

**IRSN**

INSTITUT  
DE RADIOPROTECTION  
ET DE SÛRETÉ NUCLÉAIRE

*Enhancing nuclear safety*

# Benchmark Inter-comparison Study

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# Data available at IRSN

Focus first on  
HEU and Pu

## MCNP (ENDF/B-VII.1)

- HEU: 386
- PU: 261
- LEU: 209
- IEU: 13
- MIX: 73
- U233: 158

## COG (ENDF/B-VII.1) /updated on May 8

- HEU: 356 → extended to 449
- PU: 143 → extended to 510
- U233: 127

## MORET (JEFF3.1.1/ JEFF3.2/ JEFF3.3/ ENDF/B-VII.1)

- HEU: 385
- PU: 184
- LEU: 449
- IEU: 18
- MIX: 164
- U233: 32

*Additional calculation on  
HEU (72) and Pu (45) are  
planned*

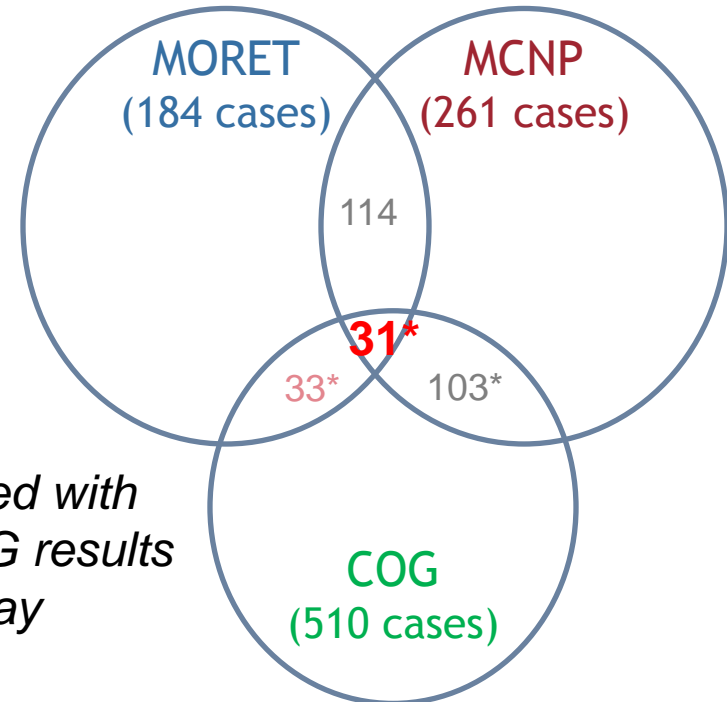
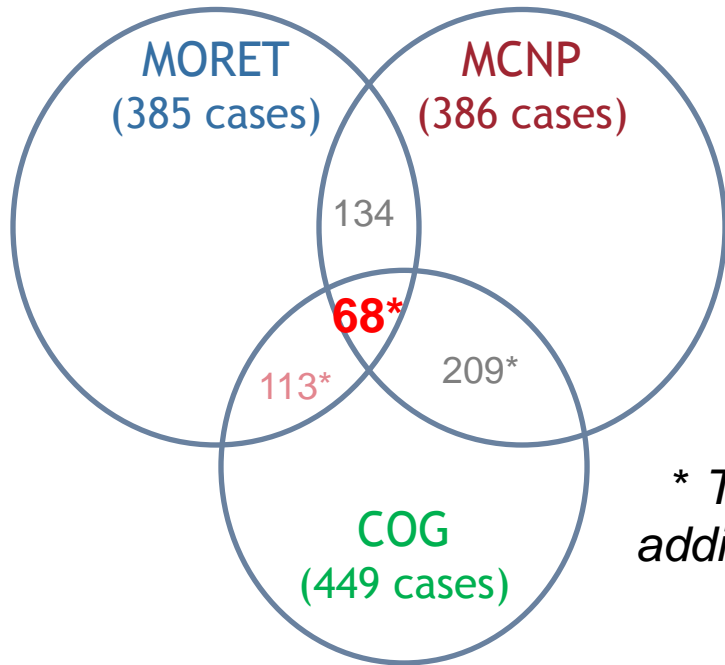
## SCALE (KENO V and VI with ENDF/B-VII.0 and .1)

- HEU: 102 (27 K6)
- PU: 93
- LEU: 159
- IEU: 13
- MIX: 61
- U233: 190

# Common set of HEU and PU benchmarks

☐ HEU: 739 benchmarks

☐ PU: 369 benchmarks



*\* To be updated with additional COG results sent in May*

➤ Only 68\* common cases for HEU

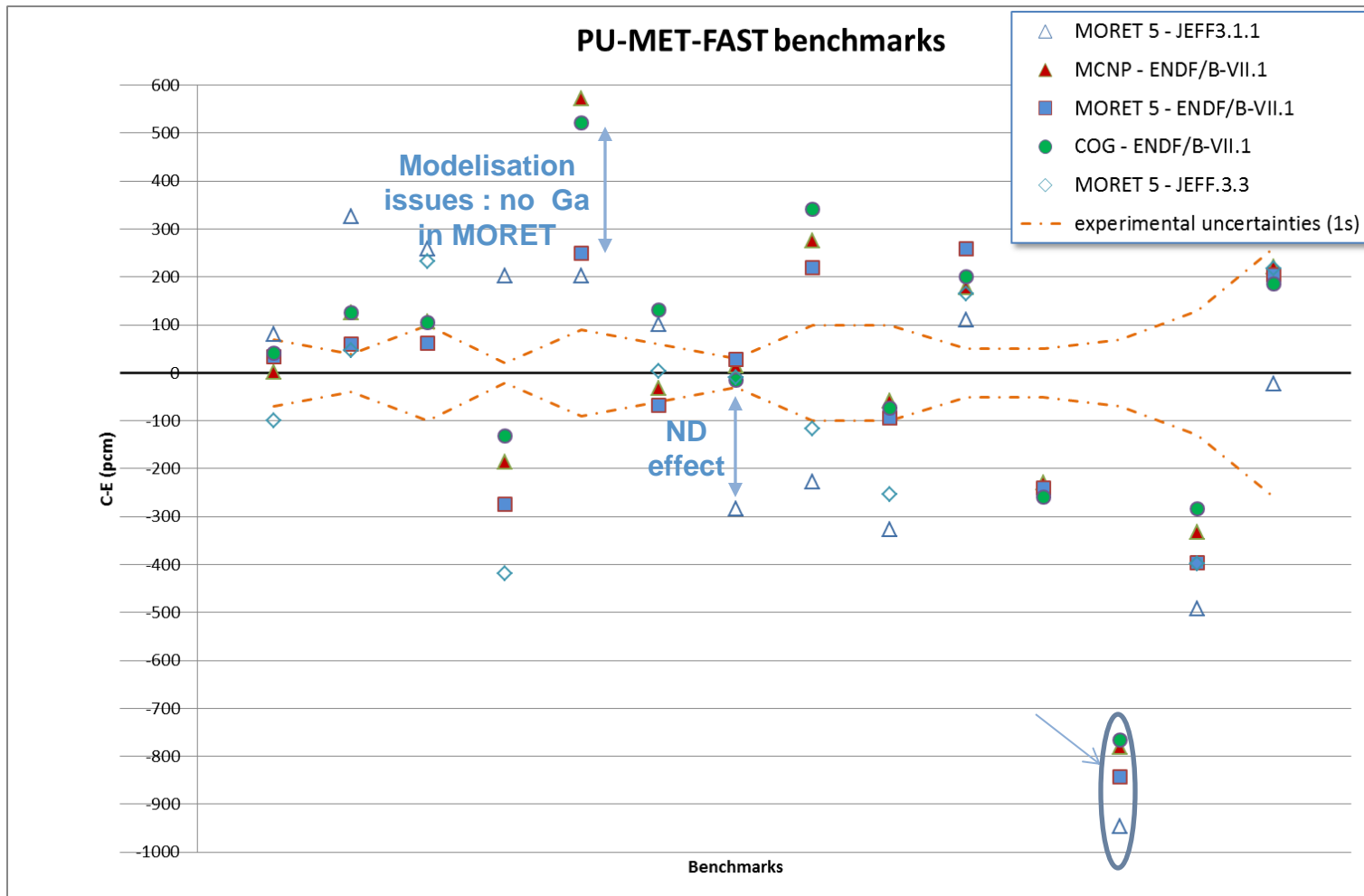
➤ Only 31\* common cases for PU

*Additional calculation on HEU (72) and Pu (45) common to MCNP and COG are planned*

# Preliminary analyses

☐ PU MET FAST: 21 common cases

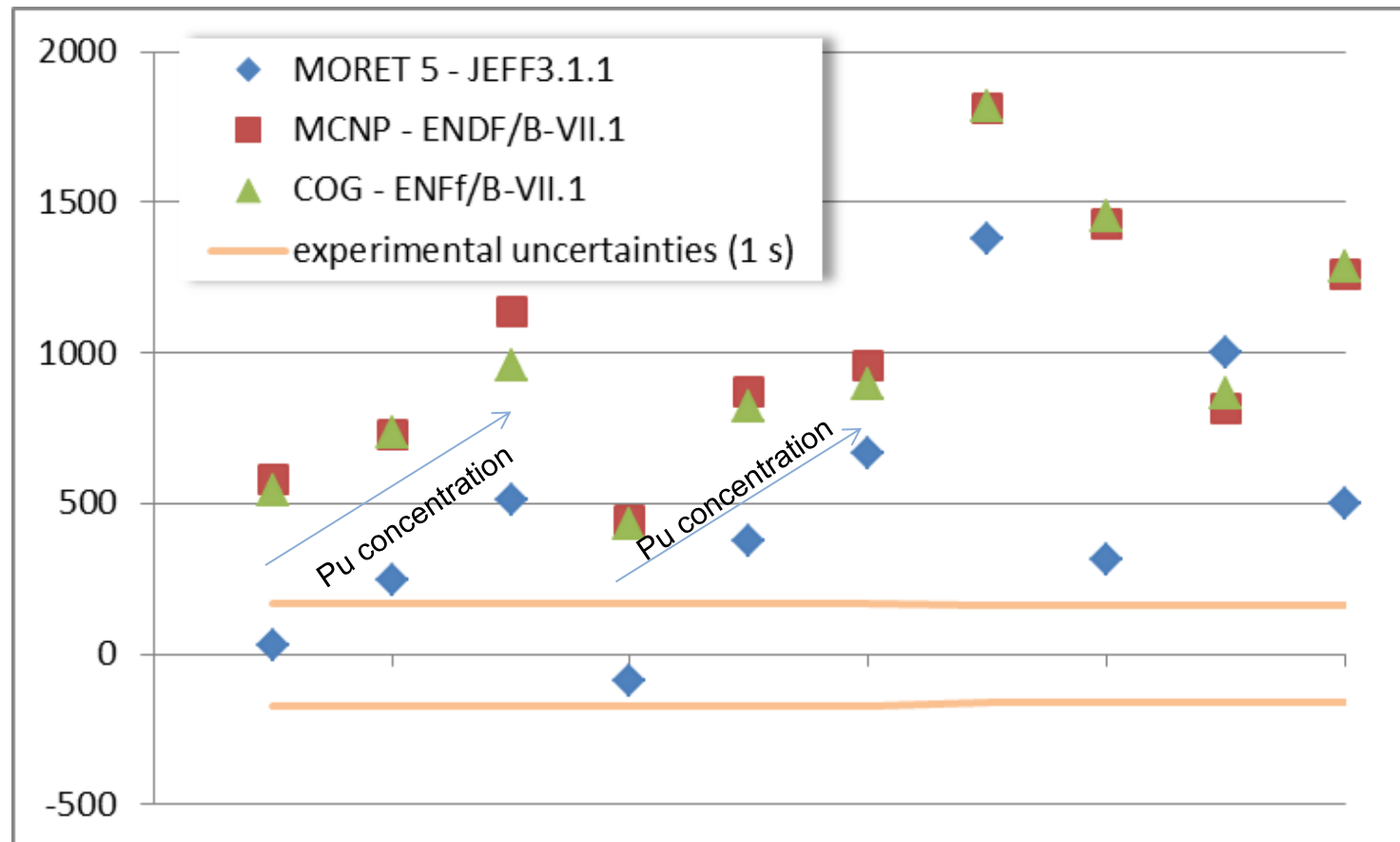
- ☐ MC Standard deviations
  - COG: 0.00020
  - MCNP: inf. 0.00010
  - MORET: 0.00010



# Preliminary analyses

☐ PU SOL THERM: 10 common cases

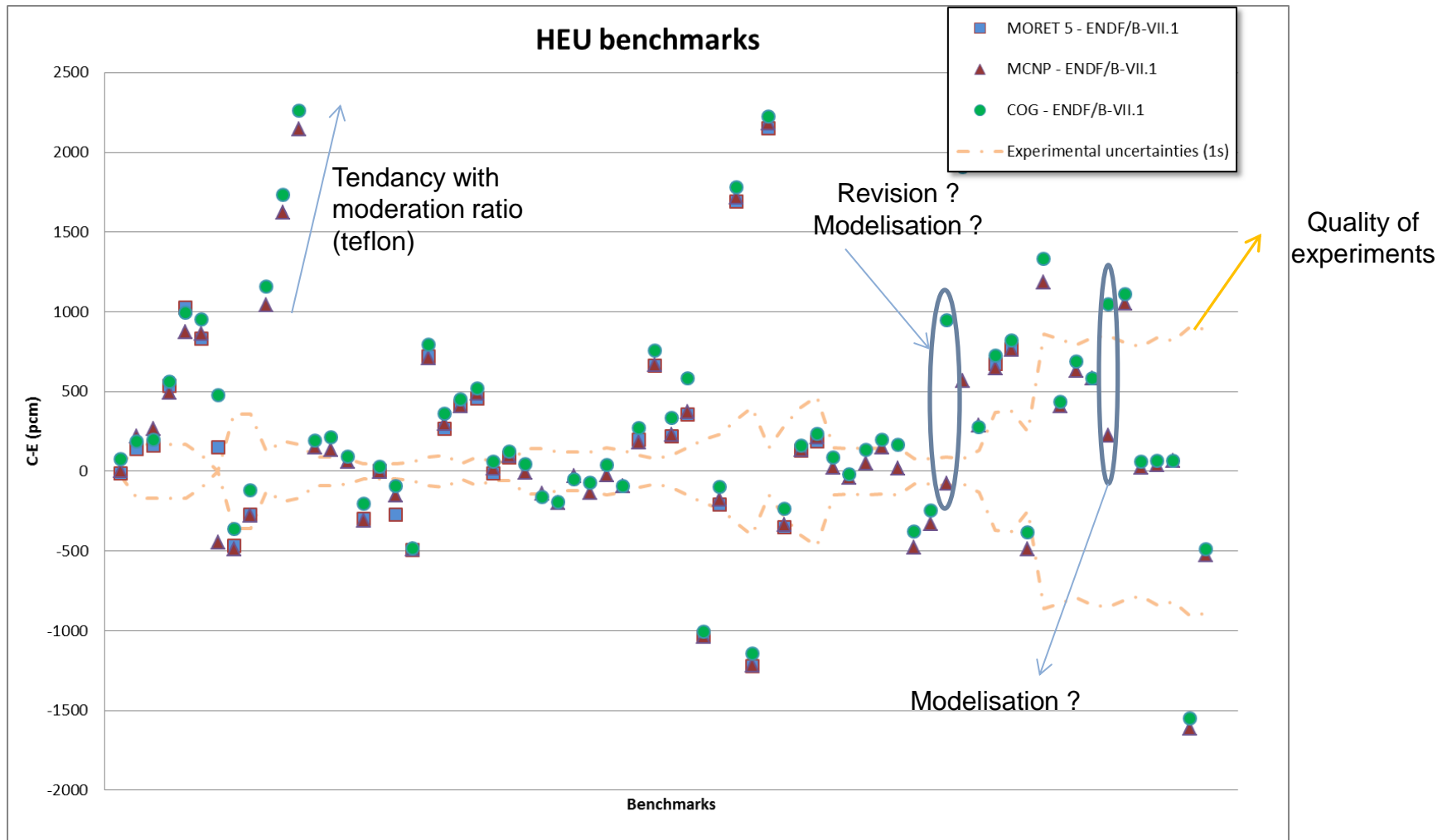
- ☐ MC Standard deviations
  - COG: 0.00020
  - MCNP: inf. 0.00010
  - MORET: 0.00010



# Preliminary analyses

☐ HEU benchmarks: 68 common cases

- ☐ MC Standard deviations
  - COG: 0,00020
  - MCNP: inf. 0,00010
  - MORET: 0,00010



# Advantages of this comparison

- Improvement of the codes validation suites
  - Modelisation errors or misunderstanding
  - Additional benchmarks of interest
  - ICSBEP revision ?
  - Simplified or Detailed Model ?
  
- Feedback to ICSBEP
  - Experimental data quality
  - Misunderstanding in benchmark model
  - Suspicious data
  - Experimental uncertainties
  
- Feedback to Nuclear Data
  - JEFF and ENDF
  - Processing tools
  - New evaluation need
  
- Need of additional uncorrelated experiments ?