AFCI-2.0-beta Covariance Library

S. Hoblit, NNDC, BNL

AFCI working group, Nov 4, 2010

Library files

- 110 files of neutron cross section covariances
  - 12 light nuclei
  - 78 structural materials & fission products
  - 20 actinides
- 20 files with nu-bar covariances (Actinides)
- 3 files with fission neutron spectra covar.
  - ^{238,239,240}Pu
- 2 files with mu-bar covar. (^{23}Na, ^{56}Fe)

Major changes to version 2.0β

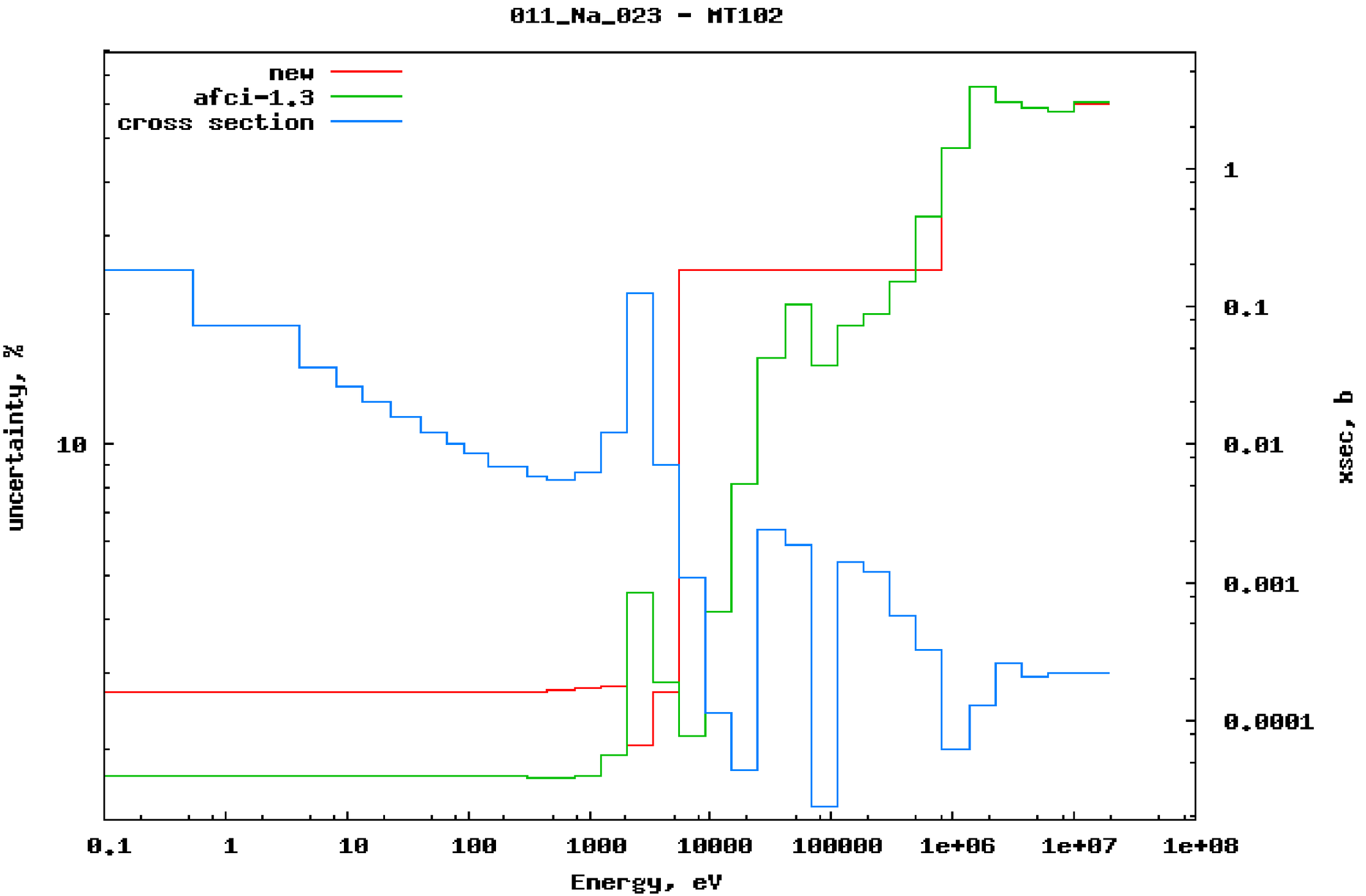
- Many structural materials updated at BNL
  - Resonance region modeled with kernel approx.
  - New analysis of fast region with Empire

- Actinides updated by LANL, BNL
  - LANL: ^{238,239,240}Pu, ^{241}Am
  - BNL: ^{237}Np, ^{242}Pu

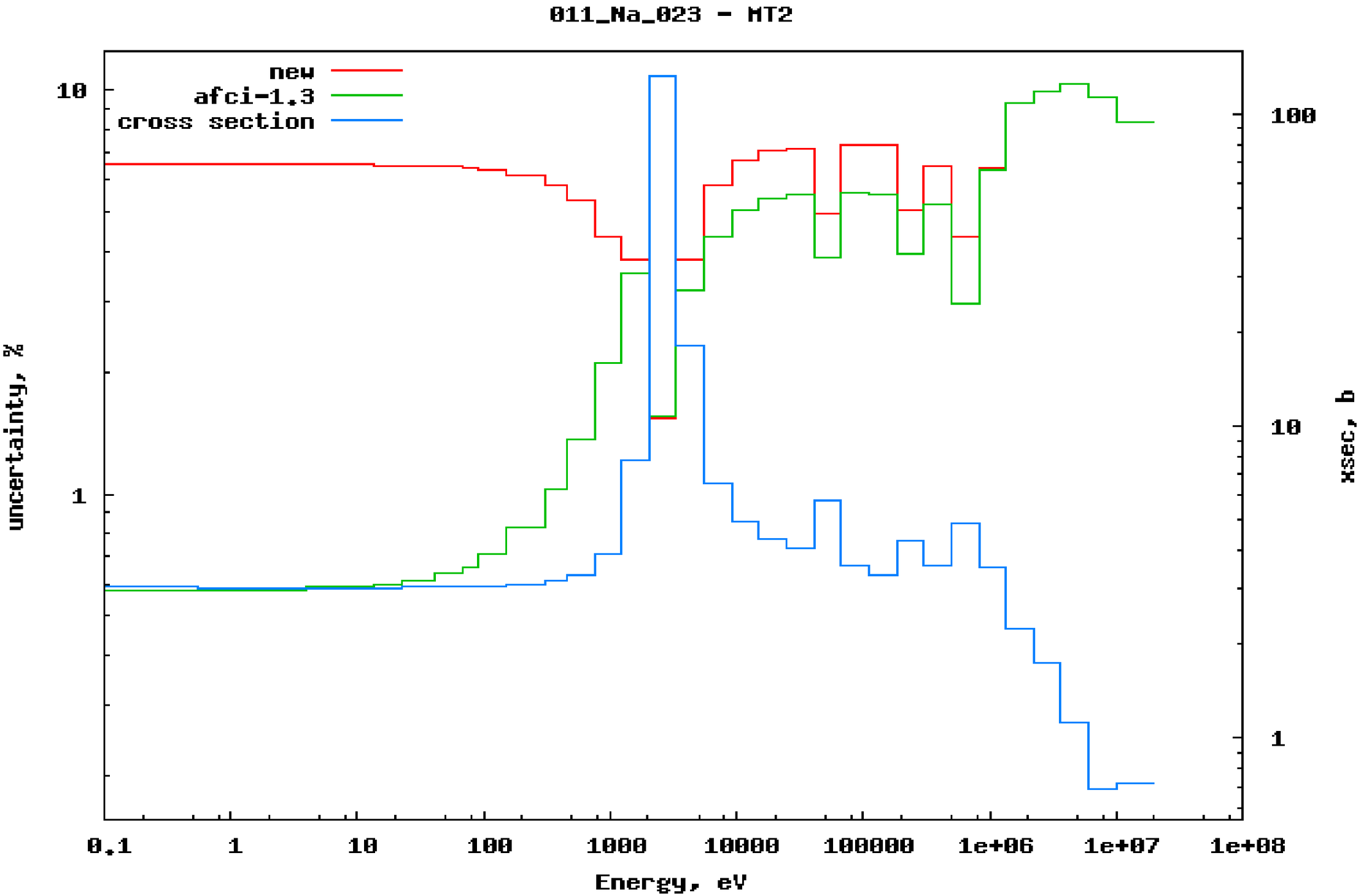
Updated structural materials (BNL)

- 23-Na
- 24-Mg, 27-Al
- 28,29,30-Si
- 50,52,53-Cr
- 55-Mn
- 54,56,57-Fe
- 58,60-Ni
- 90,91,92,94-Zr
- 92-Mo
- 109-Ag
- 143,145,146,148-Nd
- 141-Pr
- 204,206,207,208-Pb
- 209-Bi

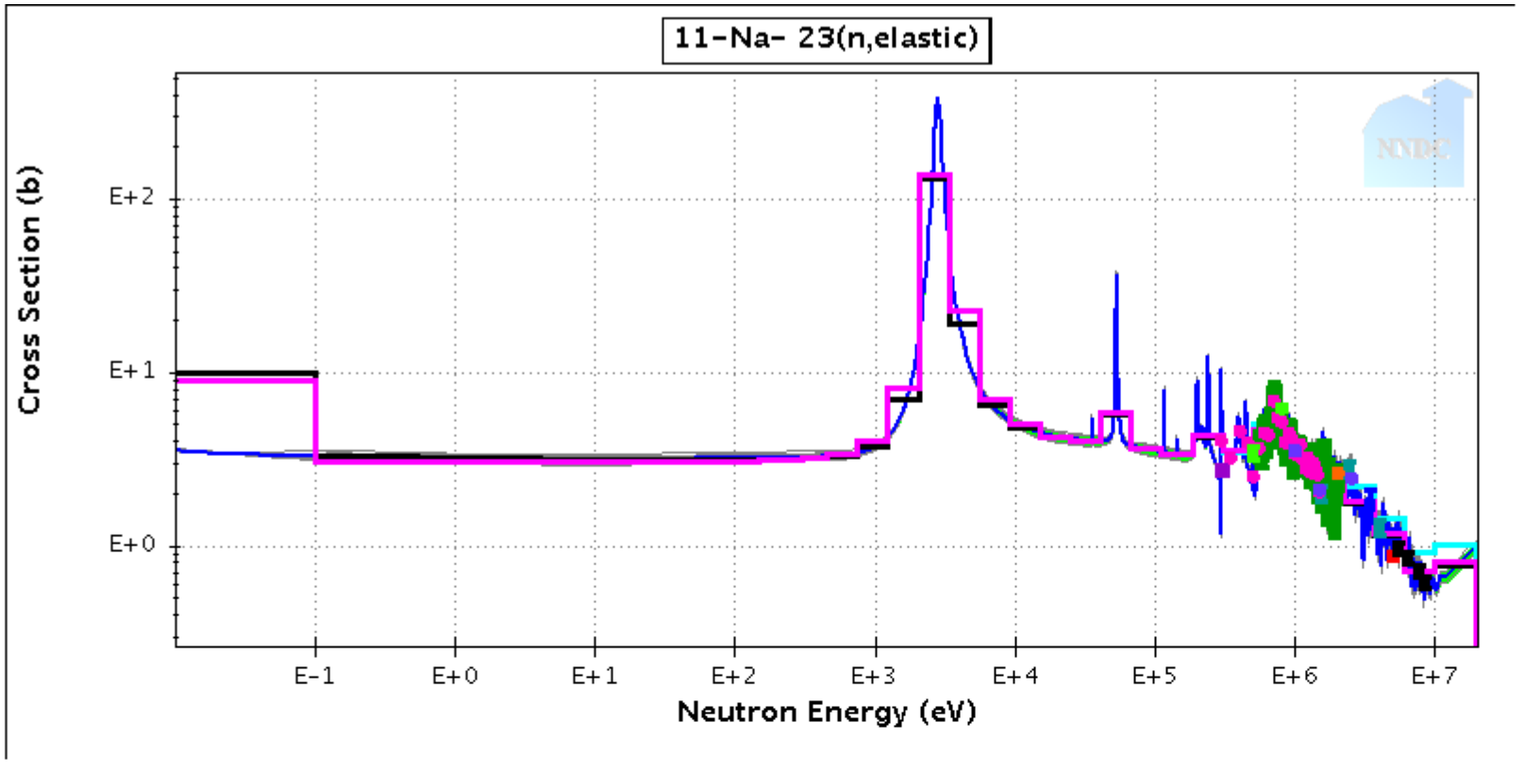
23-Na capture (M. Pigni)



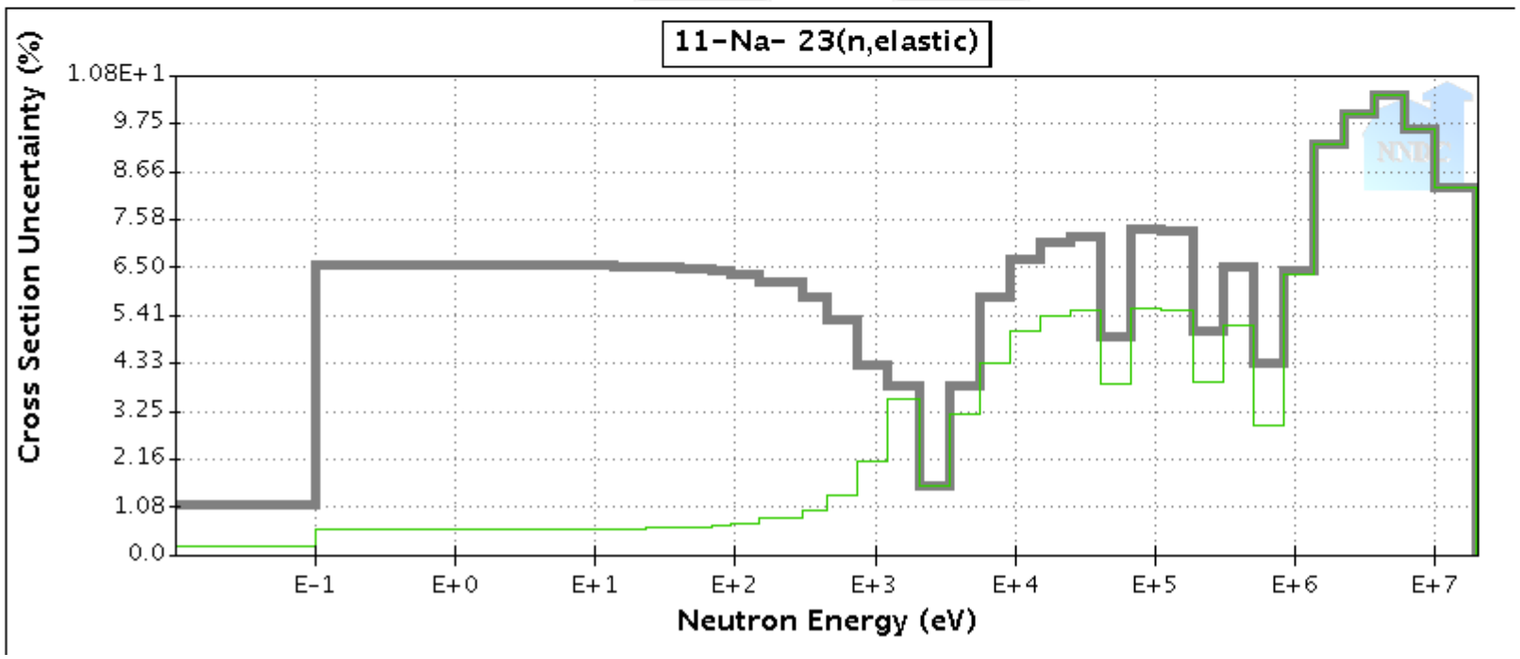
23-Na elastic



23-Na elastic QA



Cursor at: x = (eV) y = (b)



Update Plot | Reset

1E-2 ≤ E_n (eV) ≤ 2E7 Log

2.637E-1 ≤ σ (b) ≤ 5.386E2 Log

- ☑ ENDF/B-VII.0 pointwise
- ☐ AFCI 1.2 uncertainty
- ☑ AFCI 1.3 uncertainty
- ☐ AFCI 2.0 uncertainty
- ☑ AFCI 2.0' uncertainty

Group cross sections with 1/E flux

- ☑ ENDF/B-VII.0 group
- ☑ JENDL-4.0 group
- ☑ JEFF-3.1 group
- ☐ CENDL-3.1 group
- ☐ ROSFOND group
- ☐ ENDF/B-VI.8 group

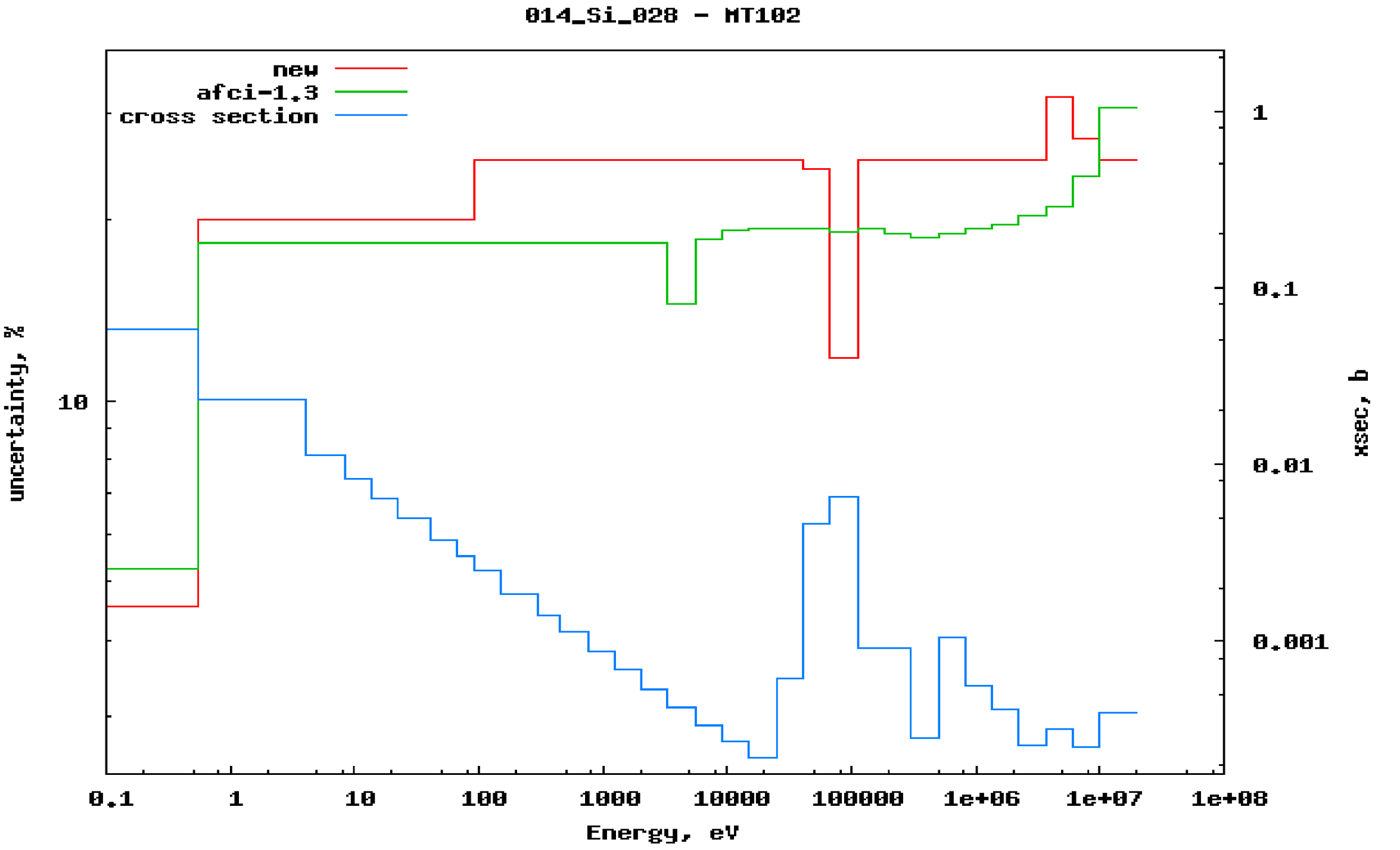
There are 11 EXFOR datasets

- ☑ Check/Uncheck All
- ☑ Schweitzer 1978
- ☑ Kinney 1976
- ☑ Coles 1971
- ☑ Perey 1970
- ☑ Fasoli 1969
- ☑ Chien 1966
- ☑ Kazakova 1965
- ☑ Korzh 1964
- ☑ Korzh 1963
- ☑ Towle 1962
- ☑ Fermi 1947

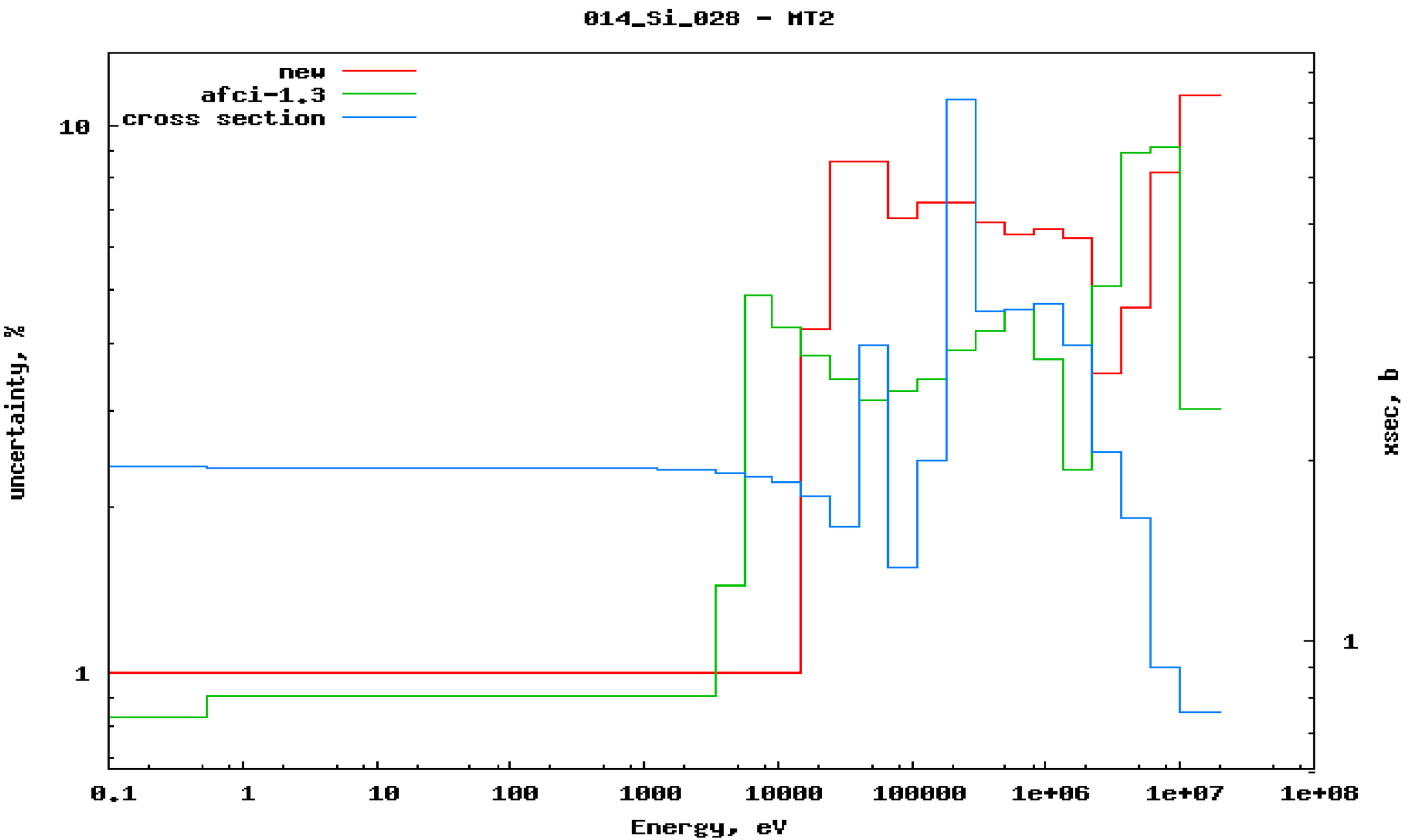
Remove EXFOR

Download plot for your article

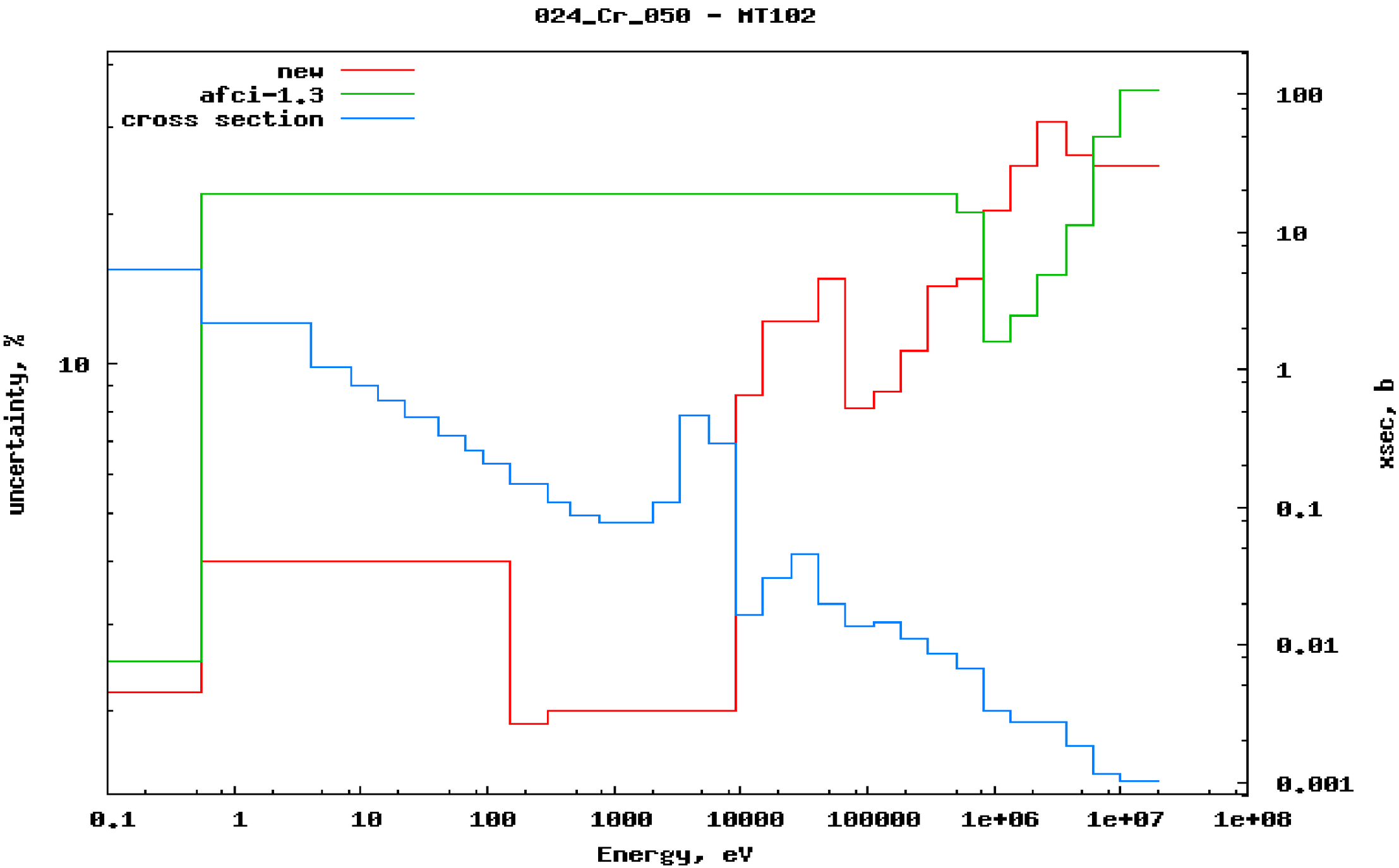
28-Si capture



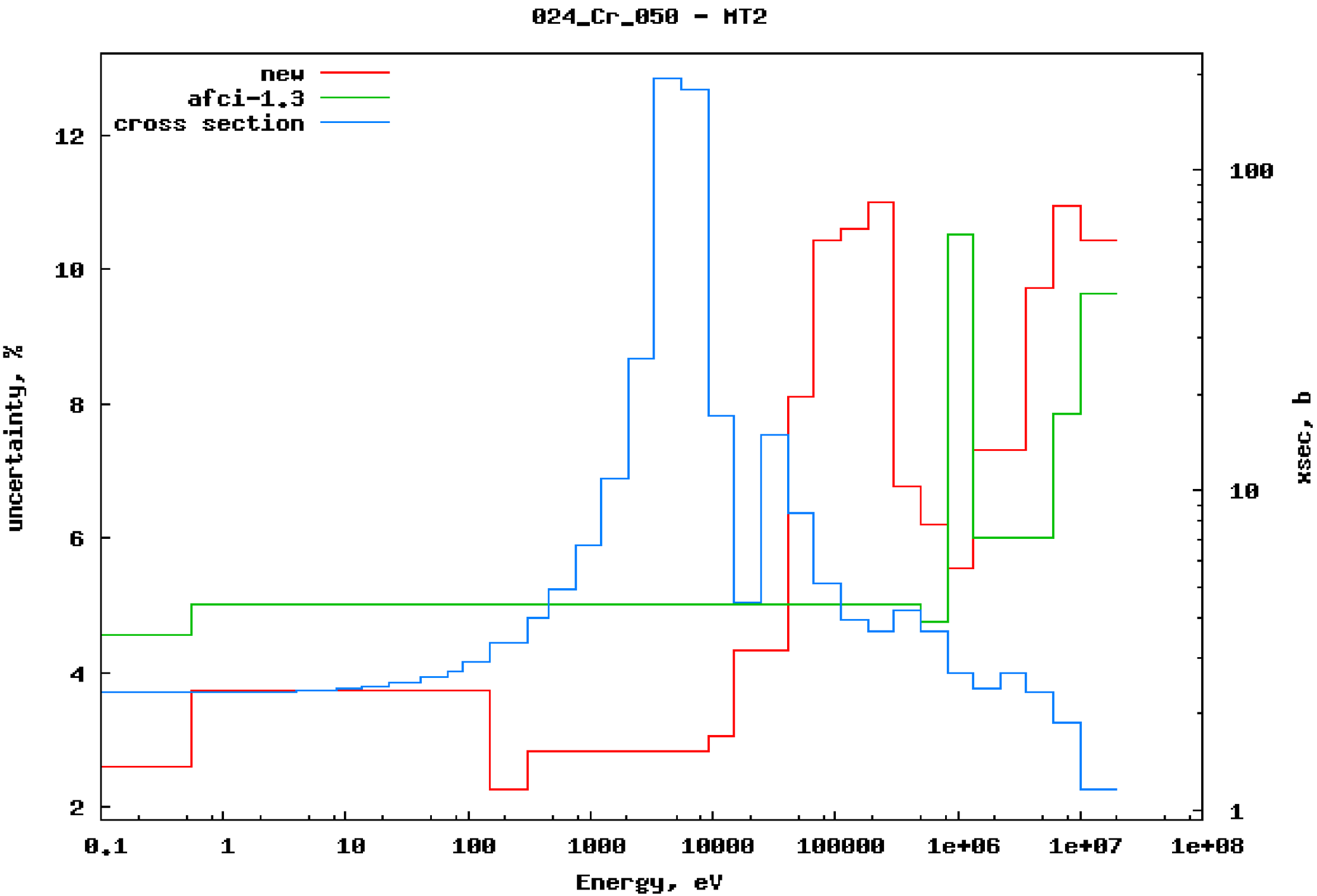
28-Si elastic



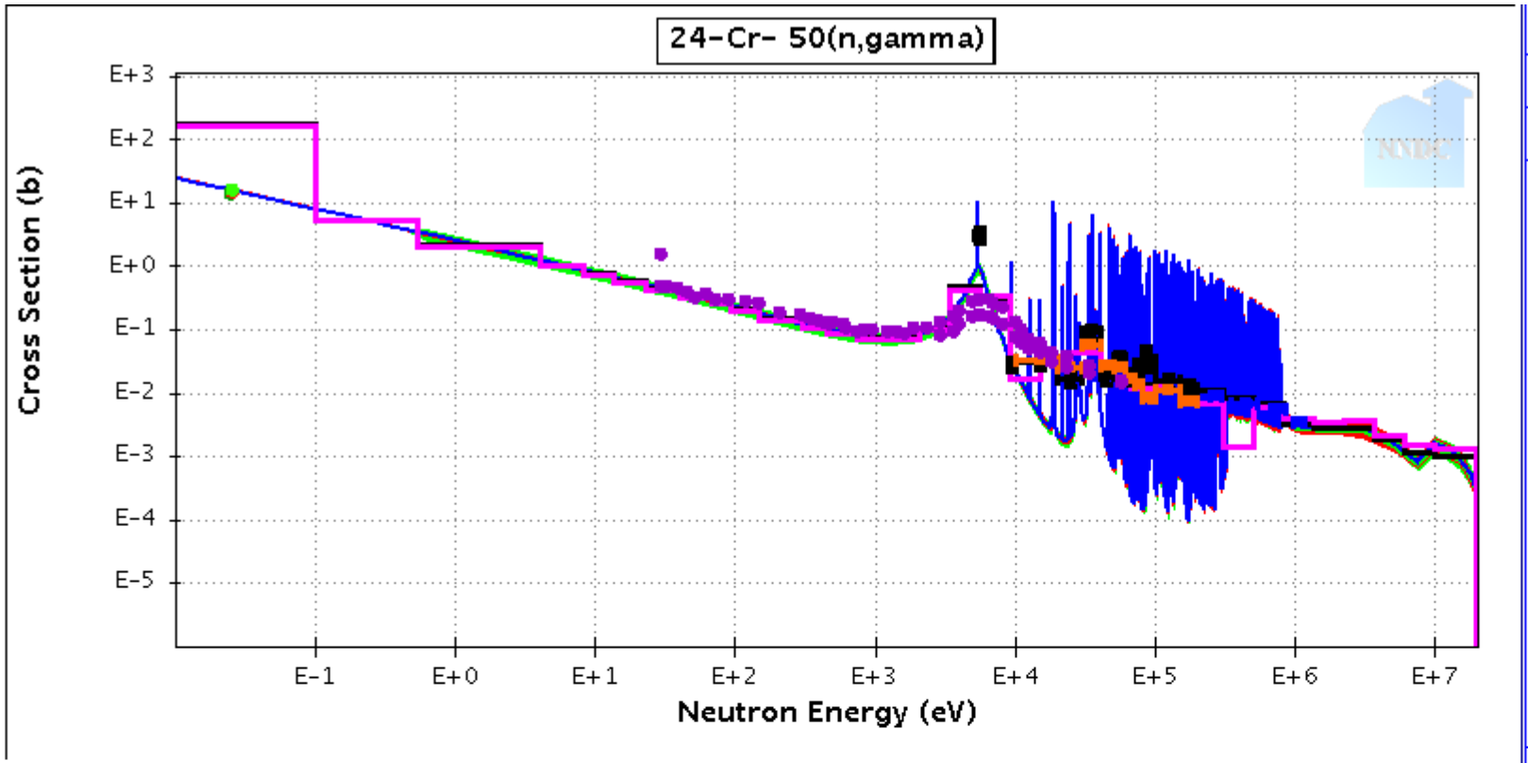
50-Cr capture



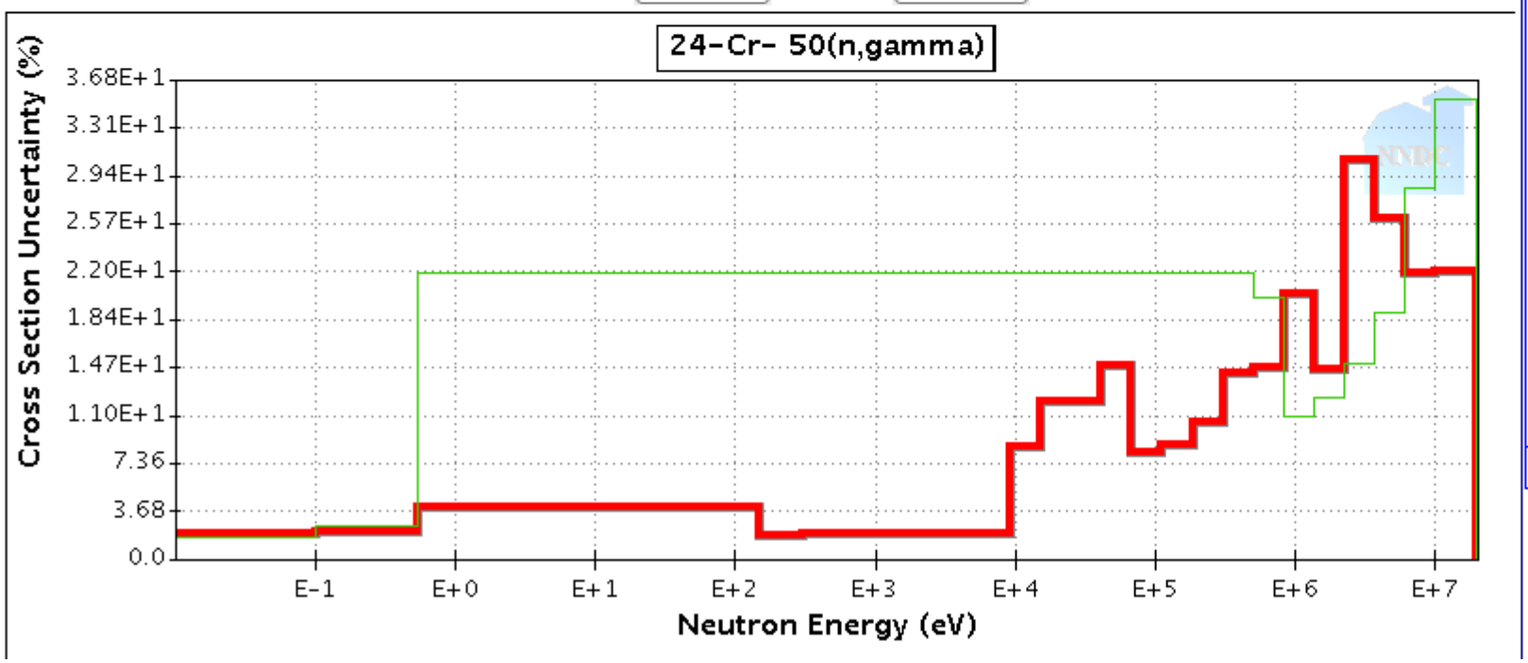
50-Cr elastic



Cr-50 QA



Cursor at: x = (eV) y = (b)



Update Plot | Reset

1E-2 ≤ E_n (eV) ≤ 2E7 Log

1E-6 ≤ σ (b) ≤ 1.145E3 Log

- ☑ ENDF/B-VII.0 pointwise
- ☐ AFCI 1.2 uncertainty
- ☑ AFCI 1.3 uncertainty
- ☑ AFCI 2.0 uncertainty
- ☑ AFCI 2.0' uncertainty

Group cross sections with 1/E flux

- ☑ ENDF/B-VII.0 group
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- ☐ ROSFOND group
- ☐ ENDF/B-VI.8 group

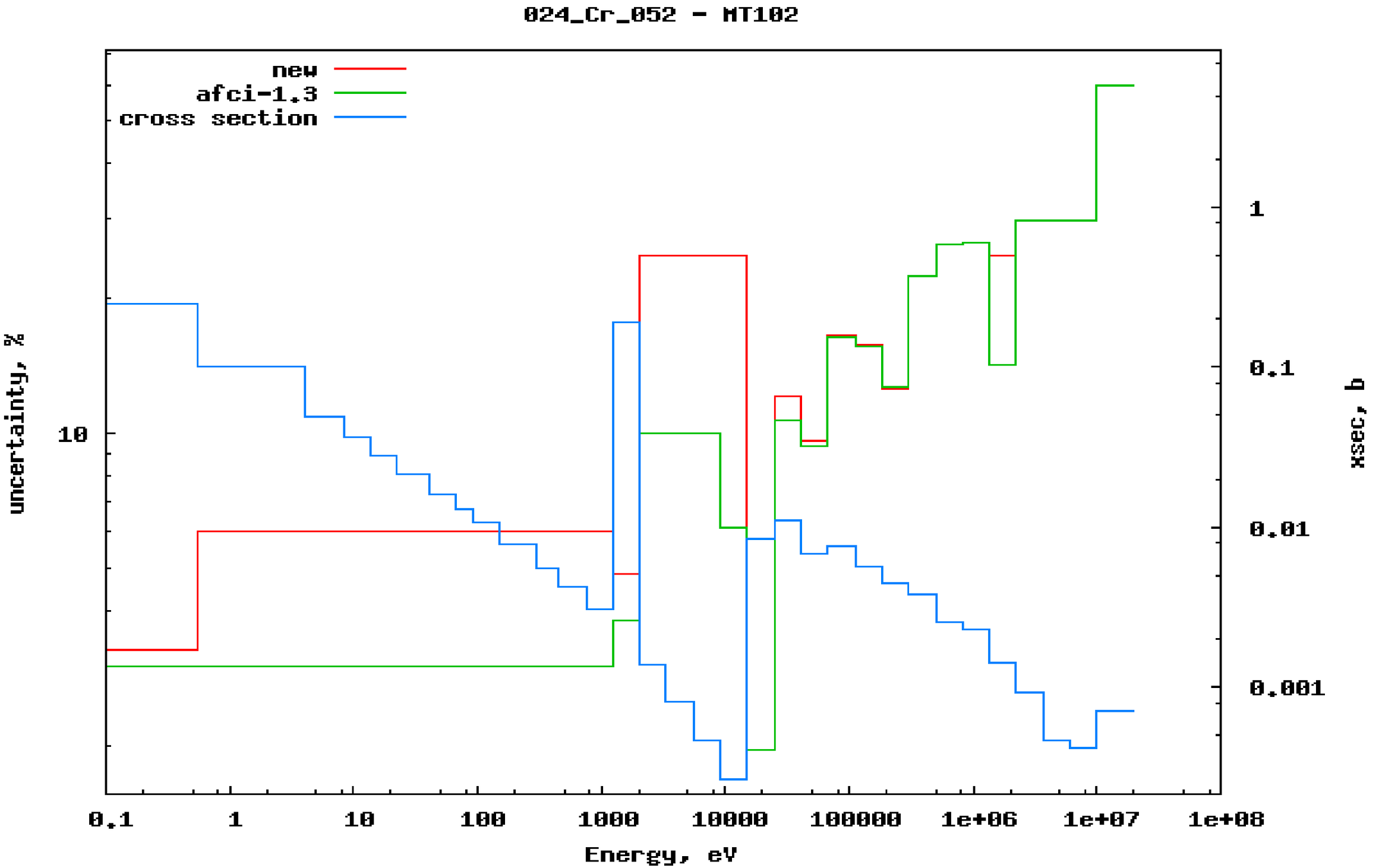
There are 10 EXFOR datasets

- ☐ Check/Uncheck All
- ☑ Yijun Xia 2002
- ☑ Venturini 1997
- ☑ Simonits 1984
- ☑ Kenny 1977
- ☐ Kenny 1977
- ☑ Gleason 1975
- ☑ Stieglitz 1971
- ☑ Sims 1968
- ☑ Kapchigashev 1964
- ☐ Pomerance 1952

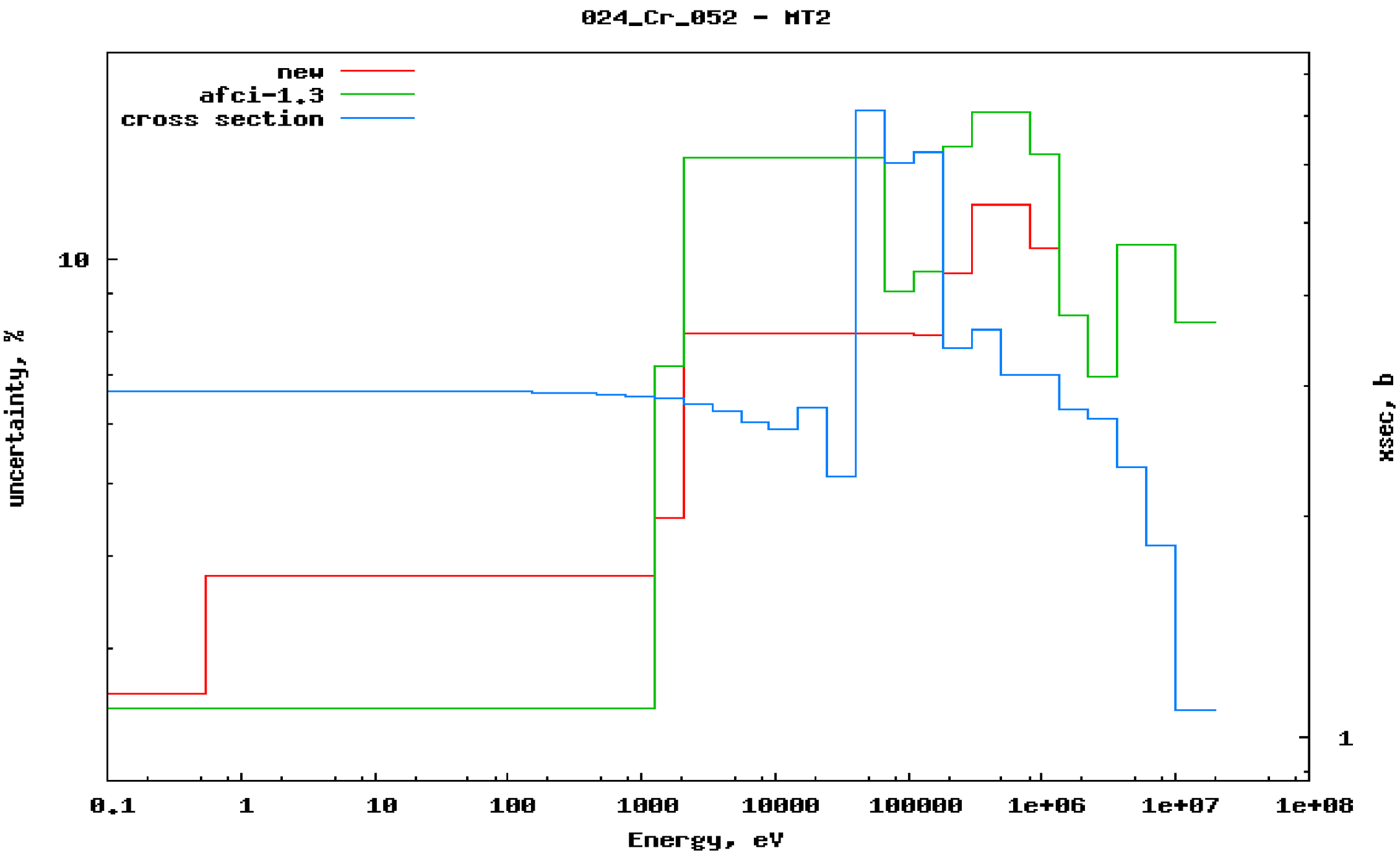
Remove EXFOR

Download plot for your article

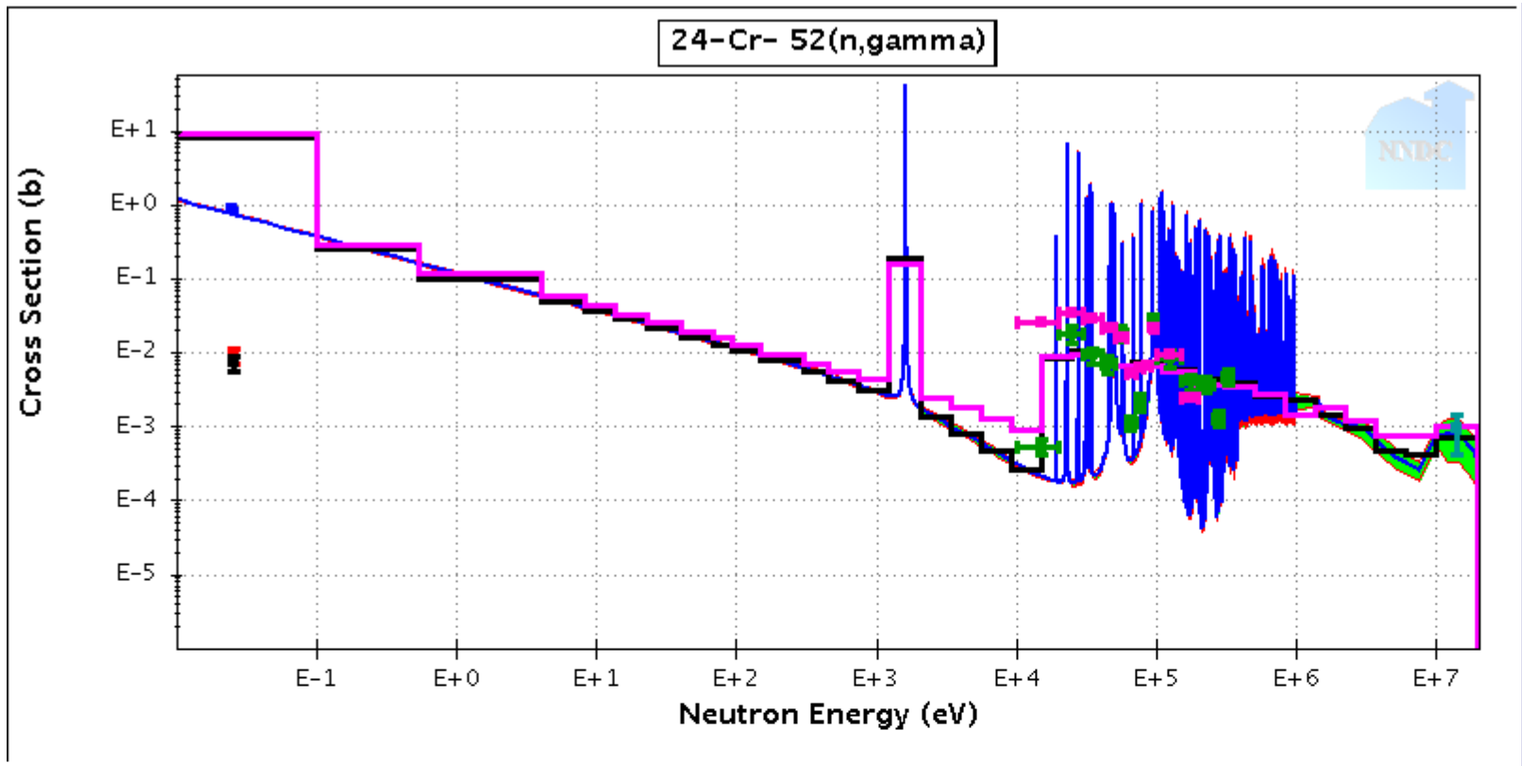
52-Cr capture



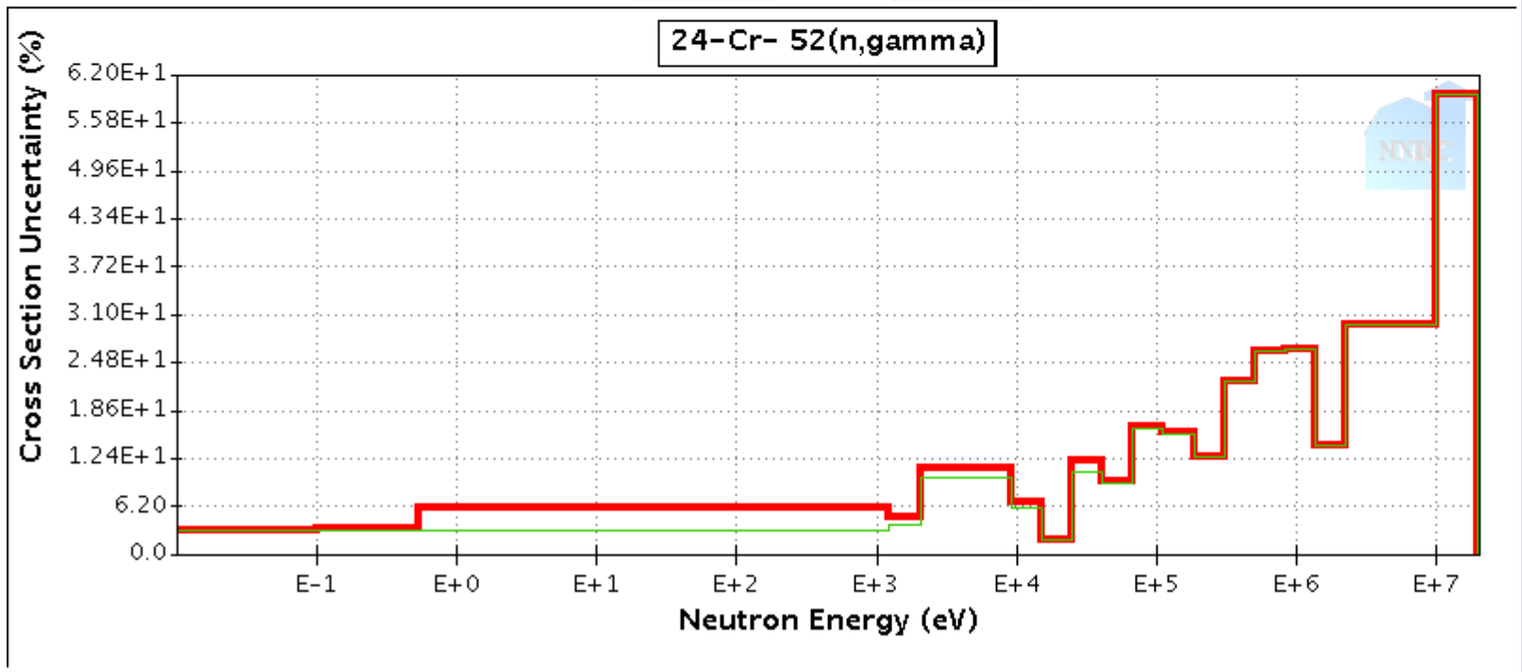
52-Cr elastic



52-Cr QA



Cursor at: x = (eV) y = (b)



Update Plot | Reset

1E-2 ≤ E_n (eV) ≤ 2E7 Log

1E-6 ≤ σ (b) ≤ 5.779E1 Log

- ☑ ENDF/B-VII.0 pointwise
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- ☑ AFCI 1.3 uncertainty
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- ☐ CENDL-3.1 group
- ☐ ROSFOND group
- ☐ ENDF/B-VI.8 group

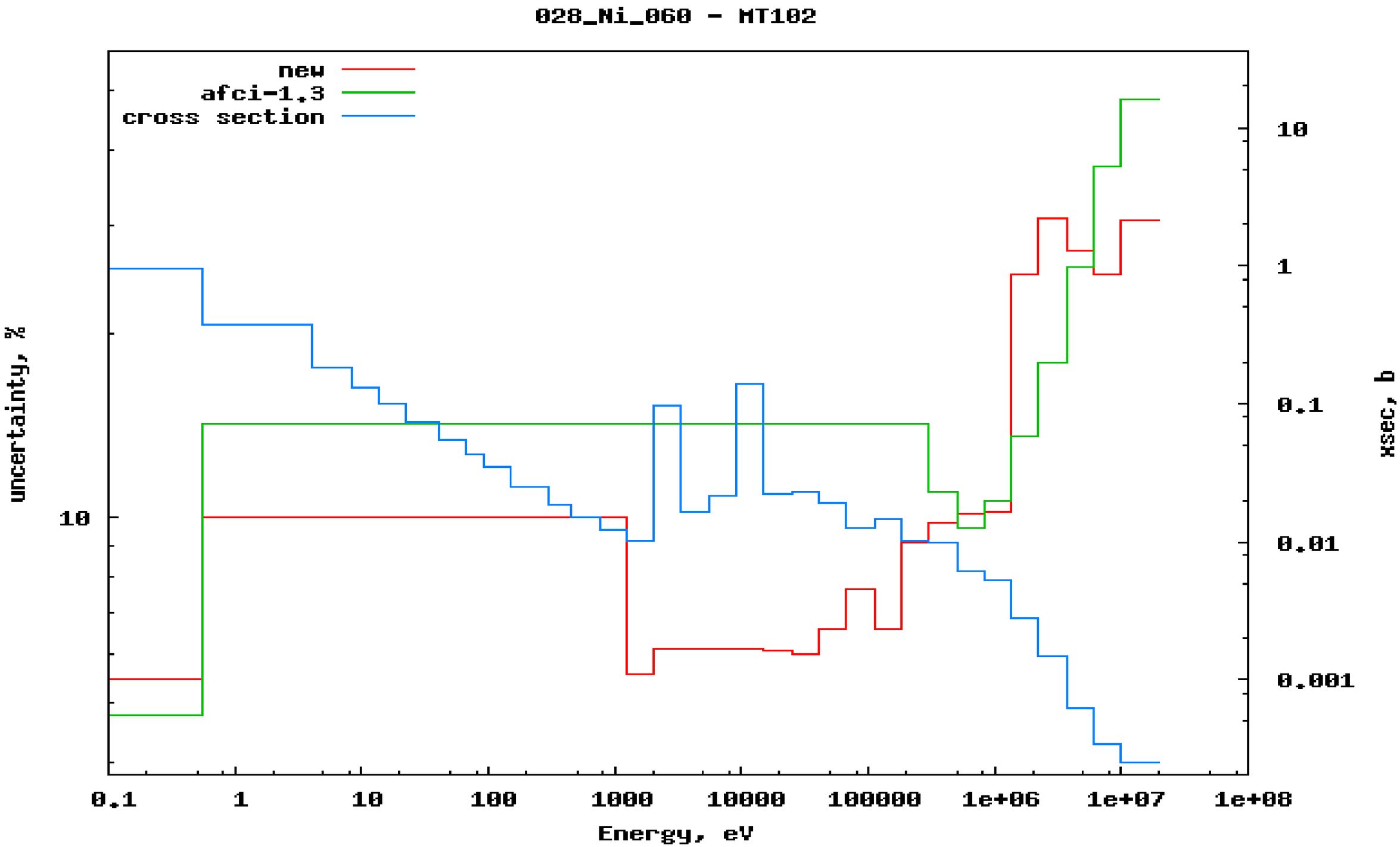
There are 8 EXFOR datasets

- ☐ Check/Uncheck All
- ☑ Venturini 1997
- ☑ Kenny 1977
- ☑ Kenny 1977
- ☑ Allen 1975
- ☑ Frenes 1974
- ☑ Stieglitz 1971
- ☐ Kapchigashev 1964
- ☐ Pomerance 1952

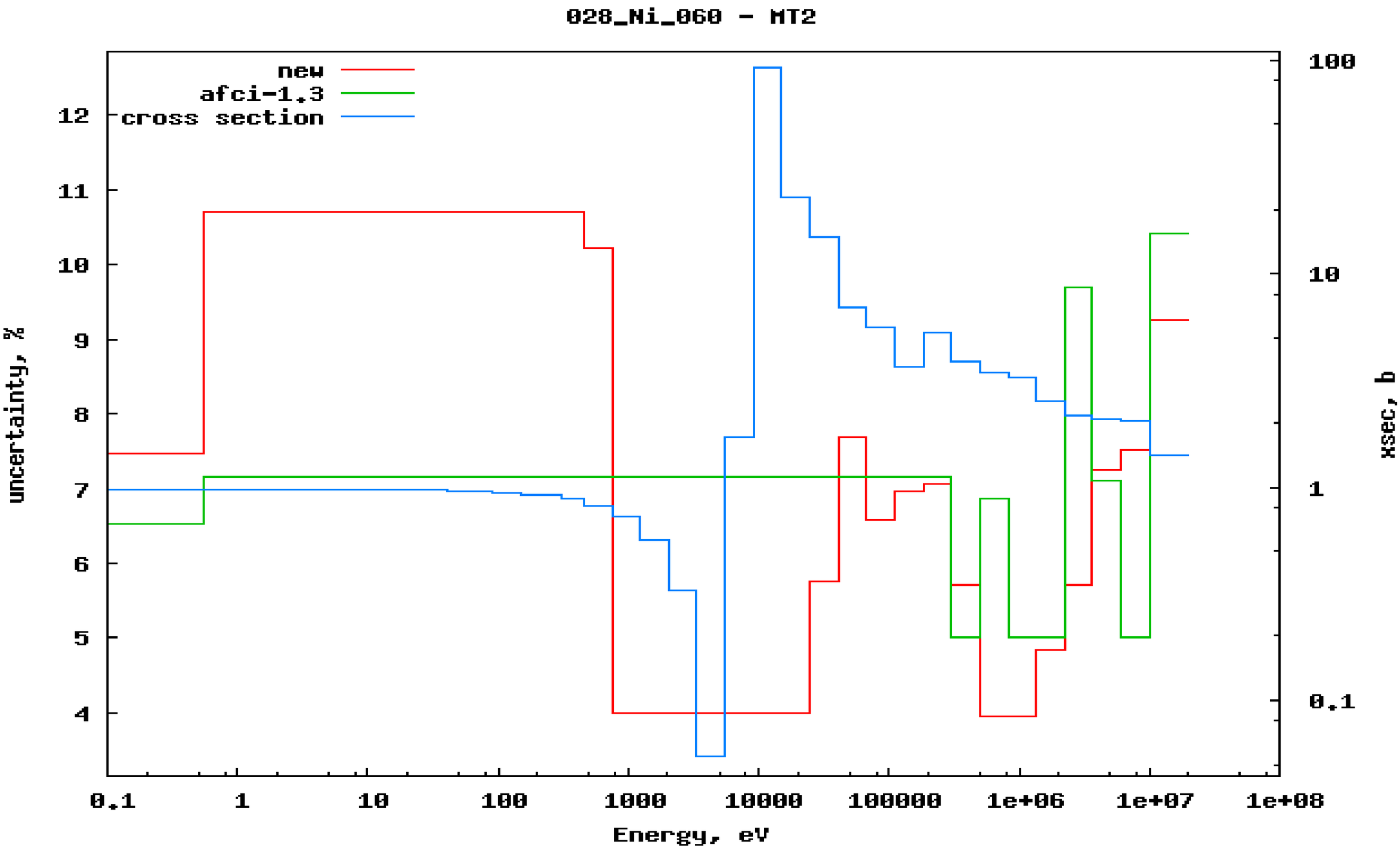
Remove EXFOR

Download plot for your article

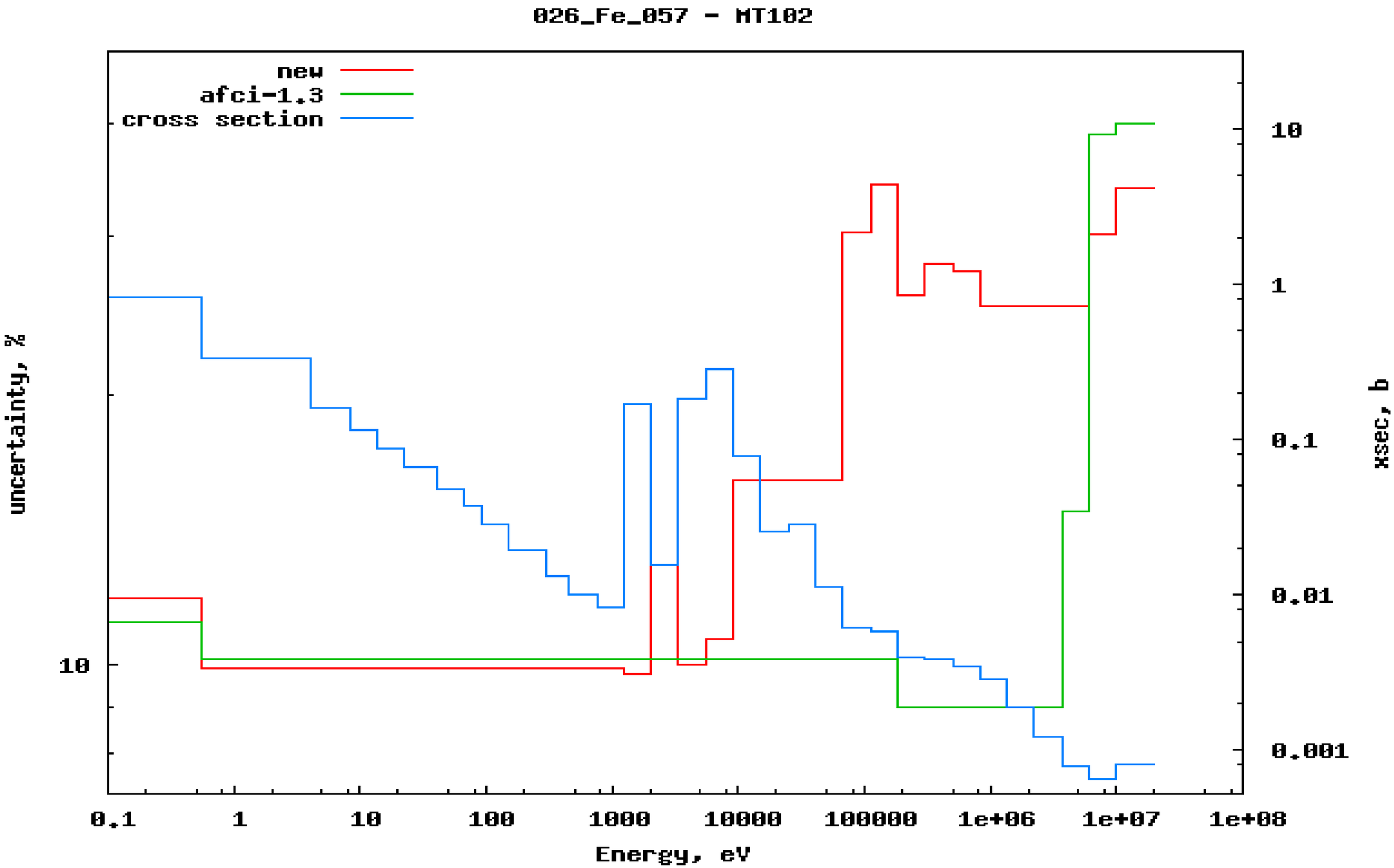
60-Ni capture



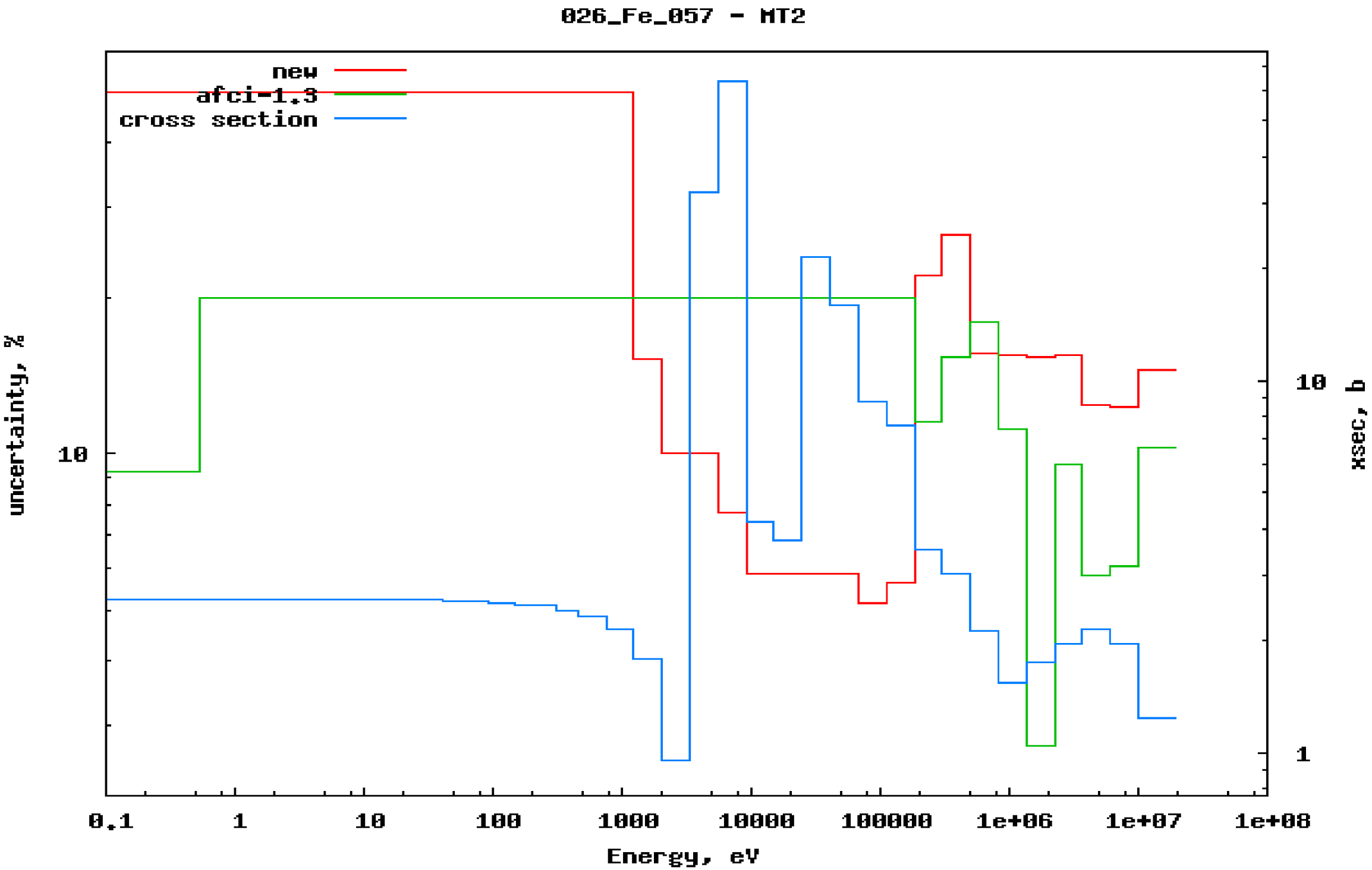
60-Ni elastic



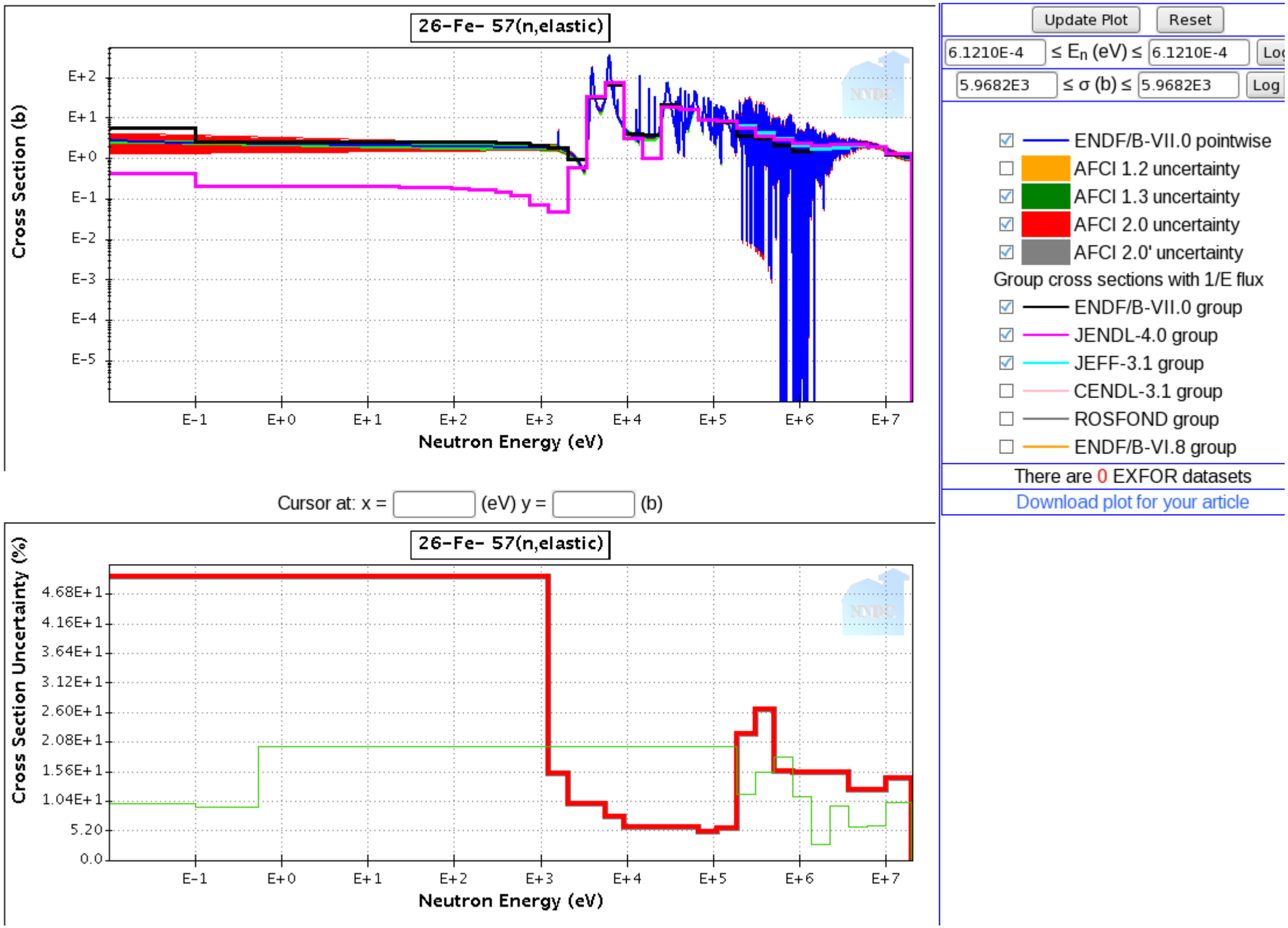
57-Fe capture



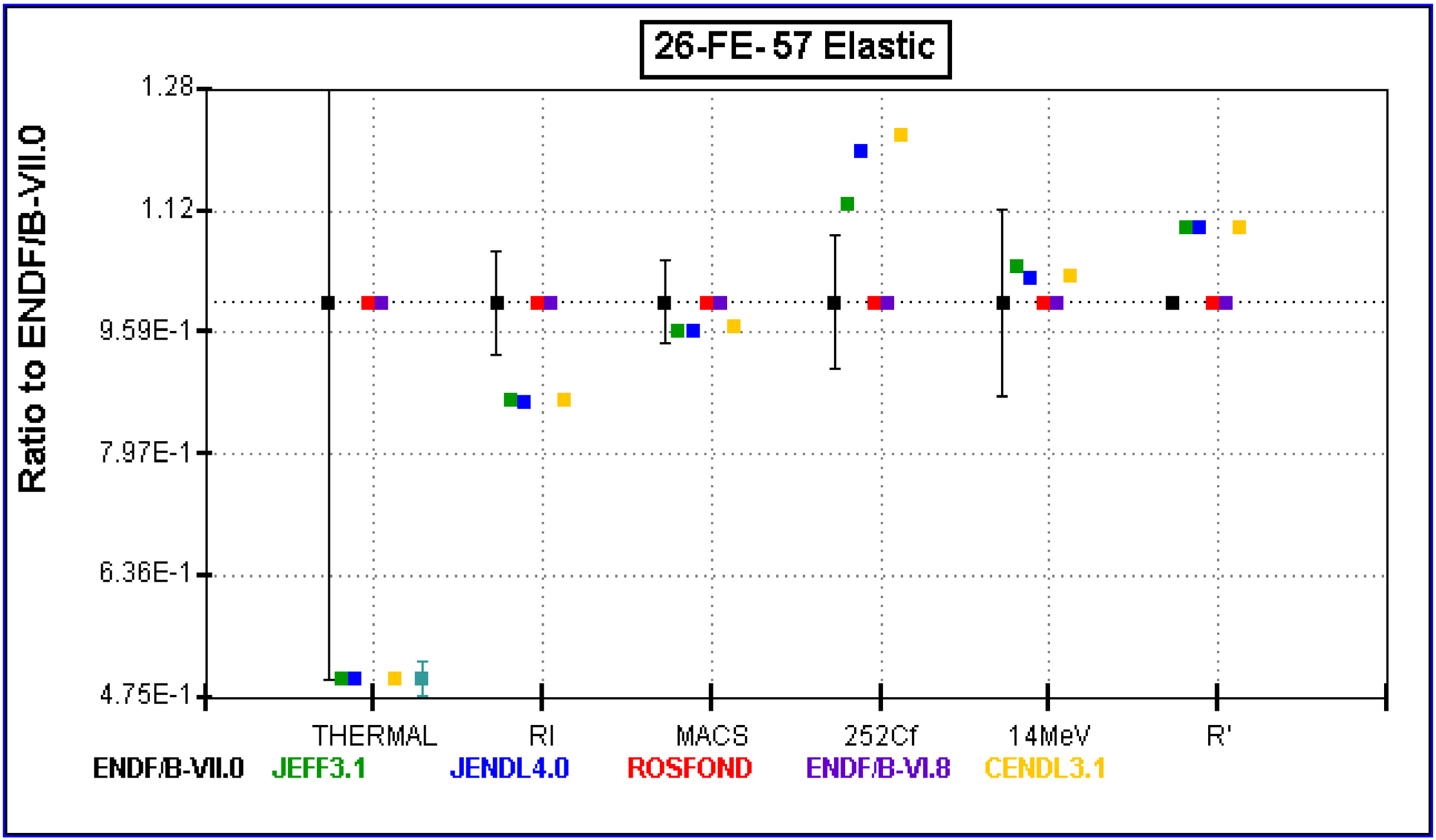
57-Fe elastic



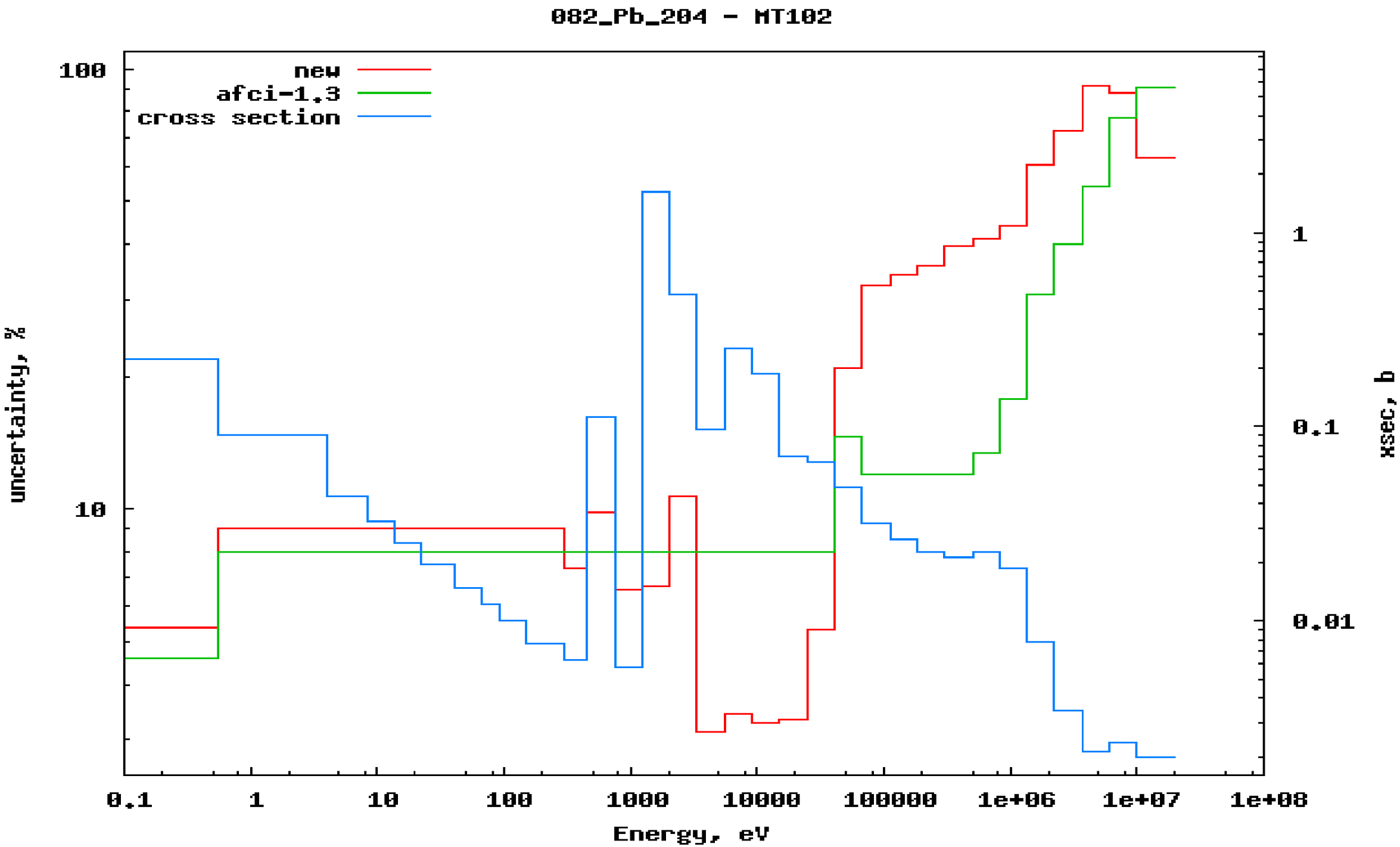
57-Fe elastic QA



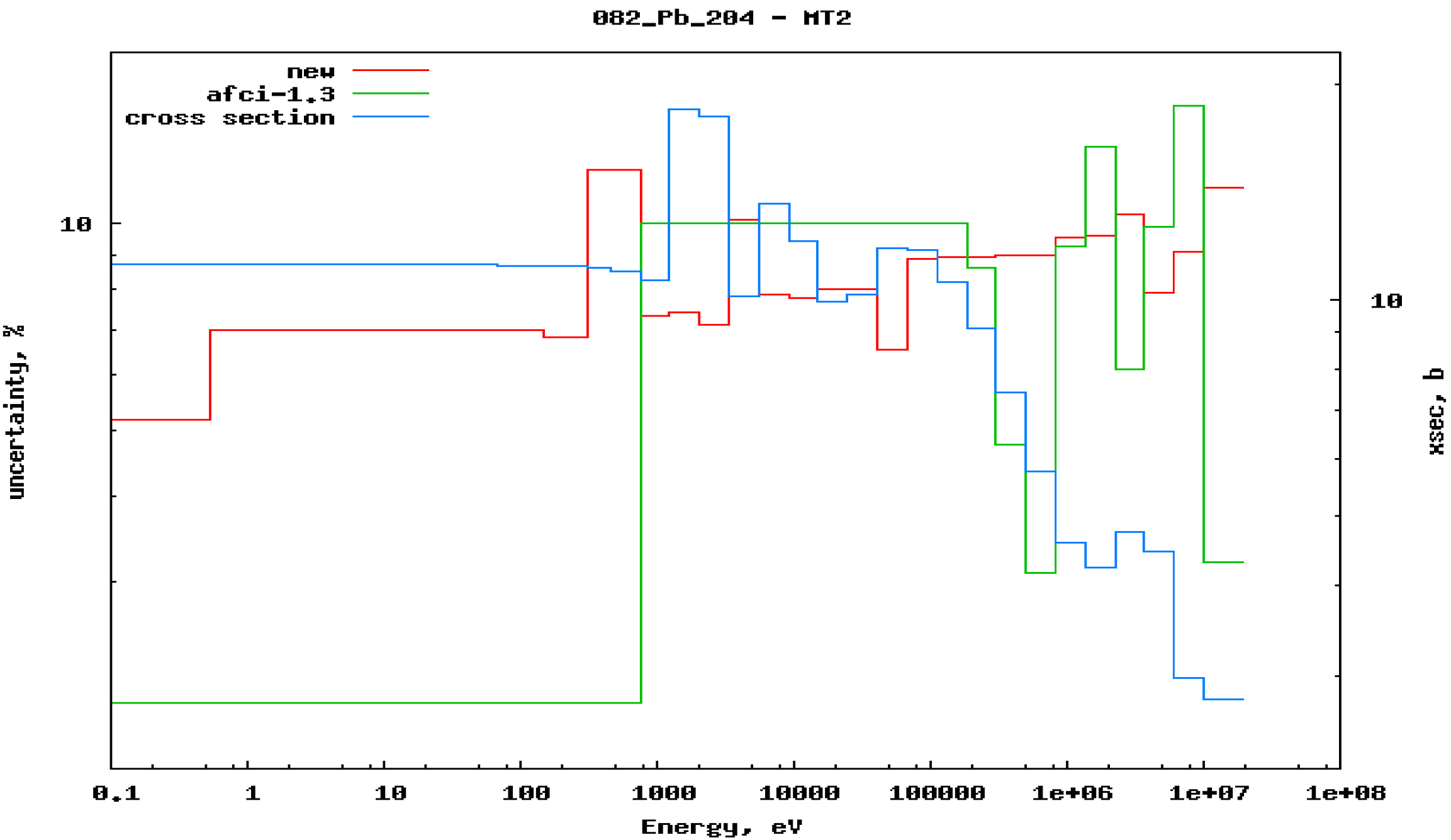
57-Fe elastic integral QA



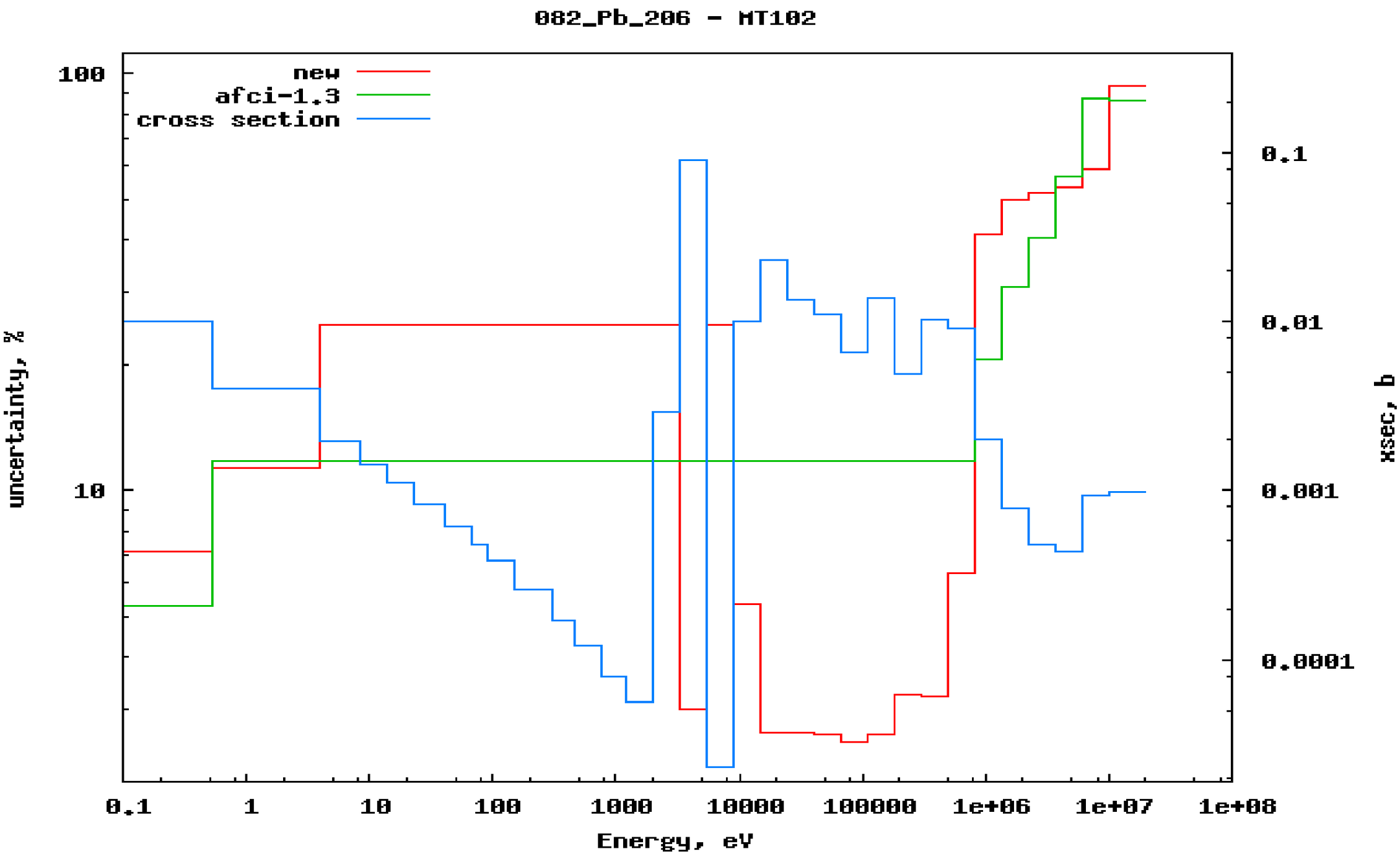
204-Pb capture



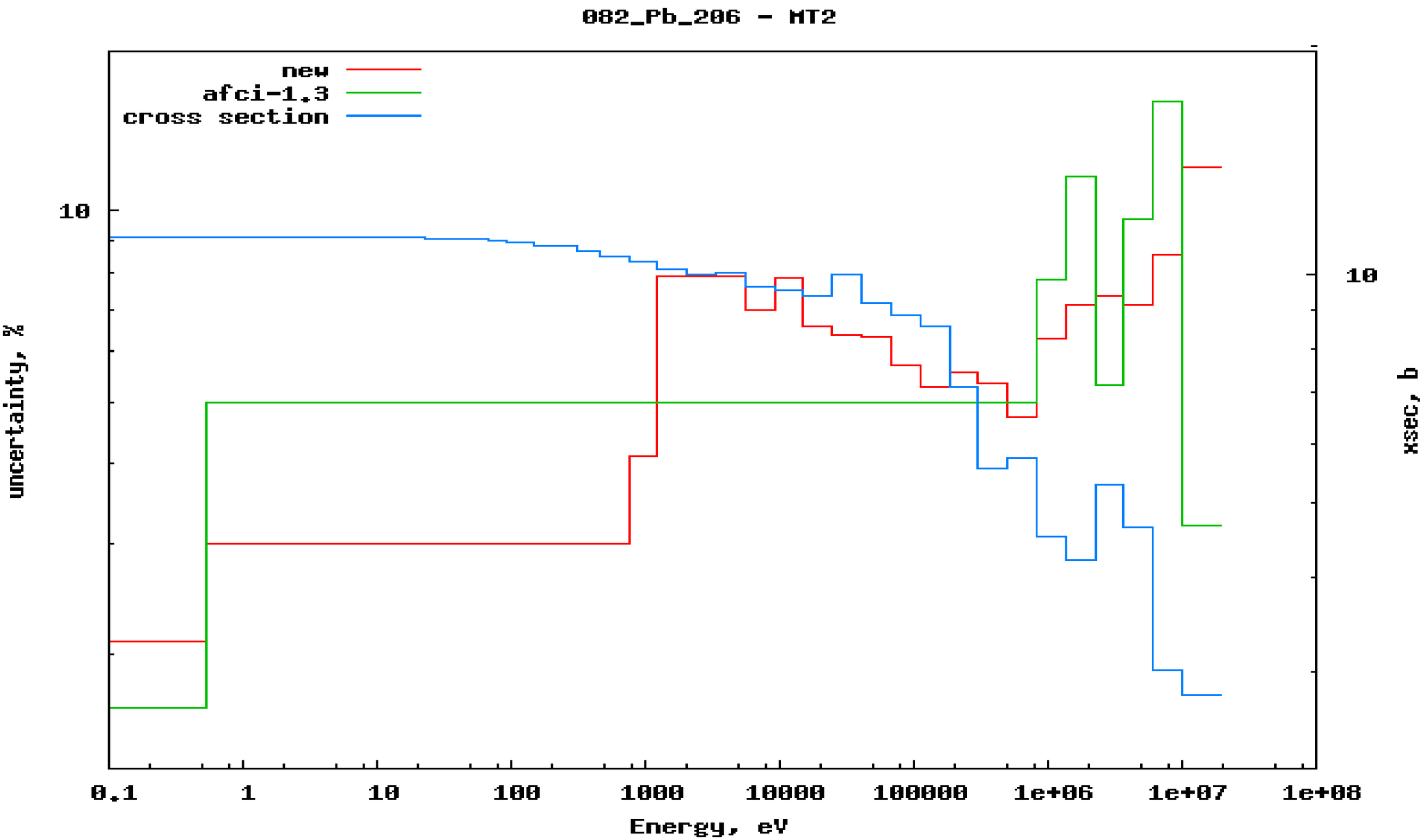
204-Pb elastic



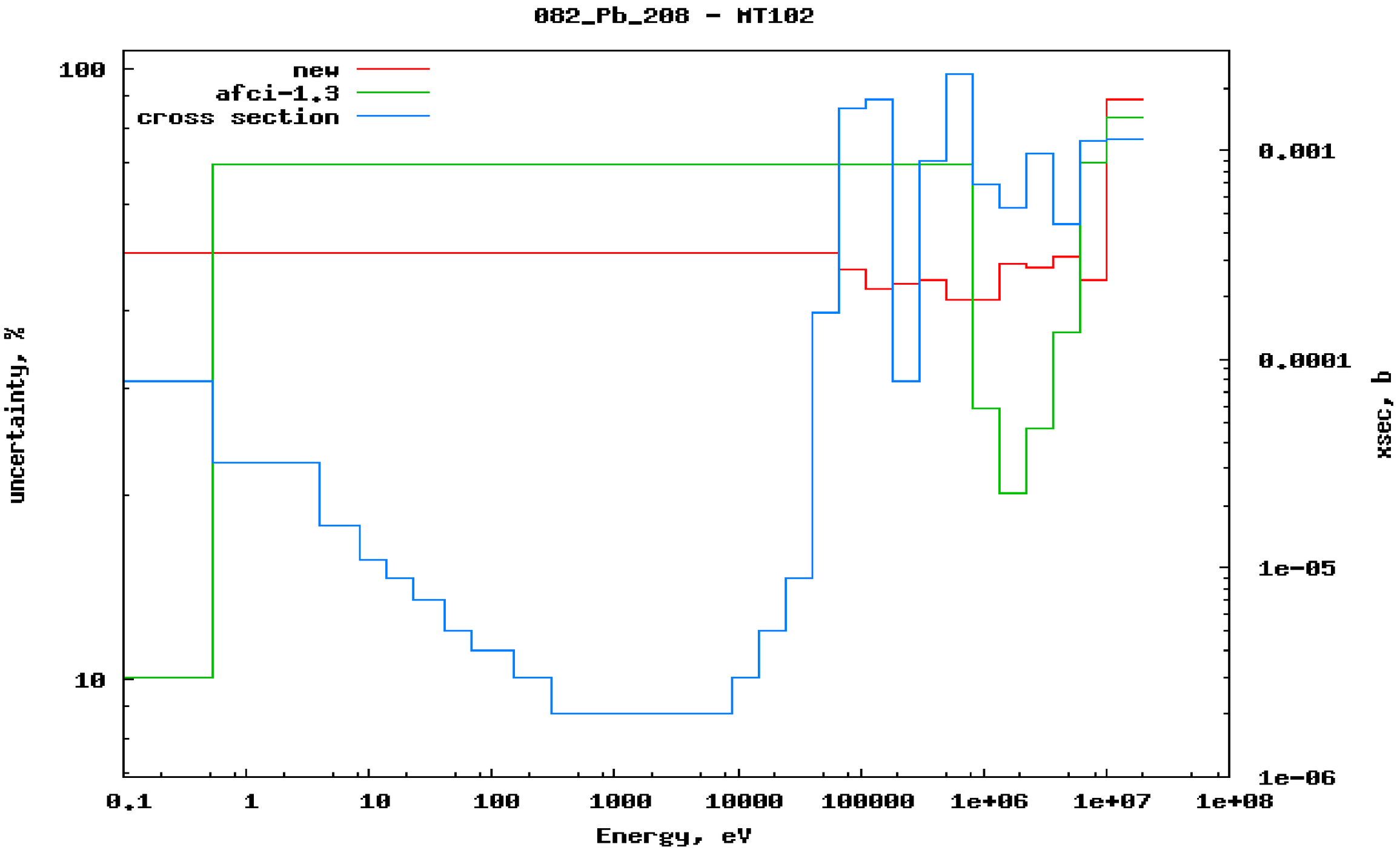
206-Pb capture



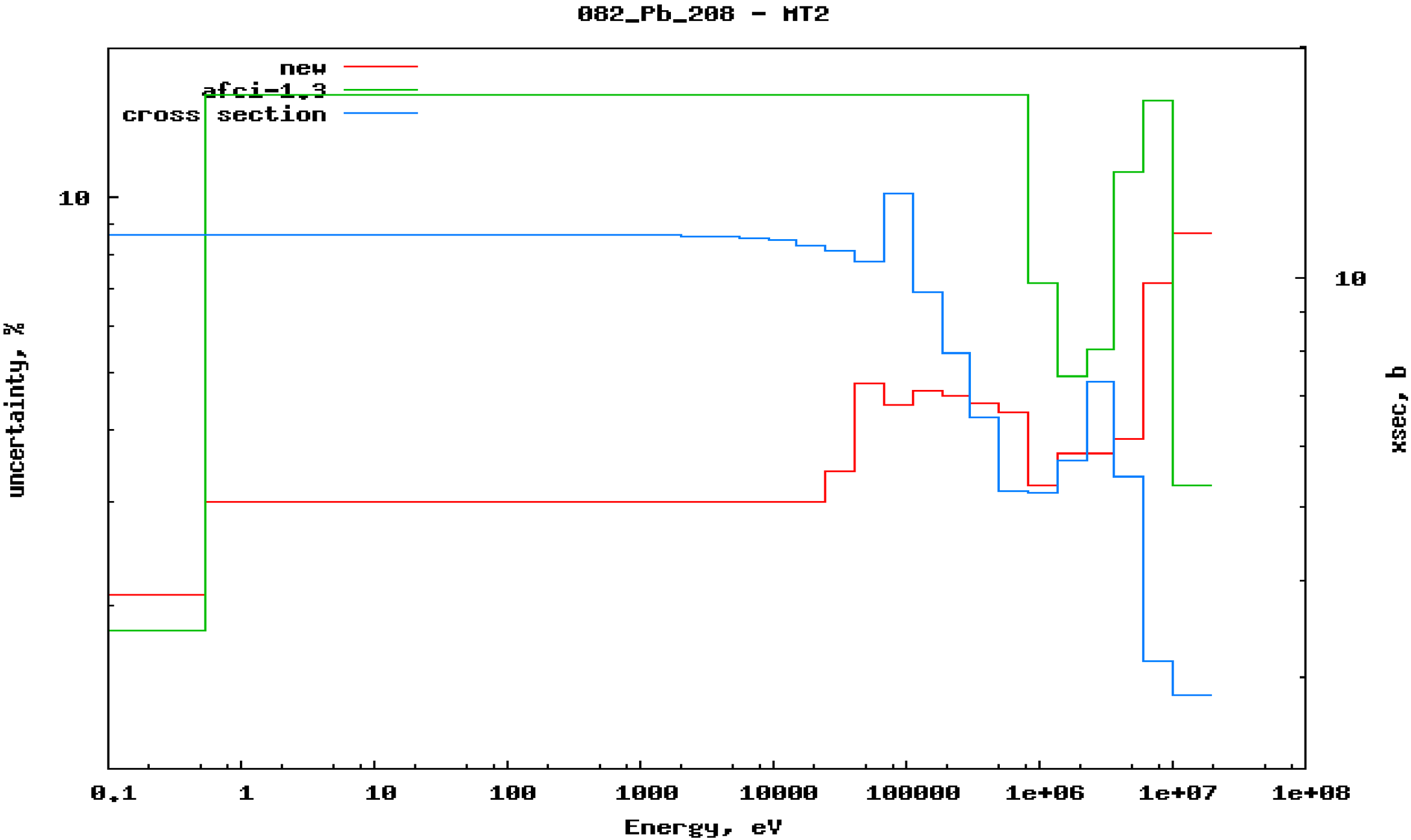
206-Pb elastic



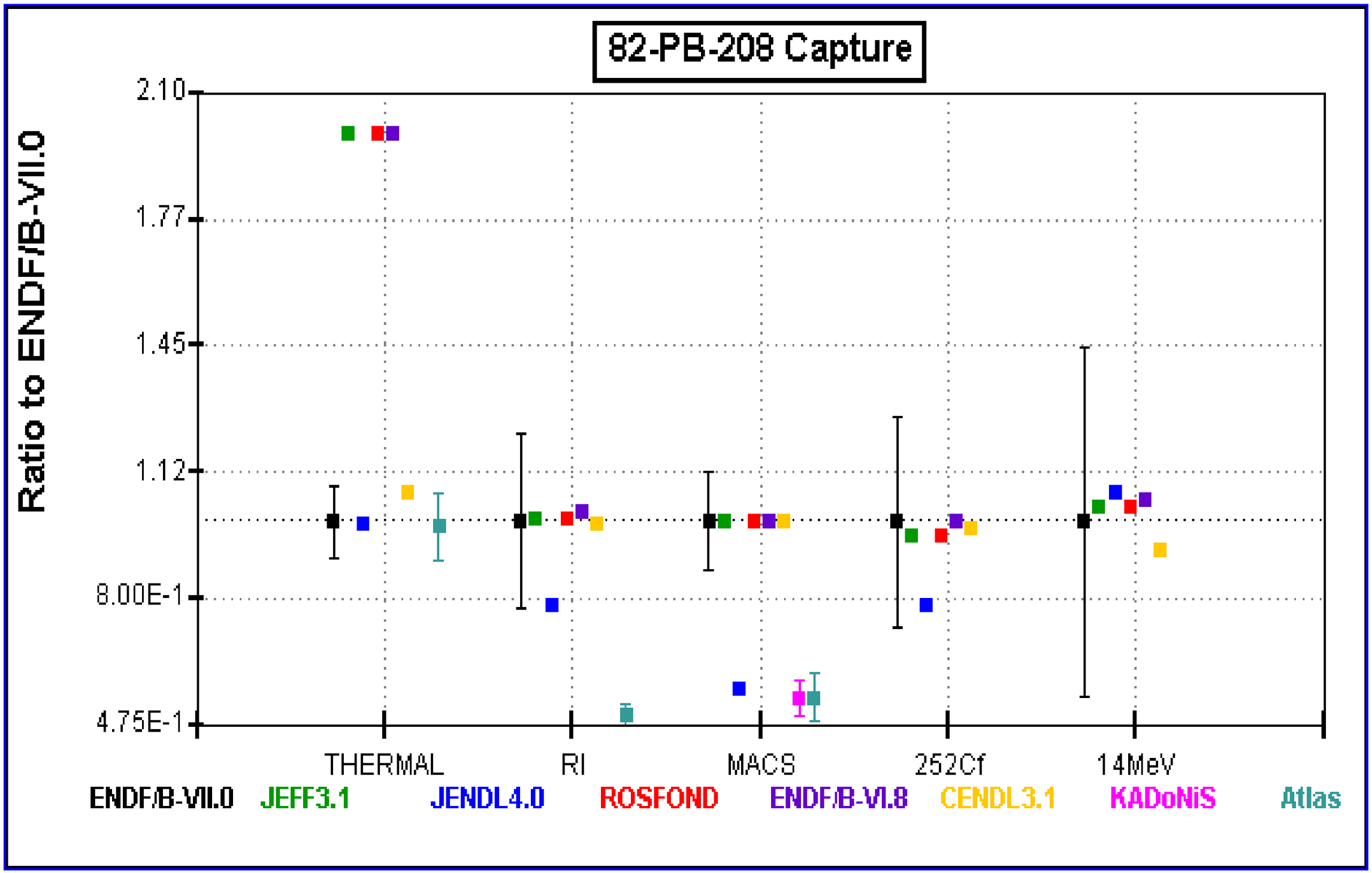
208-Pb capture



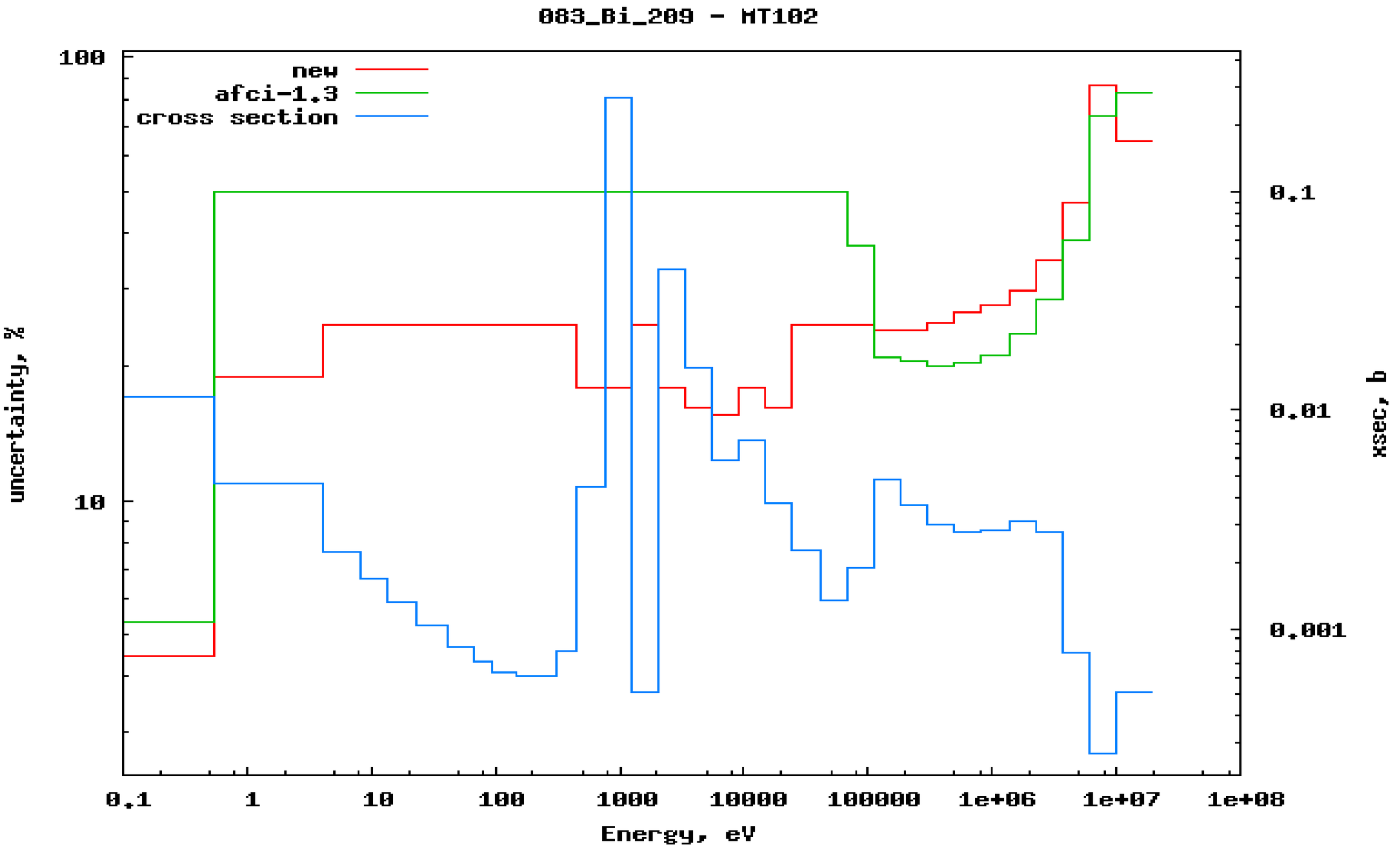
208-Pb elastic



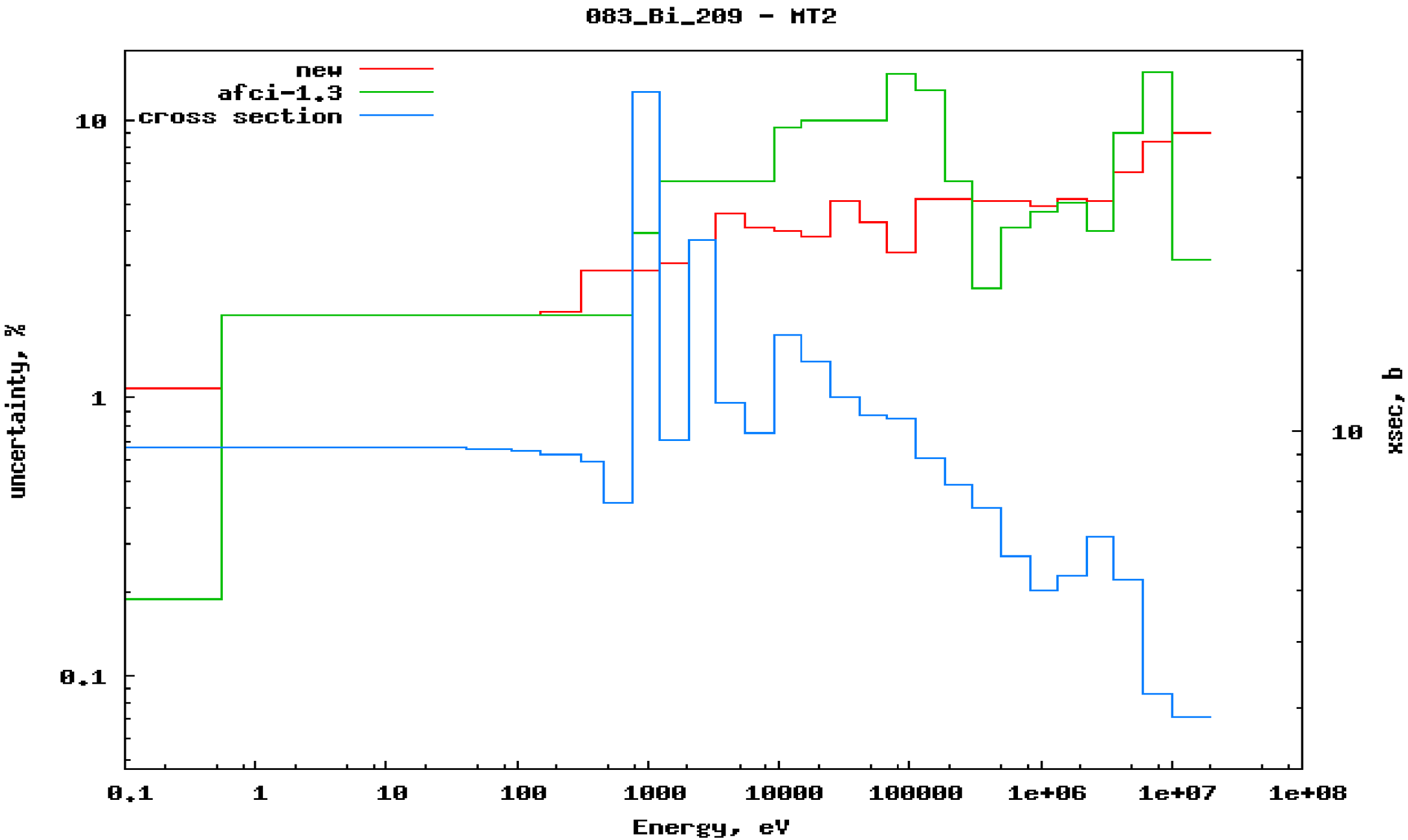
208-Pb capture integral QA



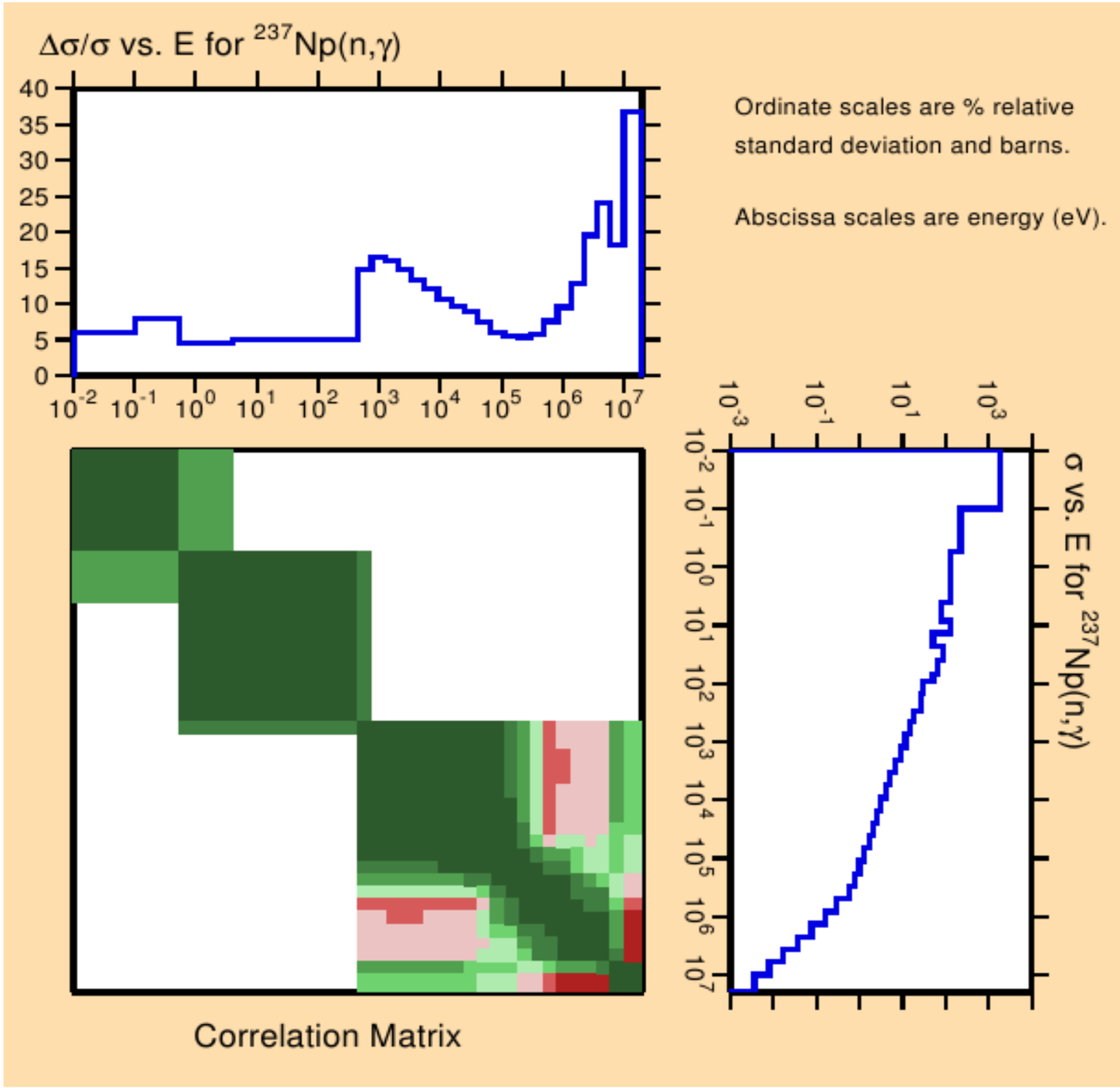
209-Bi capture



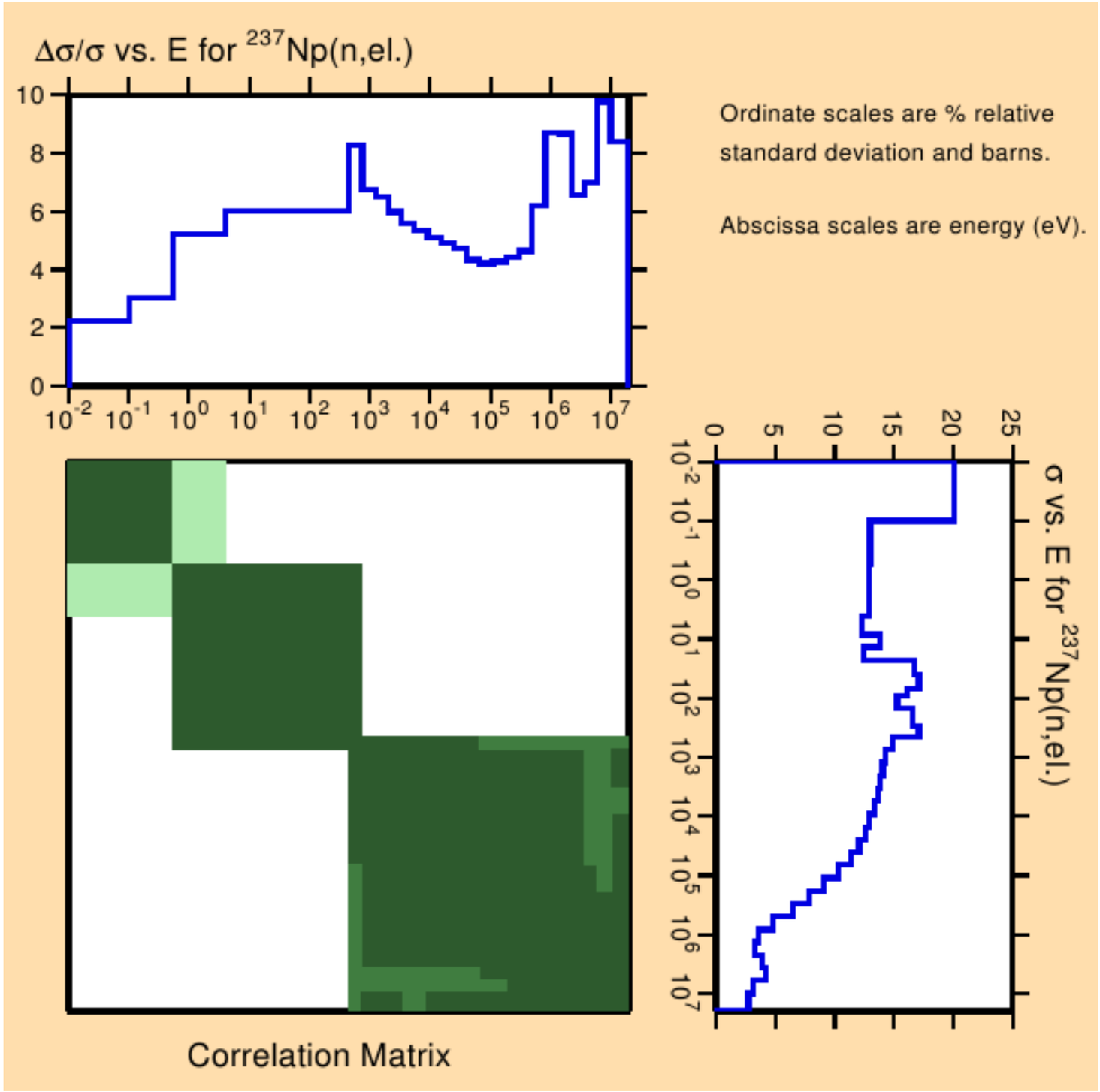
209-Bi elastic



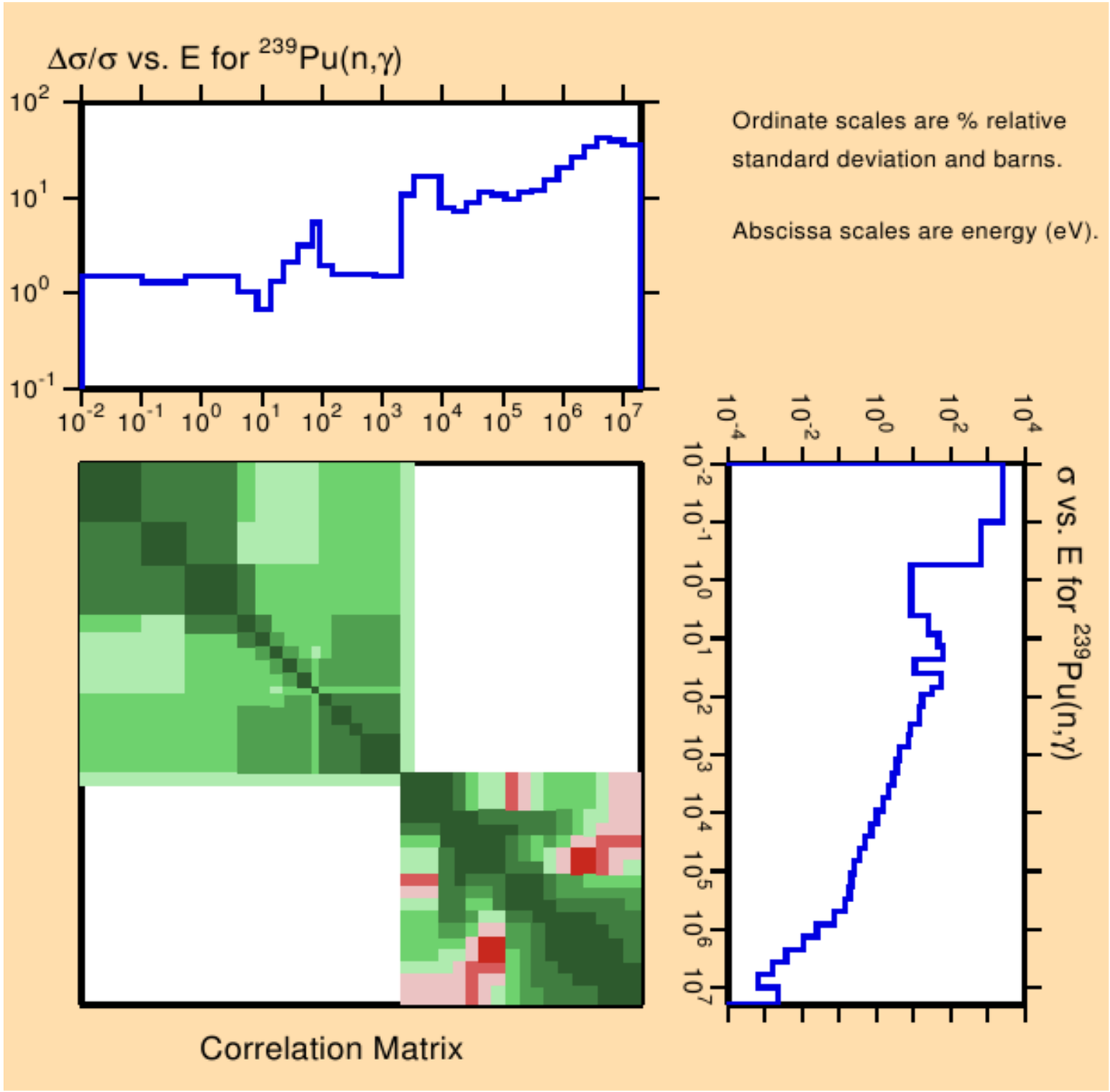
237-Np capture



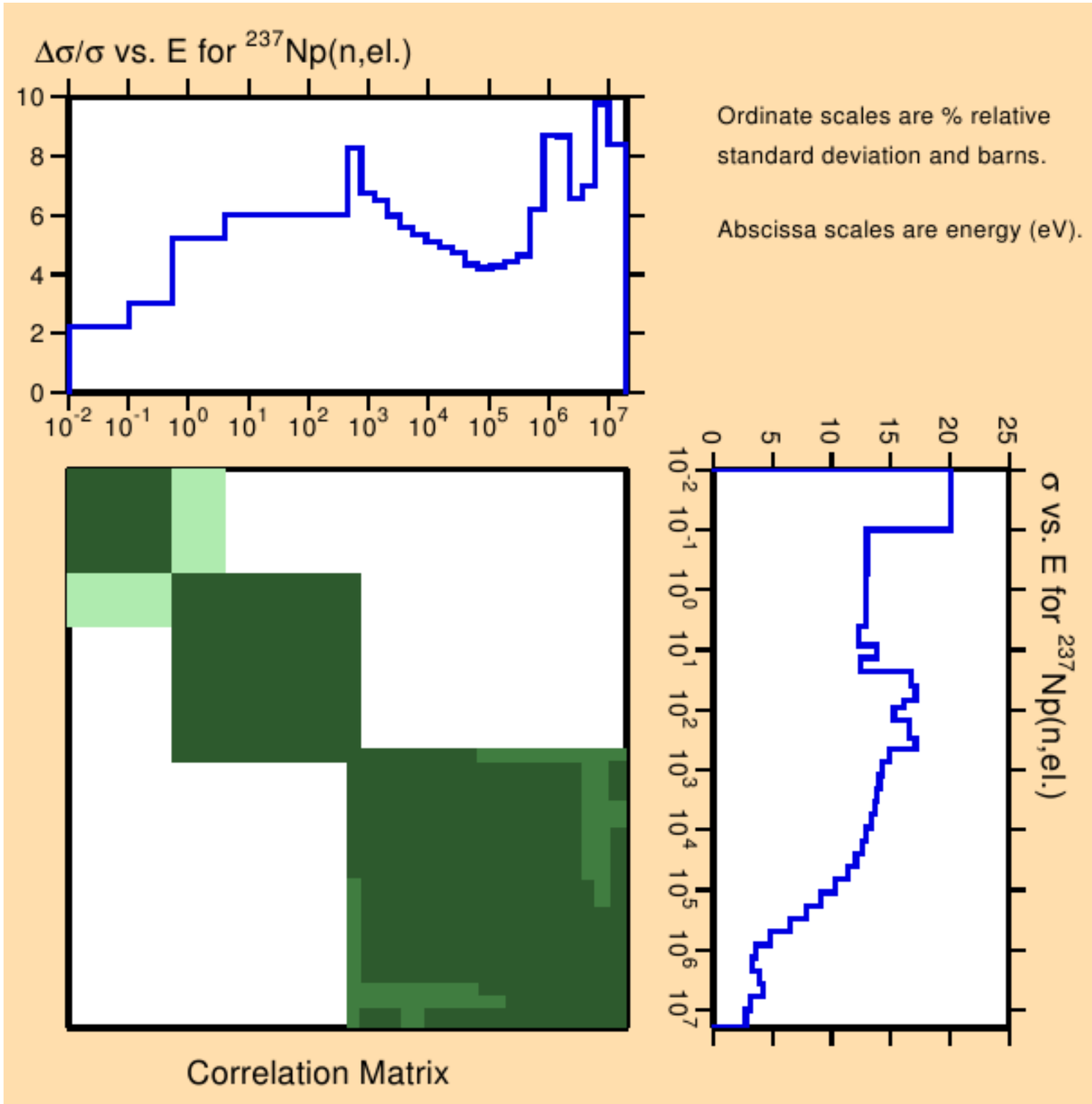
237-Np elastic



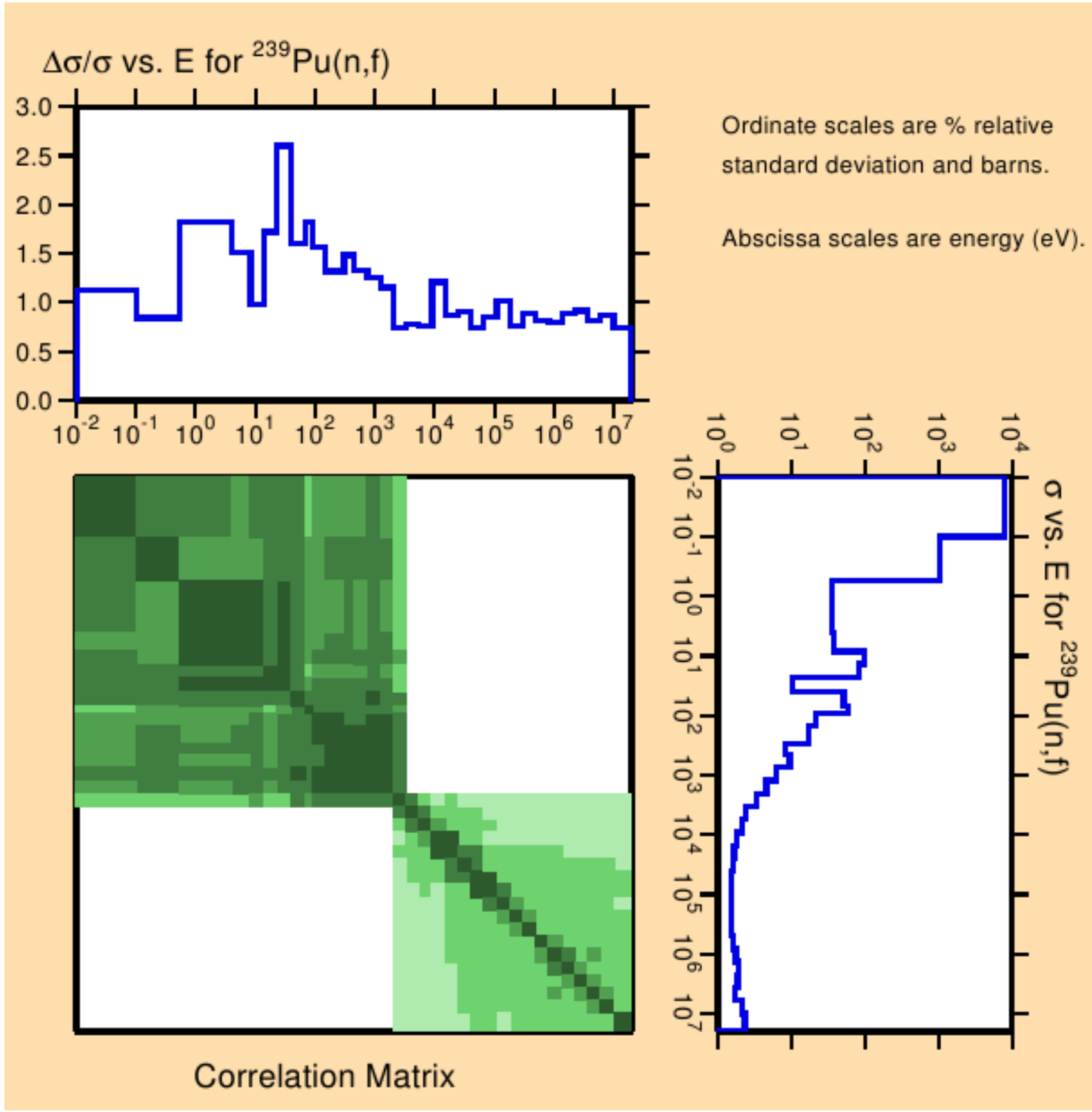
239-Pu capture (LANL)



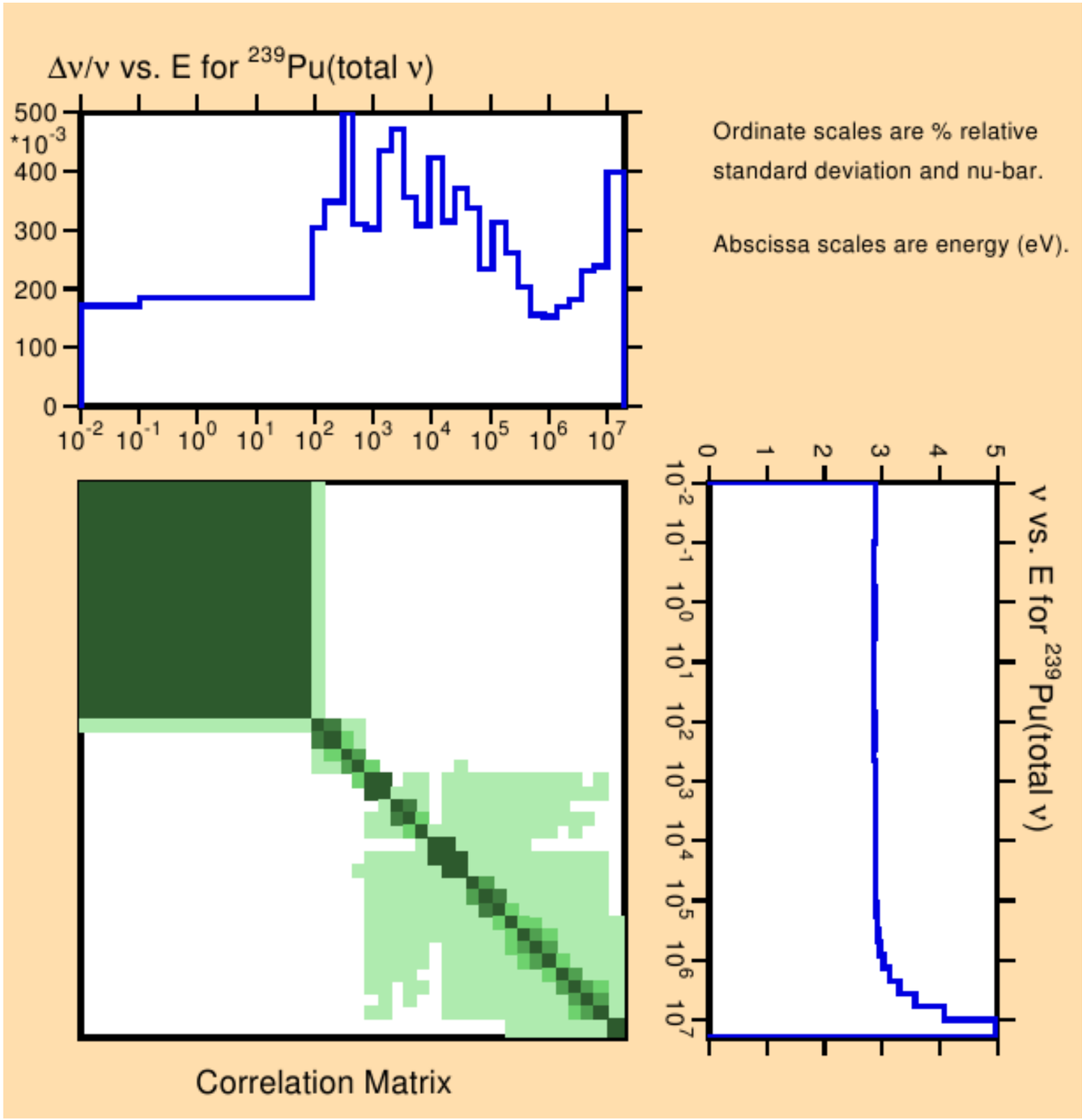
239-Pu elastic (LANL)



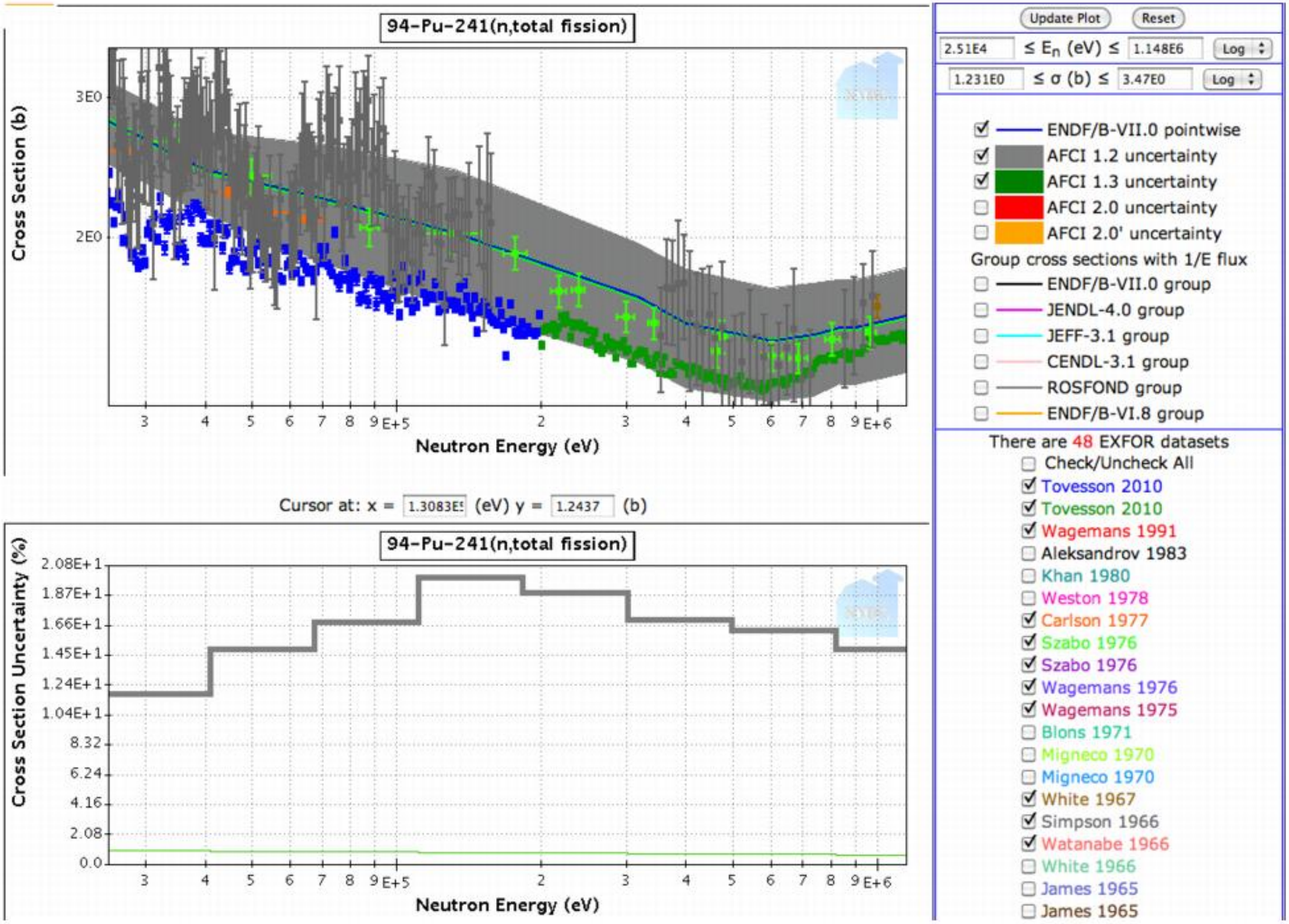
239-Pu fission (LANL)



239-Pu nubar (LANL)



241-Pu fission (LANL)



Summary

AFCI-2.0β covariance library released Oct 2010.
Final release planned for Dec 2010.

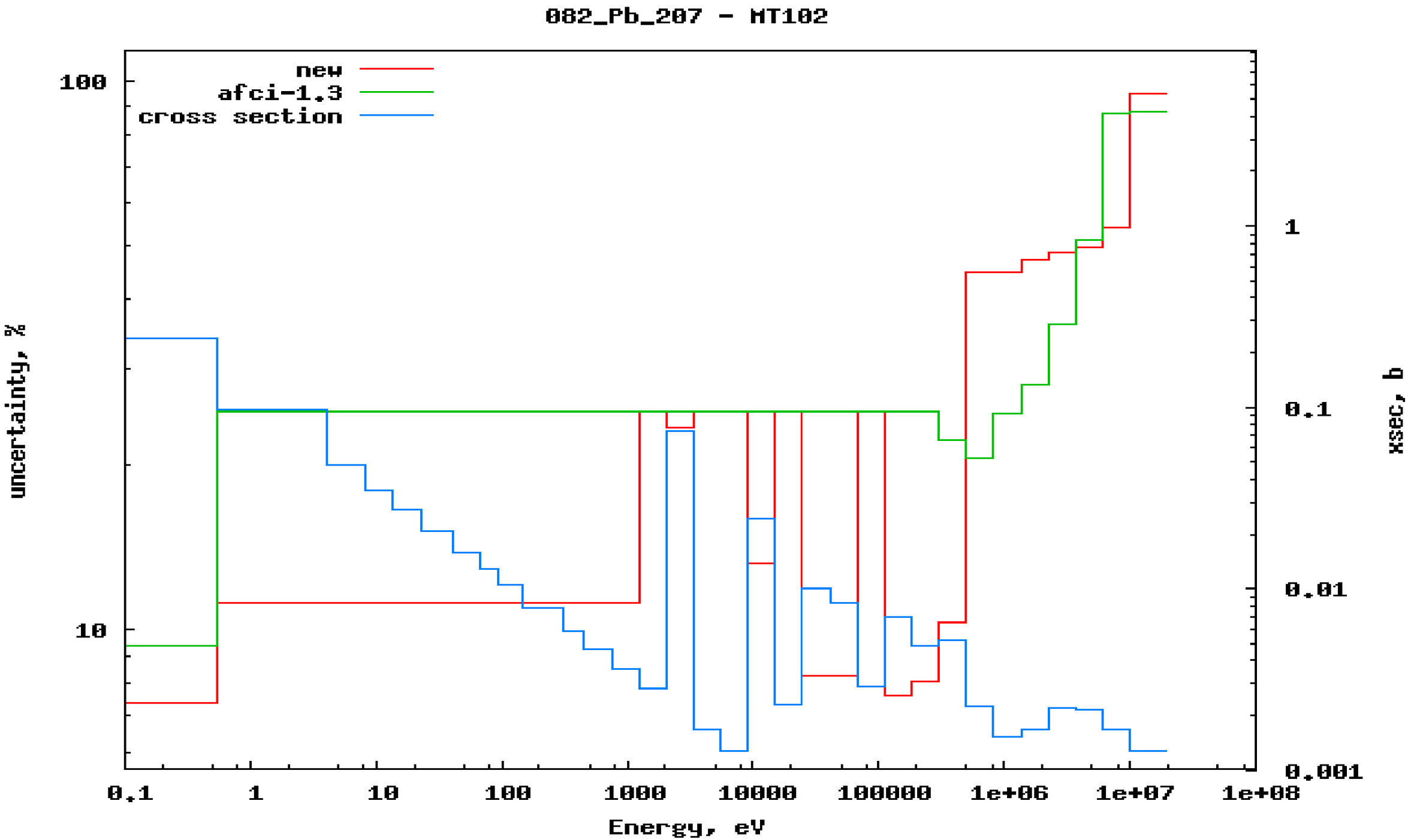
Files being tested using Sigma-QA and unCor procedures for quality assurance.

Active user community (ANL,INL) provides valuable feedback; feedback expected from WPEC-SG33 international data adjustment

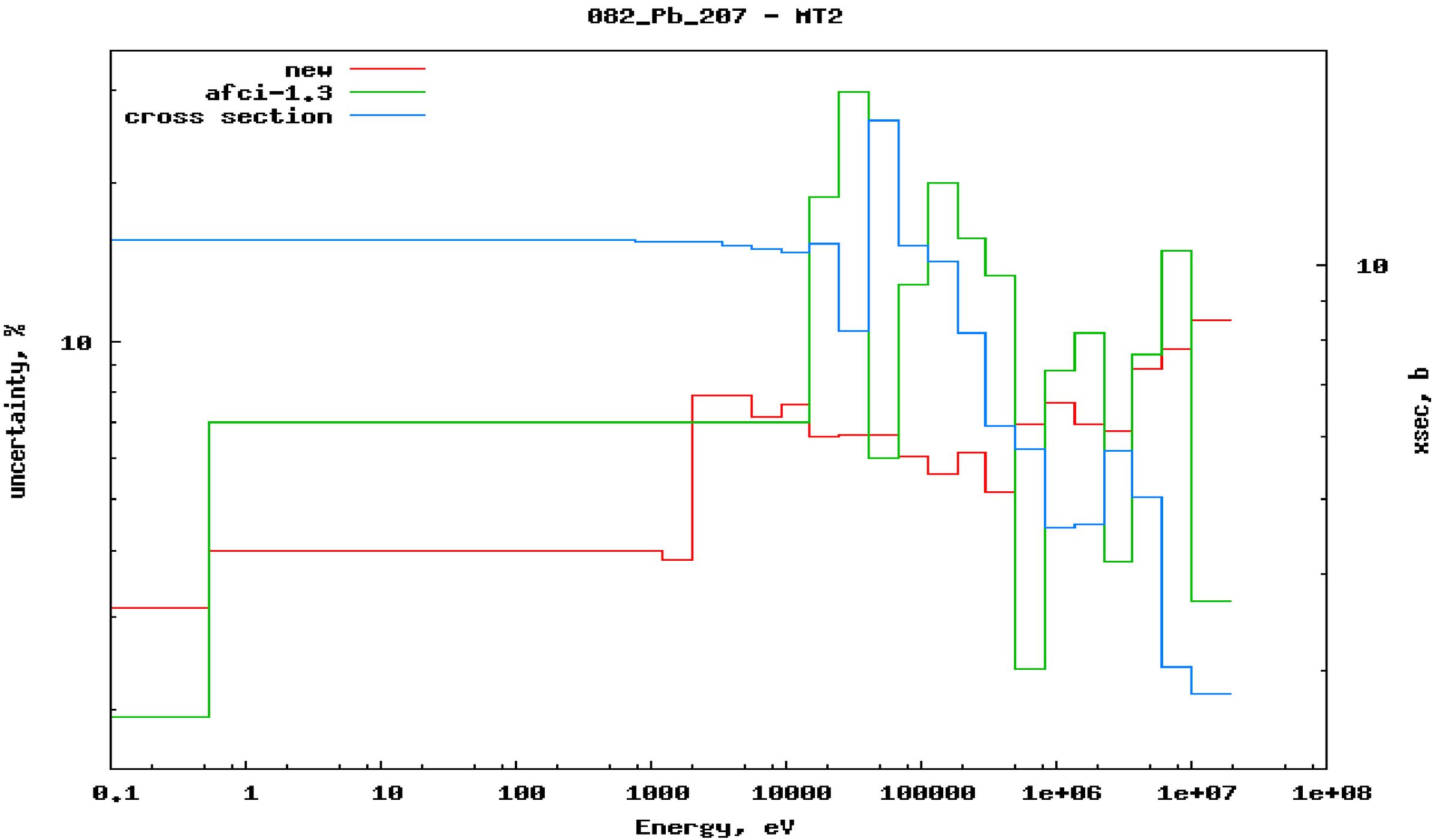
Many AFCI covariance files should make it into ENDF/B-VII.1 library

extras

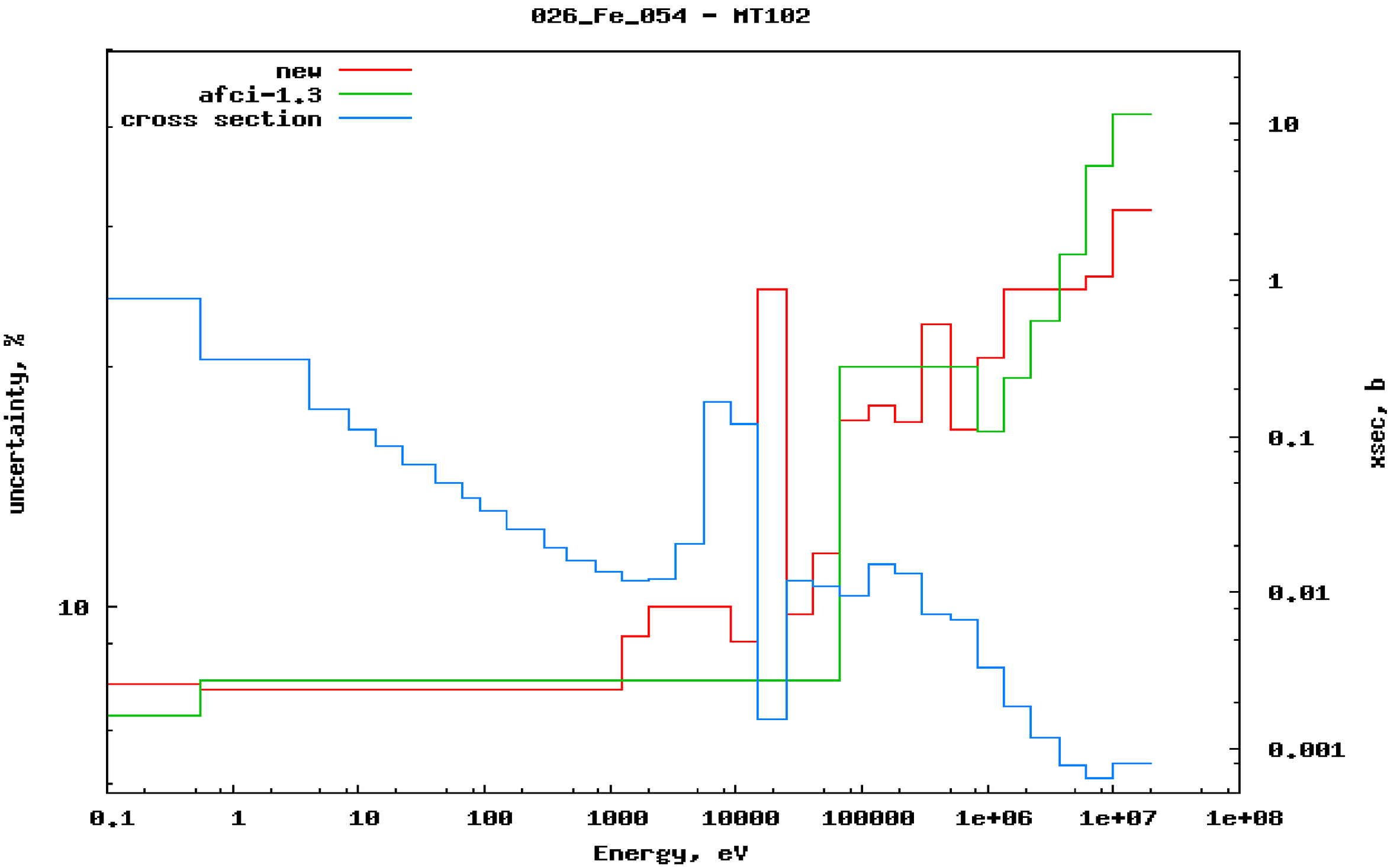
207-Pb capture



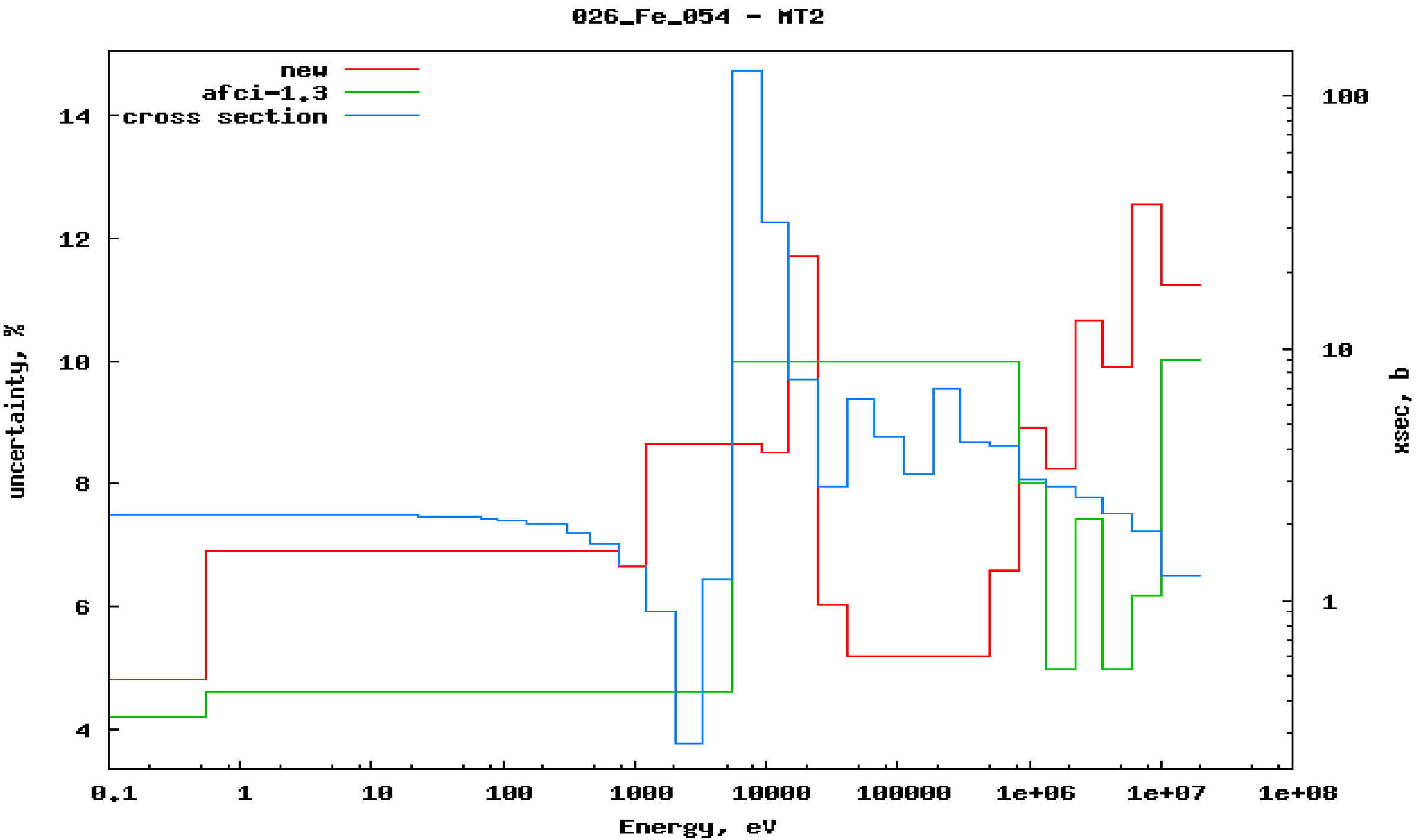
207-Pb elastic



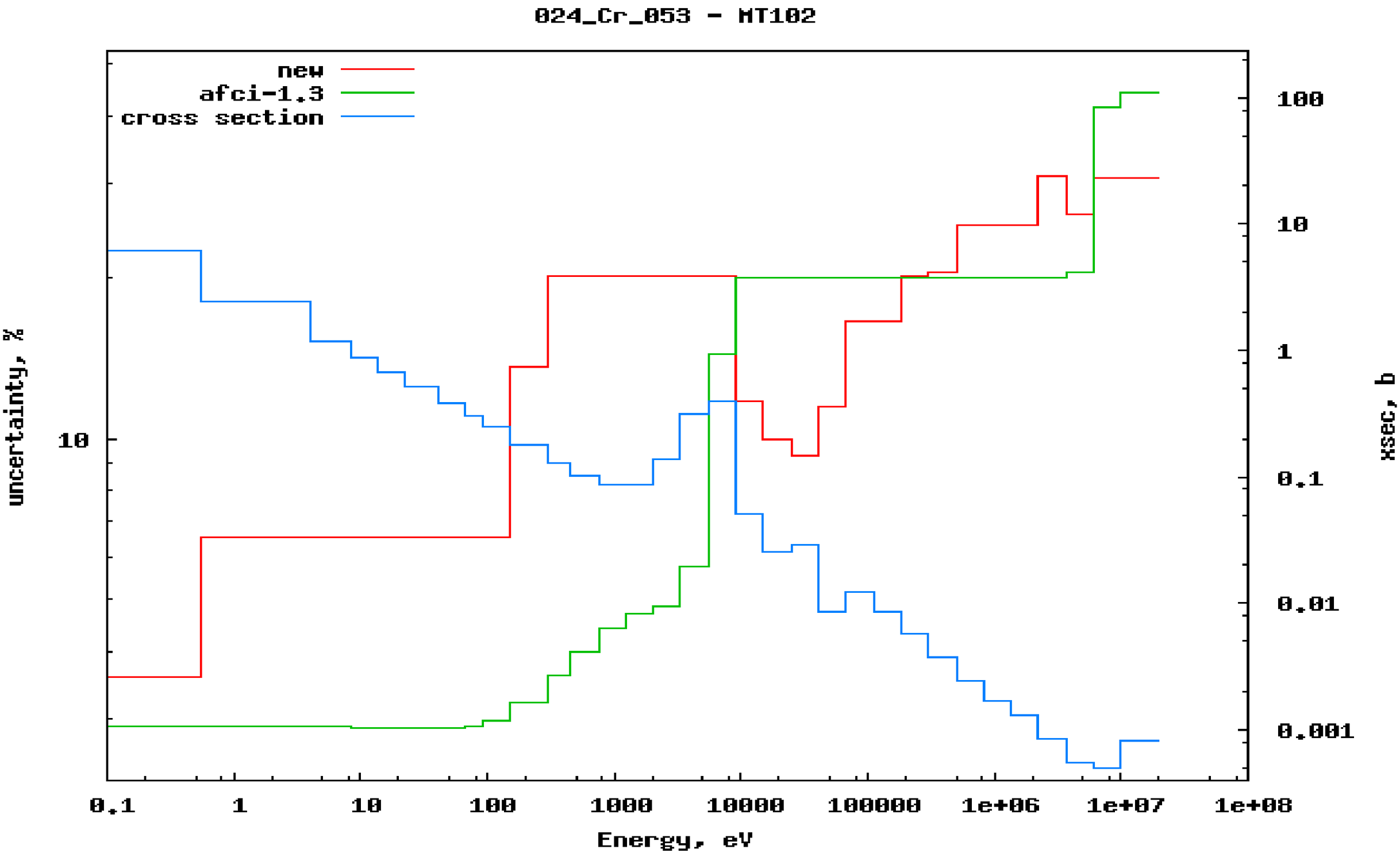
54-Fe capture



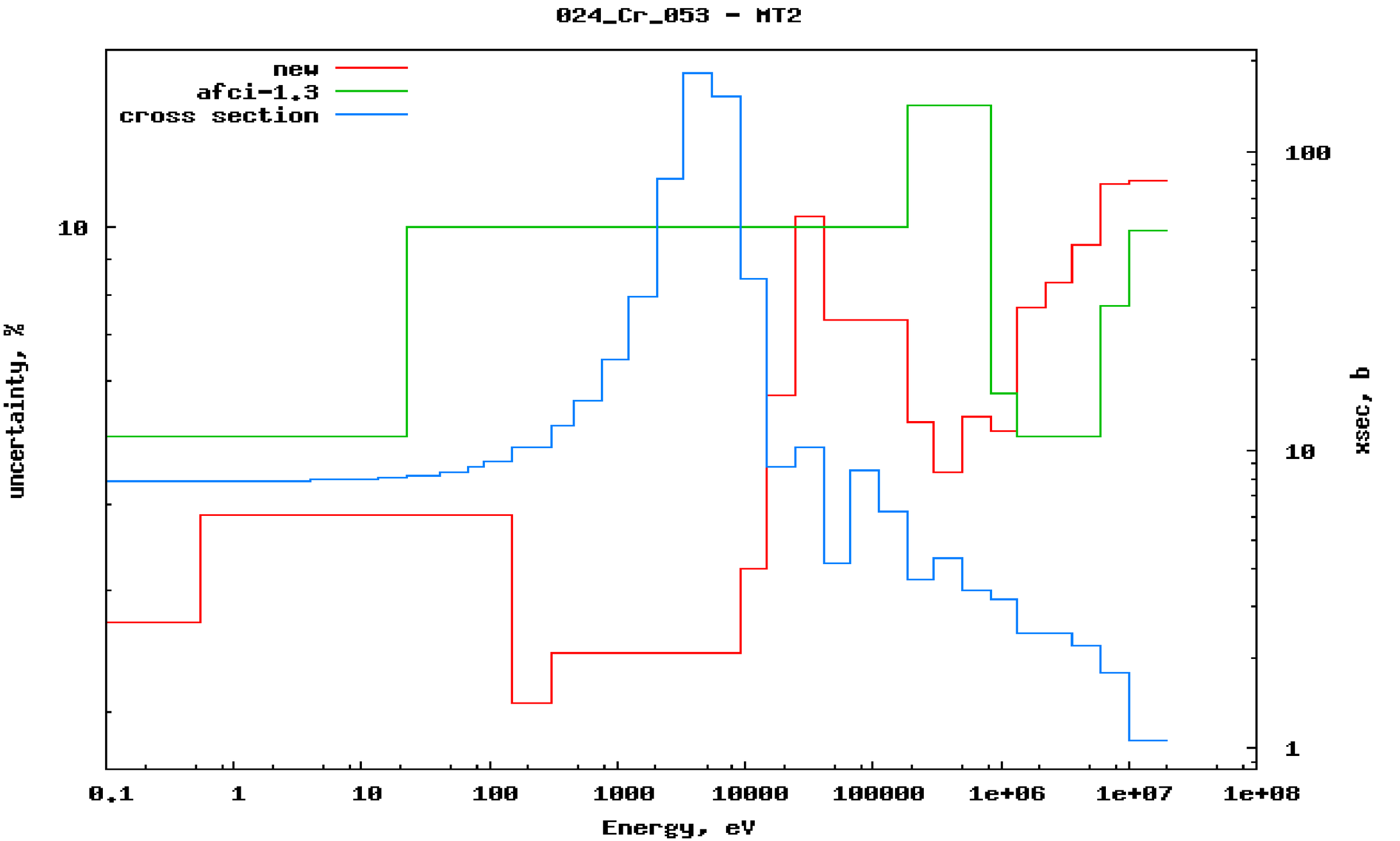
54-Fe elastic



53-Cr capture



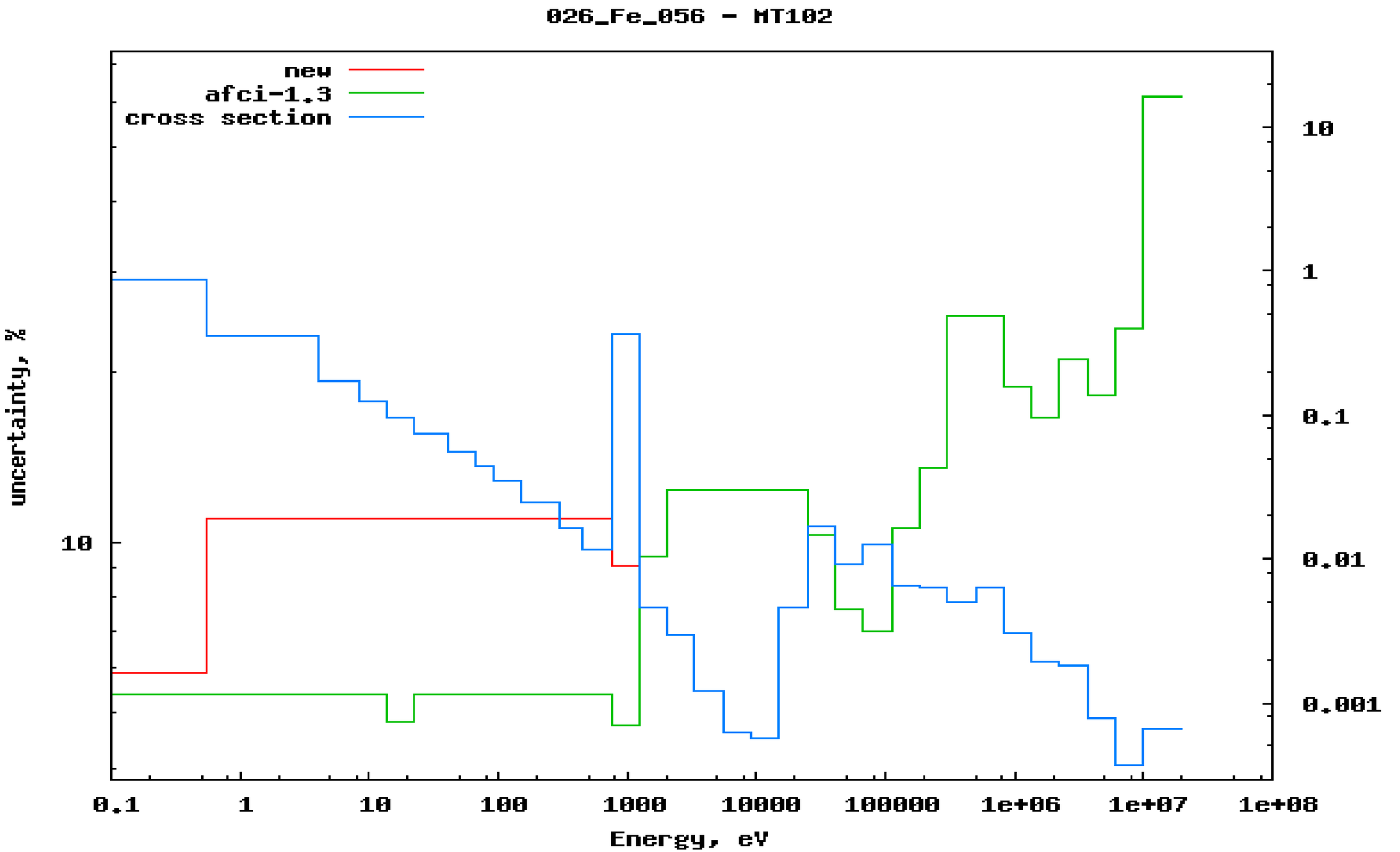
53-Cr elastic



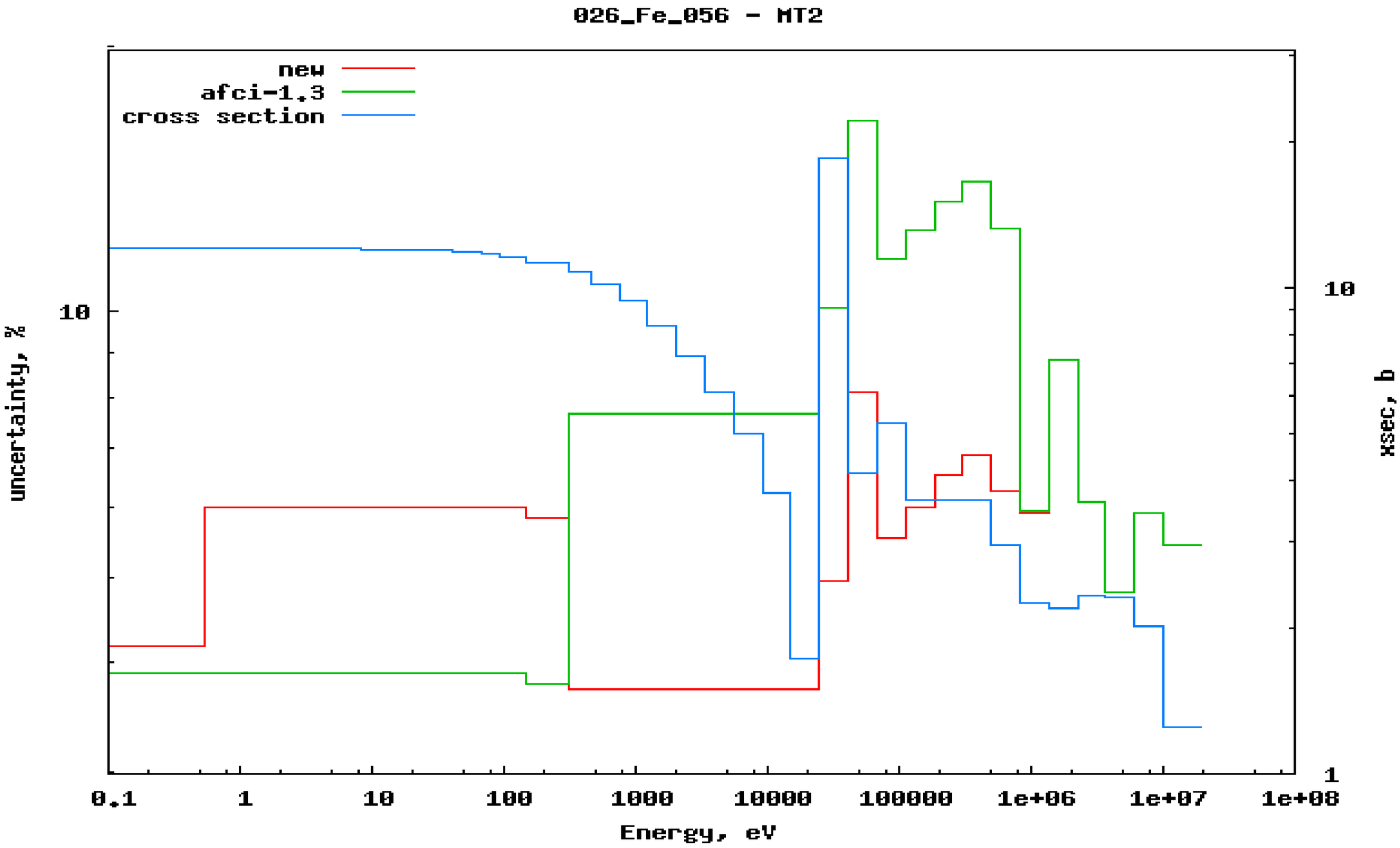
57-Fe elastic integral QA

Elastic						
Library	THERMAL	RI 0.5-2E+7 eV	MACS 30 keV	^{252}Cf	14 MeV	R' (fm)
ENDF/B-VII.0	2.619	1.102E+2	1.484E+1	2.195	1.212	5.899
JEFF3.1	2.039E-1	9.585E+1	1.431E+1	2.482	1.270	6.500
JENDL4.0	2.039E-1	9.566E+1	1.430E+1	2.640	1.254	6.500
ROSFOND	2.619	1.102E+2	1.484E+1	2.195	1.212	5.899
ENDF/B-VI.8	2.619	1.102E+2	1.484E+1	2.195	1.212	5.899
CENDL3.1	2.097E-1	9.585E+1	1.438E+1	2.681	1.255	6.500
Atlas	6.800E-1					
Atlas Δ	6.000E-2 8.82%					
AFCI2.0 Δ	1.309 4.99E+1%	7.553 6.85%	8.225E-1 5.54%	1.945E-1 8.86%	1.496E-1 1.23E+1%	
Recommended Δ	1.539 5.87E+1%					

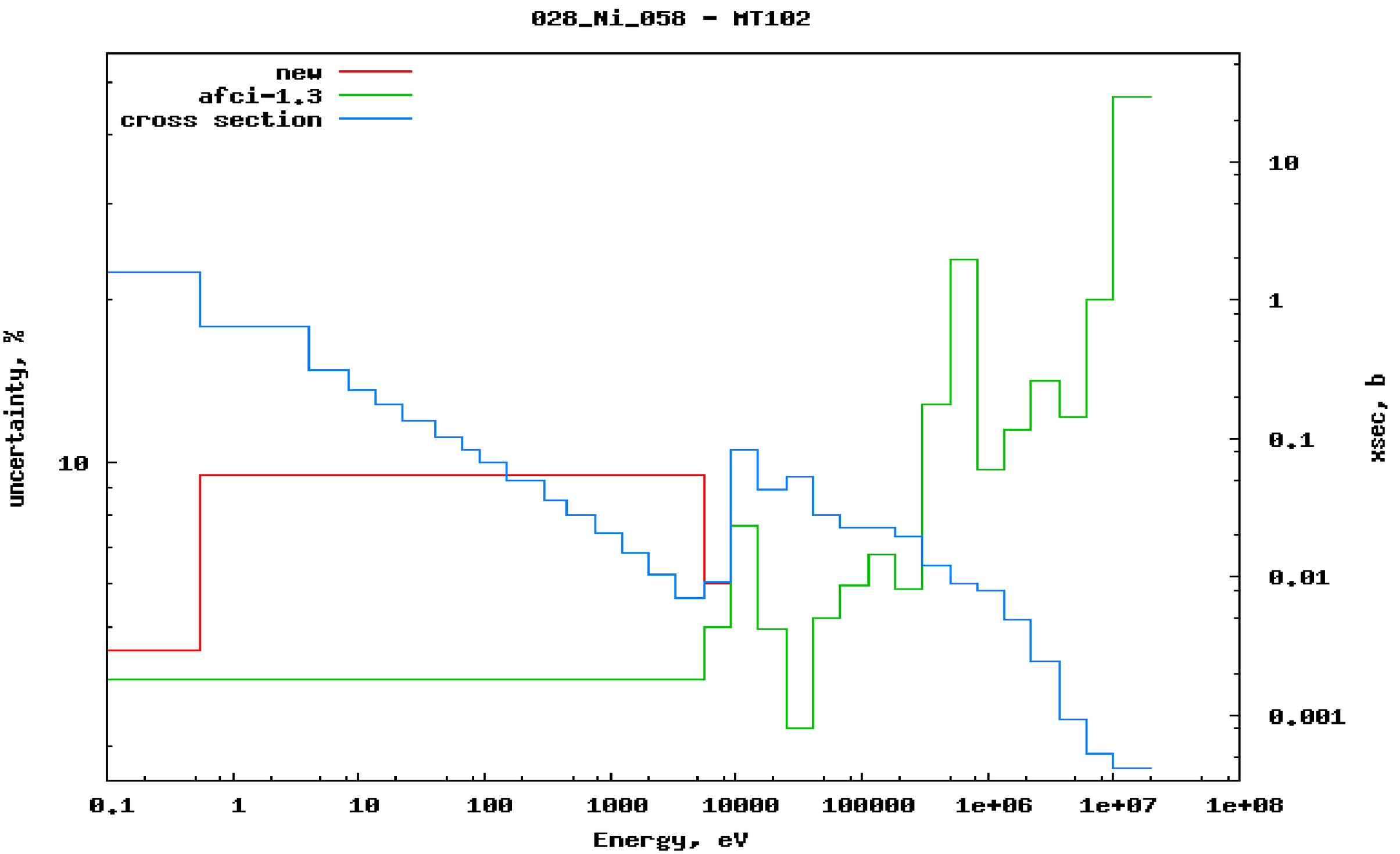
56-Fe capture



56-Fe elastic



58-Ni capture



58-Ni elastic