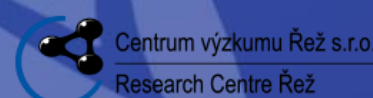
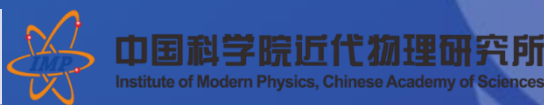
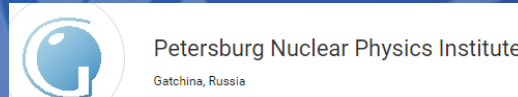
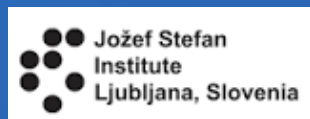




International Nuclear Data Evaluation Network (INDEN)

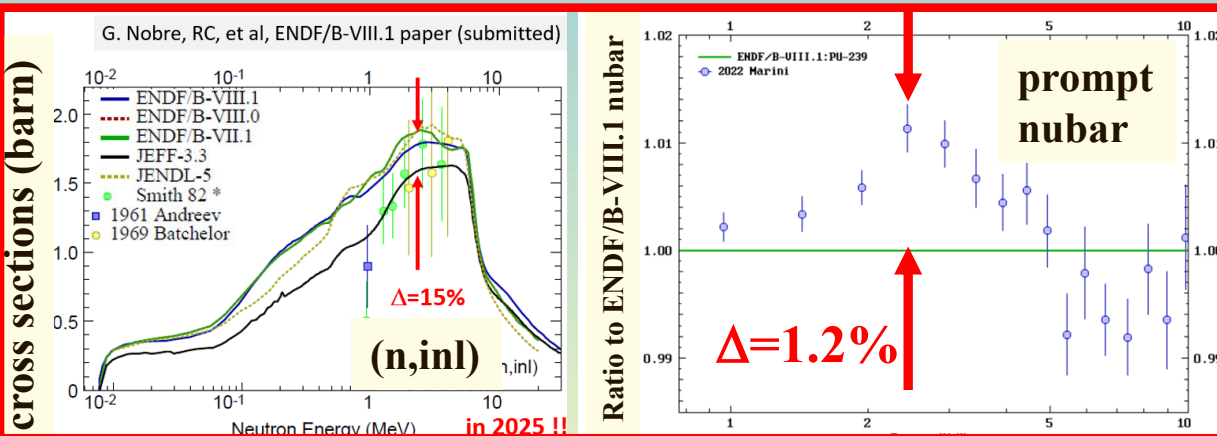
New INDEN Pu-239 evaluation: Improving scattering cross sections

R. Capote, A. Trkov, D. Martyanov, O. Cabellos, M. Sin, M.W. Herman

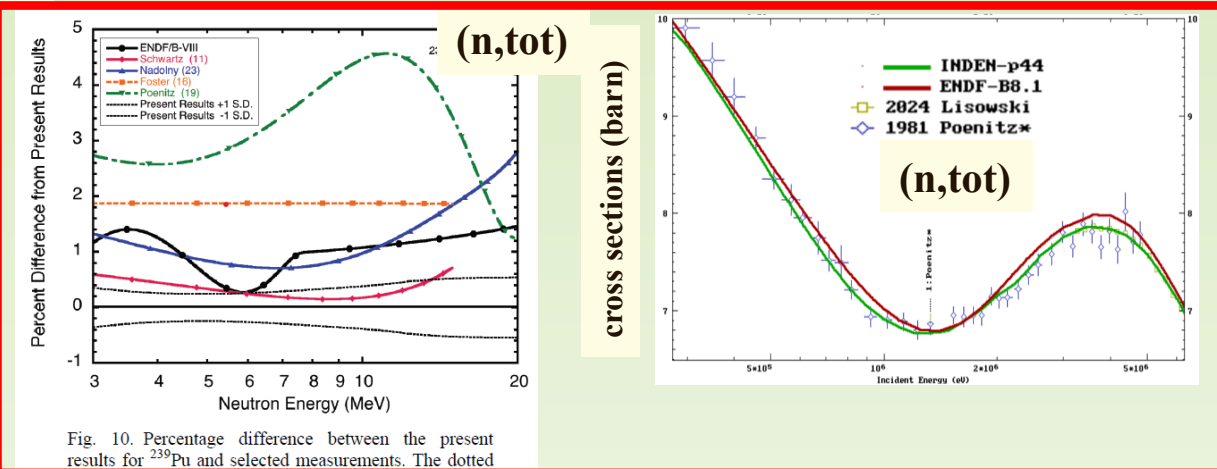
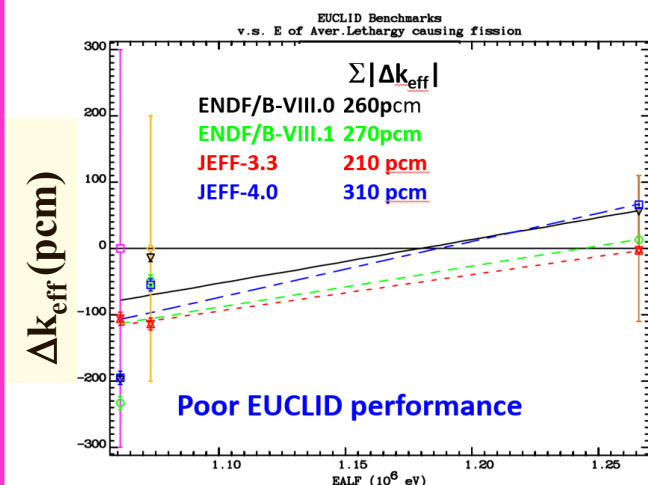


Current issues in ENDF/B-VIII.1 $n+^{239}\text{Pu}$

- * Large spread in evaluated inelastic XS from diff. libraries (well known since 2011)
- * Evaluated nubar in disagreement with lowest uncert. CEA/LANSCE Marini data
- * Trend for EUCLID+Jezebel crits: criticality decreases with increasing leakage



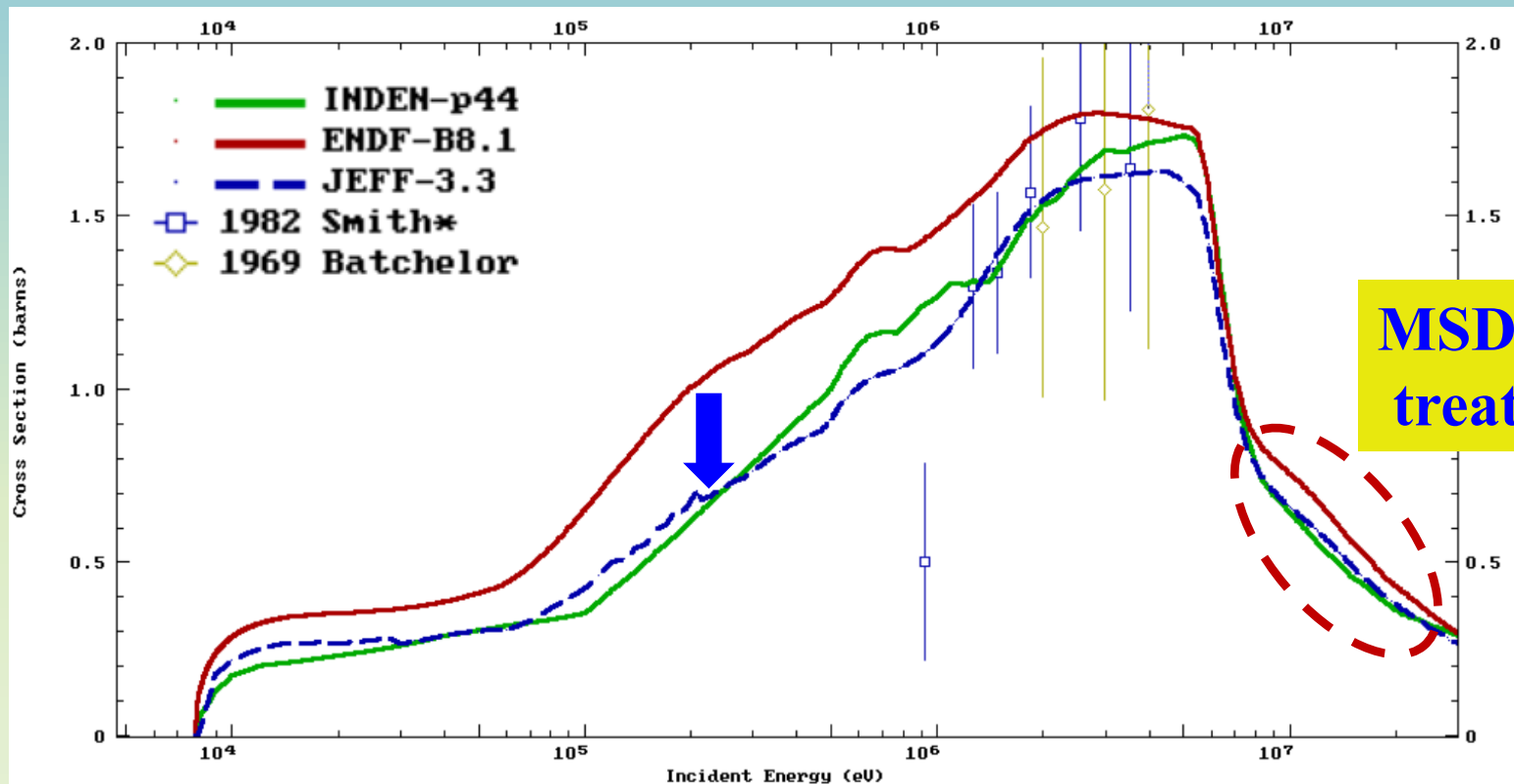
EUCLID+ Jezebel criticality: existing ND libr



σ_{tot} by Lisowski et al, NSE 198 (2024) 1901; v by Marini et al, Phys. Lett. B835 (2022)



Reduction in inelastic cross sections $n + {}^{239}\text{Pu}$



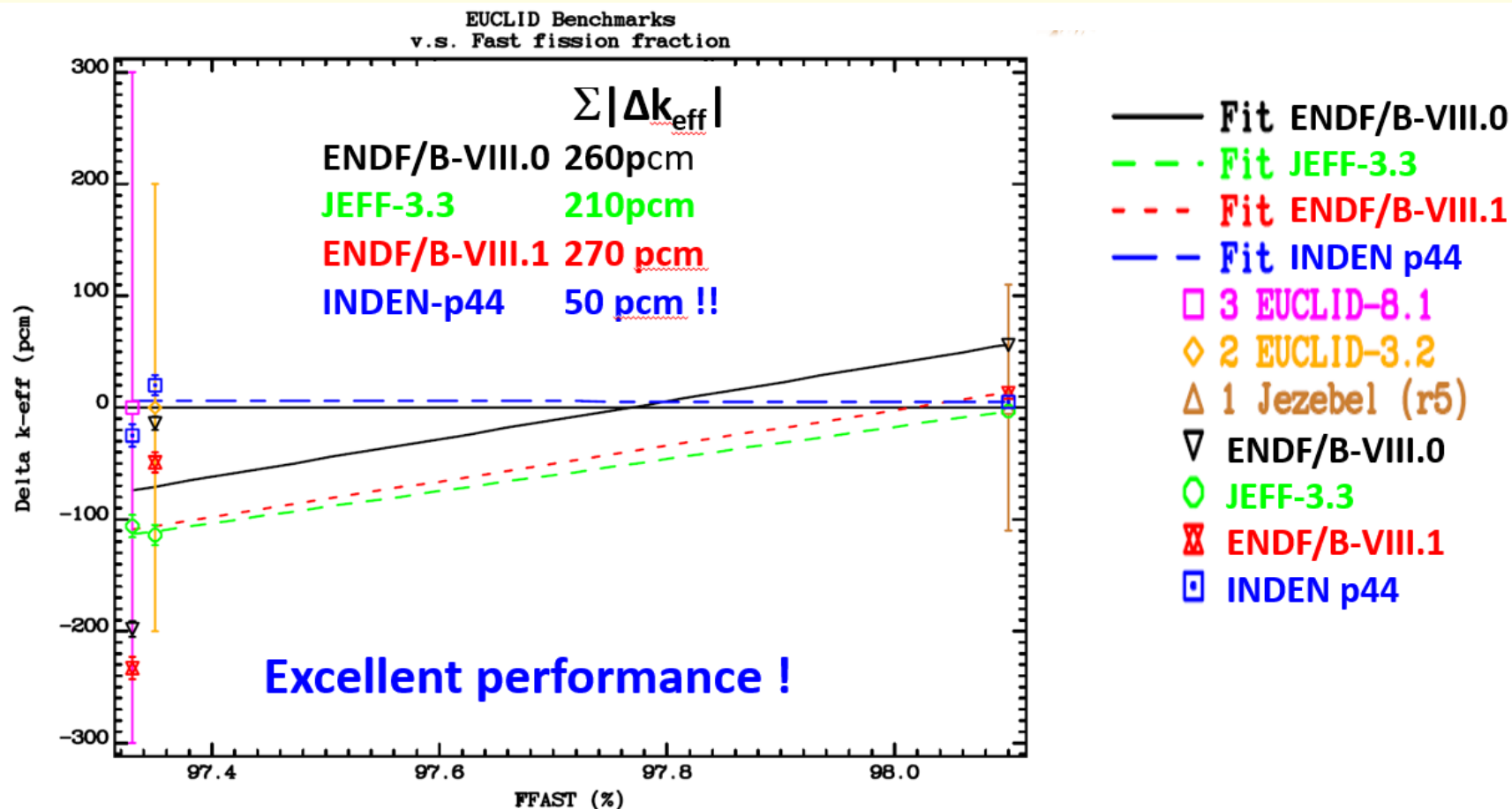
Theory developments for the new INDEN evaluation:

- * New soft-rotor model DCC OMP coupling two $K=1/2$ bands -19 CC (better nuclear data structure considered in the OMP)
- * MSC+MSD pre-equilibrium calculations using EMPIRE code



Better physics/data >> better performance

EUCLID+Jezebel criticality- INDEN file p57 (p44 calc)



LPS performance improved due to advanced MSD+MSC PE treatment



Updated INDEN evaluation of n + Pu-239

A new INDEN evaluation of n+ ²³⁹Pu have been developed (p44 calc, p57 file)

- ❑ DCC OMP with two band coupling developed by Martyanov et al (19 CC)
- ❑ MSD +MSC used to calculate inelastic scattering to continuum (no param)
- ❑ ENDF/B-VIII.1 fission, capture and (n,xn) adopted (and consistent with new evaluation)
- ❑ Compared to the ENDF/B-VIII.1 evaluation the following changes are noted:
 - ✓ Inelastic XS decreased significantly and is now compatible to JEFF-3.3 inelastic
 - ✓ Elastic XS is a bit lower than JEFF-3.3, much higher than ENDF/B-VIII.1
 - ✓ Total cross section is reduced following Lisowski 2024 data and discussions
 - ✓ Nubar exactly follows CEA-LANSCE Marini 2022 data from EXFOR without tweak.

EXCELLENT PERFORMANCE ACHIEVED - [pu239e80p57empJb file](#)

- ❑ **The trend Jezebel-EUCLID is gone, no gradient, 0 bias with ±25pcm spread**
- ❑ **Excellent LPS performance due to advanced MSD+MSC PE treatment**

Better physics/data leads to better performance

