

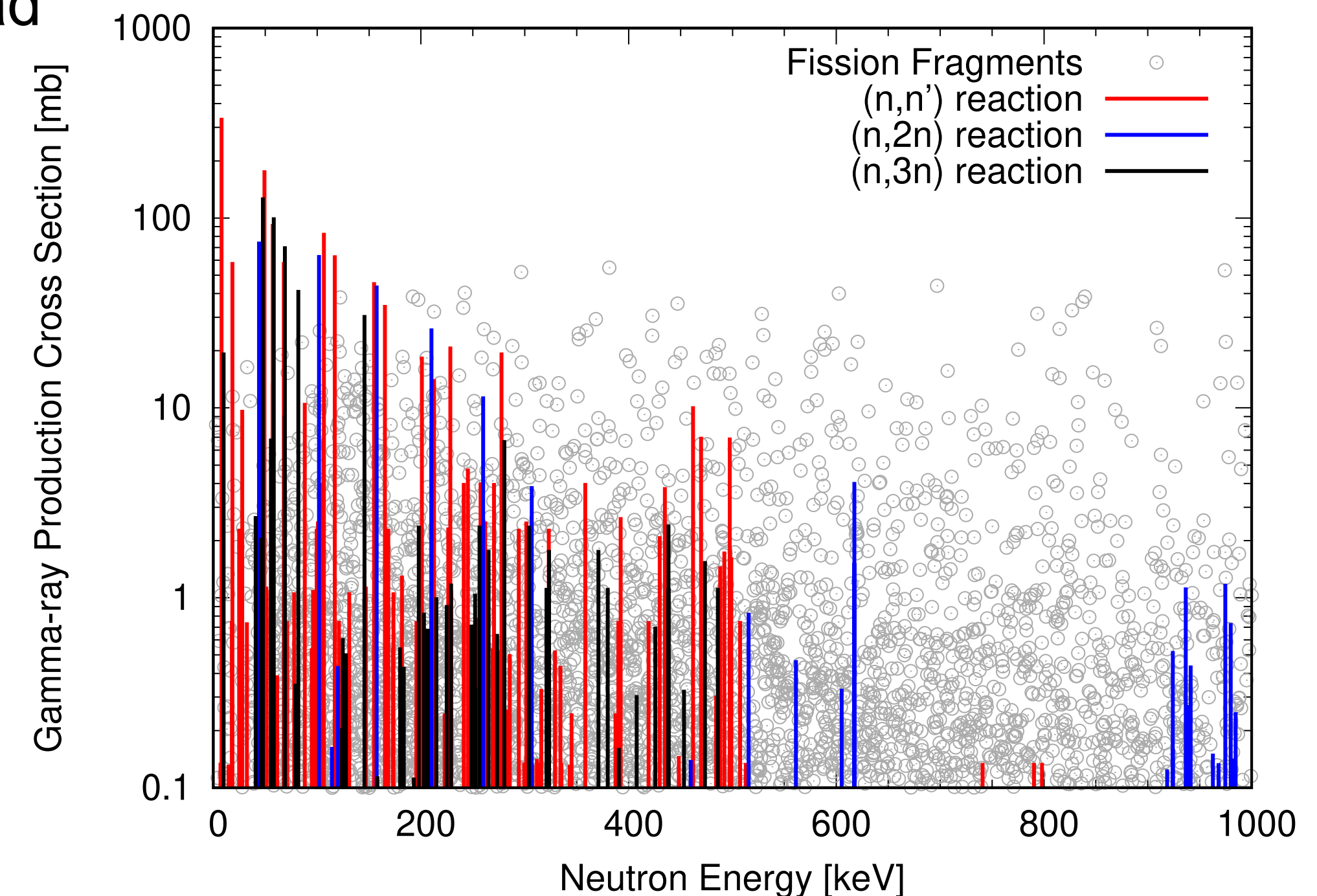


Updating GEANIE Experimental Data by Evaluated Fission Product Yields, and Los Alamos CoH-based Evaluation (LACE) Framework

T. Kawano, A.E. Lovell
T-2, LANL

Test of Evaluated FPY Data at Higher Energies

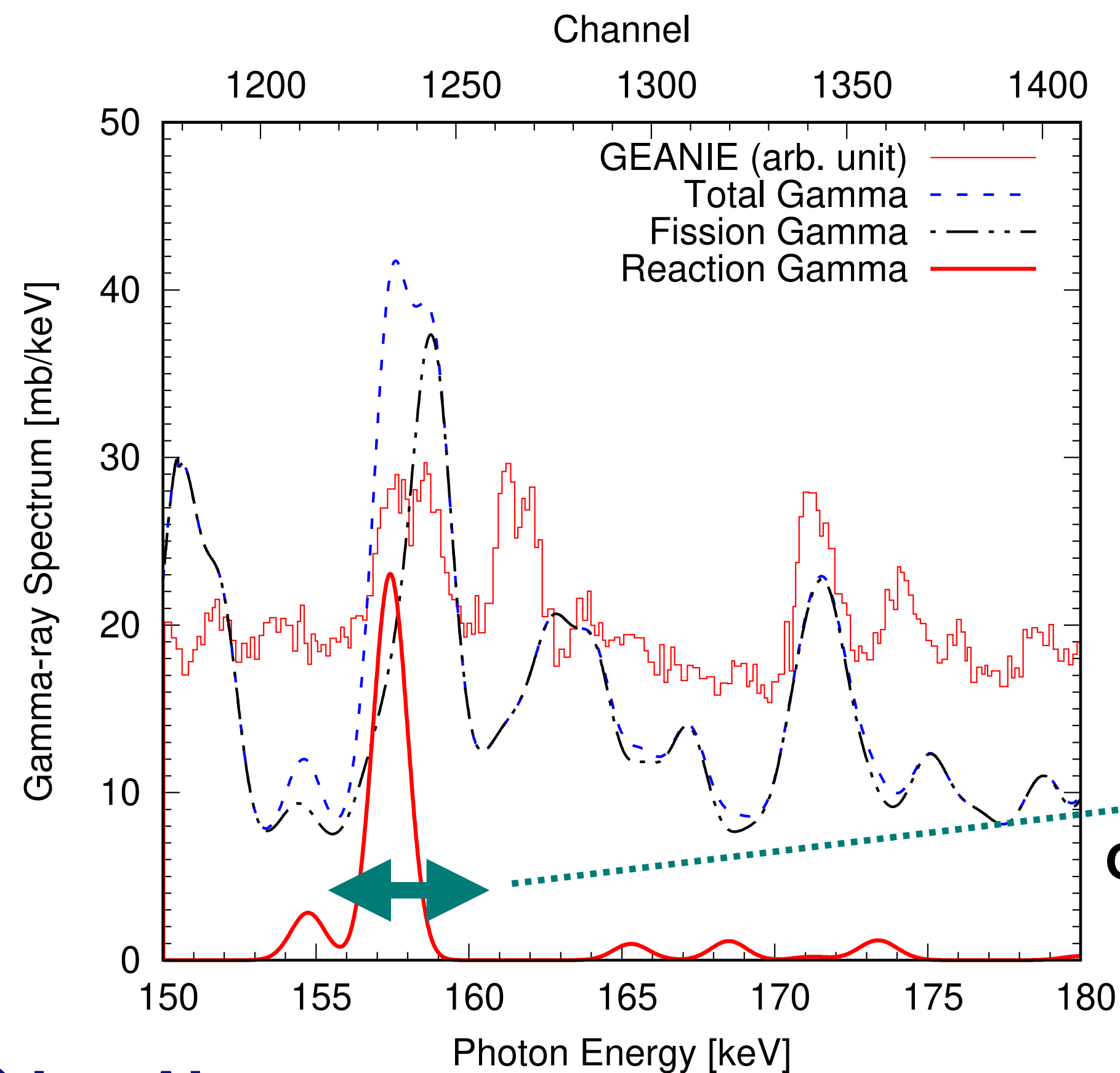
- **Evaluated energy-dependent FPY data in the fast energy range**
 - Tested by calculating R-values for critical assemblies, compared with measurements (talk by A. Lovell)
 - However, testing FPY data at higher energies is not so straightforward
- **Recent measurements of neutron inelastic scattering at Geel**
 - (n,n') gamma-ray production for actinide measured, but didn't agree with model calculations
 - Probably prompt fission gamma rays were measured instead
- **Recent progress on fission modeling at LANL**
 - BeoH produces more than 10,000 gamma lines per fission
- **Revisiting GEANIE $^{239}\text{Pu}(n,xn)$ data reported in 2002**
 - Calculate gammas by (n,xn) and fission separately
 - GEANIE data could have high fission background



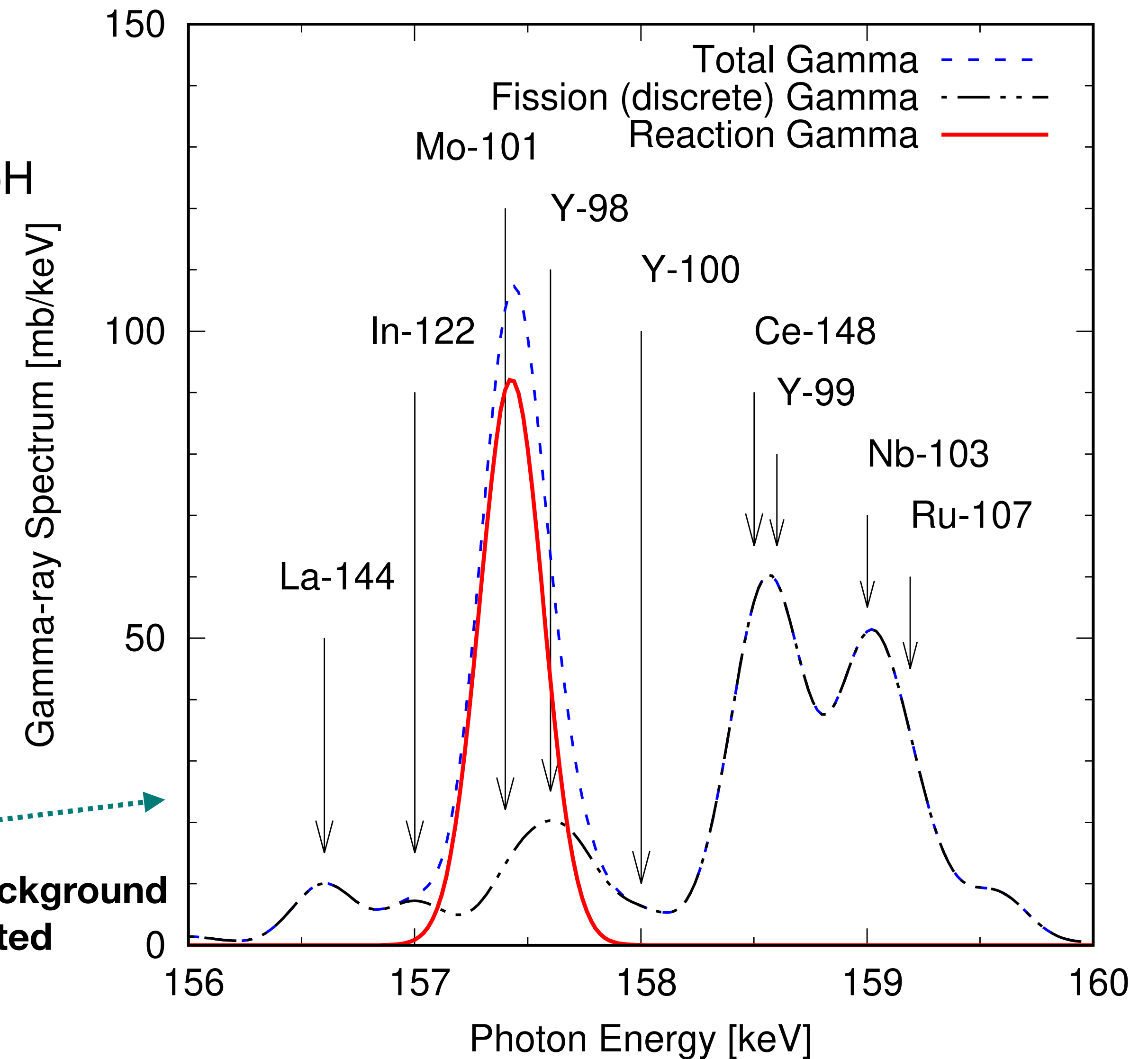
Fission Gamma Ray Background

- **Gamma production calculation**

- (n,xn) reactions by CoH₃
- gamma-rays produce by fission fragments by BeoH

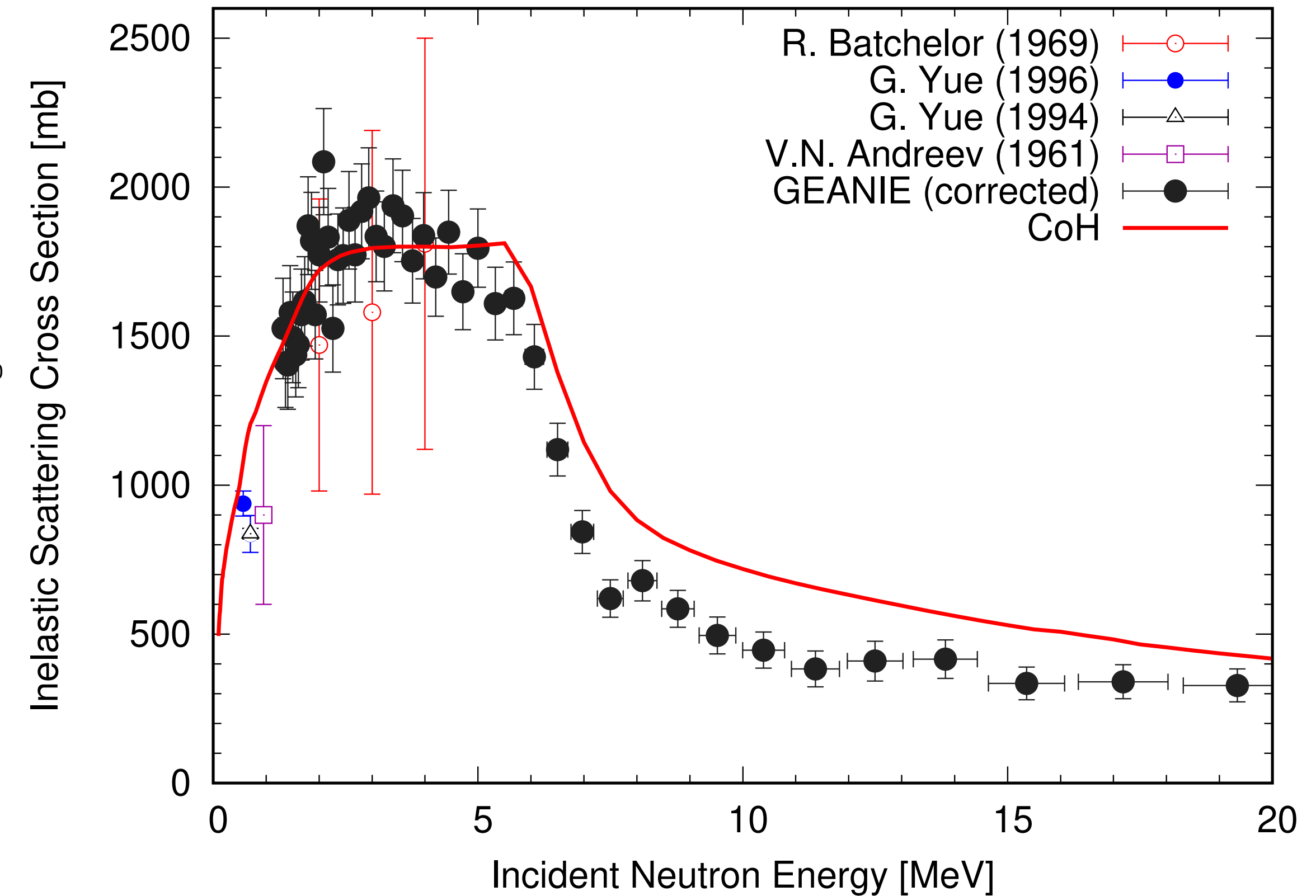
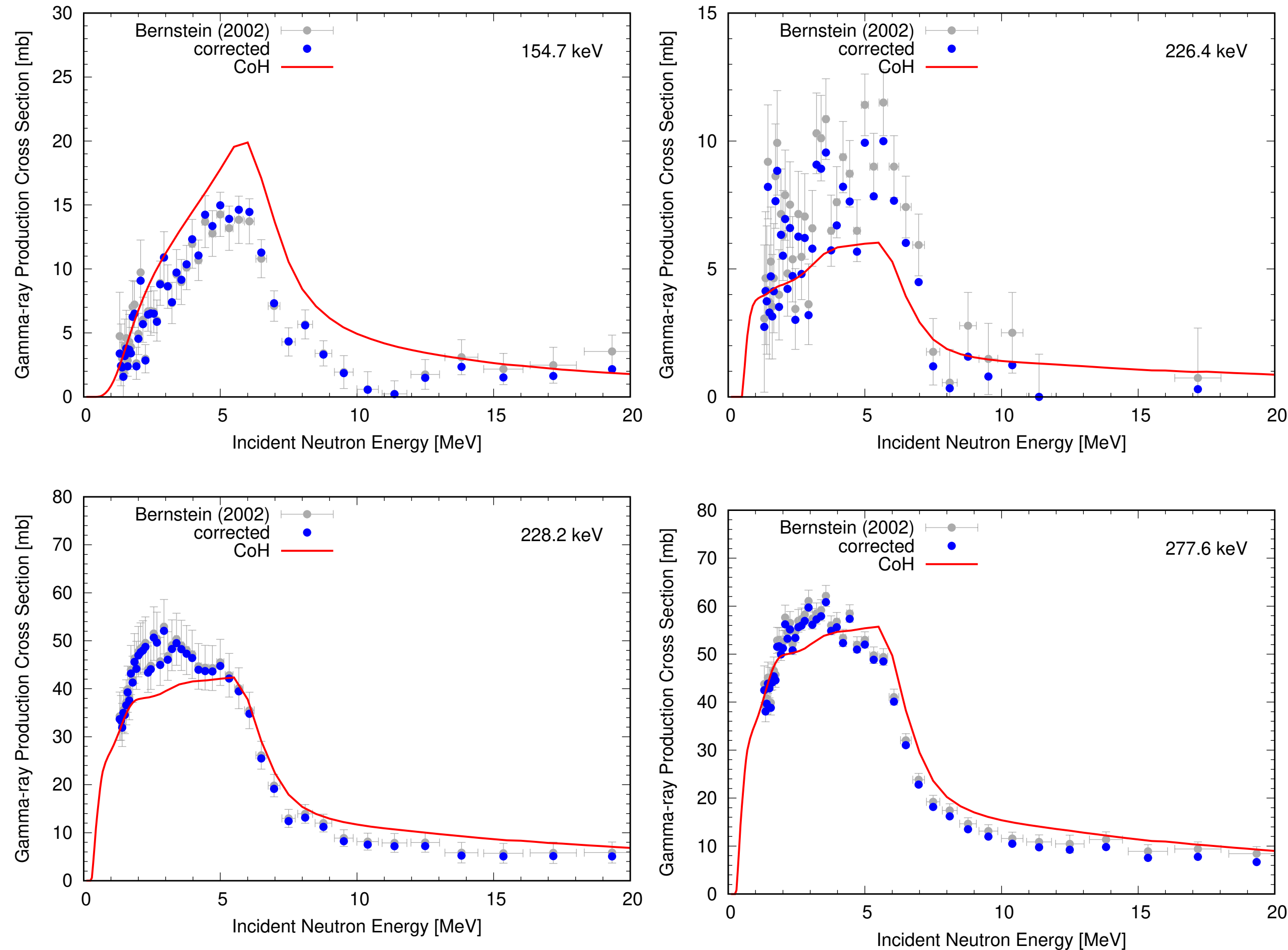


Continuum background
subtracted

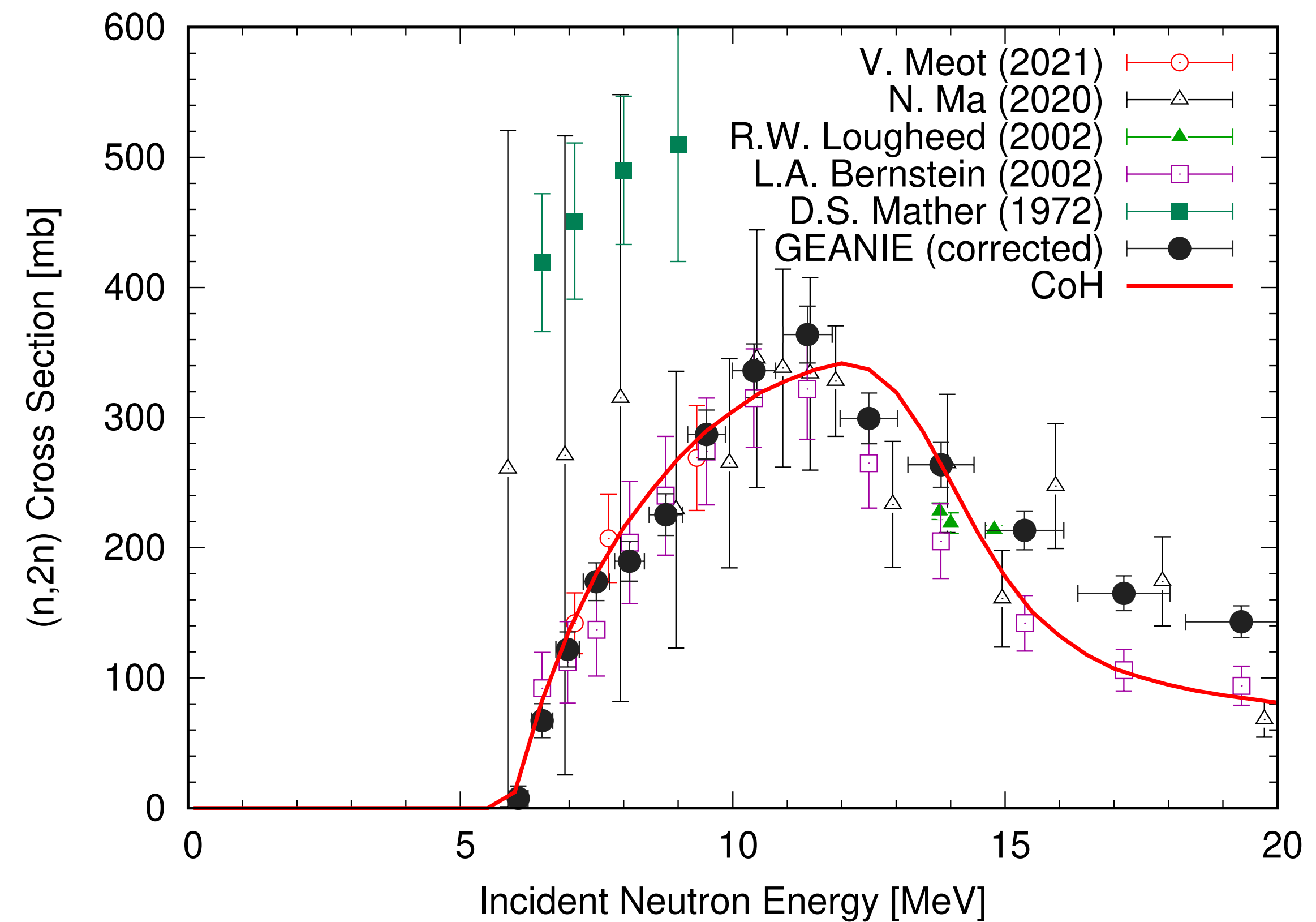
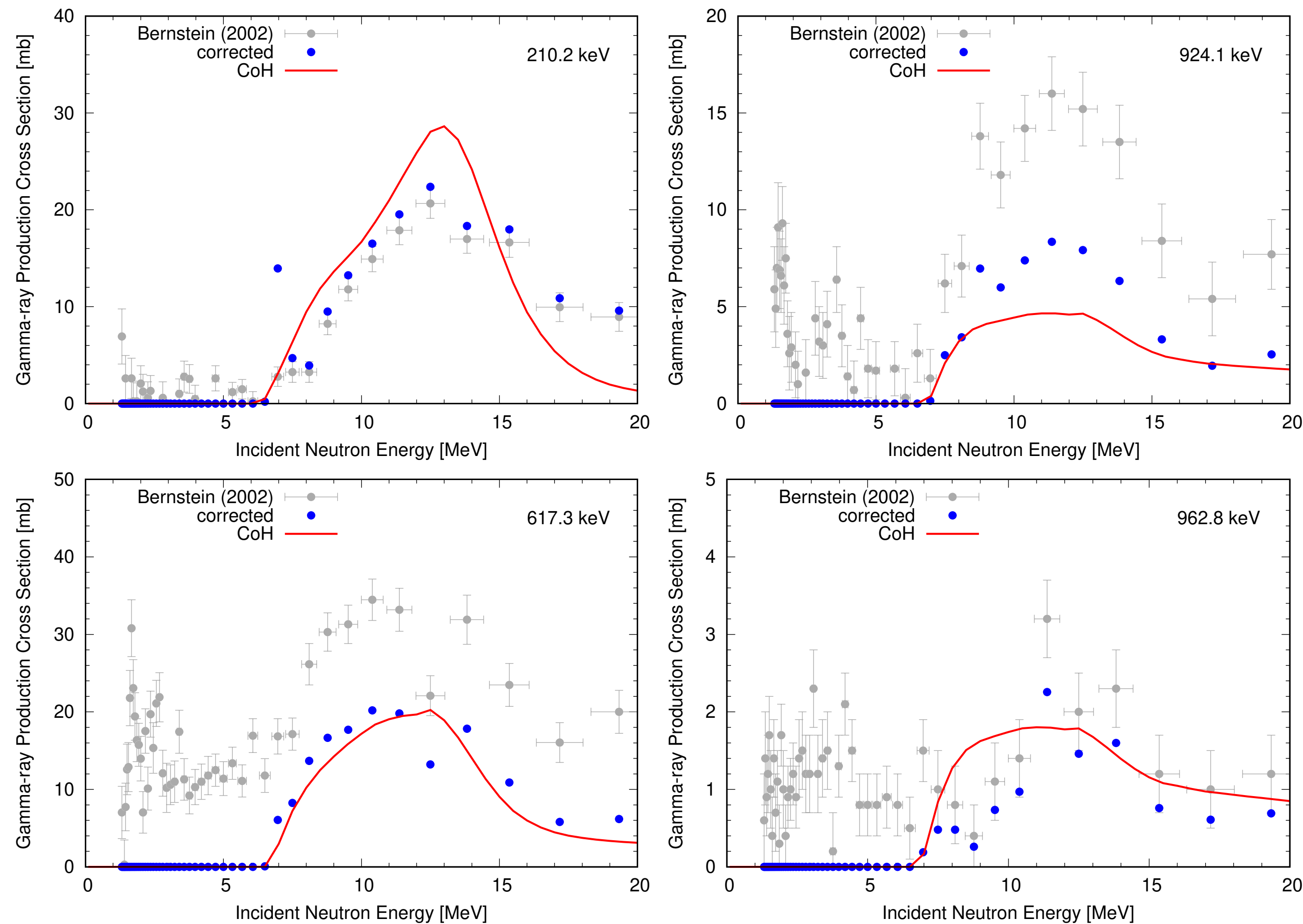


^{239}Pu Inelastic Scattering Cross Section Inferred by GANIE/CoH

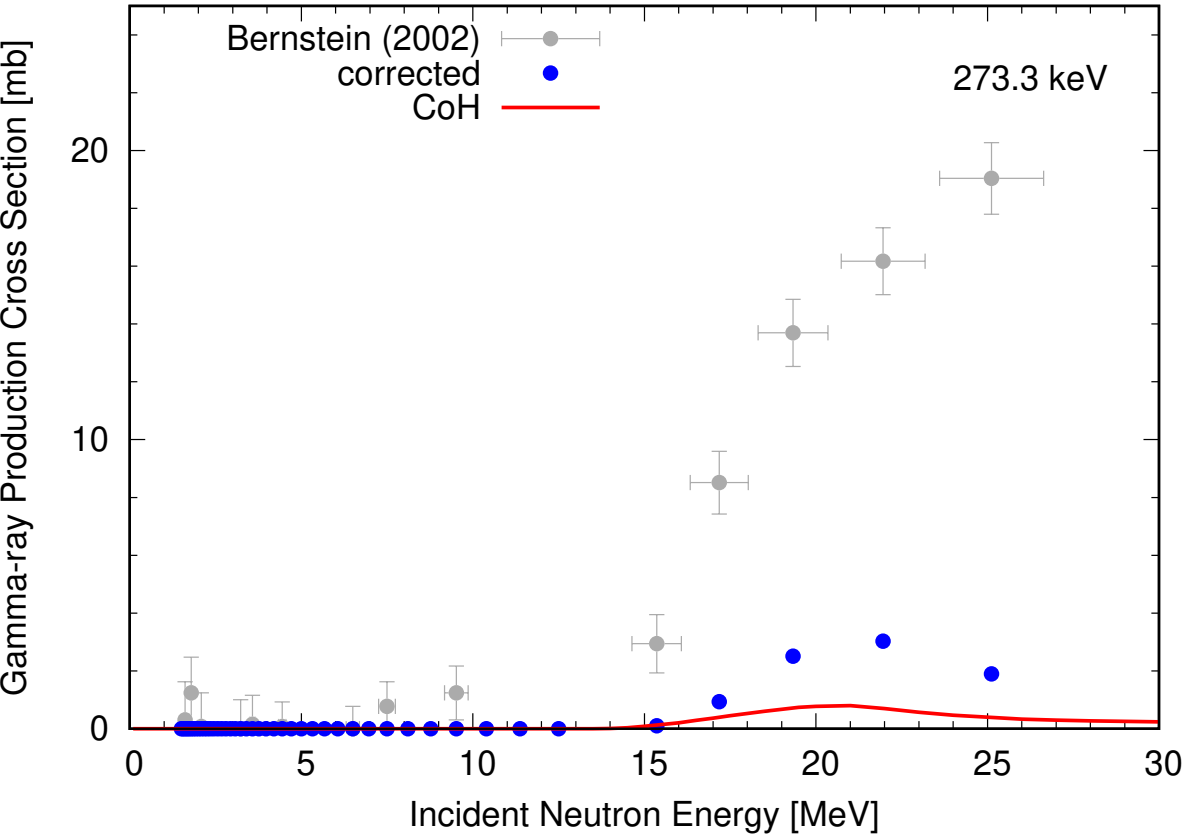
- Fission gamma rays subtracted from GEANIE data



$^{239}\text{Pu}(n,2n)$ Cross Section Inferred by GEANIE/CoH



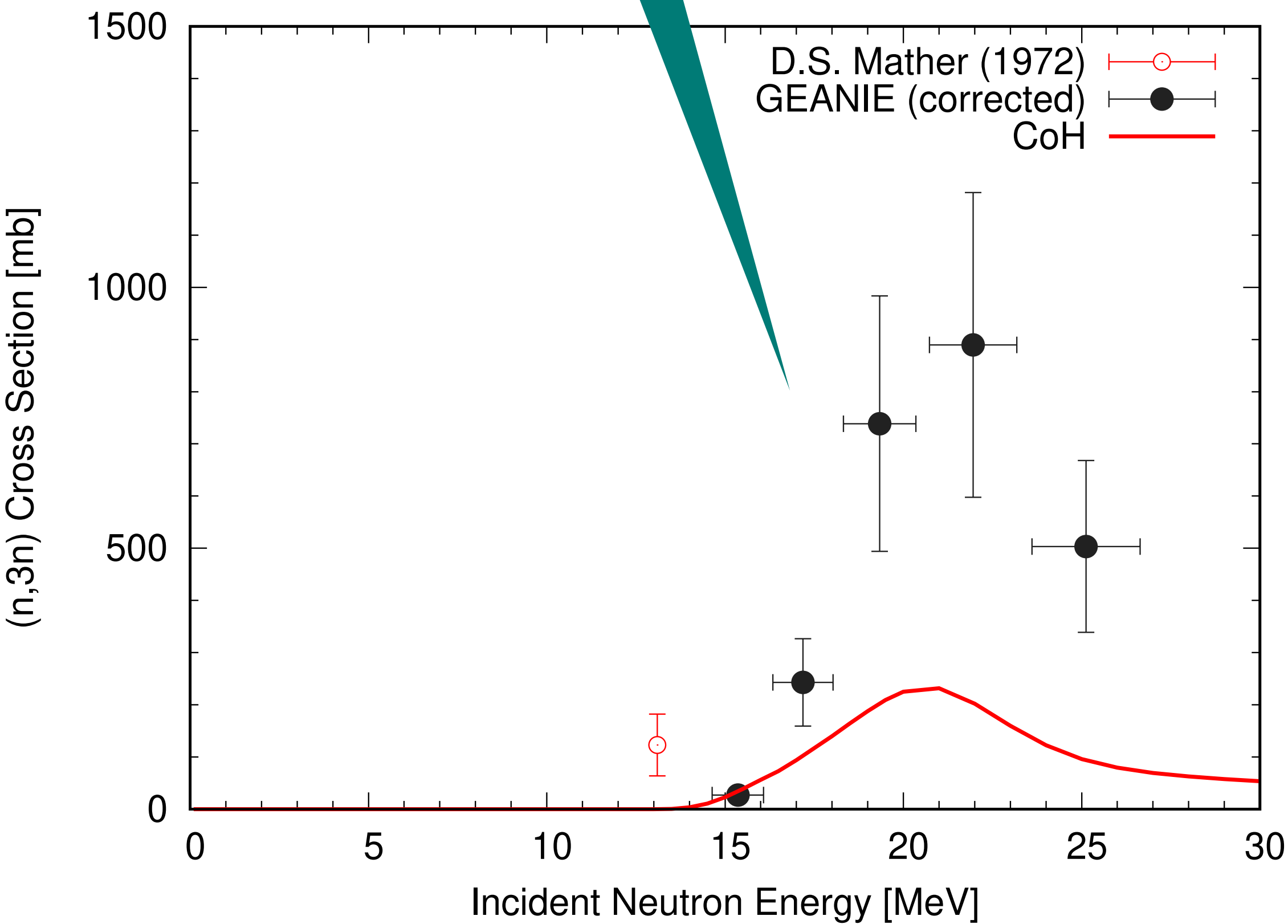
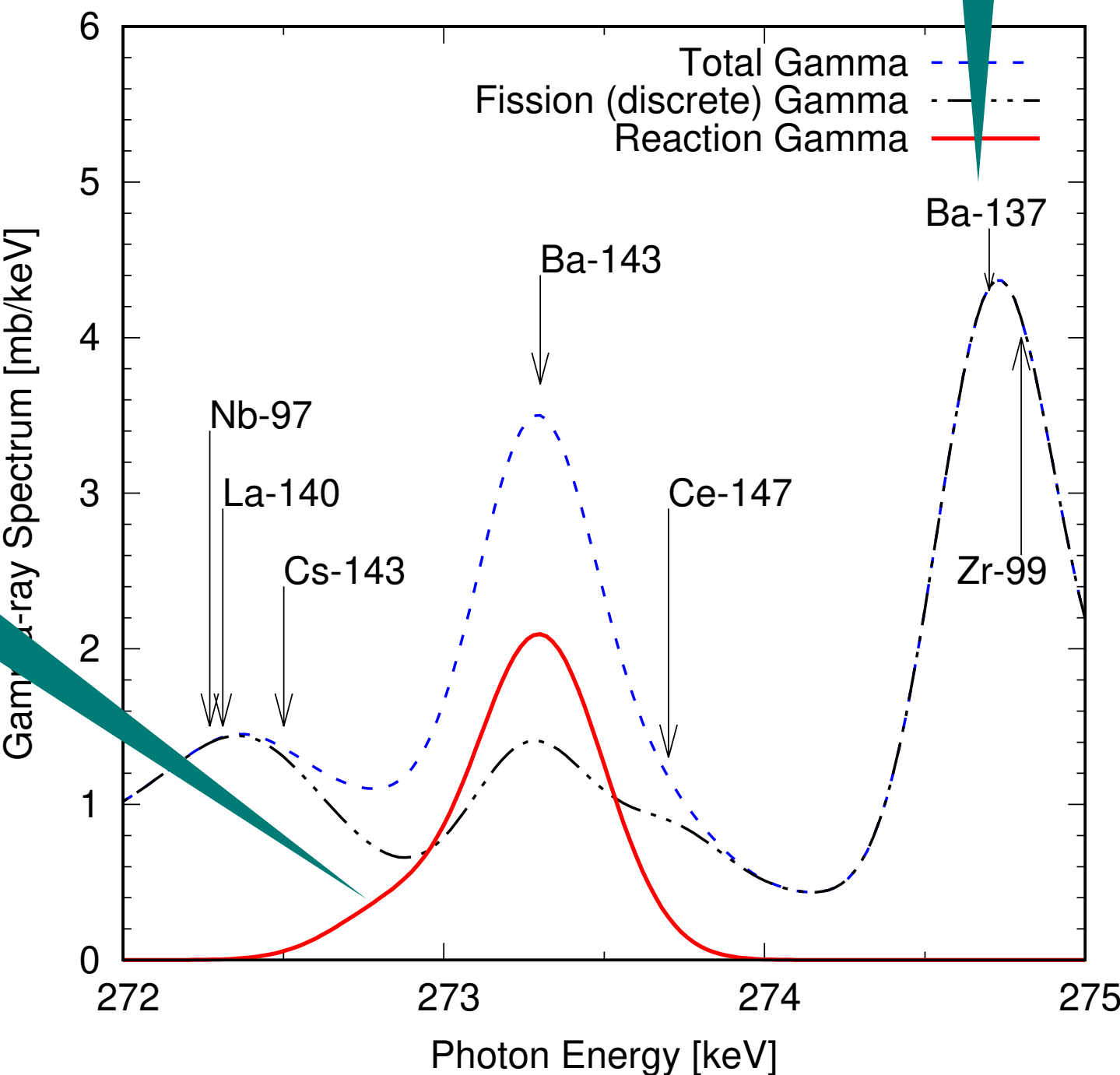
239Pu(n,3n) Cross Section Inferred by GEANIE/CoH



Discrepancy due to unknown branching ratio of 779 keV level in ^{239}Pu

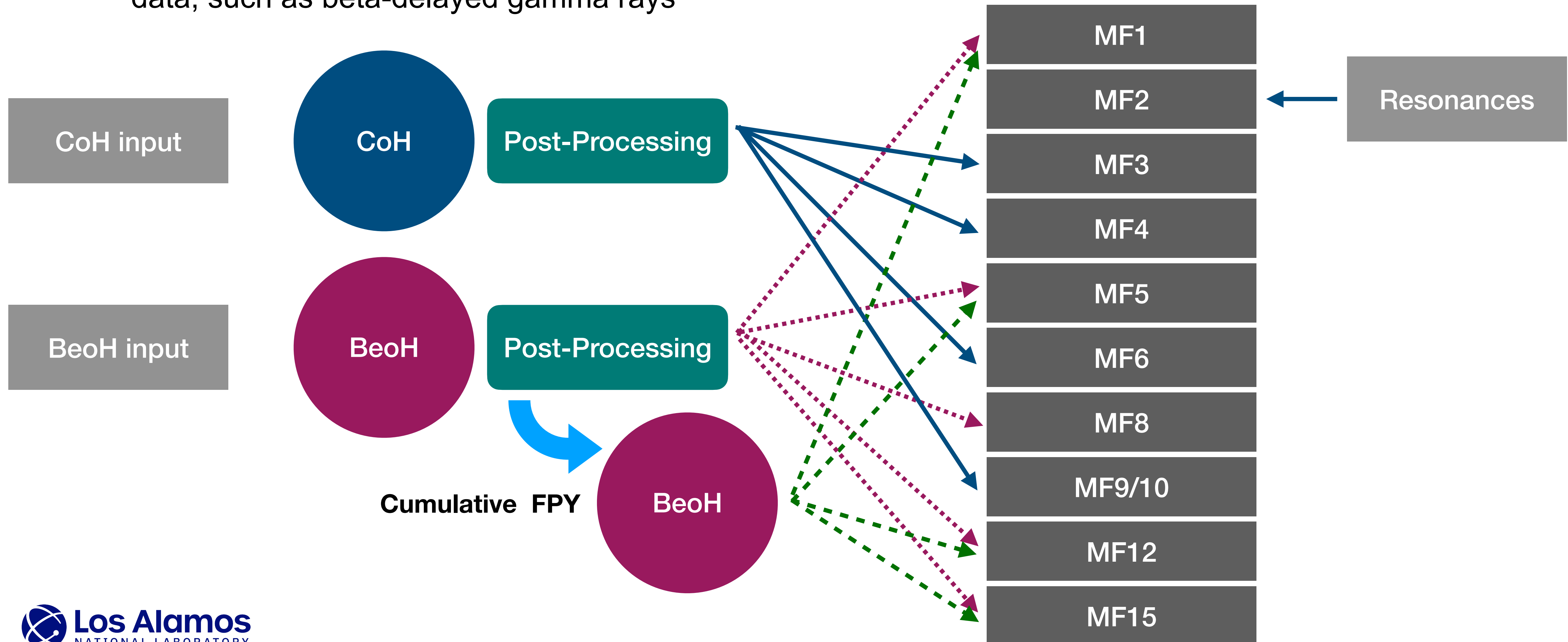
^{137}Ba yield has strong energy dependence

There is (n,n'g) too

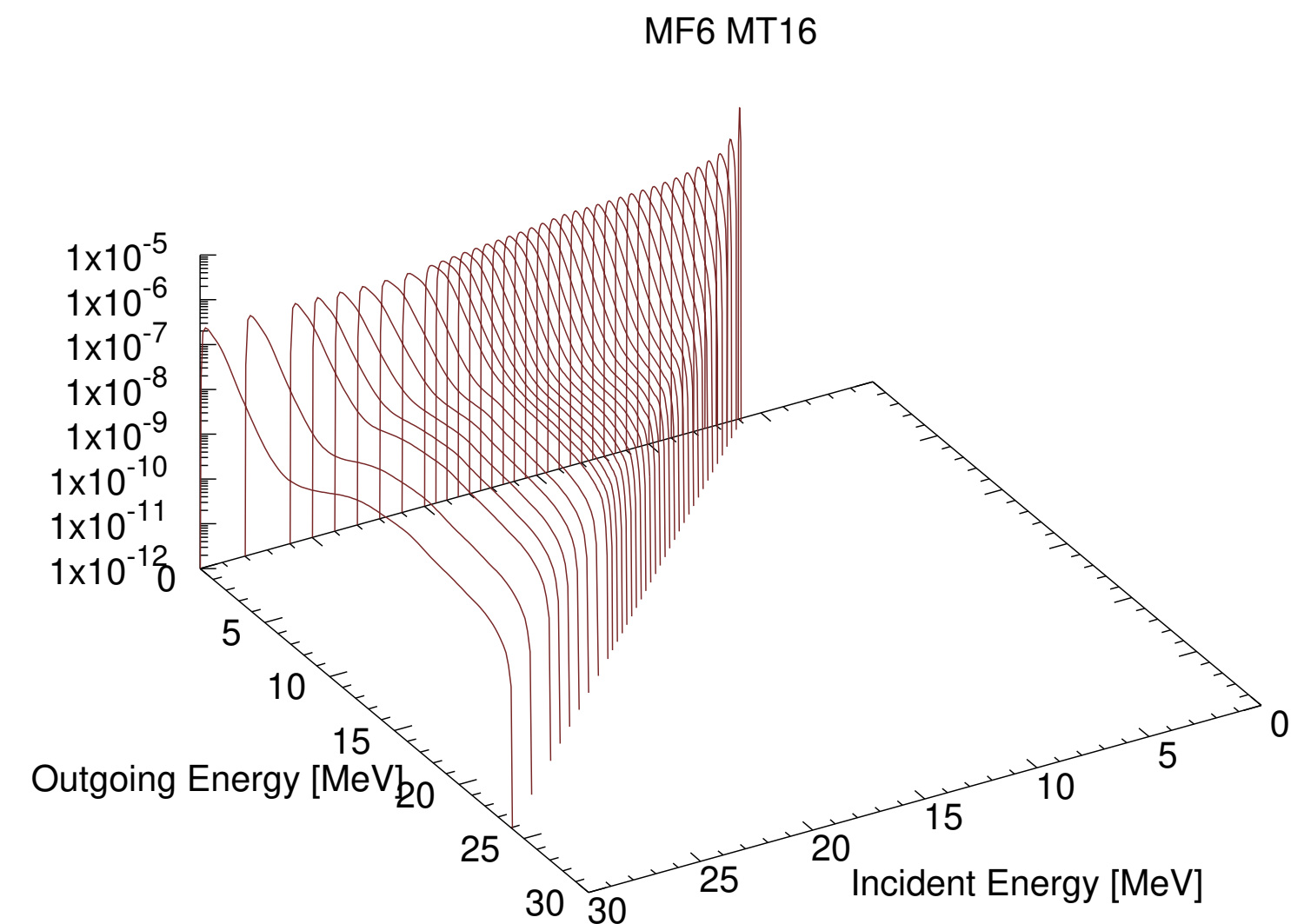
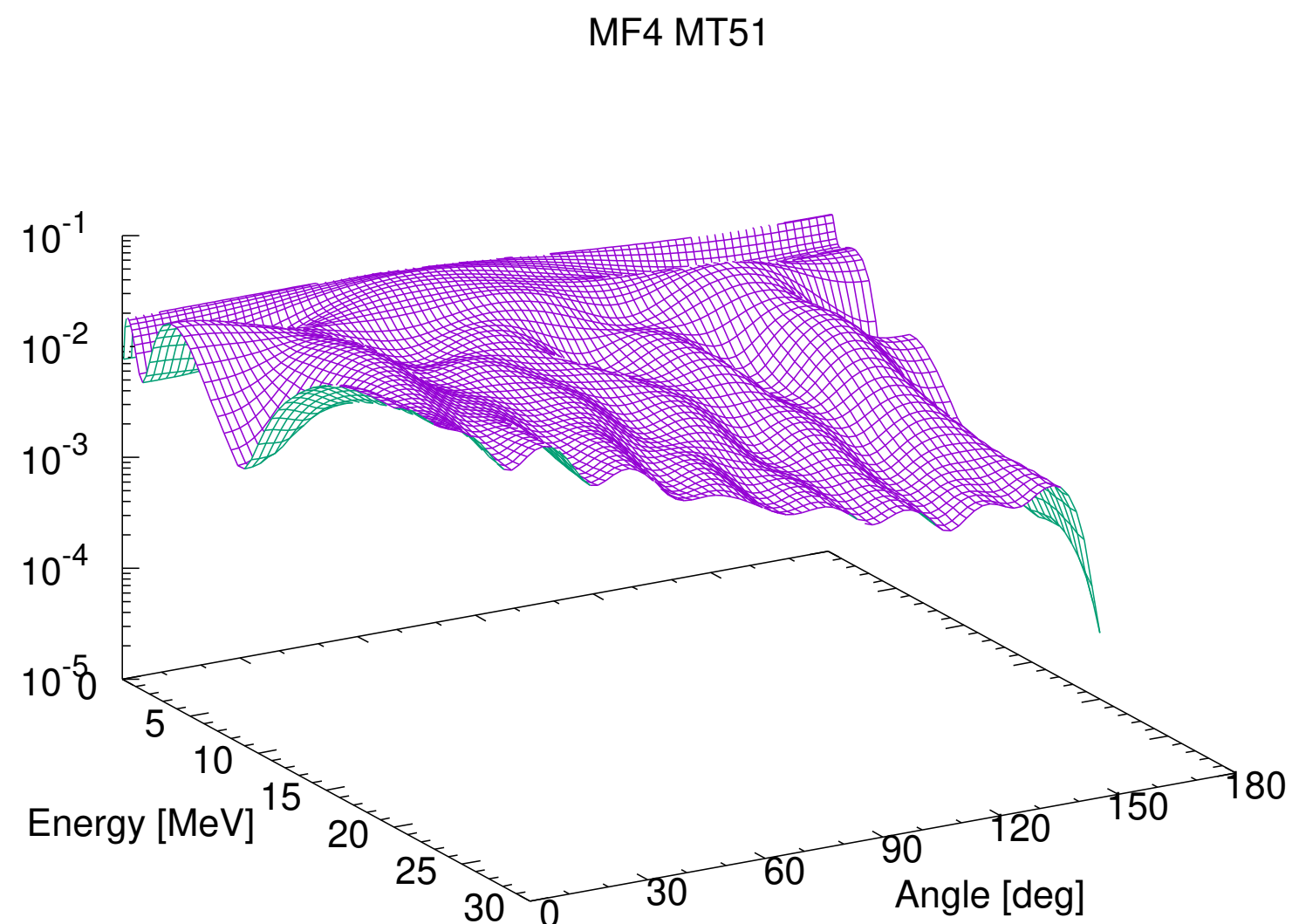
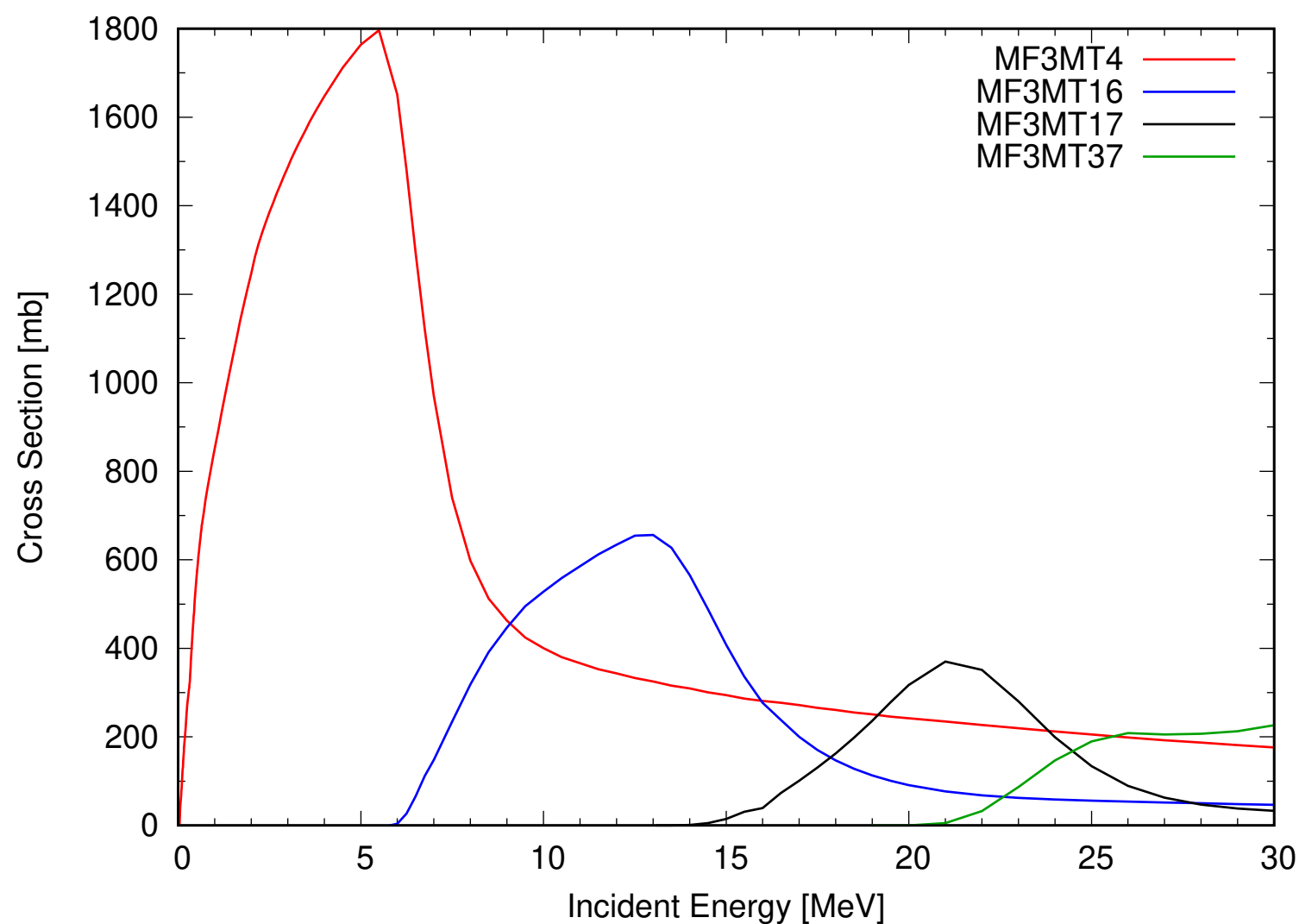
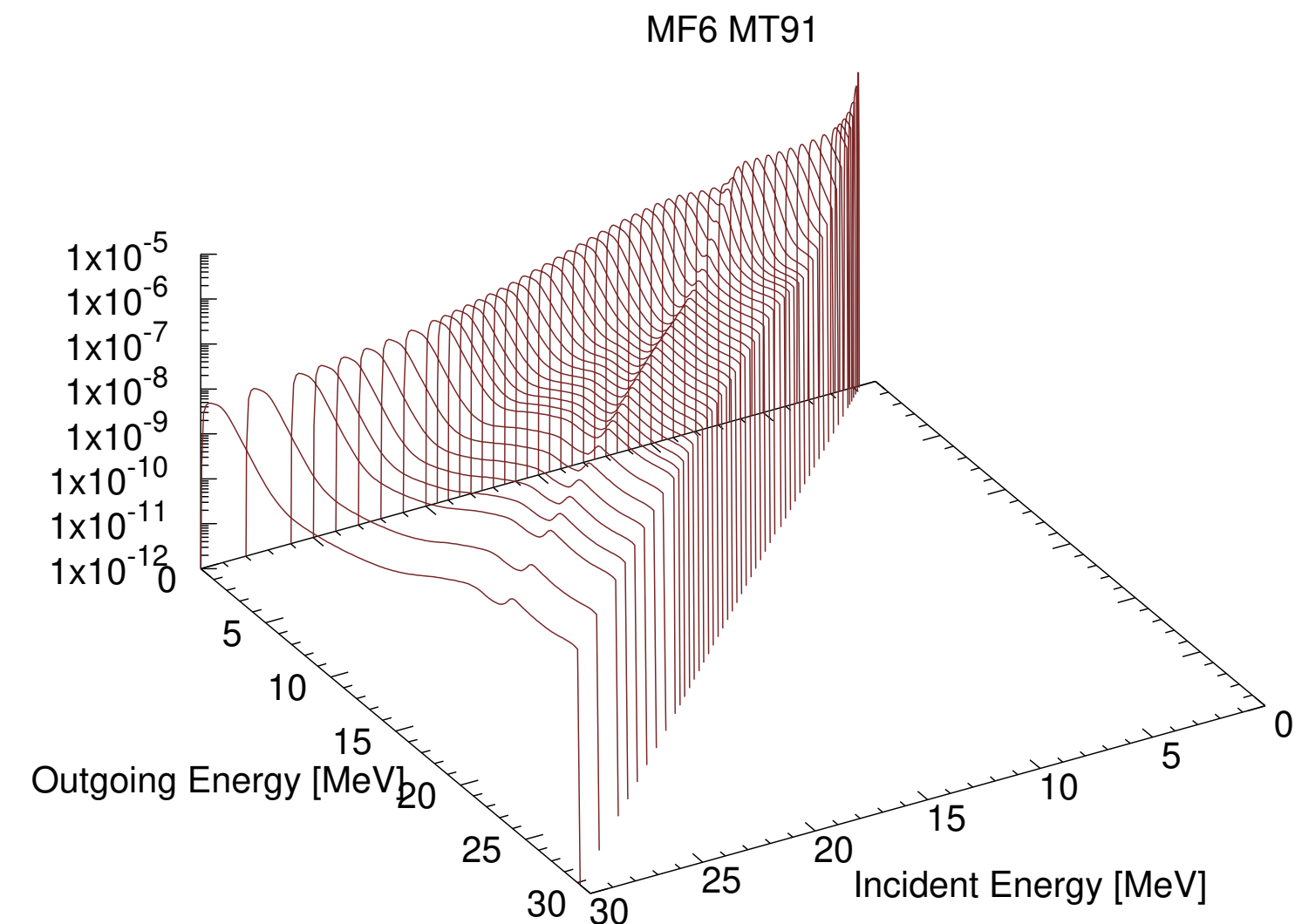
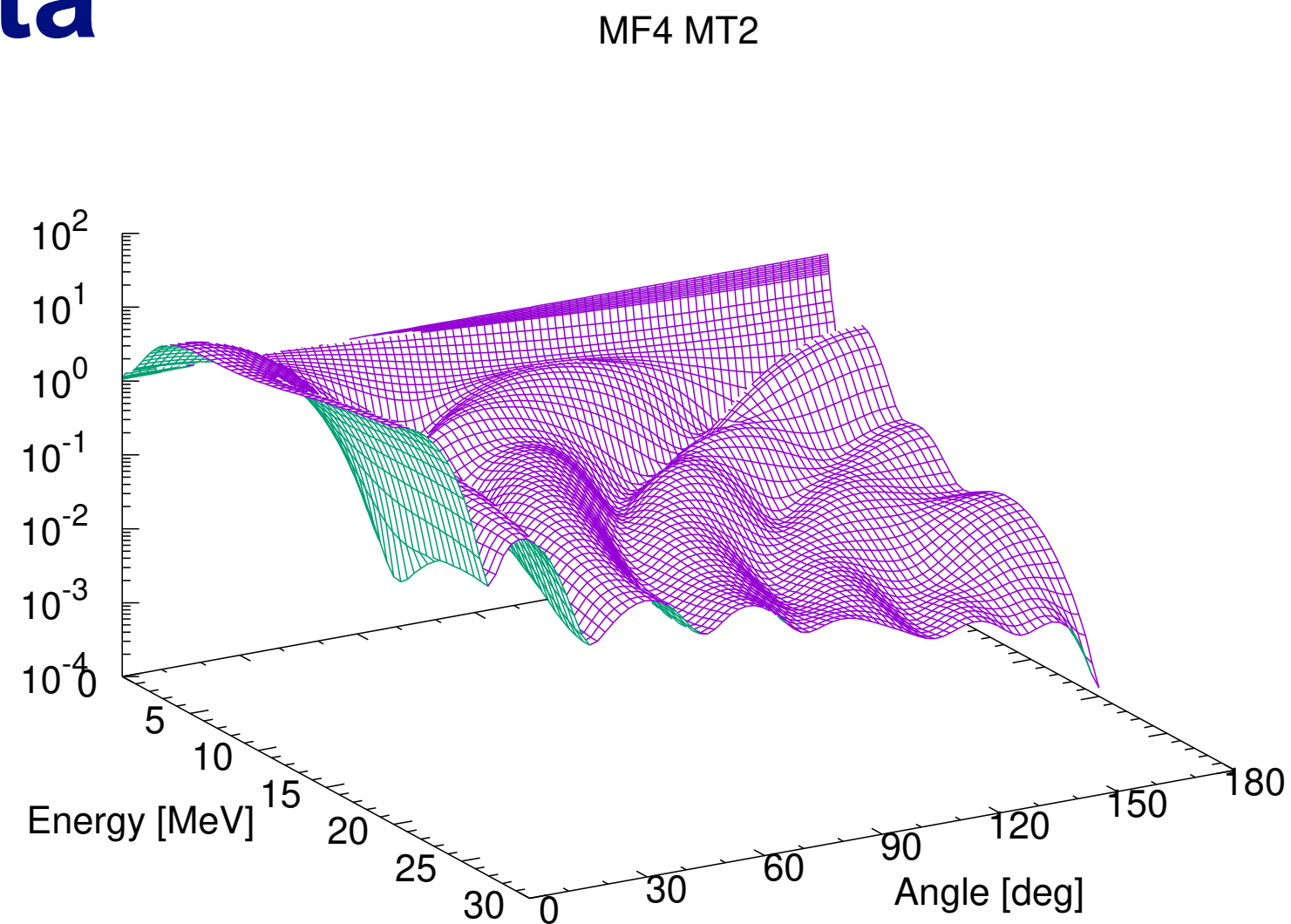
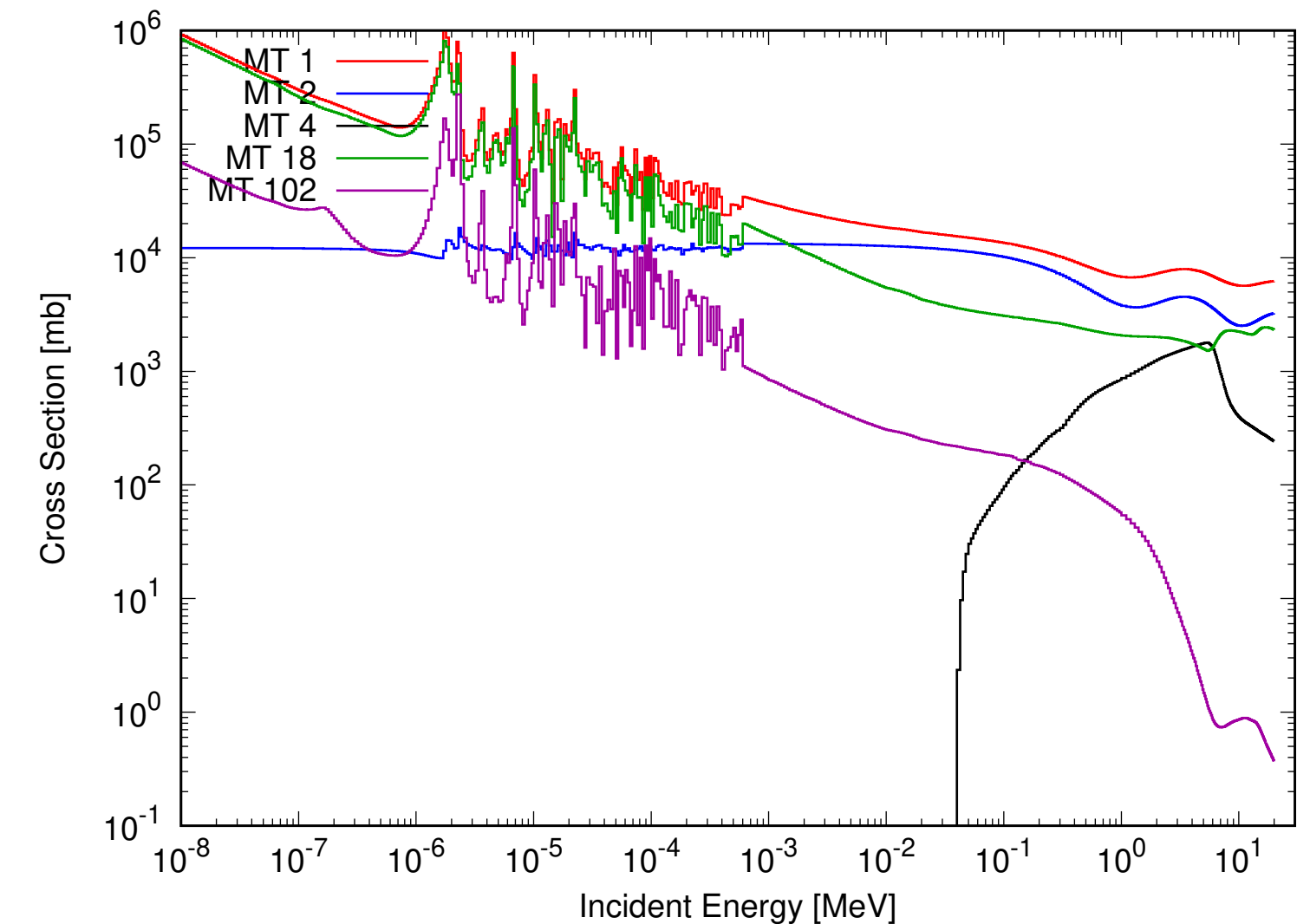


Los Alamos CoH₃-based Evaluation: LACE

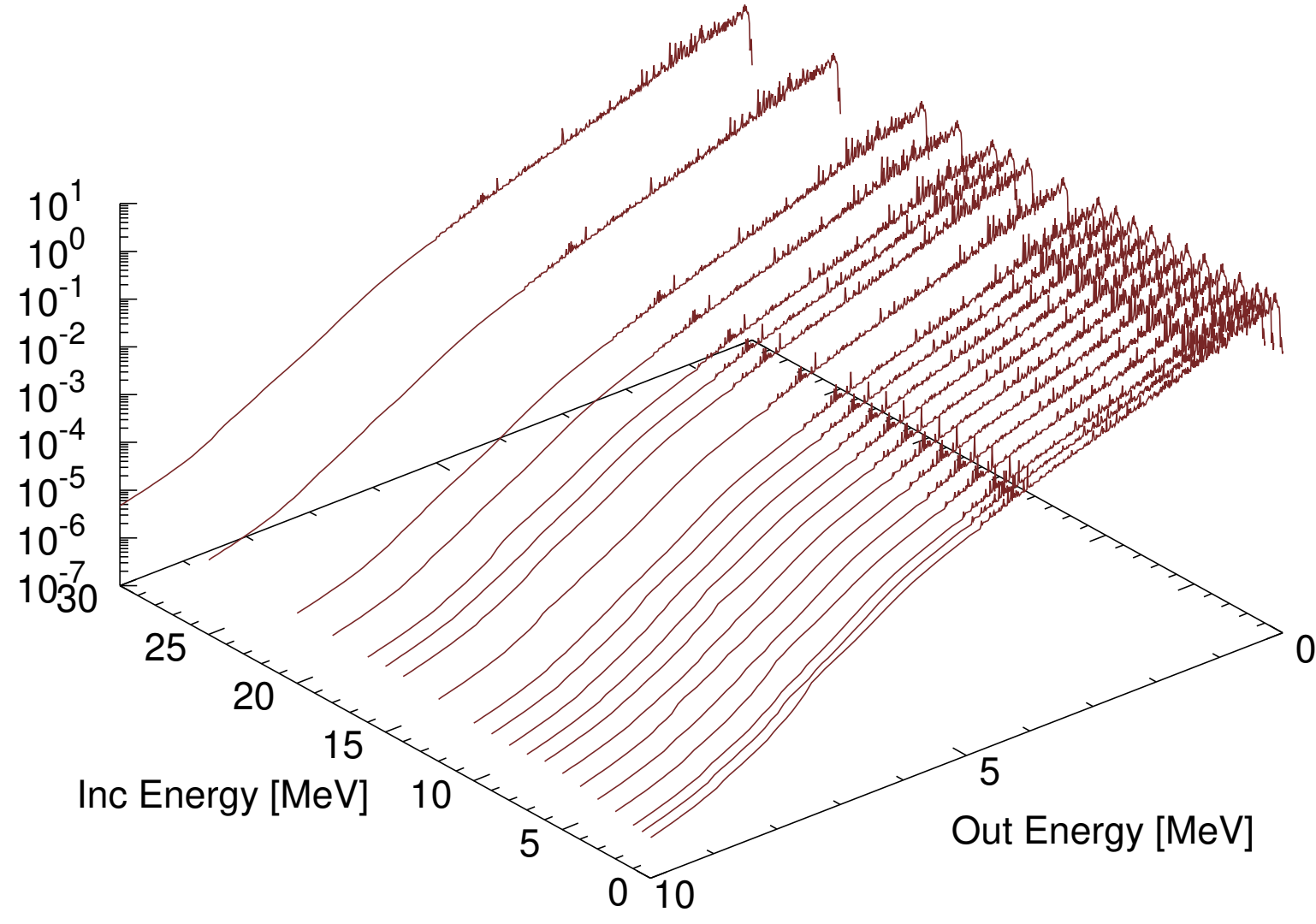
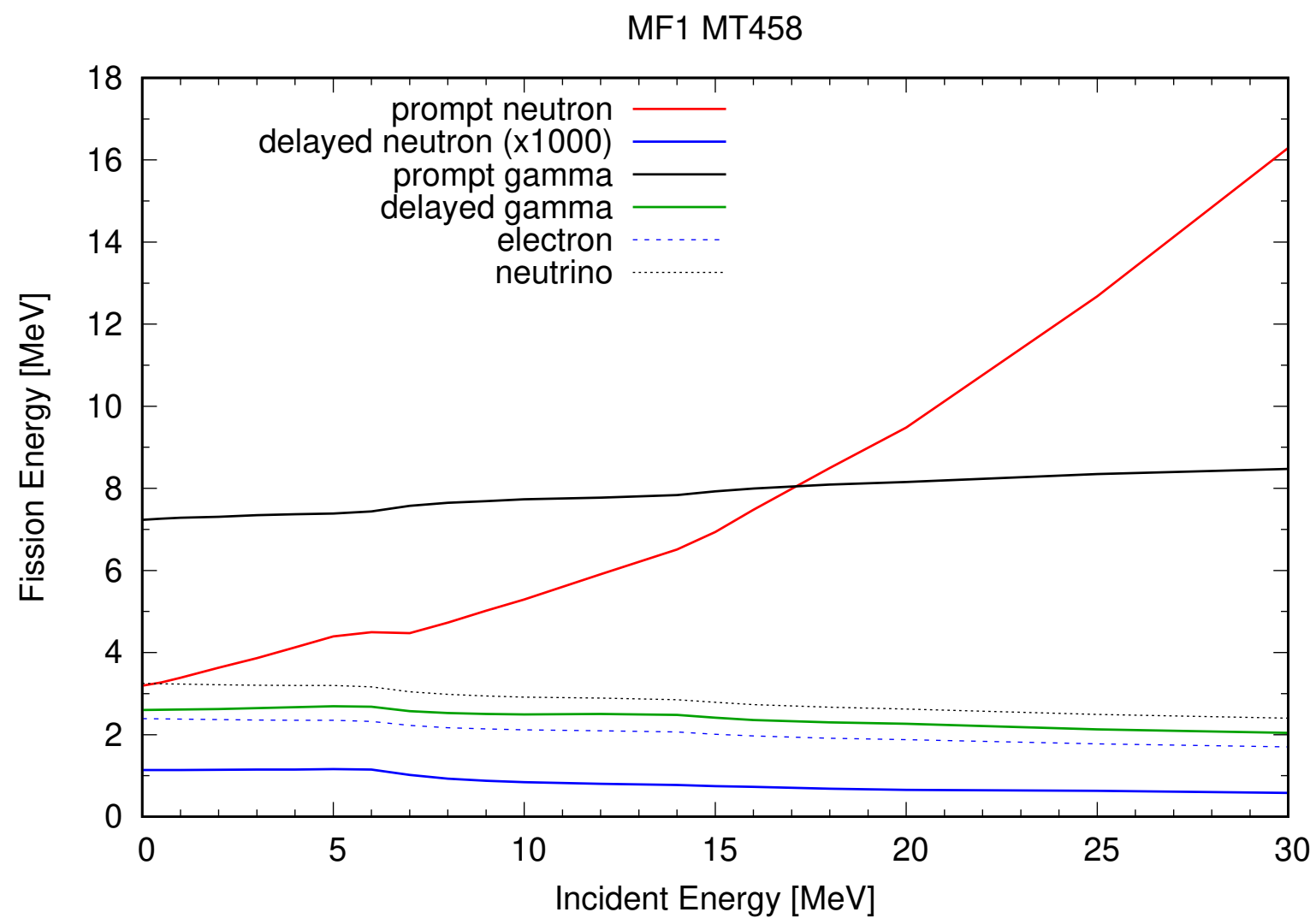
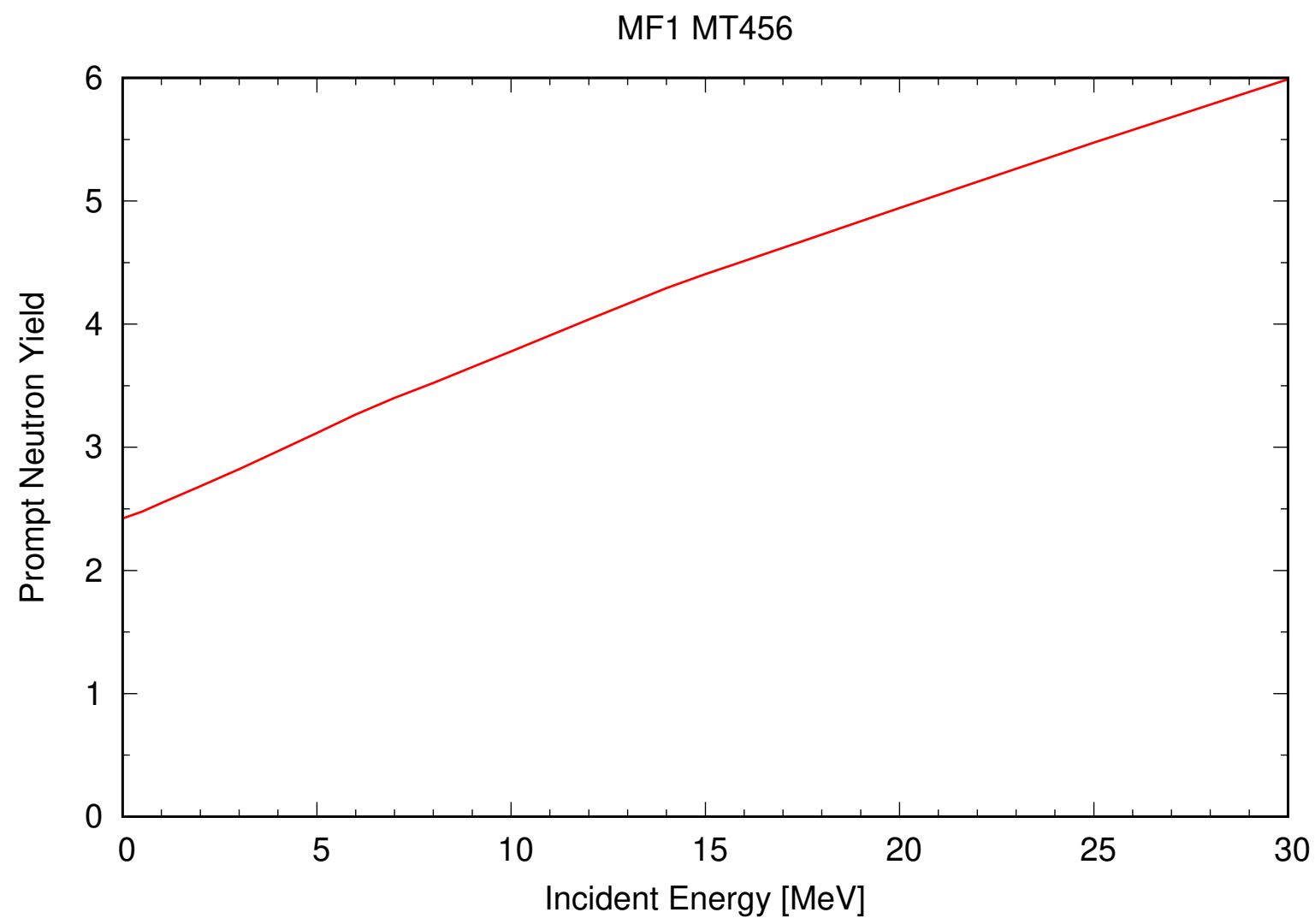
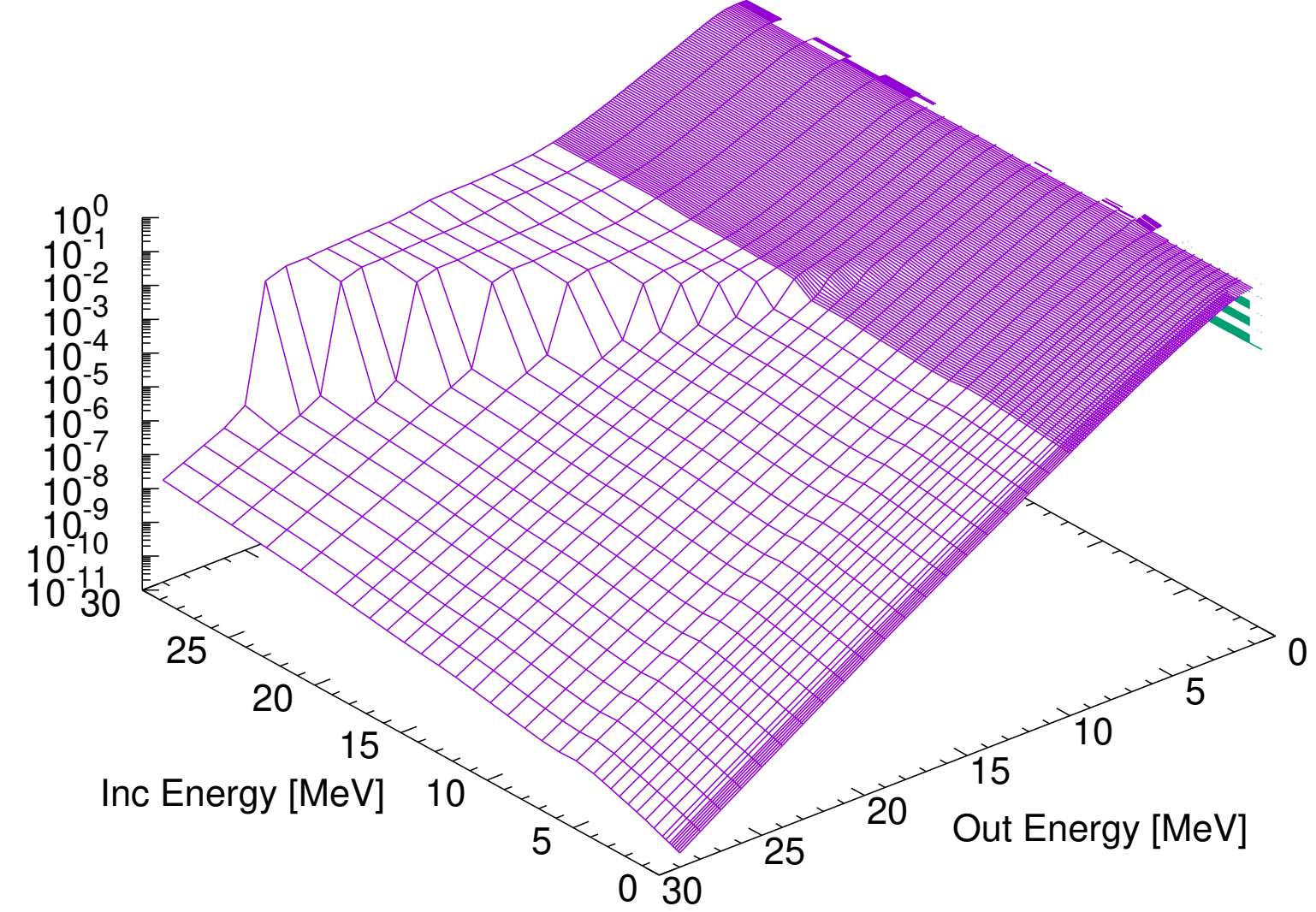
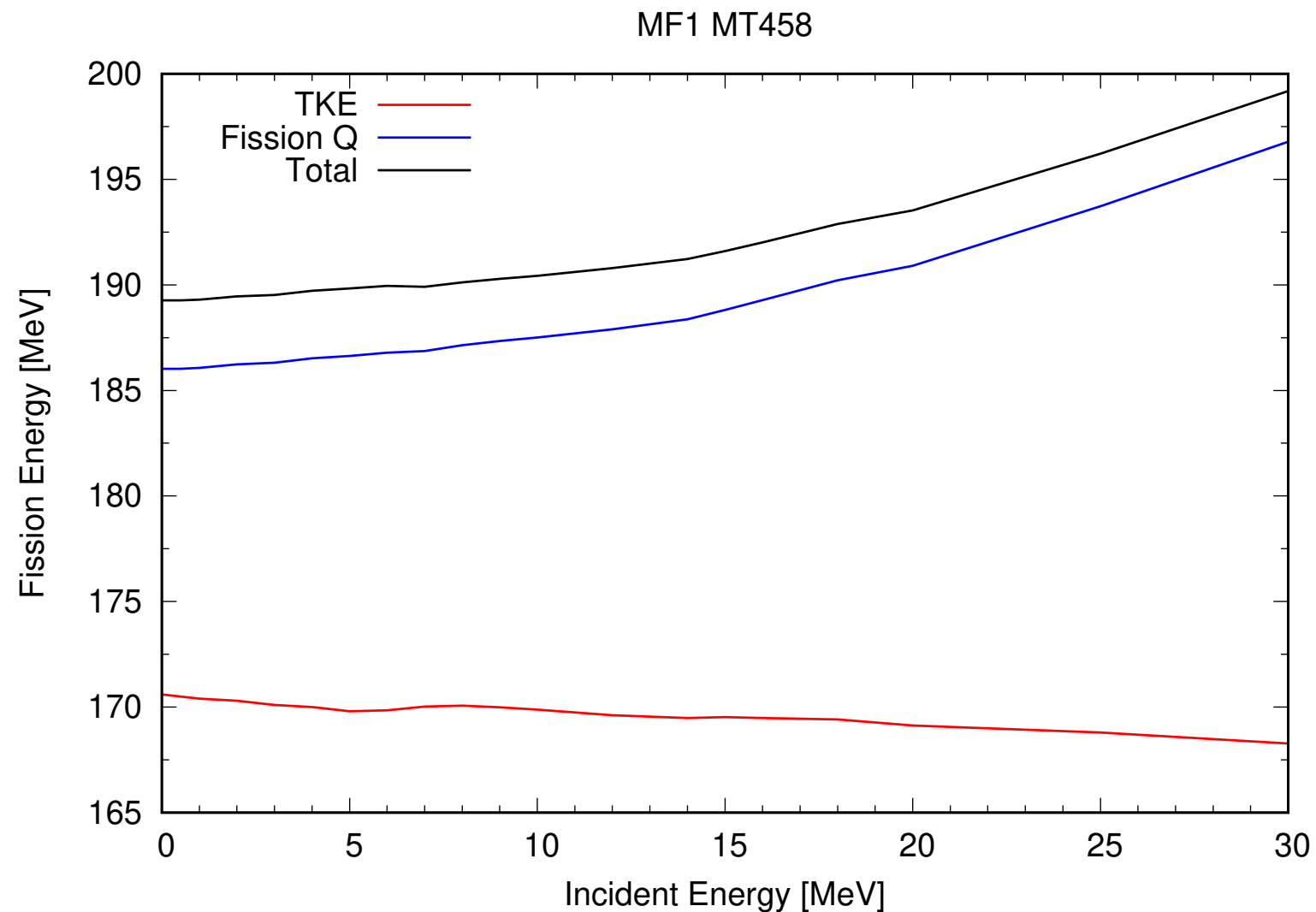
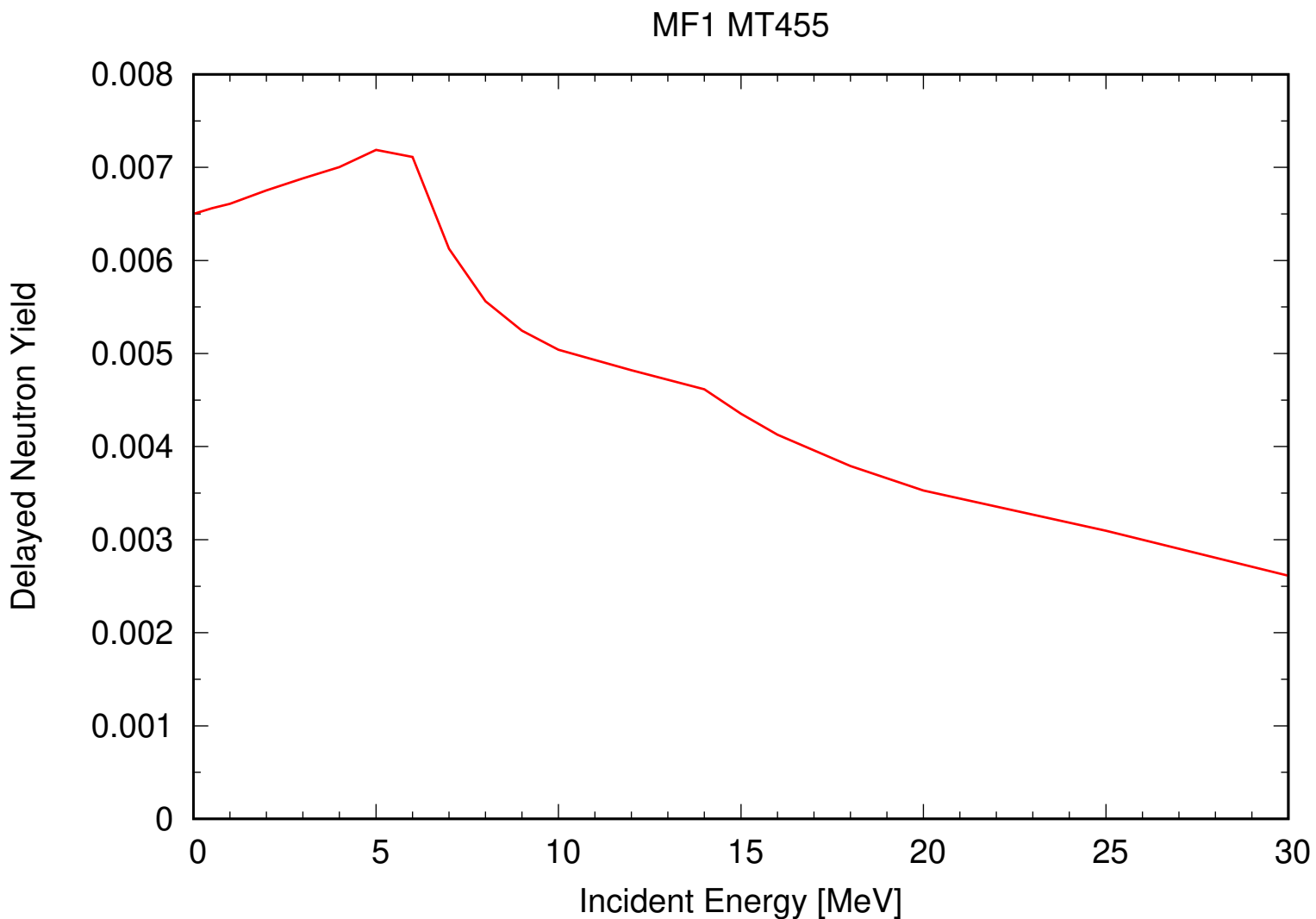
- **Production of all nuclear data using the CoH₃ and BeoH codes (with external resonance files)**
 - Facilitate to produce evaluated nuclear data files automatically, and provide not-so-commonly used data, such as beta-delayed gamma rays



LACE Example ^{233}U Data

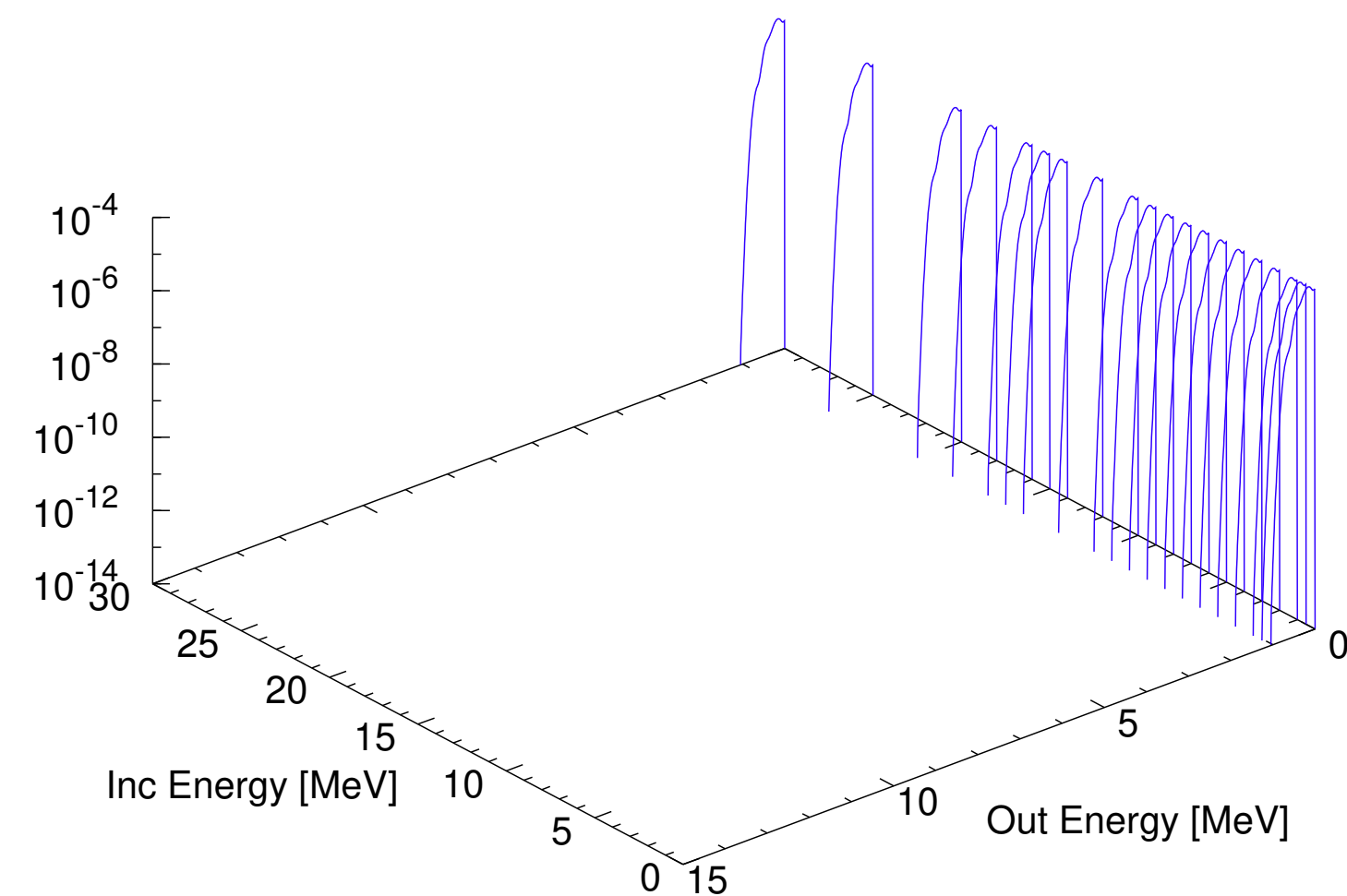


LACE Example ^{233}U Data, Fission Energy, Spectrum and Multiplicity

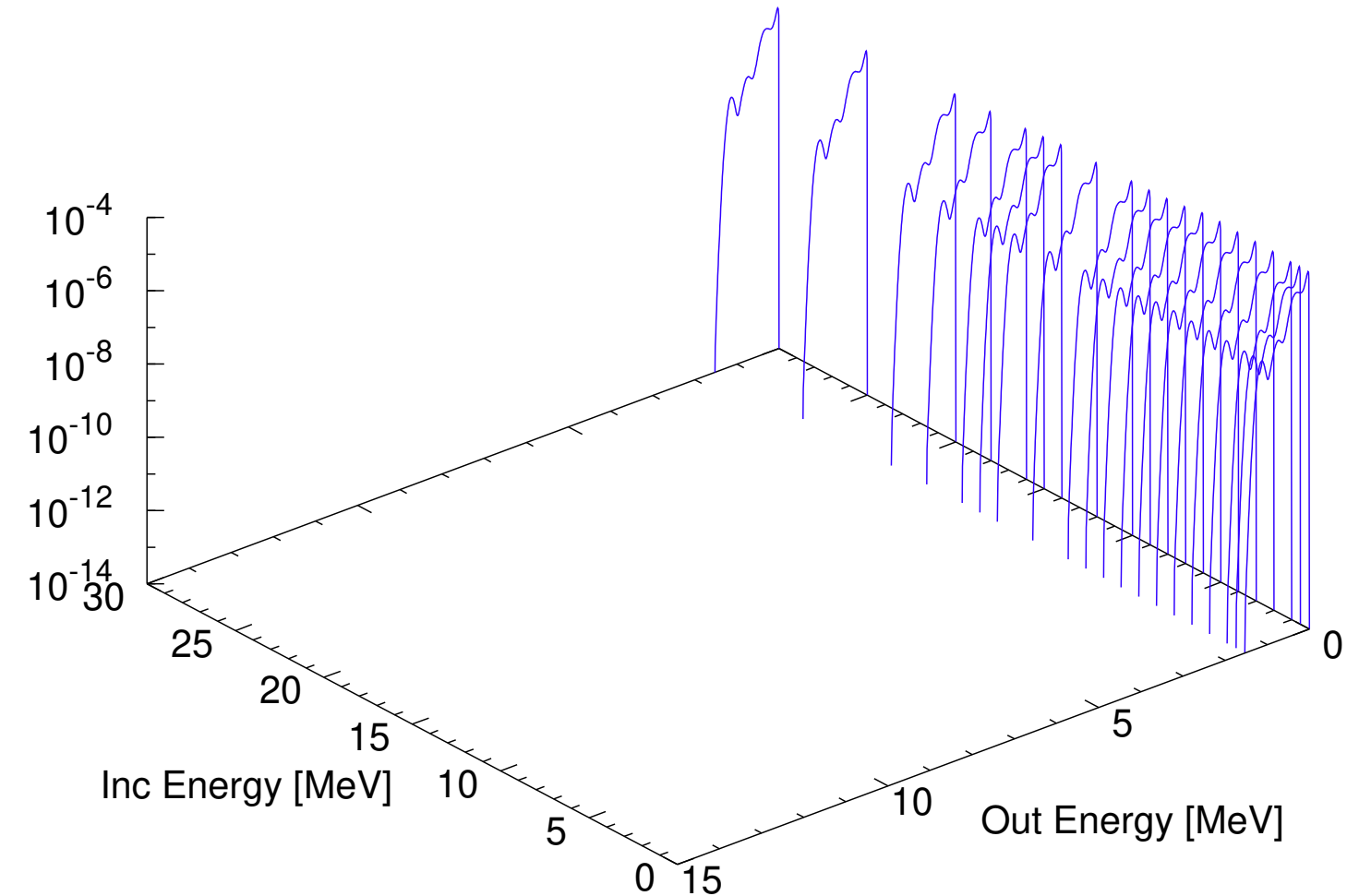


LACE Example ^{233}U Data, Delayed Neutron Energy Spectra

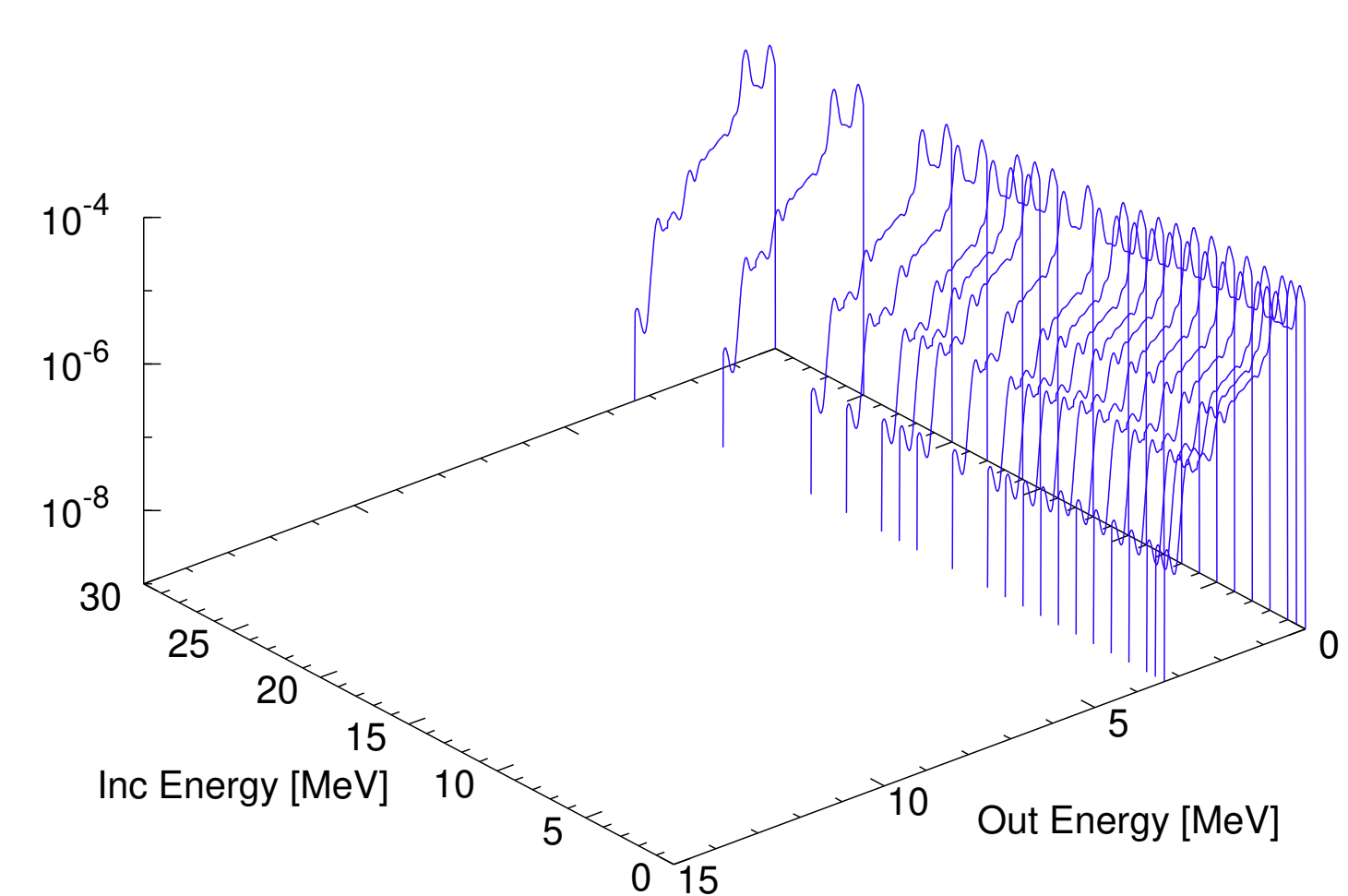
MF5 MT455 Group 1



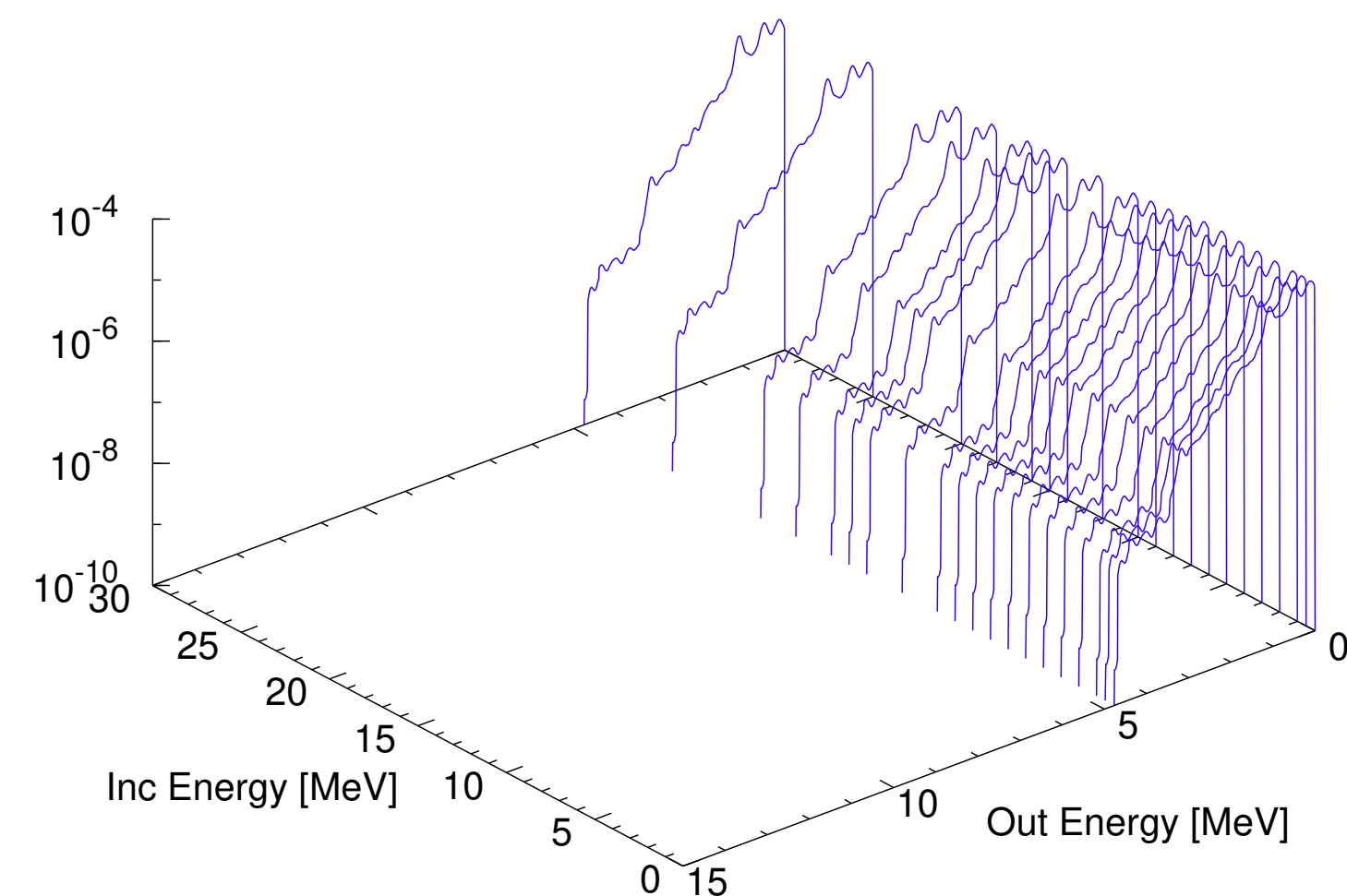
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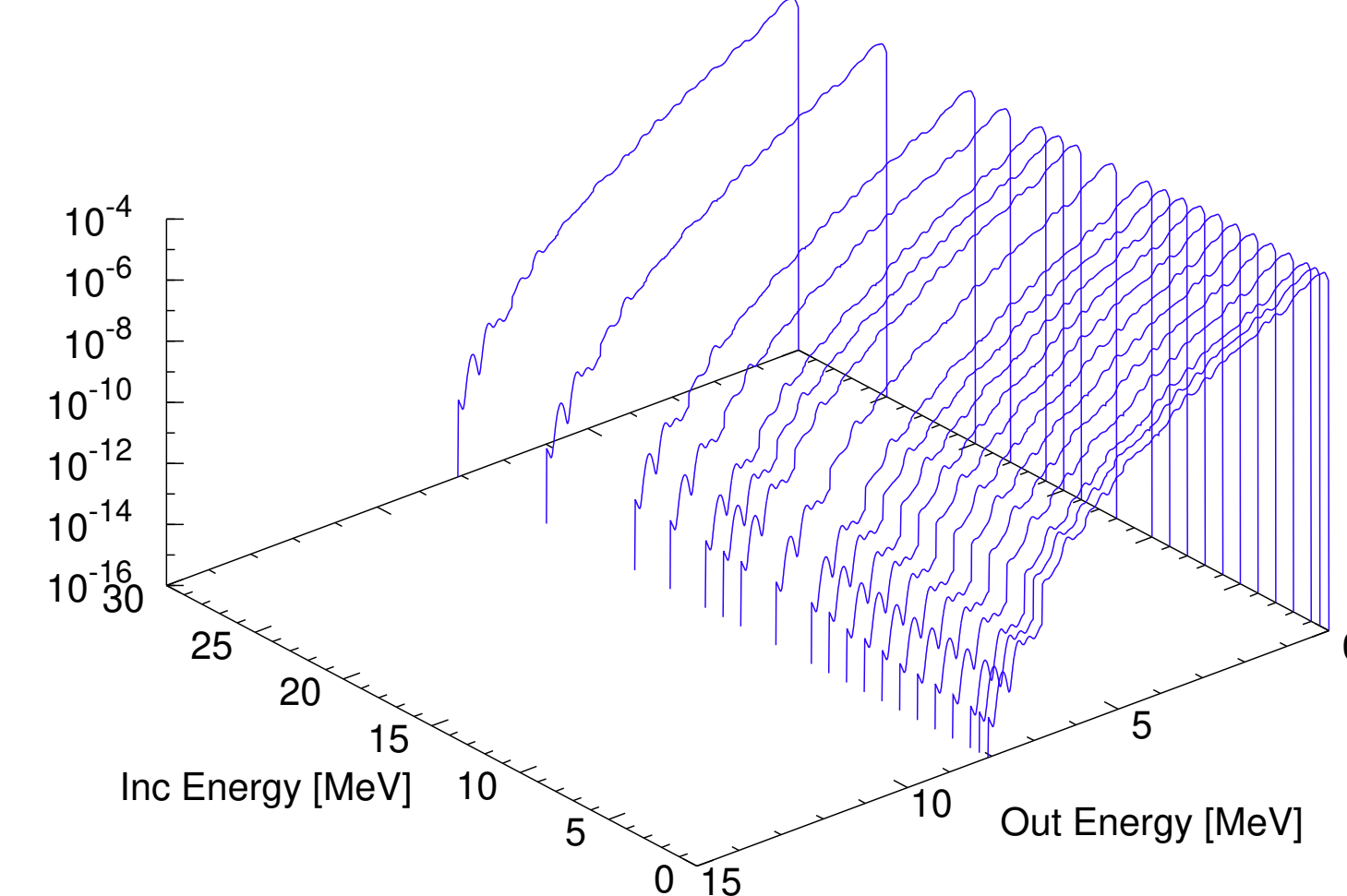
MF5 MT455 Group 3



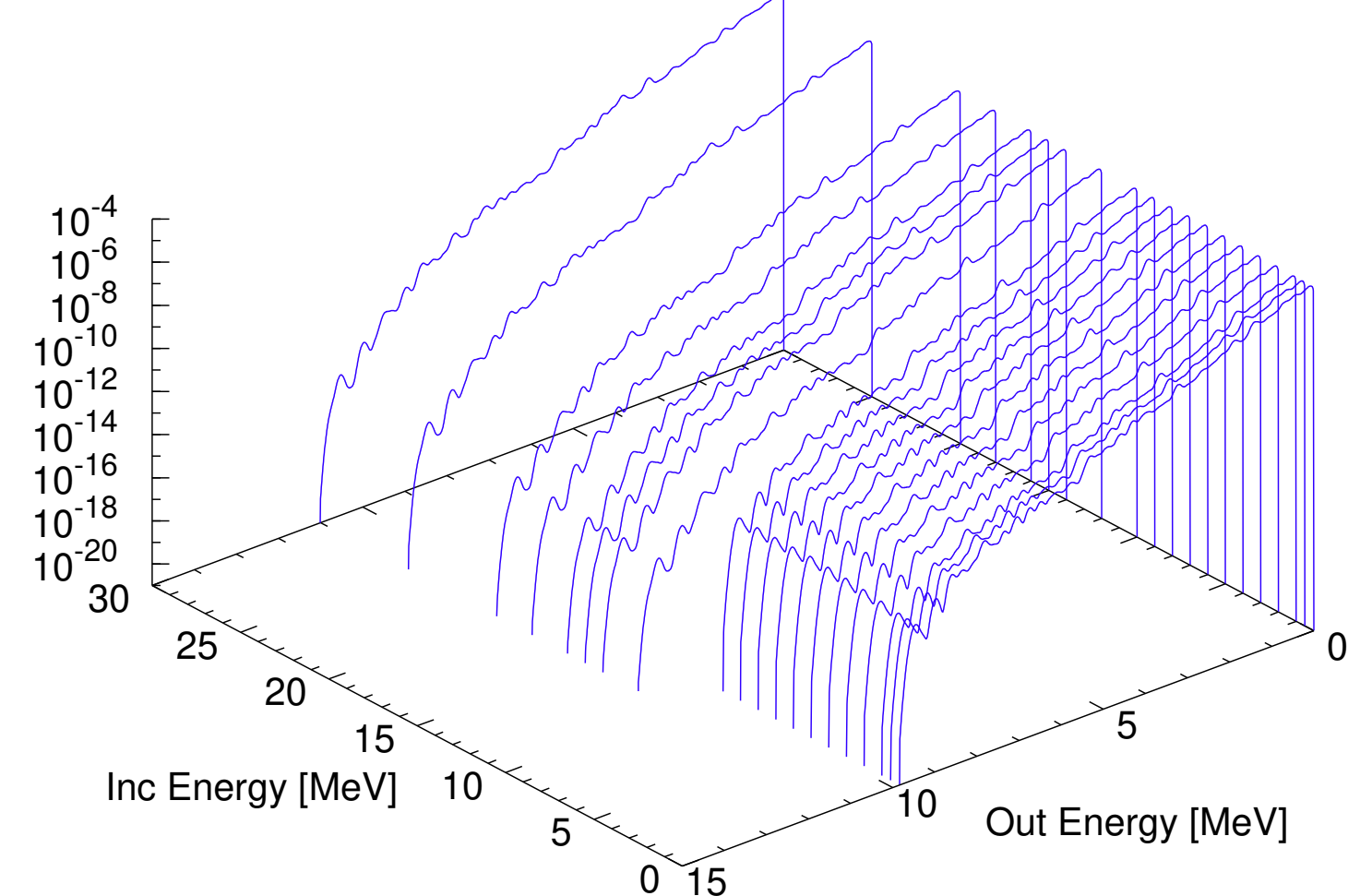
MF5 MT455 Group 4



MF5 MT455 Group 5

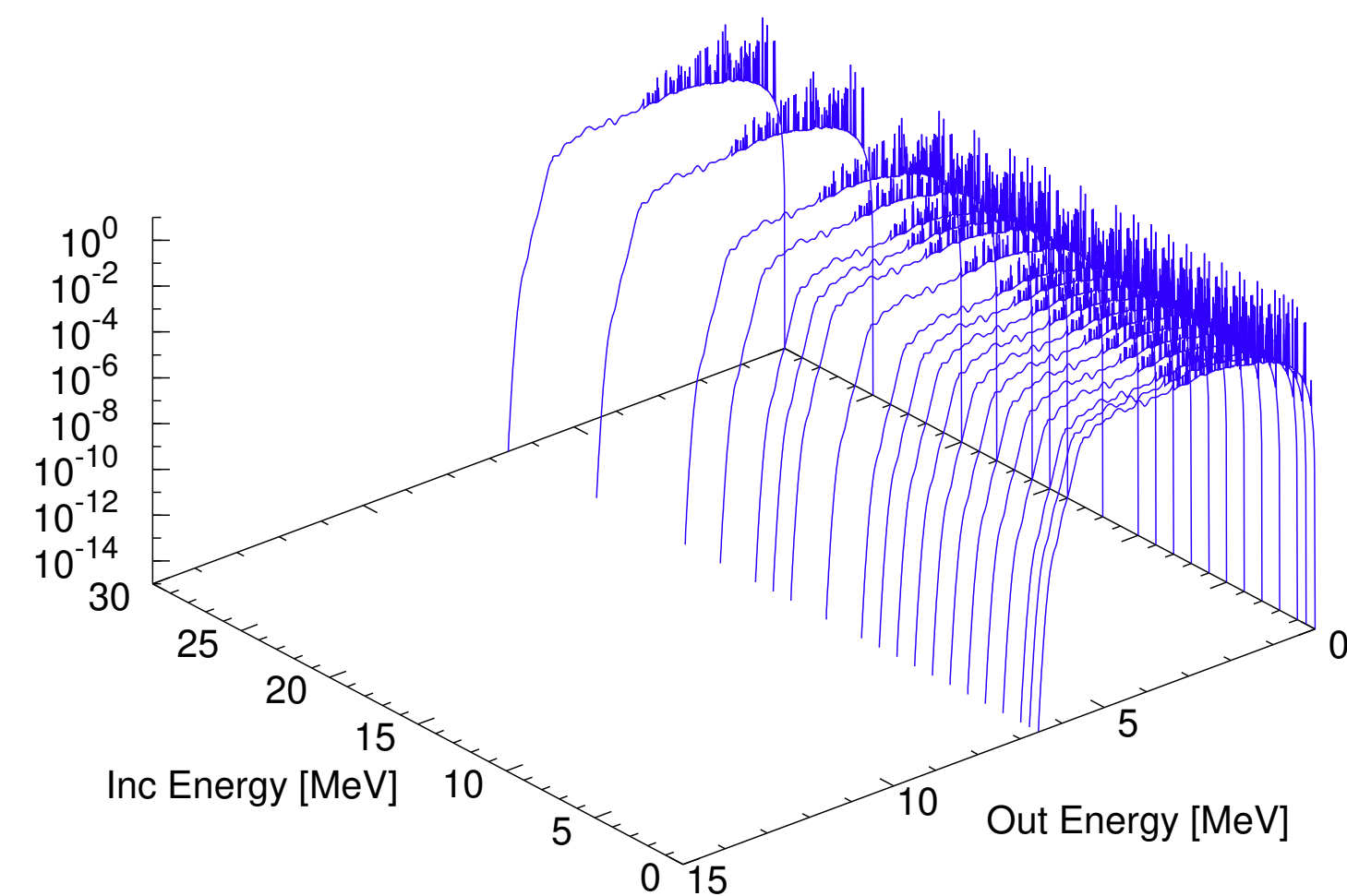


MF5 MT455 Group 6

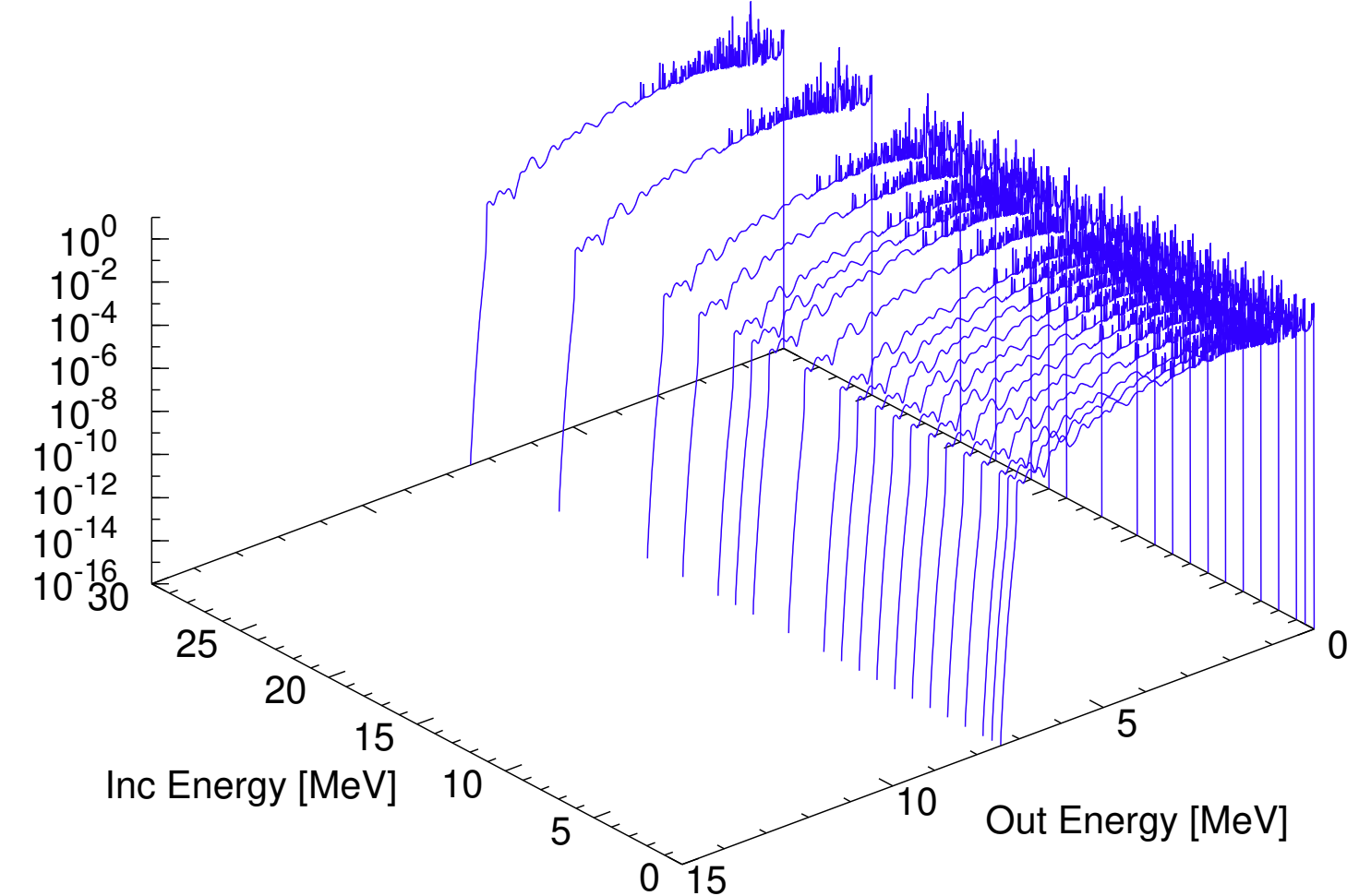


LACE Example ^{233}U Data, Delayed Photon Energy Spectra

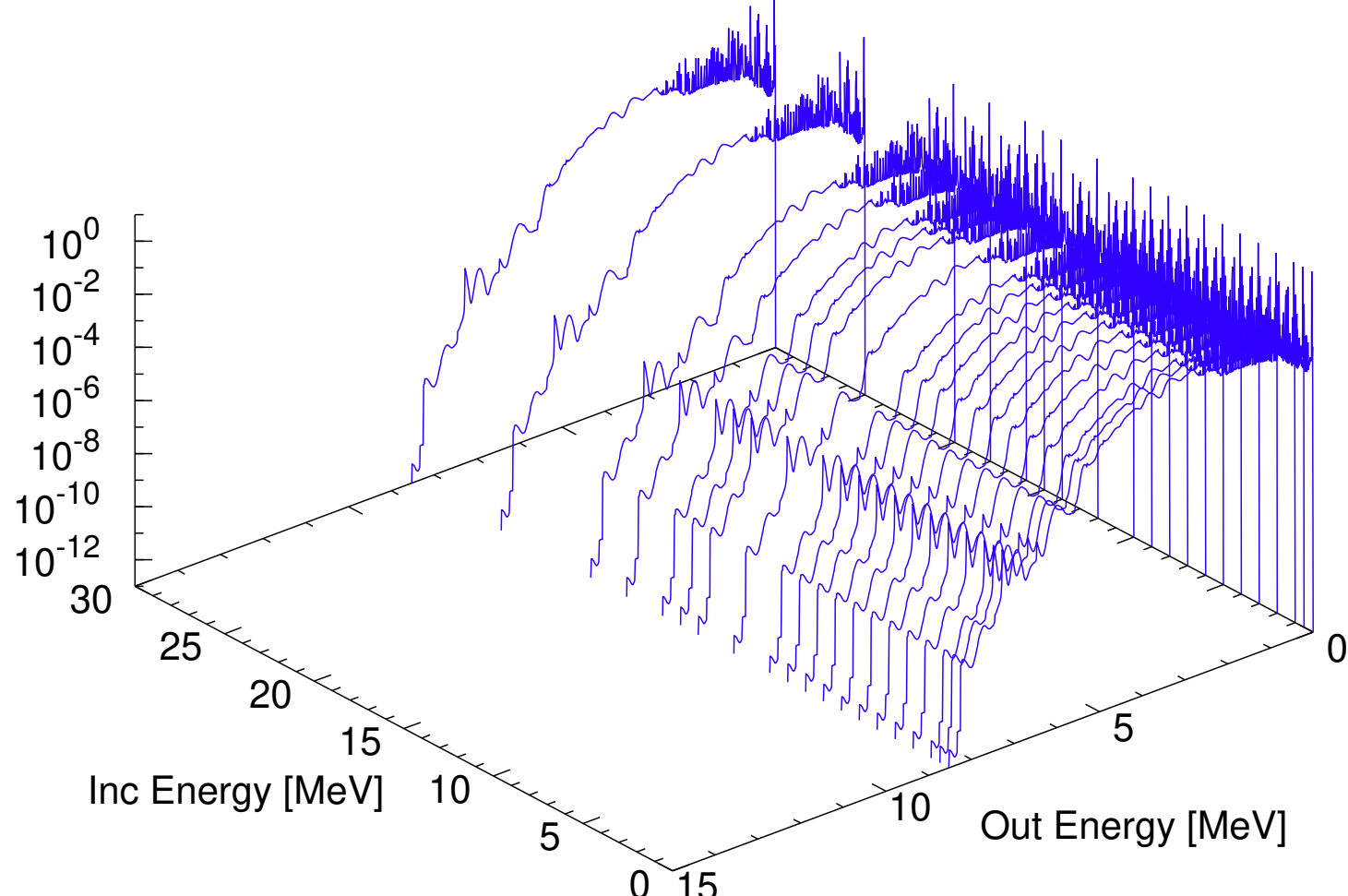
MF15 MT460 Group 1



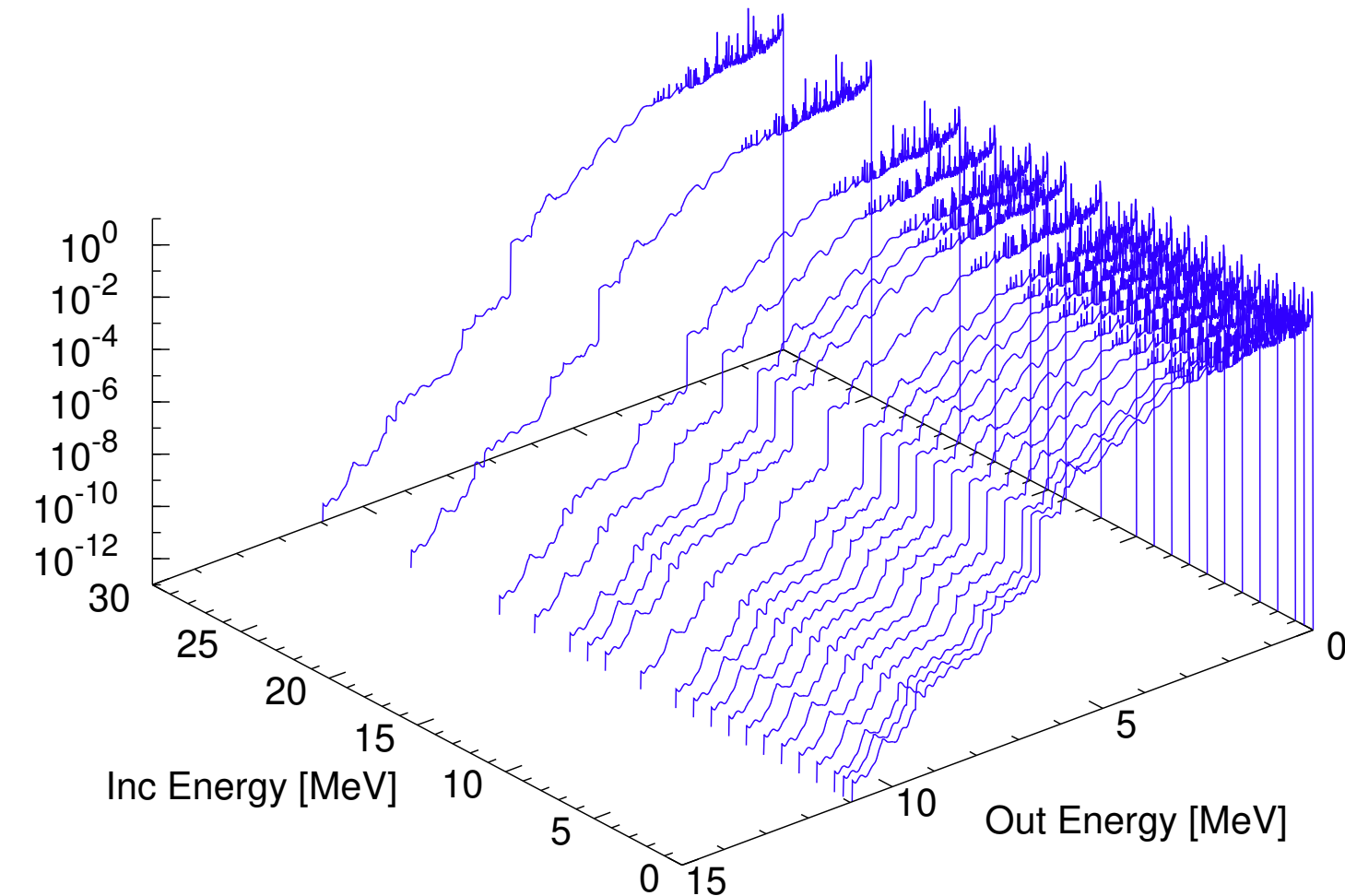
MF15 MT460 Group 2



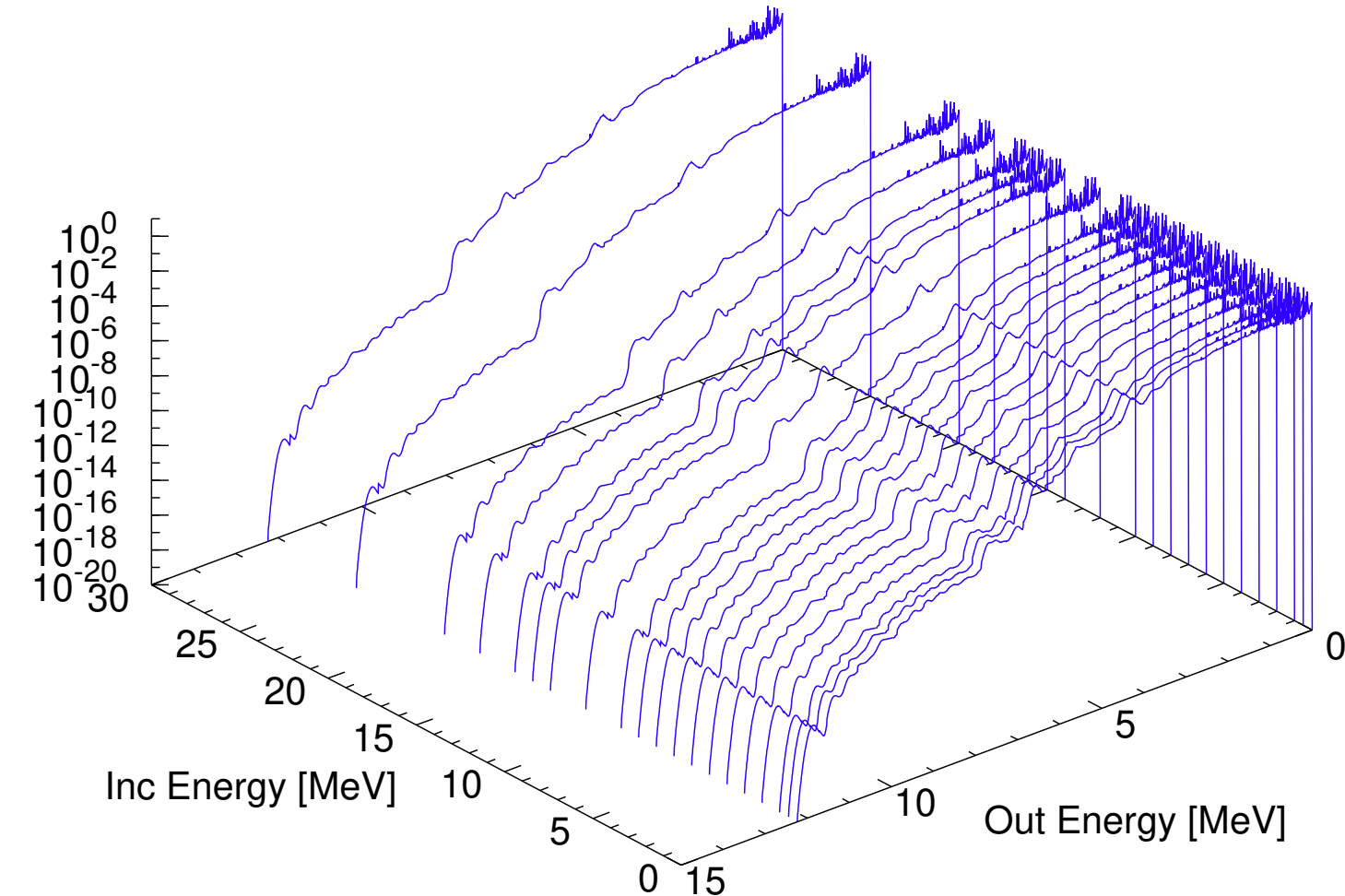
MF15 MT460 Group 3



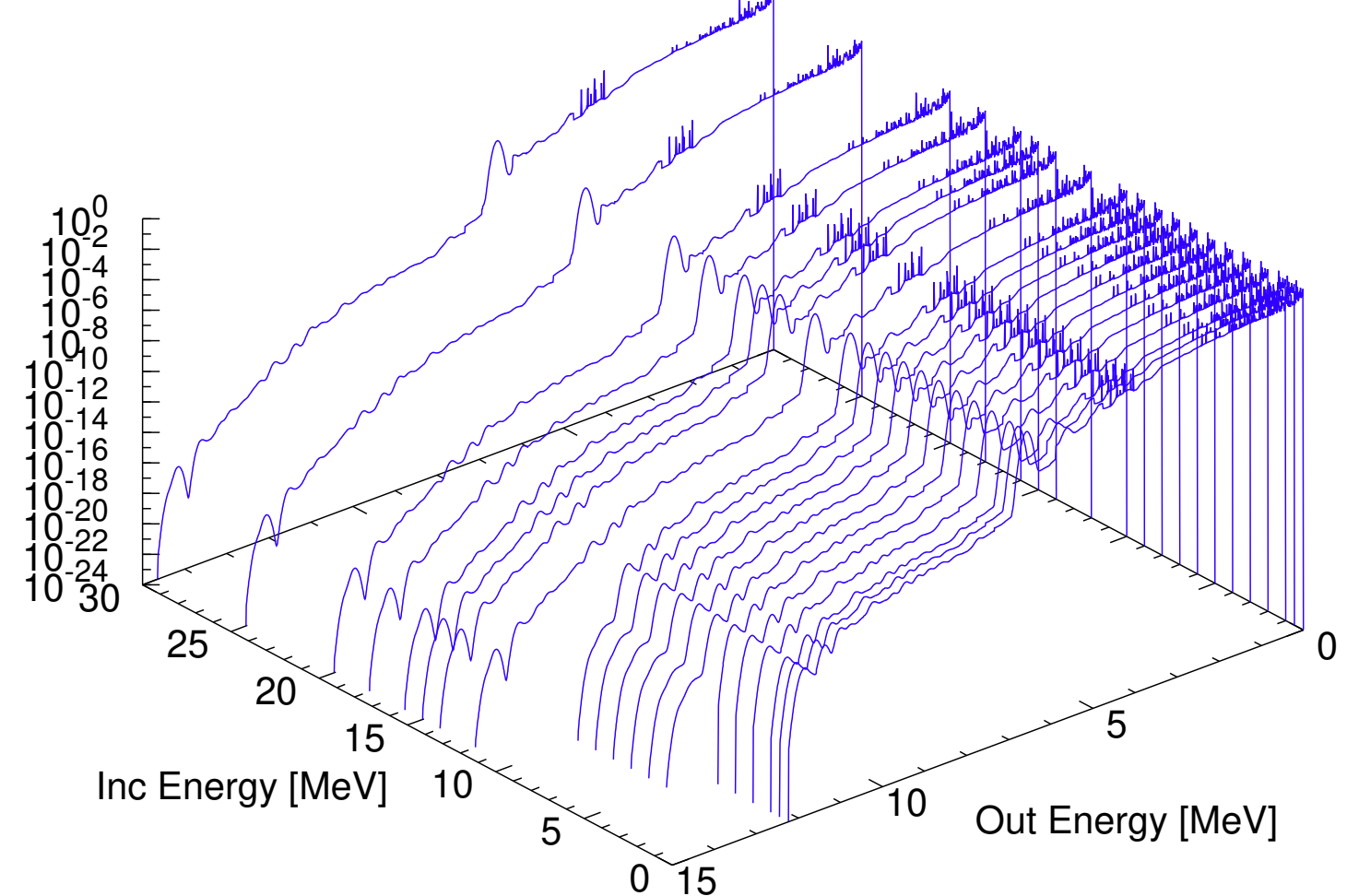
MF15 MT460 Group 4



MF15 MT460 Group 5

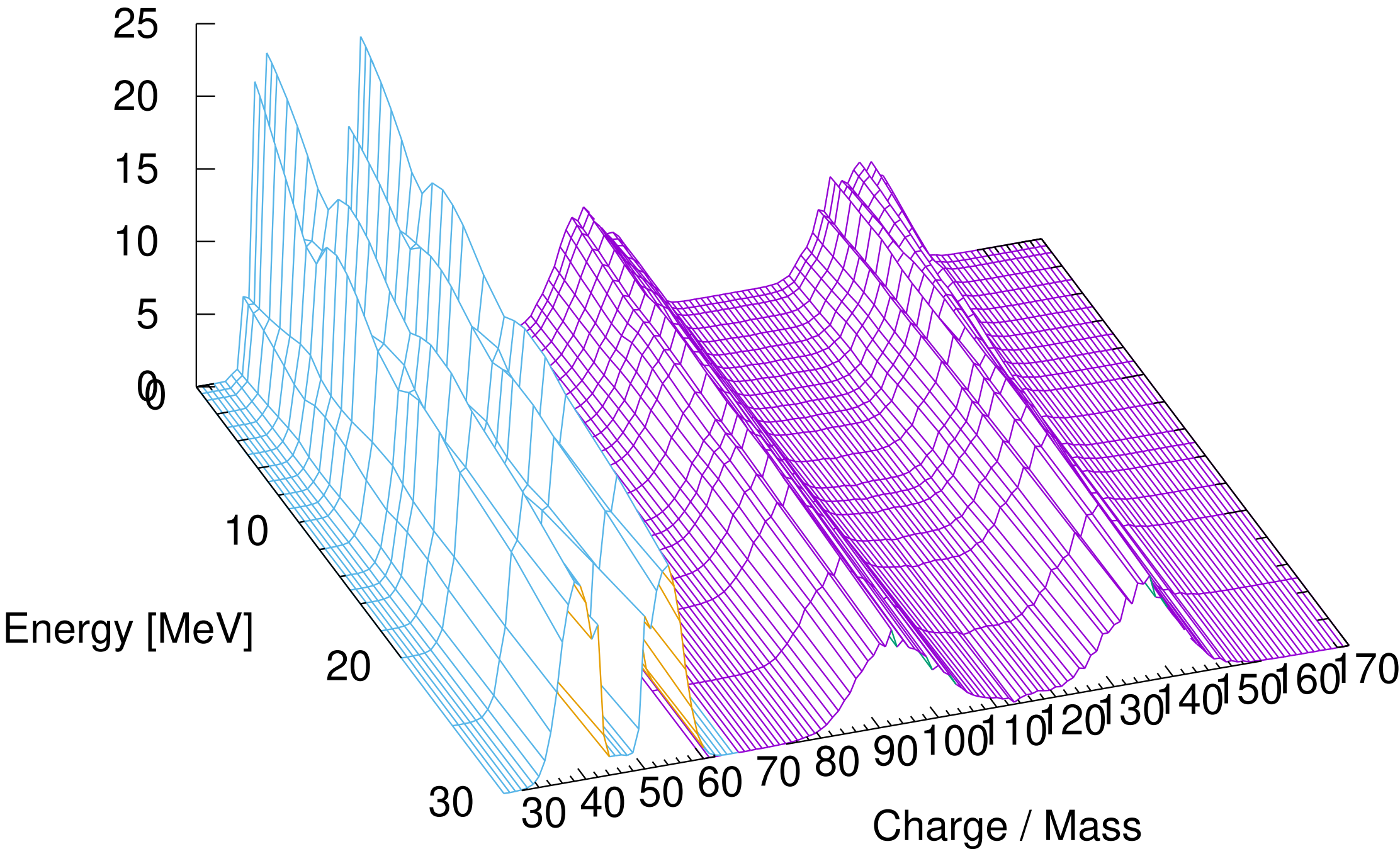


MF15 MT460 Group 6

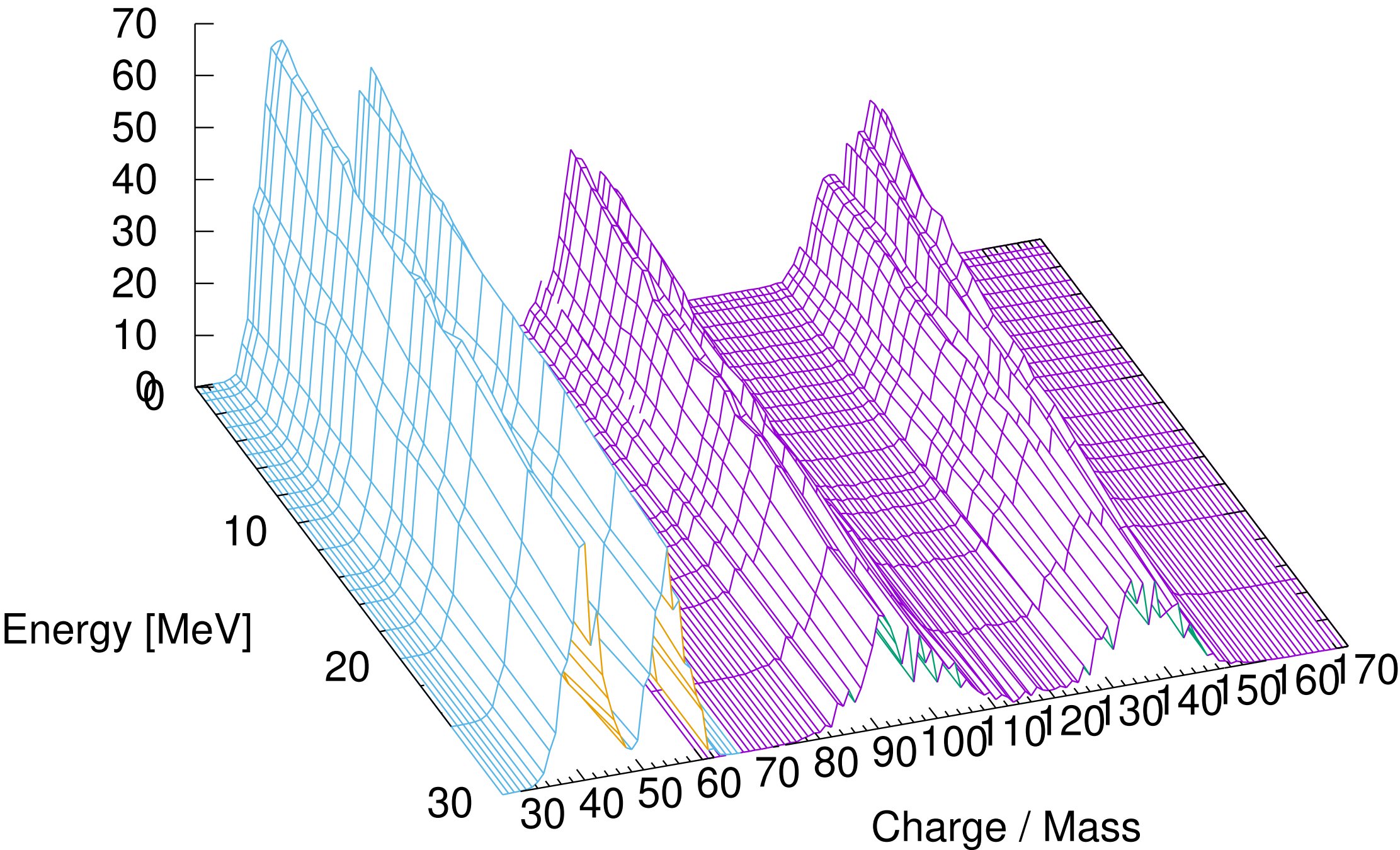


LACE Example ^{233}U Data, Independent and Cumulative FPY

MF8 MT454



MF8 MT459



Summary

- **Benchmark test of FPY data at high energies**
 - Re-visited GEANIE $^{239}\text{Pu}(n,xn)$ data, and subtracted gamma rays produced by fission fragments
- **LACE (Los Alamos CoH-based Evaluation) Library**
 - Fully automated framework to produce ENDF files from CoH/BeoH calculated results
 - Included at this moment
 - neutron induced reactions on all U and Pu isotopes
 - photonuclear reactions on major actinides
 - Easy to extend to medium mass region