

IRSN

INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE

Faire avancer la sûreté nucléaire

NACRE activities on the ^{233}U resonance evaluation to improve benchmark performance

*Réunion NACRE
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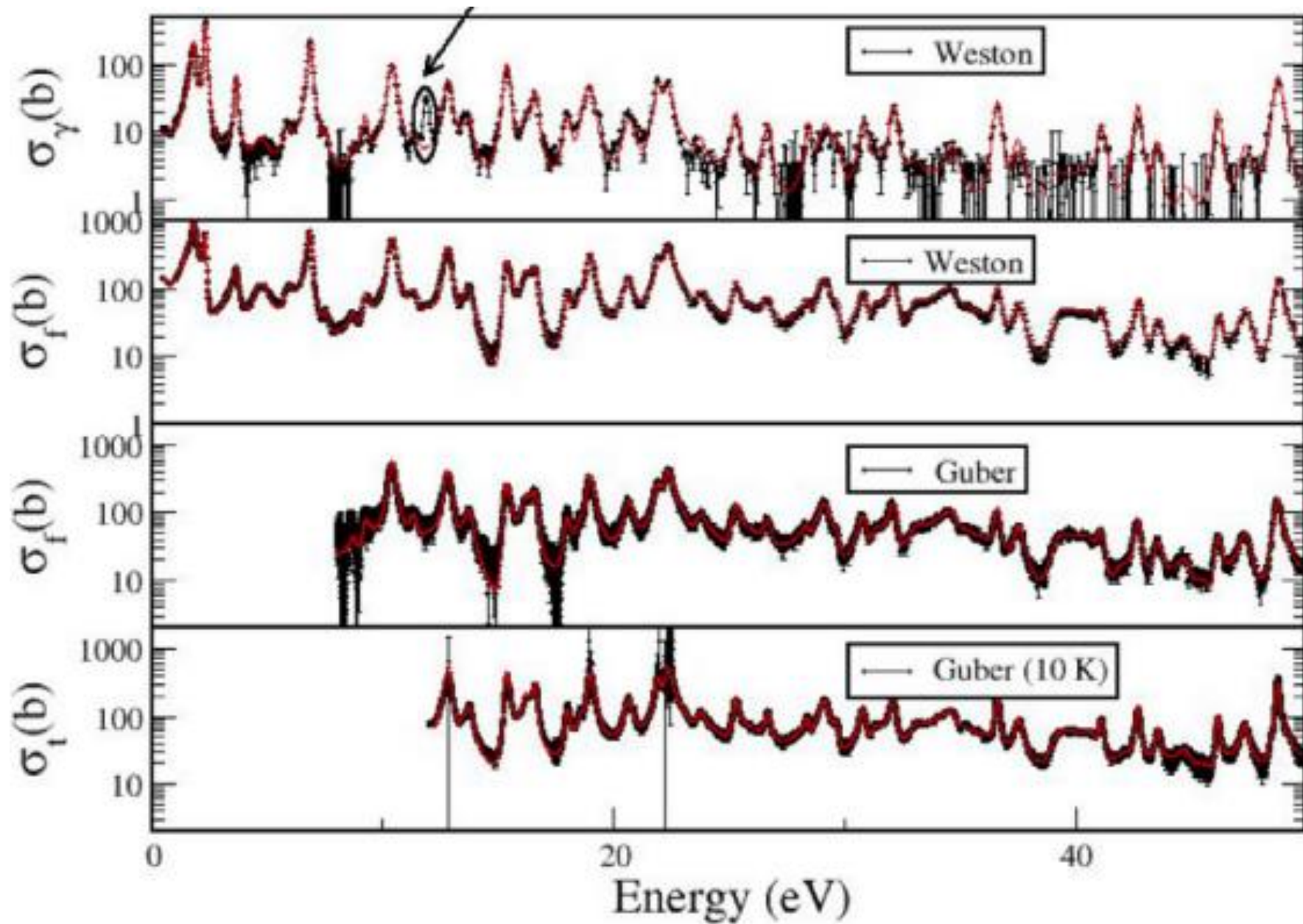
March 17-18, 2022

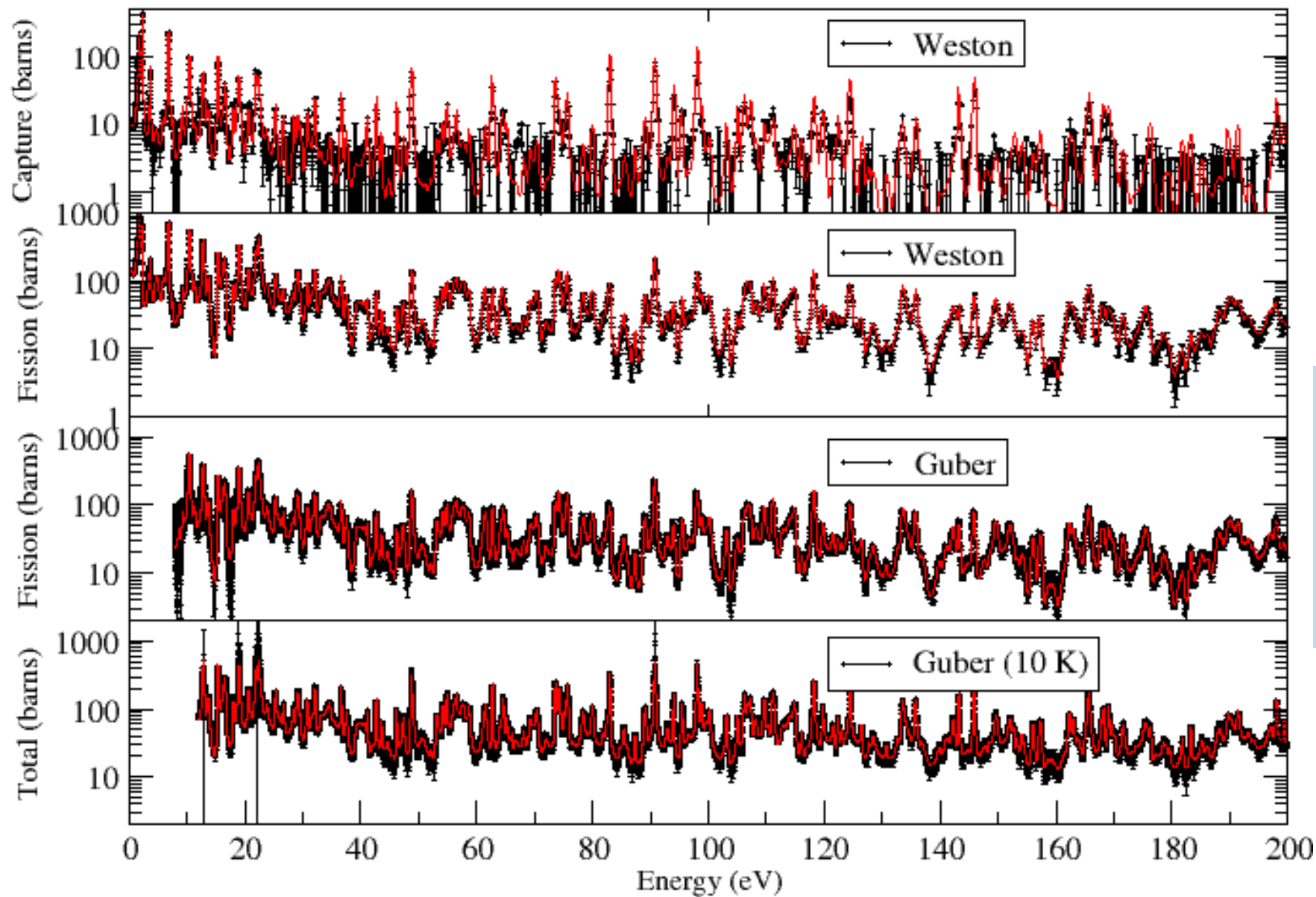
^{233}U resolved and unresolved resonance evaluation

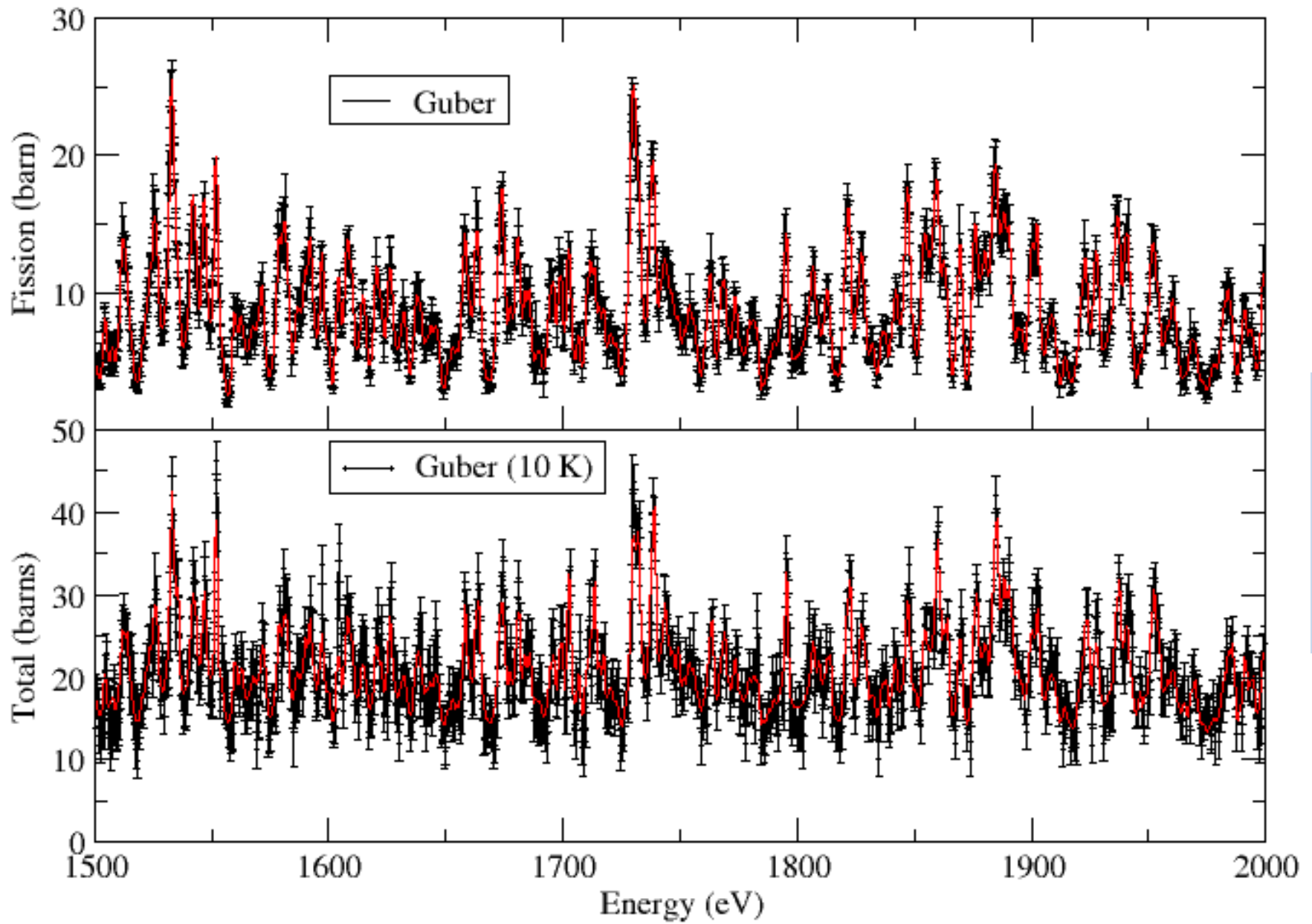
I. ^{233}U resolved resonance region evaluation:

- a) Extension of the resolved resonance region from 600 eV to 2 keV;
- b) Use of high resolution transmission data measured at the Oak Ridge Linear accelerator (ORELA) at helium liquid temperature ~ 10 K;
- c) Use of high resolution fission cross section data measured at ORELA;
- d) Use existing capture data up to 1 keV. This data include impurities and questionable resolution;

II. ^{233}U unresolved resonance region: ongoing work !!

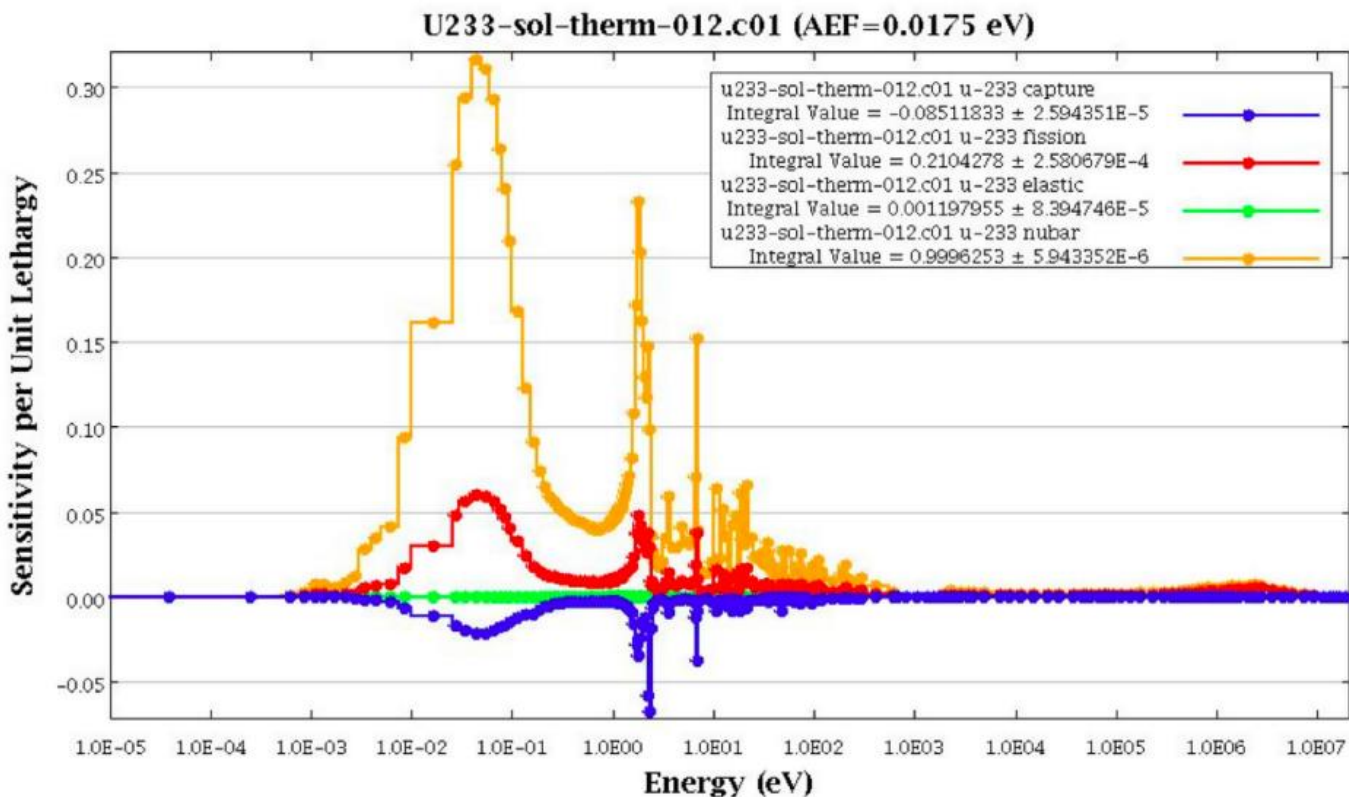






Benchmark Results

- Benchmark sensitive to ^{233}U nuclear data: MORET sensitivity calculations
- Use of a data adjustment tool to calculate cross section change for improving k_{eff} results: MACSENS;



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^{233}U Cross Section Library

- Use of the JEFF3.3 library as the template;
- Use of the IAEA **PFNS and nubar** evaluation;
- Follow IAEA standard recommended values;

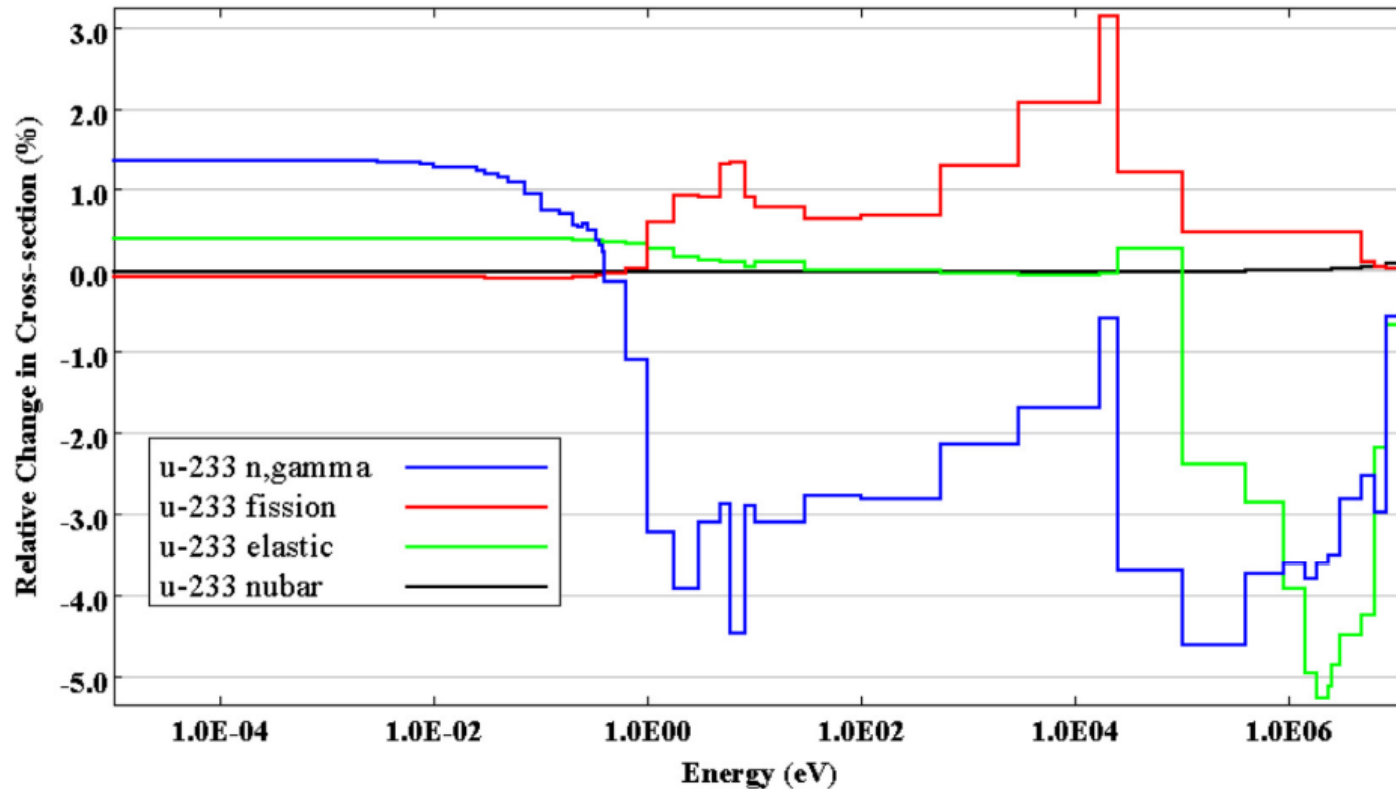
$$I_1 = \int_{0.02 \text{ eV}}^{0.06 \text{ eV}} \sigma_f(E) dE$$

$$I_3 = \int_{8.1 \text{ eV}}^{14.7 \text{ eV}} \sigma_f(E) dE$$

	IAEA	NACRE-Evaluation
I_1	17.53 <i>b.eV</i>	17.07 <i>b.eV</i>
I_3	688.96 <i>b.eV</i>	688.16 <i>b.eV</i>
σ_{0f}	533.0 b	533.0 b
$\sigma_{0\gamma}$		45.1 b

Benchmark Results

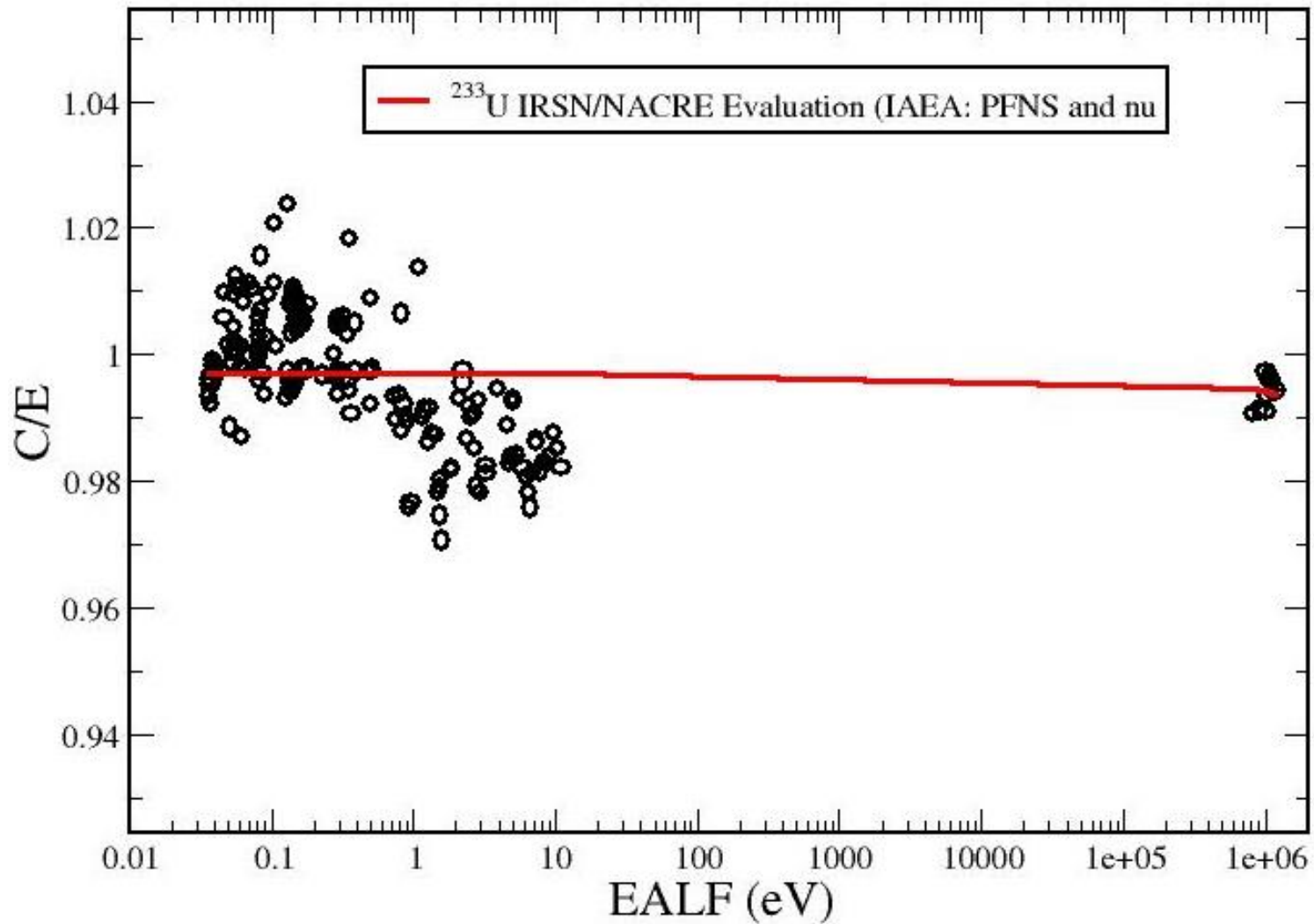
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Benchmark Results

^{233}U Benchmark Results



In summary:

- a) Working close with LANL: fission and capture measurements have been carried out at LANL under the US/NCSP sponsorship;
- b) Meeting periodically with LANL;
- c) Data will be shared with IRSN;
- d) N_TOF measurements are needed for better uncertainty for criticality safety applications;
- e) Library will be proposed to JEFF4;
- f) URR evaluation nearly completion;