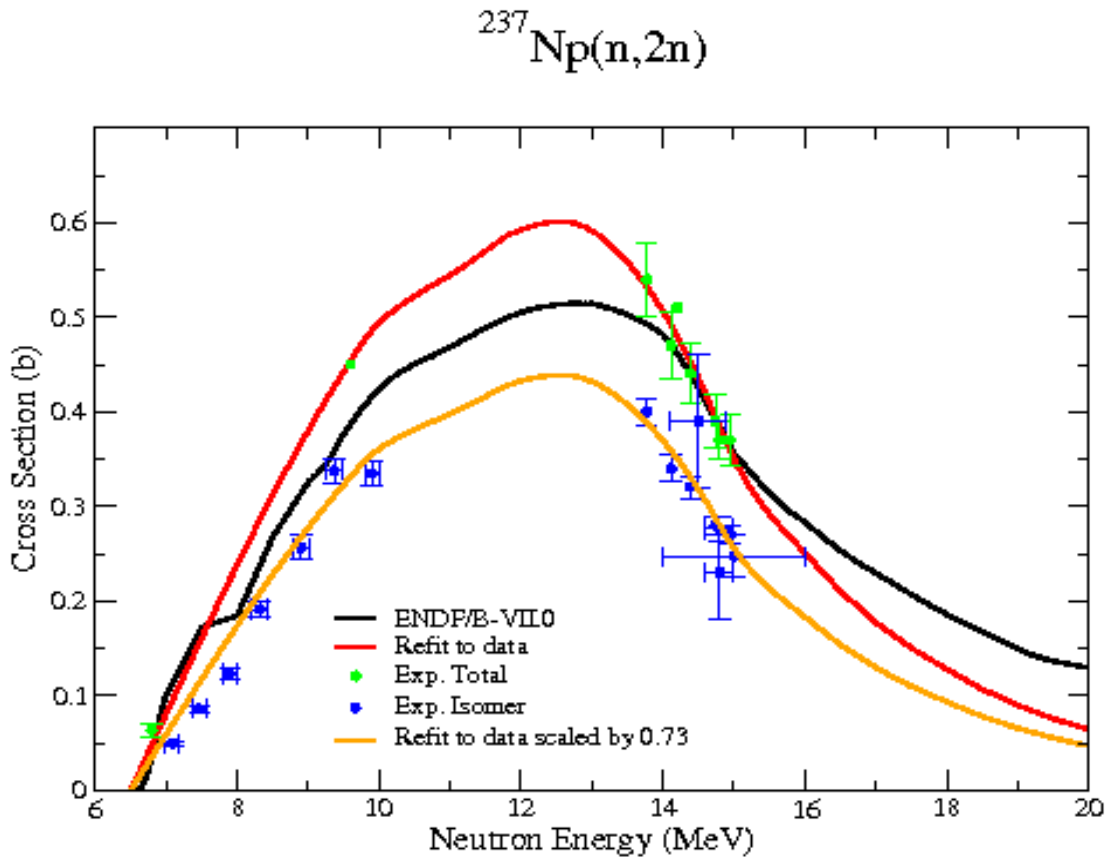
Bouland parameter with some modifications energy range, capture background, thermal fission

R = 8.88fm

R = 9.42fm

Readjusted Bouland's parameter to Eastwood data (58).

Np-237



(n,2n) upgraded based on total and isomer production data

Other Problems Reported

- **Interpolation problem in Prompt Fission Spectra**
  - transport simulation needs finer energy grid for outgoing neutron
  - MacFarlane generated log-interpolated table
  - will be stored in the evaluations soon
- **Missing Photon Production data**
  - many gamma-ray lines data were dropped
  - ^{1}H, ^{27}Al, Ca, S, K, Ti (talk by White 2008)
  - no action made