# Covariance Data for JENDL-3.3 Actinides

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# Actinide Nuclides with Covariance Data



- **JENDL-3.3**
  U-233, U-235, U-238, Pu-239, Pu-240, Pu-241
  The data of these nuclides were released together with covariance data.

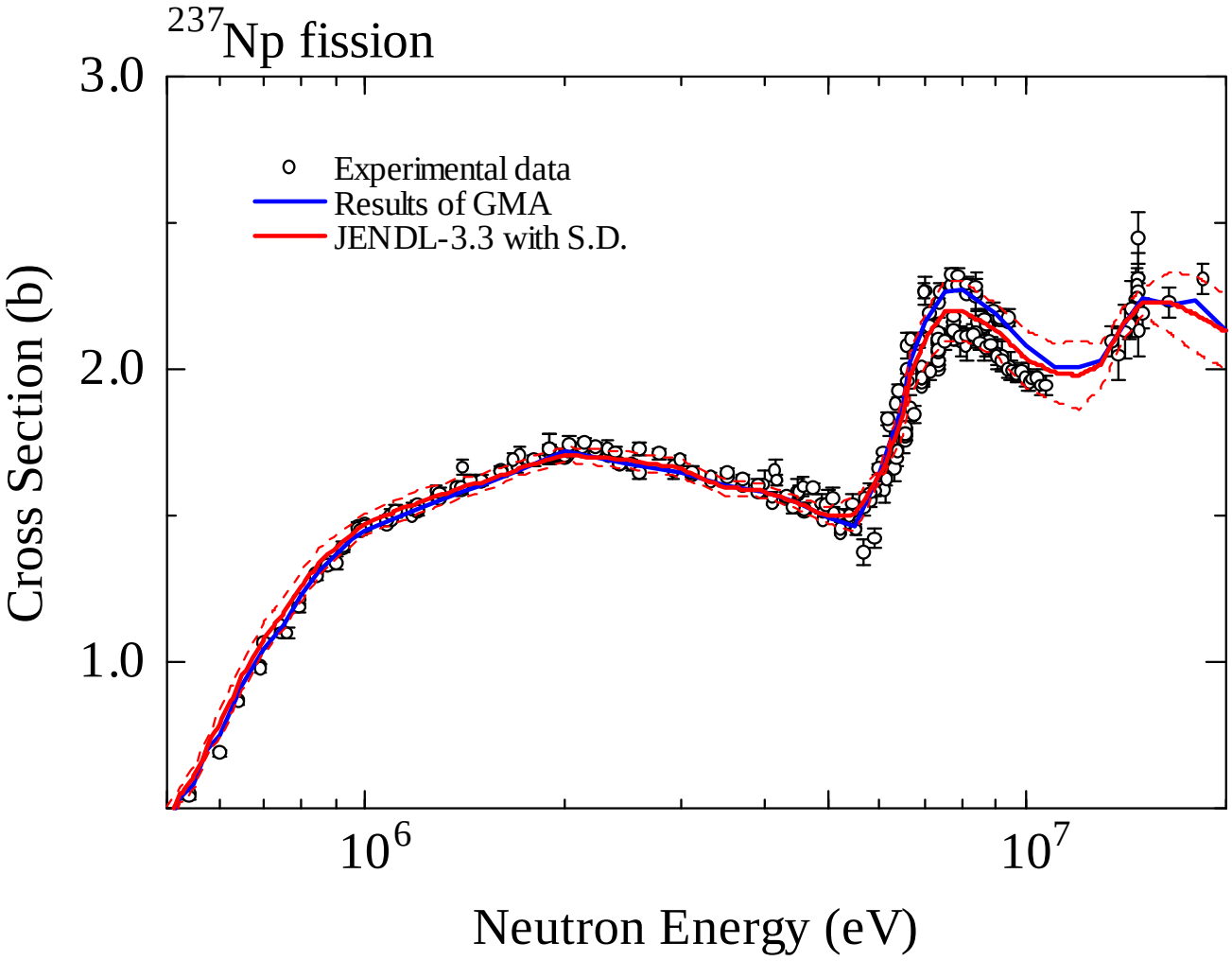
- **Additional nuclides**
  Np-237, Pu-242, Am-241, Am242m, Am-243, Cm-244
  Covariance data were evaluated after release of JENDL-3.3.

# Covariance Data for Additional Actinides

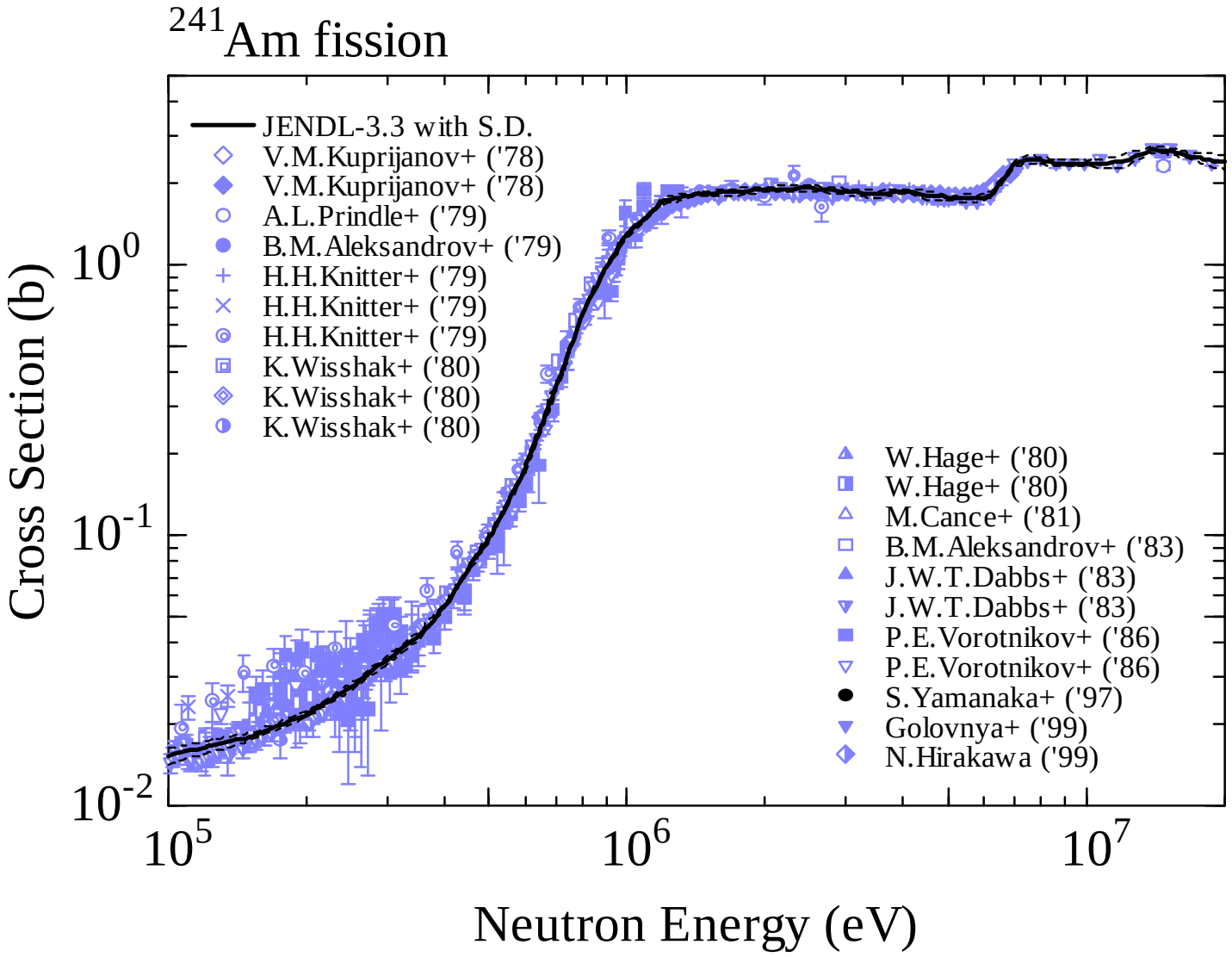


- Fission cross section
  Experimental data were analyzed with a least-squares fitting code GMA developed by Poenitz.
- Capture cross section
  Statistical model code CASTHY and covariance generation code KALMAN developed by Kawano were used.
  Covariance matrices were calculated from sensitivities and uncertainties of model parameters.
- Resonance parameters
  Standard deviations were given to a resonance energy, neutron, capture and fission widths of each resonance.
- Number of neutrons per fission
  Experimental data were fitted with a straight line.

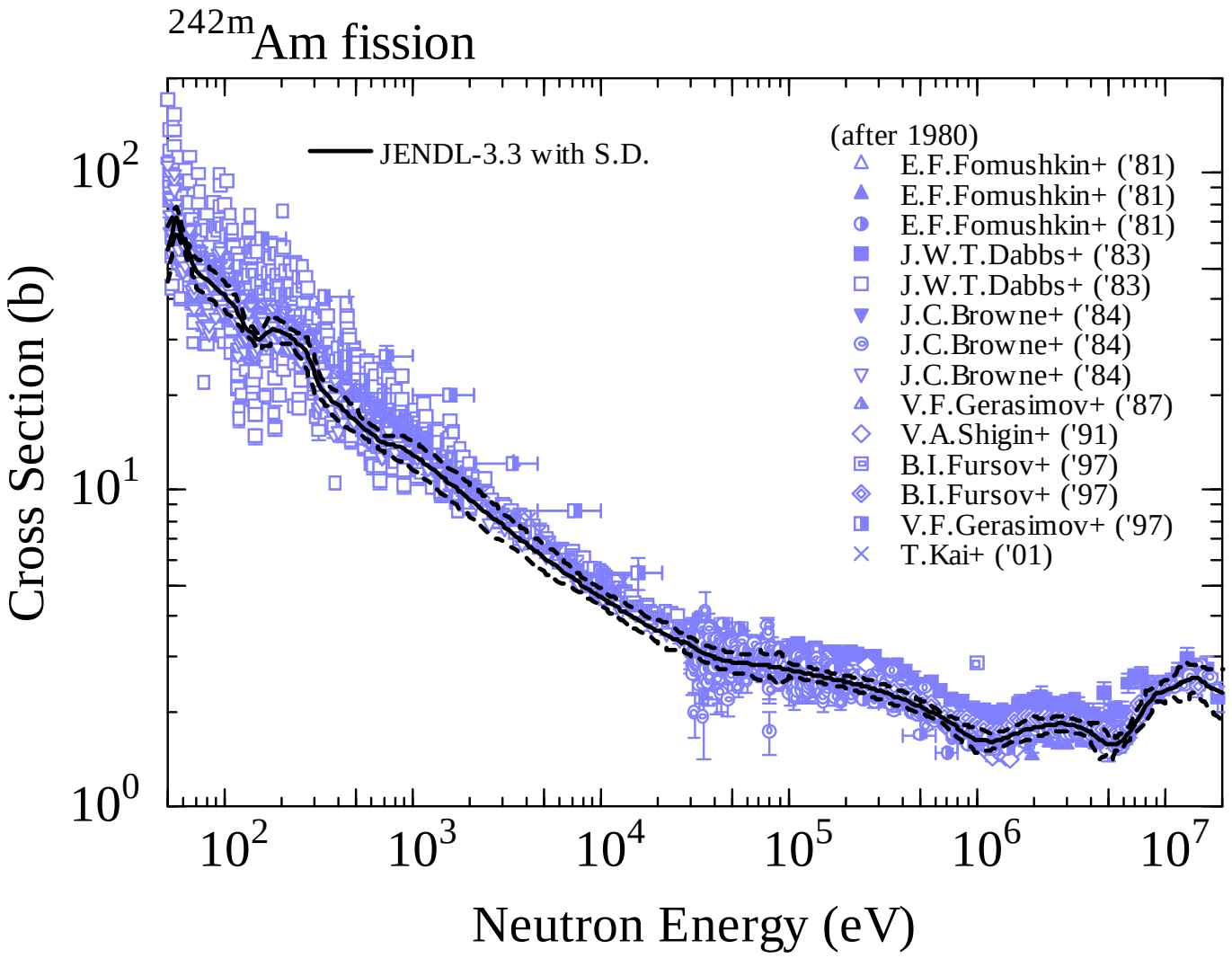
# Examples of fission cross sections



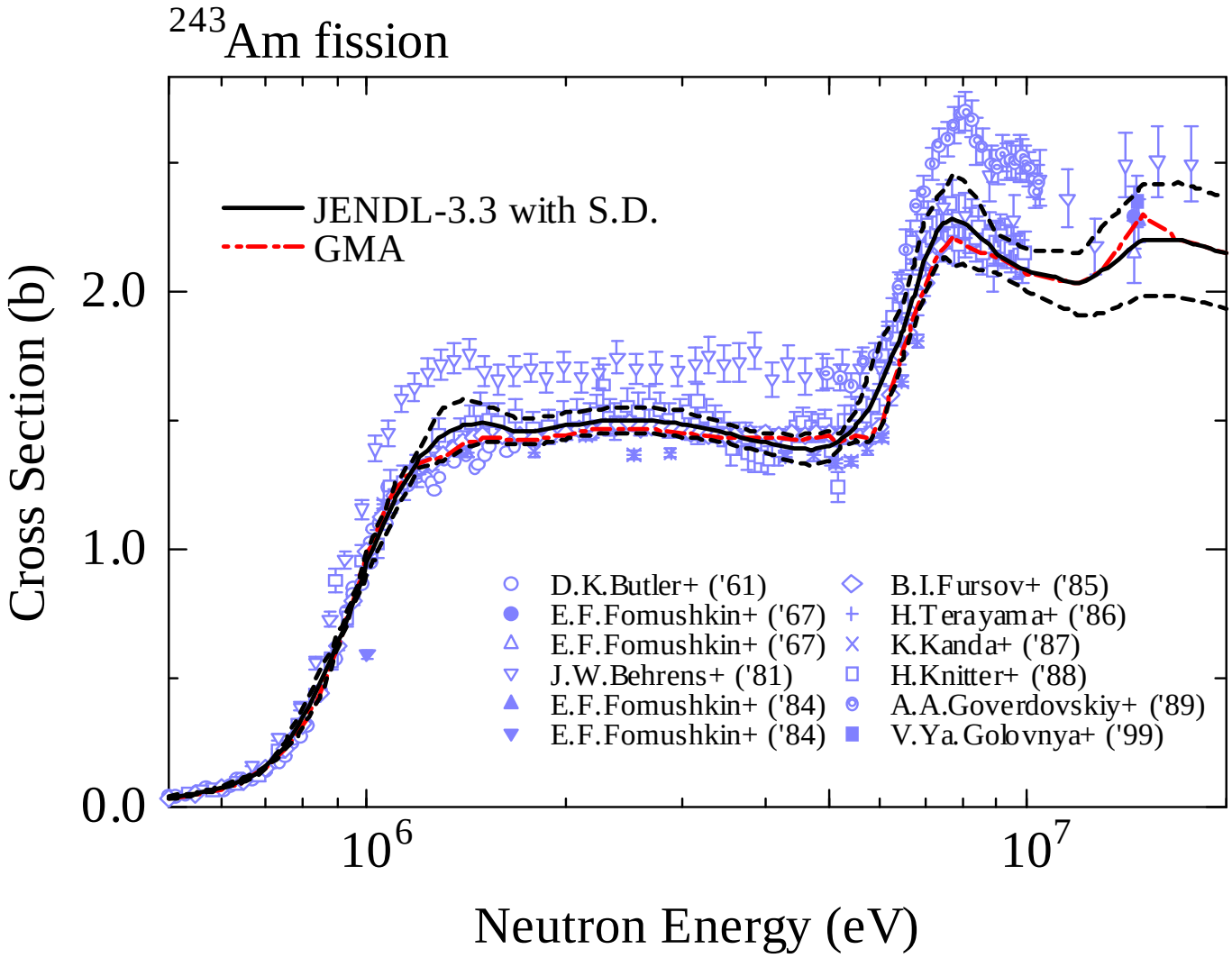

Discrepancies between GMA and JENDL-3.3 were added to the standard deviation of JENDL-3.3.




Uncertainties are smaller than 3 % in this energy range.

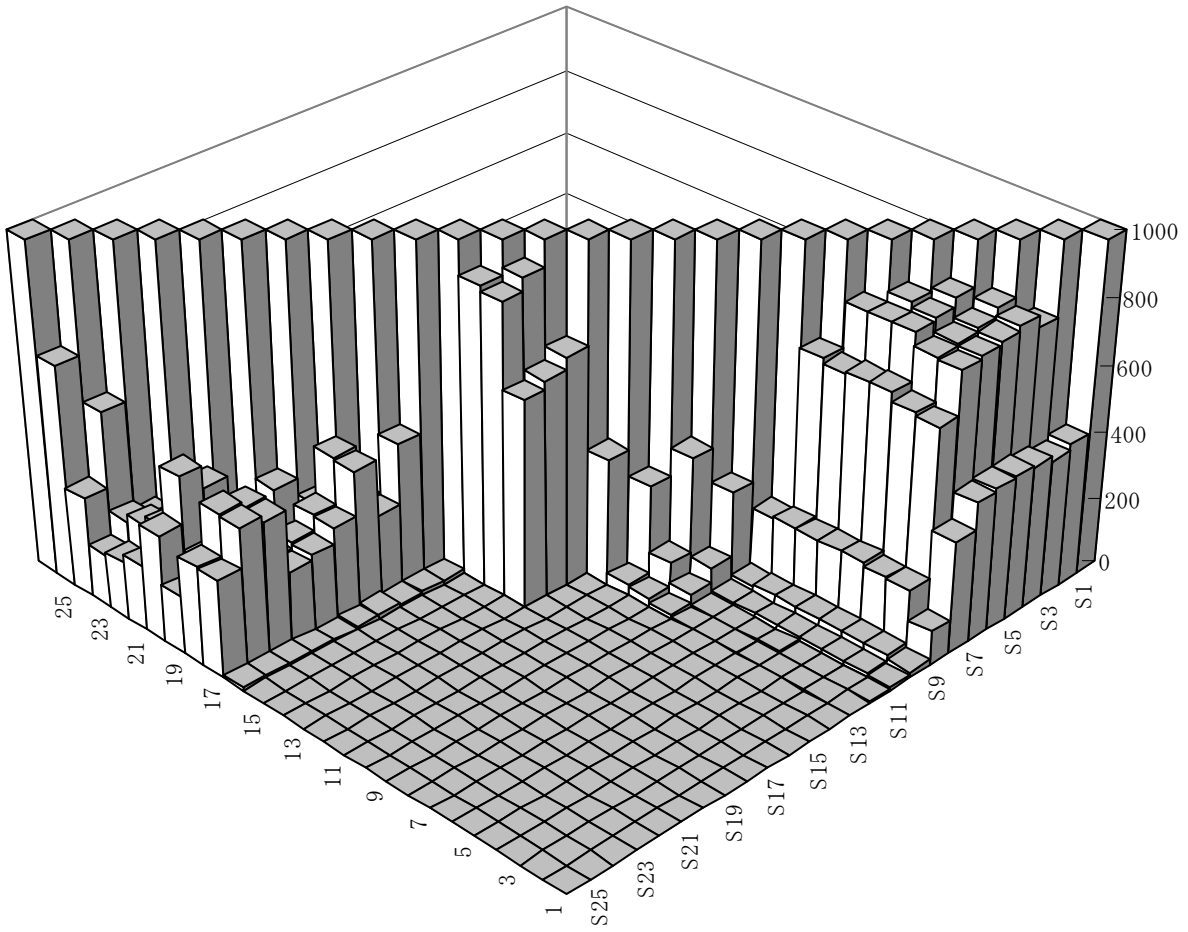



Higher cross section data sets were ignored in the evaluation.



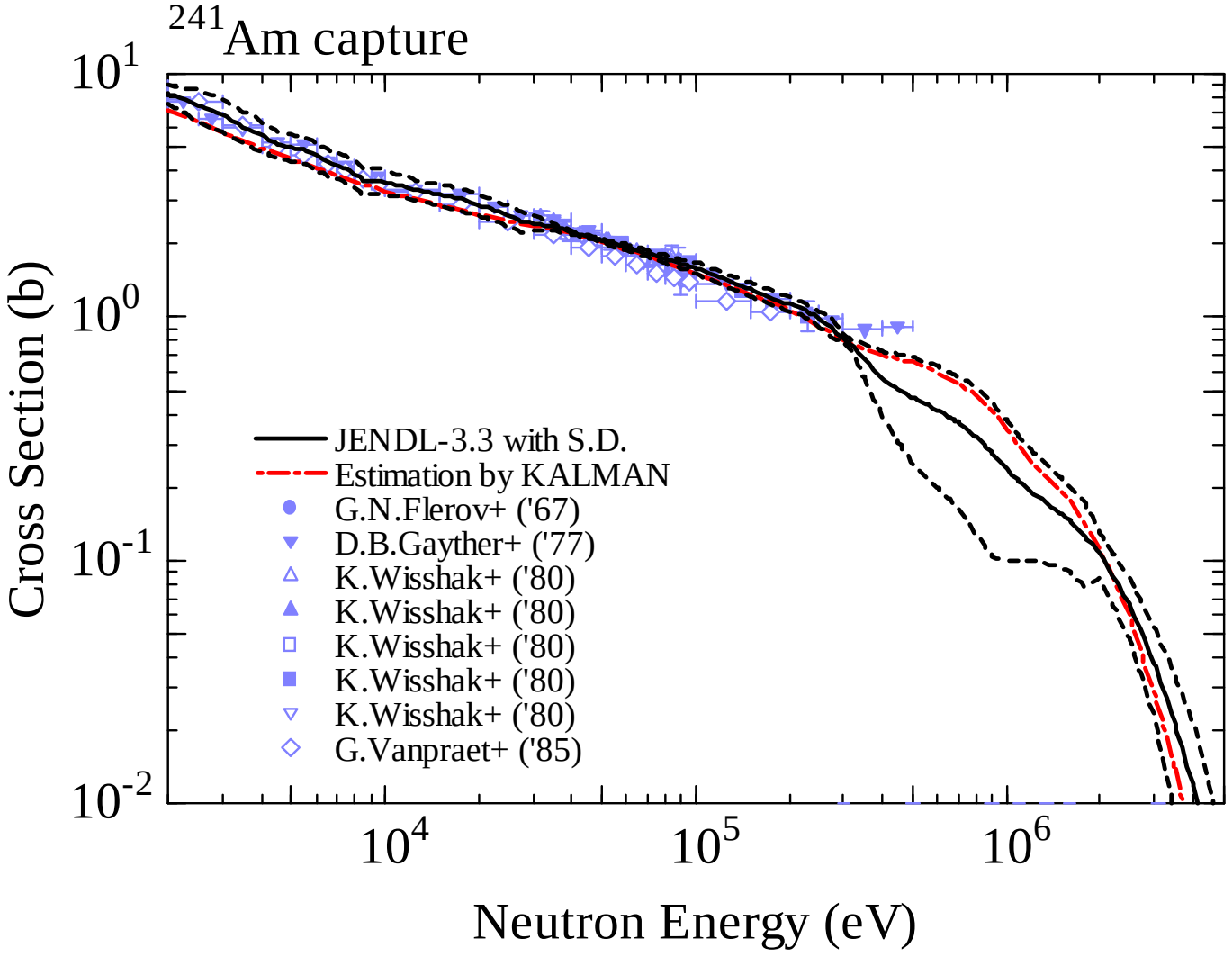

Large cross section groups were ignored in the evaluation.

# Np-237 fission

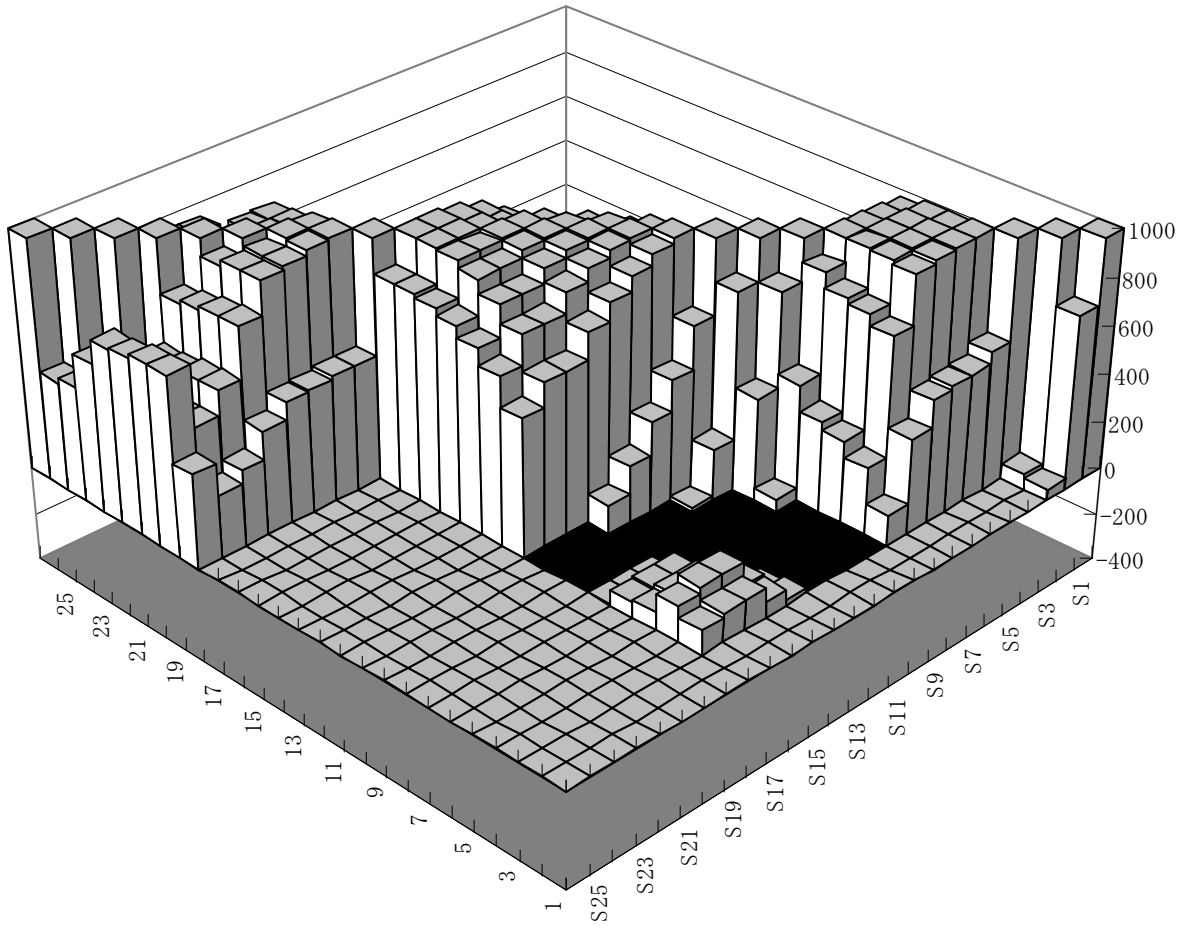


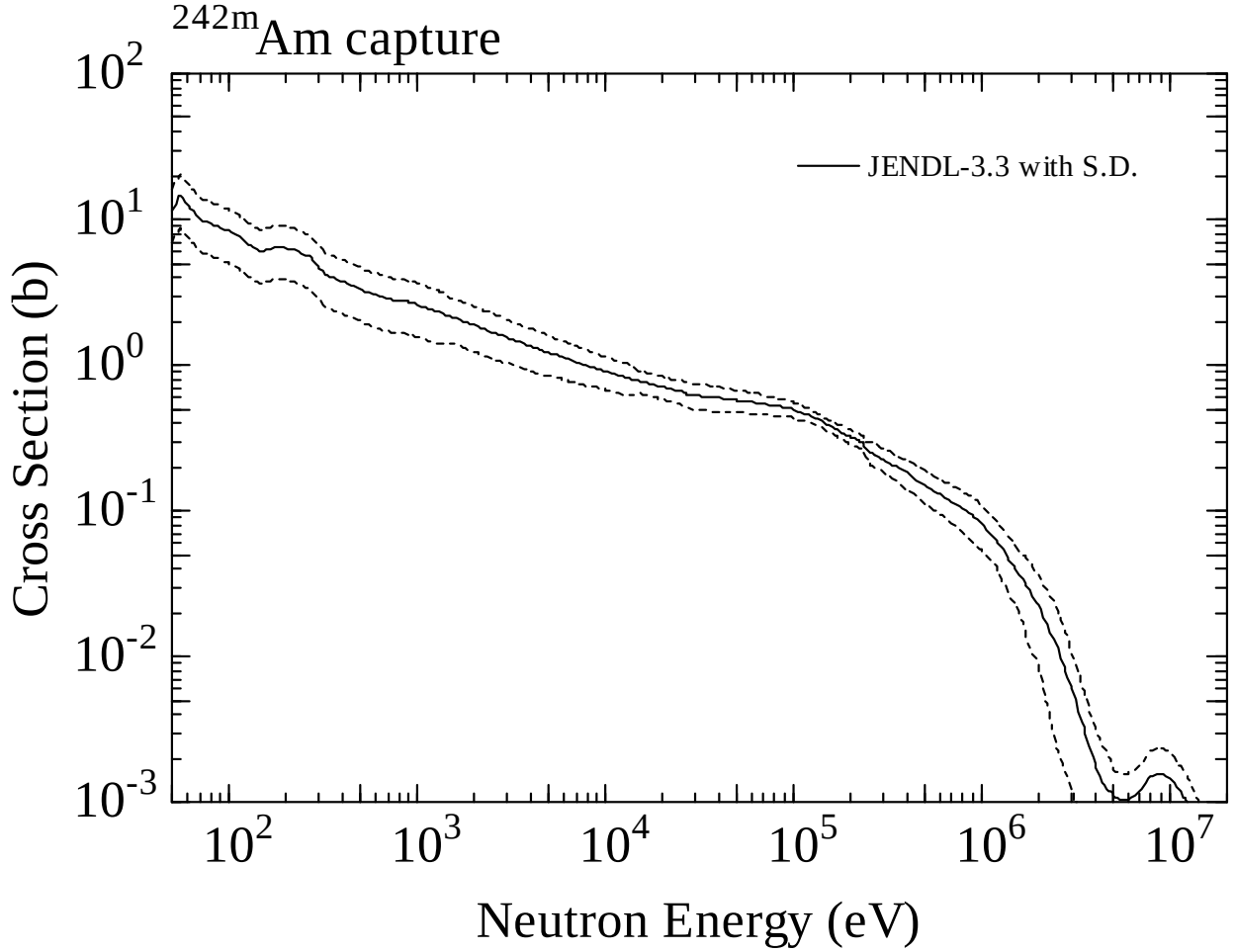

Covariance data file was processed with ERRORJ code. This figure was written from the ERRORJ output.

# Examples of capture cross sections

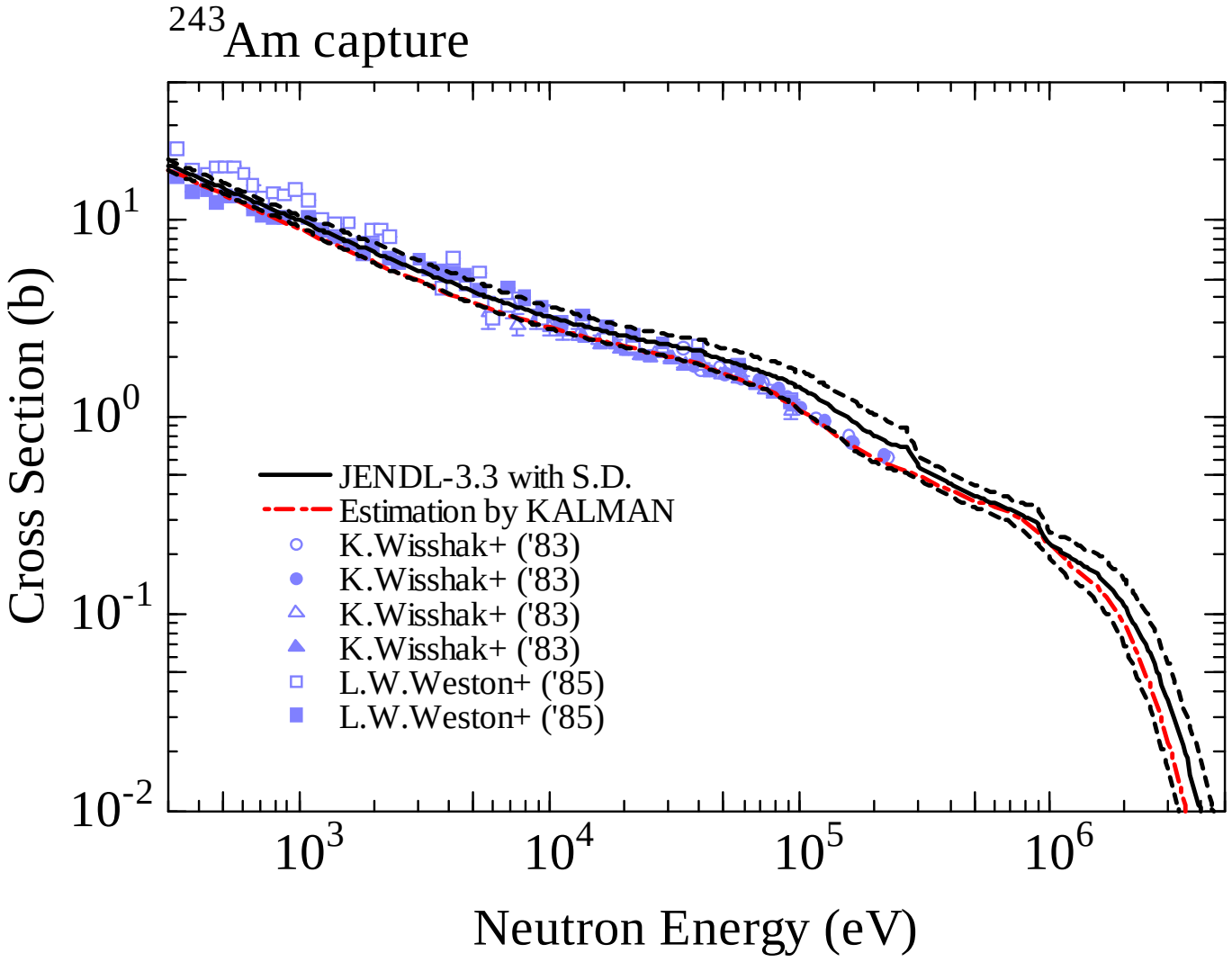


# Covariance of Am-241 capture

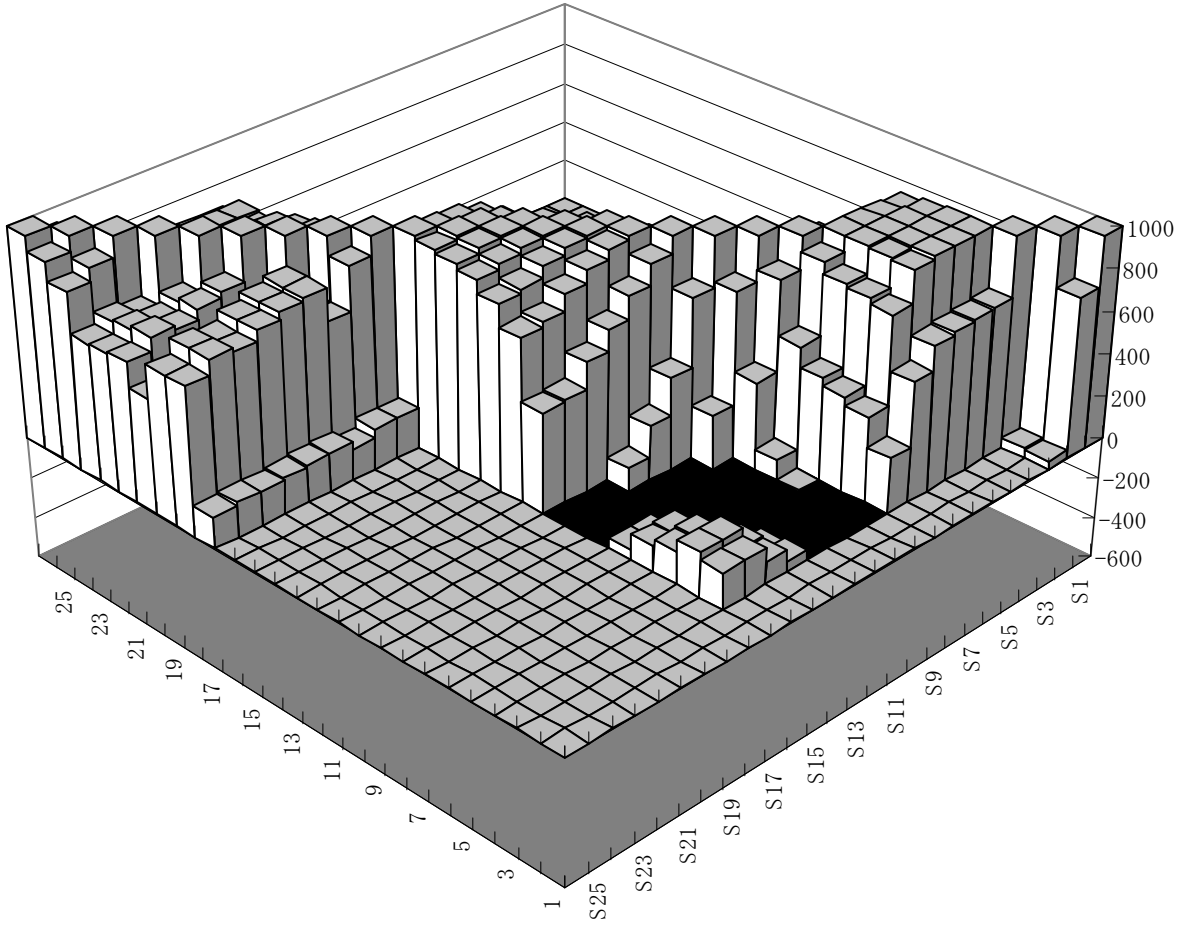




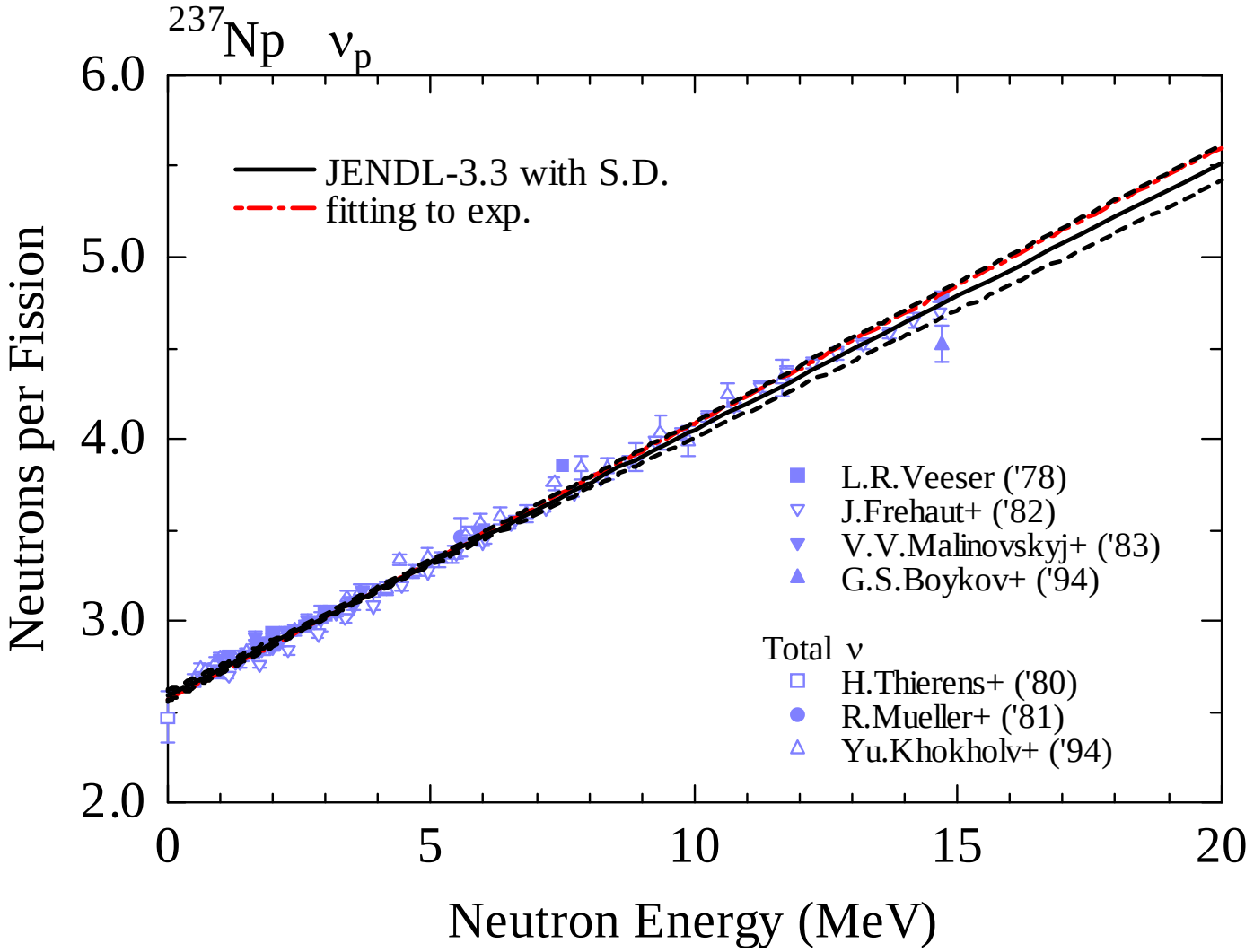

No experimental data are available. KALMAN calculation was done by assuming uncertainty of 20% at 30 keV.


$^{243}$Am capture
Cross Section (b)
$10^{1}$
$10^{0}$
$10^{-1}$
$10^{-2}$
$10^{3}$
$10^{4}$
$10^{5}$
$10^{6}$
Neutron Energy (eV)
JENDL-3.3 with S.D.
Estimation by KALMAN
K.Wisshak+ ('83)
K.Wisshak+ ('83)
K.Wisshak+ ('83)
K.Wisshak+ ('83)
L.W.Weston+ ('85)
L.W.Weston+ ('85)

# Covariance of Am-243 capture



# Examples of number of neutrons per fission



# Nuclides with Covariance Data

Covariance data have been prepared for 32 nuclides of JENDL-3.3.

- **JENDL-3.3 (20)**
  H-1, B-10, B-11, O-16, Na-23, Ti-48, V, Cr-52, Mn-55, De-56, Co-59, Ni-58, Ni-60, Zr-90, U-233, U-235, U-238, Pu-239, Pu-240, Pu-241
- **Additional nuclides (12)**
  N-15, Pb-206, Pb-207, Pb-208, Bi-209, Np-237, Pu-238, Pu-242, Am-241, Am242m, Am-243, Cm-244