# Status of 241-Am Evaluation

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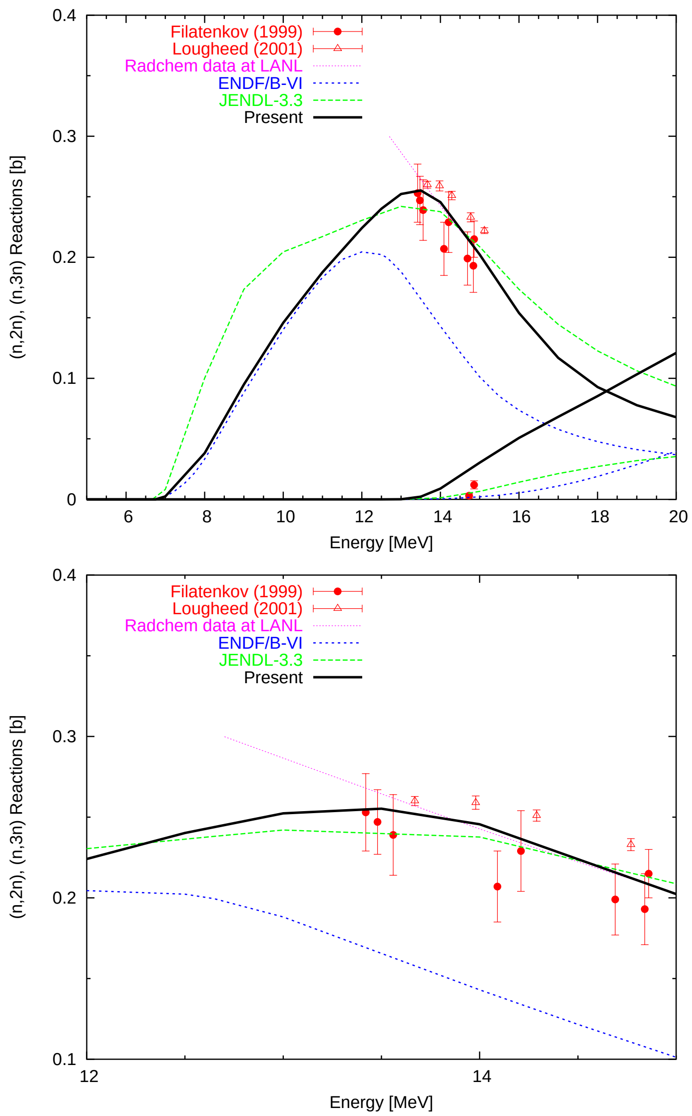
# (n,2n) Reaction Cross Section - Am-241

## Based on measurements at LANL and LLNL

- R.W. Lougheed, et al. (2001)
- Rad-Chem data at LANL (energy dependence near 14 MeV)
- A.A. Filatenkov, et al. (1999)

## GNASH calculations

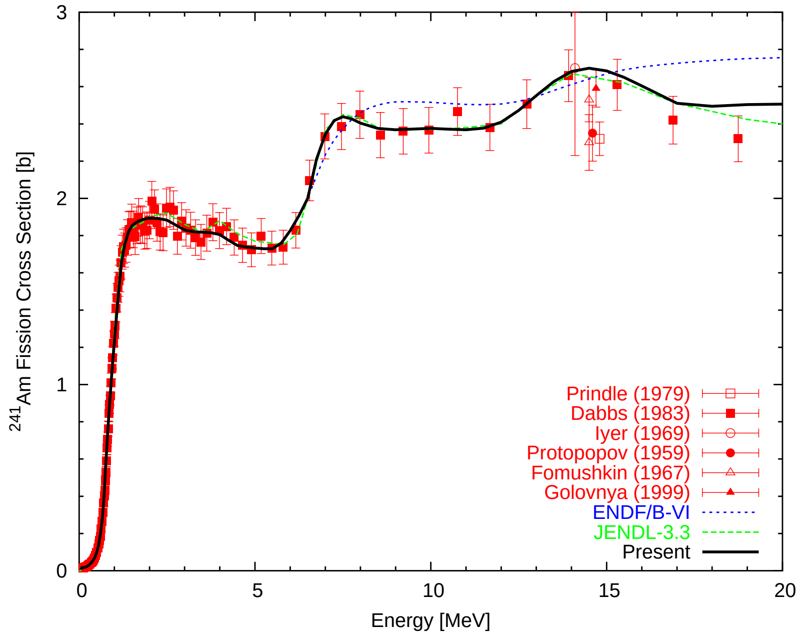
- Fission barriers were determined by adjusting to the experimental $(n,2n)$ and fission cross sections.
- The KALMAN code was used for the adjustment.
- Further theory work is needed to better predict the cross section below 12 MeV where no measurements exist.

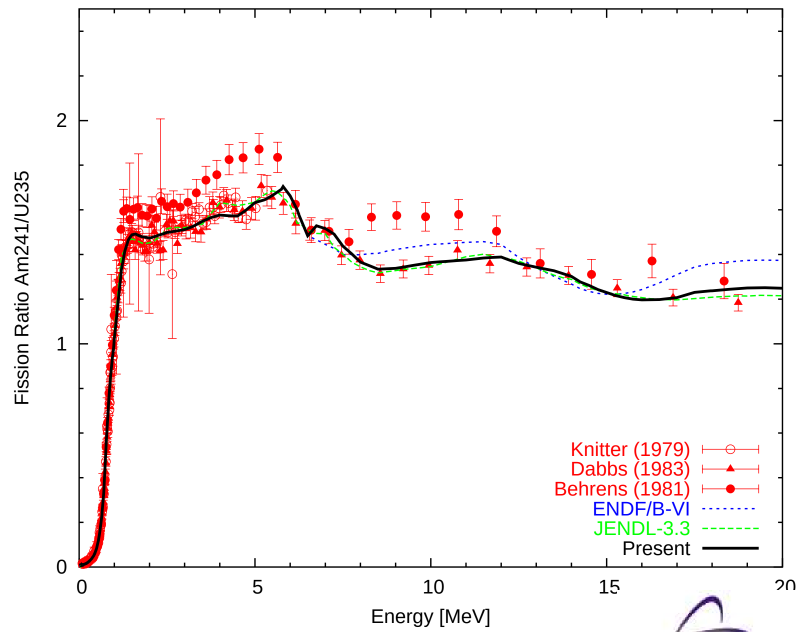


# Fission Cross Section - Am-241

## Statistical Analysis of Measurements

- The experimental data included were absolute measurements of $^{241}$Am$(n,f)$ and $^{241}$Am$(n,f)$ / $^{235}$U$(n,f)$ ratio data
- New evaluation for $^{235}$U done by LANL, T16, was used as a standard.
- The LESQ fitting was made with a generalized least-squares fitting code
  - The fission cross section data are often high quality, and this procedure allows us to try to resolve discrepancies in measured values to determine the best value.
  - Based on the Bayesian statistics.

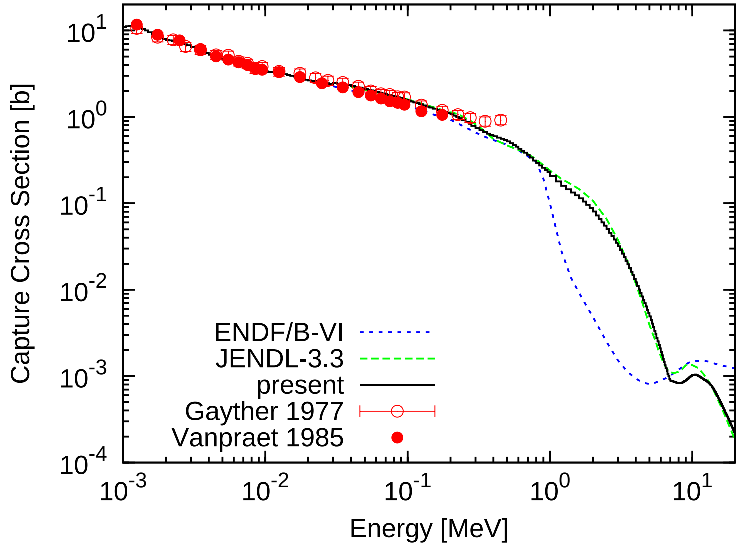


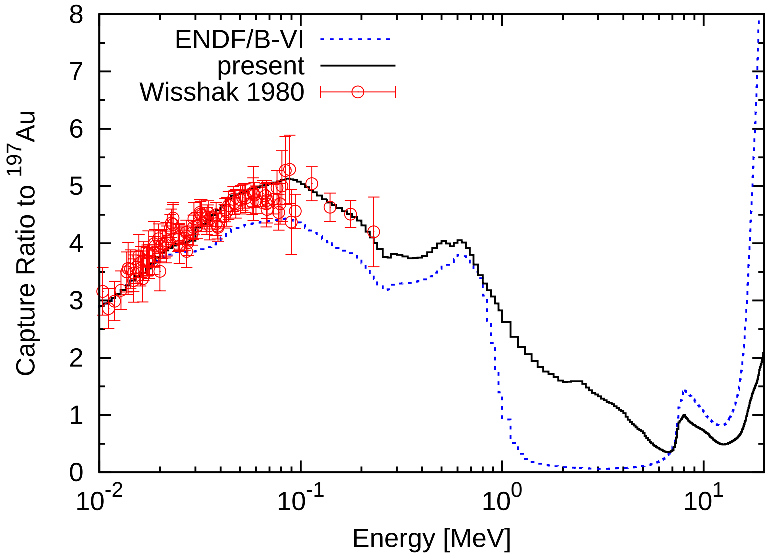



# Capture Cross Section - Am-241

## Statistical HF calculation

- ENDF/B-VI data were evaluated so as to reproduce Vanpraet data.
- However, the evaluated capture data are inconsistent with $^{241}$Am / $^{197}$Au ratio measurement by Wisshak and Käppelar.
- New data were evaluated to reproduce both Gayther *et al.* and Wisshak and Käppelar, simultaneously.
- The direct/semidirect capture process was included at higher energies.
- The new evaluation is about 15% higher than ENDF/B-VI.

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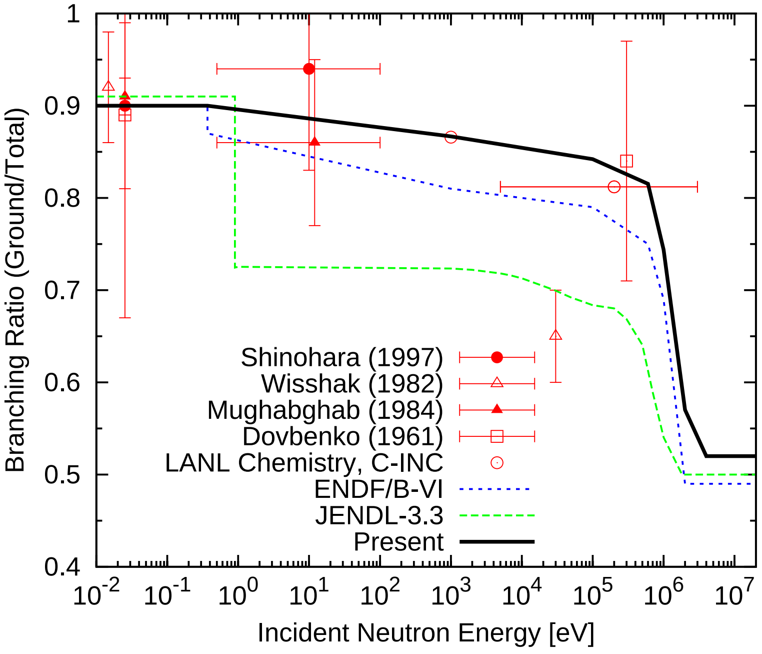
# $^{241}$Am Capture (Isomeric Ratio)

## Experimental database

- Thermal and epi-thermal regions
  - Shinohara, et al. (1997)
  - Wisshak, et al. (1982)
  - Mughabghab et al. (1984)
- High energy region
  - LANL data — $^{242m}$Am/$^{242g}$Am production ratio
  - Averaged over Maxwell spectrum at $kT$ =1 keV (C-INC)
  - Averaged over prompt fission neutron spectrum (C-INC)




The IR values were calculated with GNASH, and renormalized to the experimental data above. The higher IR is also consistent with the fast spectrum averaged value of Dovbenko (1961), and recent Post-Irradiation analyses at JNC (Ohki, et al.)

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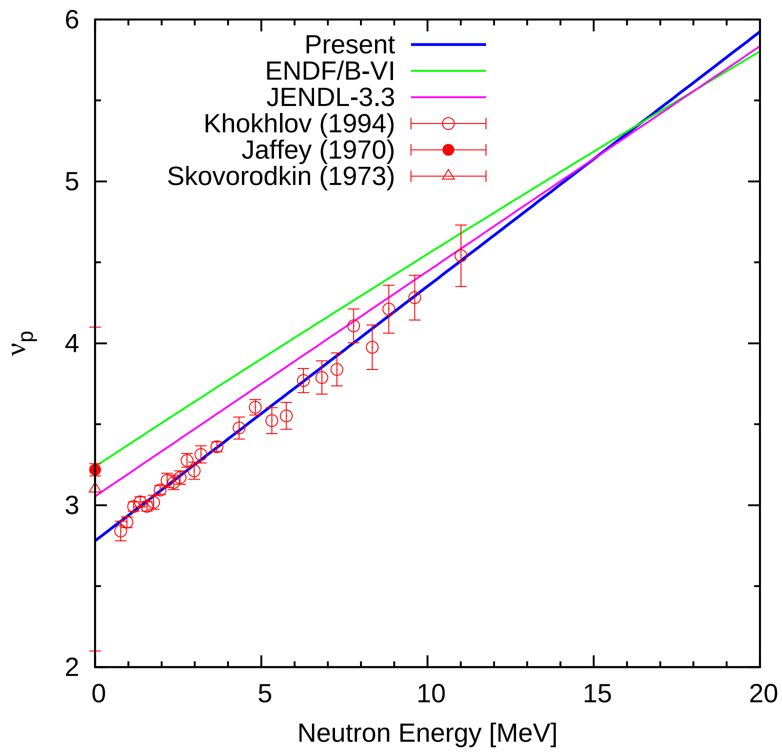
# Number of Prompt Neutrons Per Fission

## Experimental database

- Thermal region
  - Jaffey and Lerner (1970)
  - Skovorodkin *et al.* (1973)
- Energy dependence
  - Khokhlov *et al.* (1994)




$$\nu_p = 2.780 + 0.157 E_n$$

- The data of Khokhlov *et al.* are inconsistent with the others.

- A study on systematics of $\nu_p$ by Ohsawa supports the higher values.

$$\nu_p = 3.228 + 0.1497 E_n \qquad (max)$$
$$\nu_p = 3.179 + 0.1482 E_n \qquad (min)$$

- A further investigation is needed to resolve this discrepancy.

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