

# ENDF/B-VIII-beta Data Testing at ORNL

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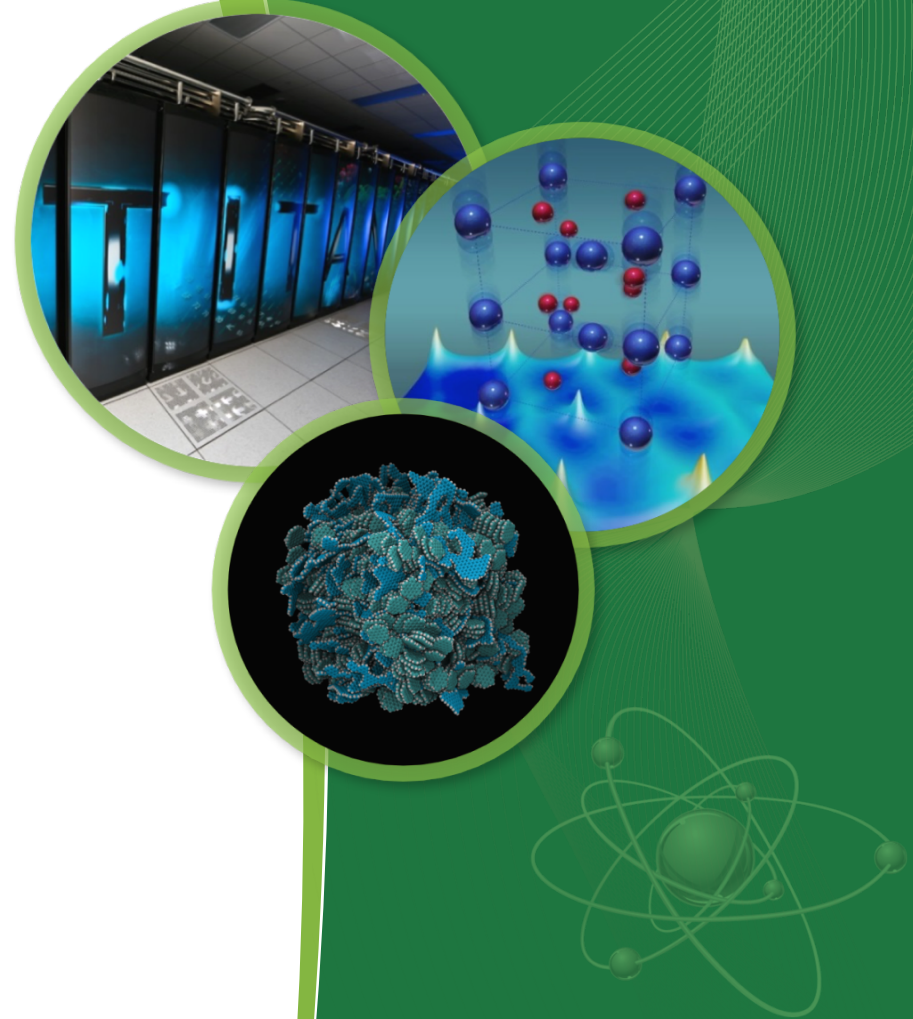
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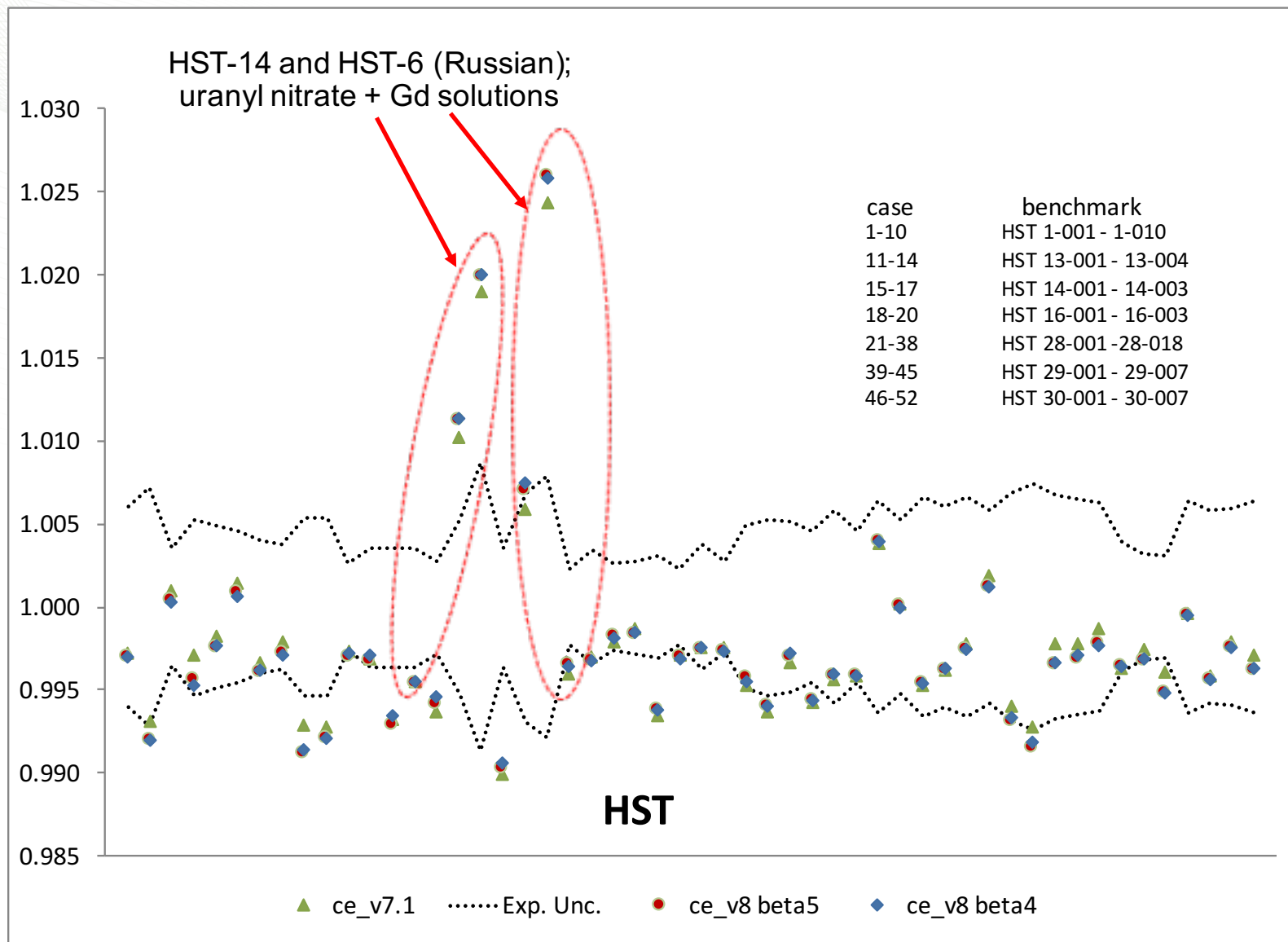
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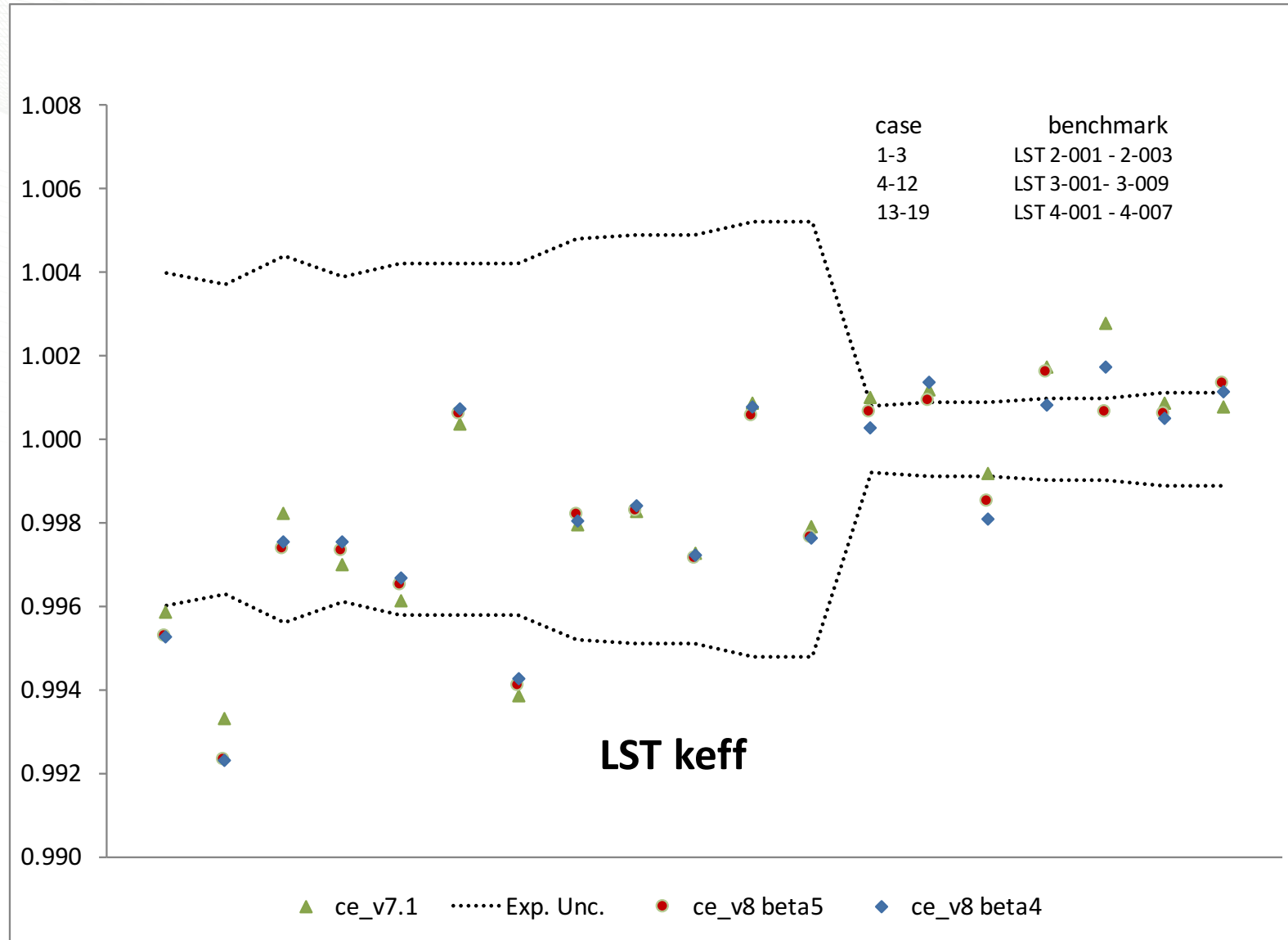
# Summary of Methods

- AMPX processing system was used to process continuous energy (CE) and multigroup (MG) libraries from ENDF/B-VIII beta-4 and beta-5 files
- 317 Critical benchmark calculations were performed with CE-KENO from SCALE-6.2.2
- Benchmark cases taken from ORNL's VALID Suite of inputs for selected criticals in ICSBEP Handbook
  - 52 HEU solutions, thermal (HST)
  - 19 LEU solutions, thermal (LST)
  - 81 Pu solutions, thermal (PST)
  - 72 LEU lattices, thermal (LCT)
  - 49 Mixed U-Pu, thermal lattices (MCT)
  - 11 IEU metal, fast (IMF)
  - 23 HEU metal, fast (HMF)
  - 10 Pu metal, fast (PMF)

# Results for Thermal HEU Solutions

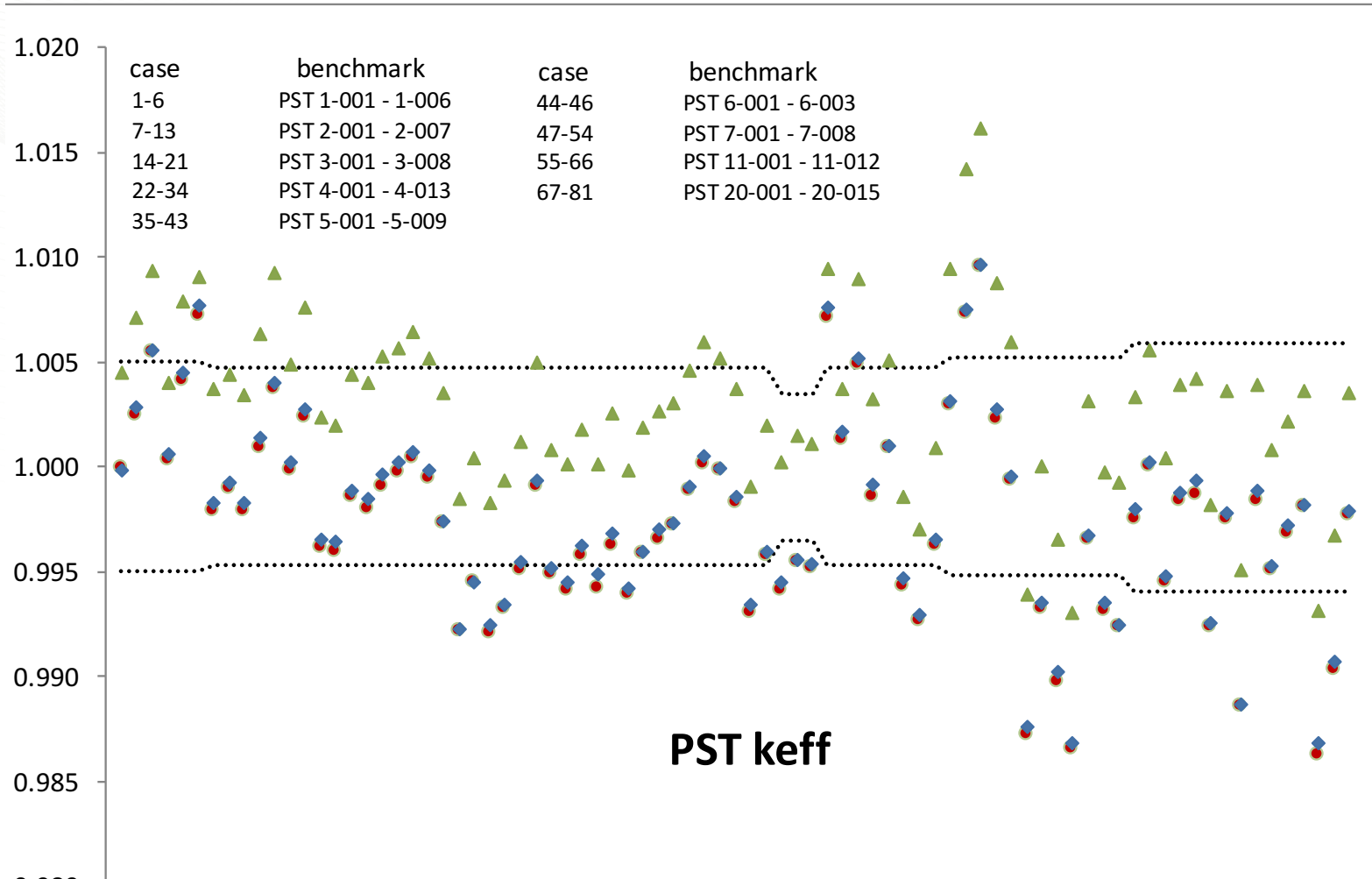


# Results for Thermal LEU Solutions

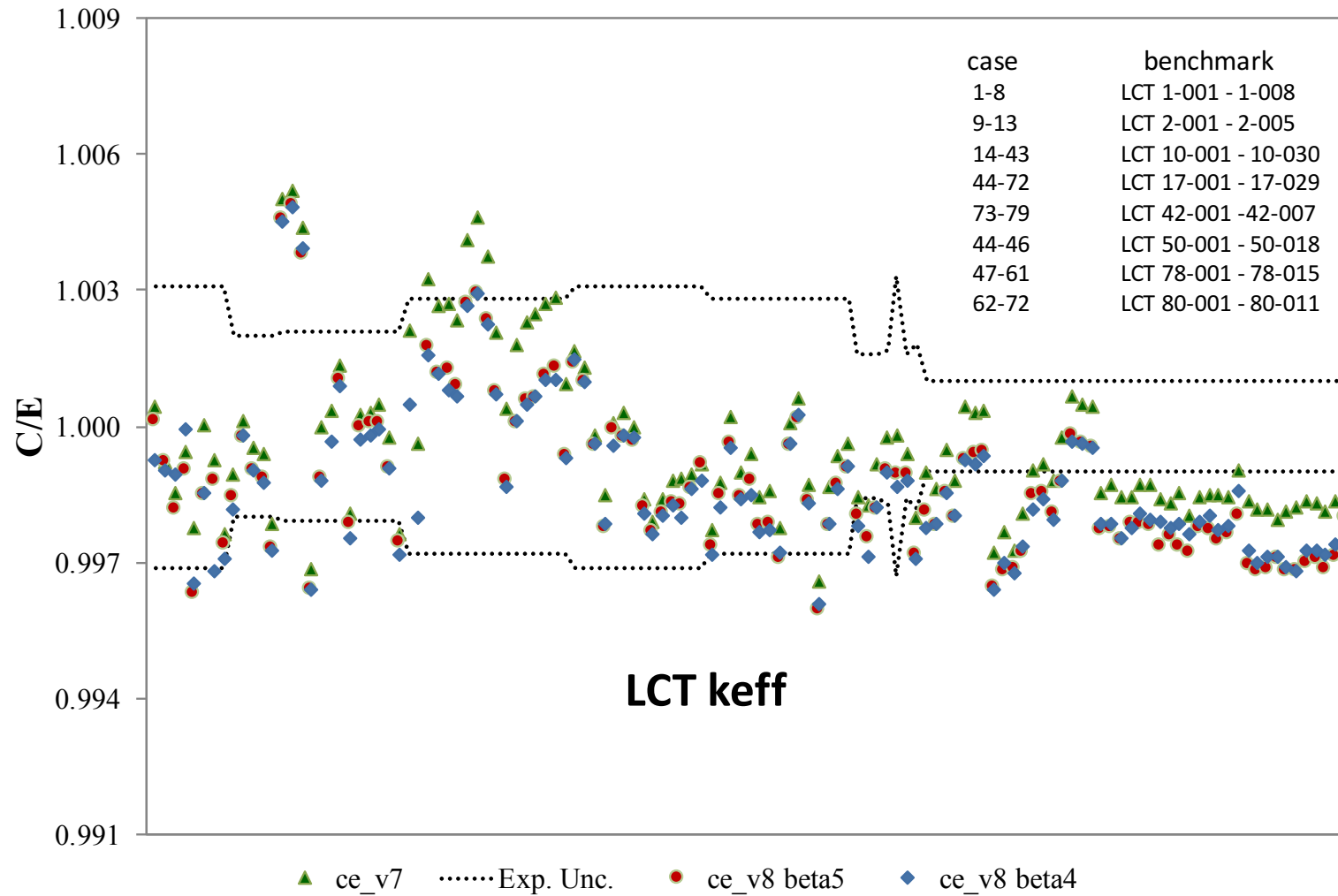




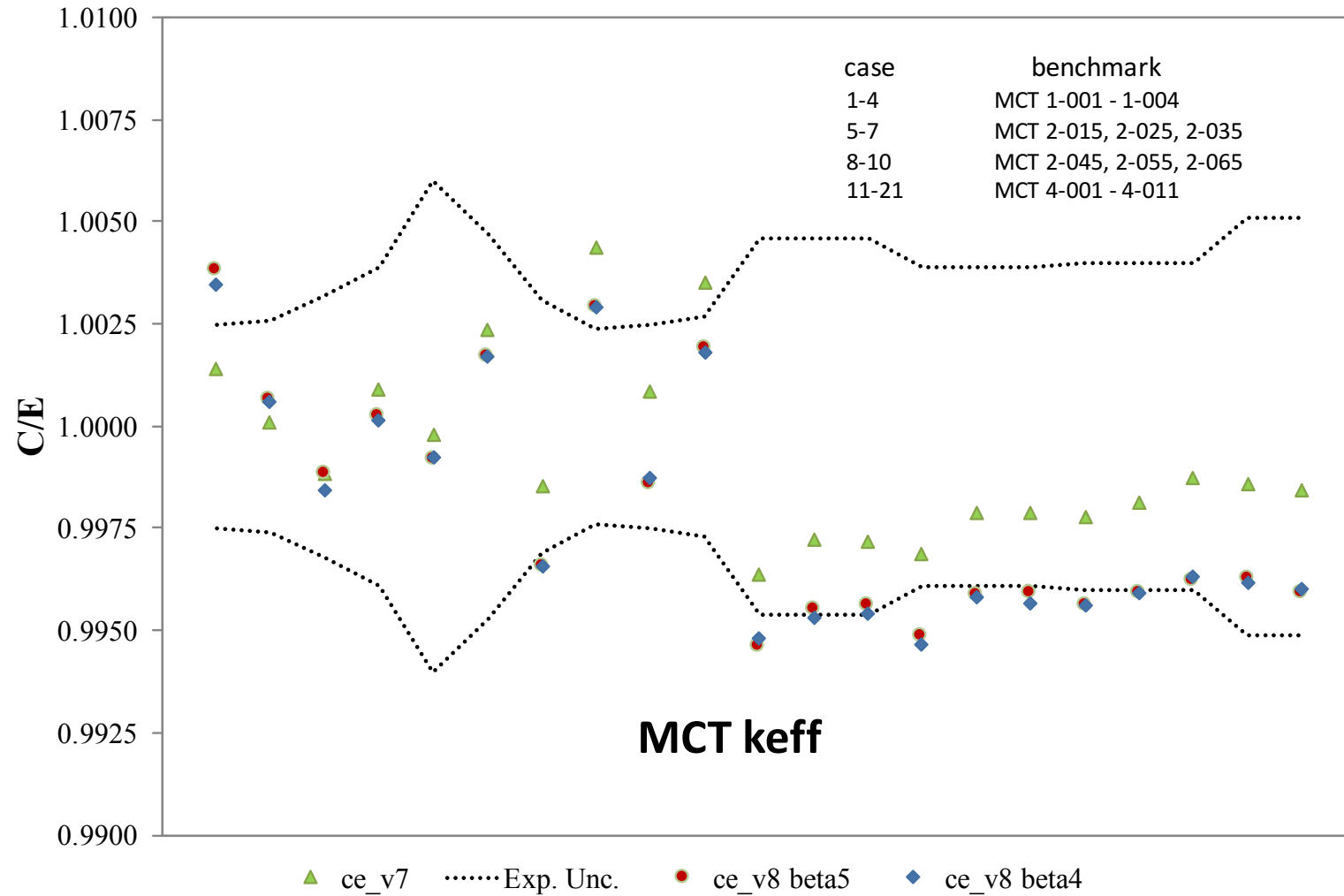
# Results for Thermal Pu Solutions



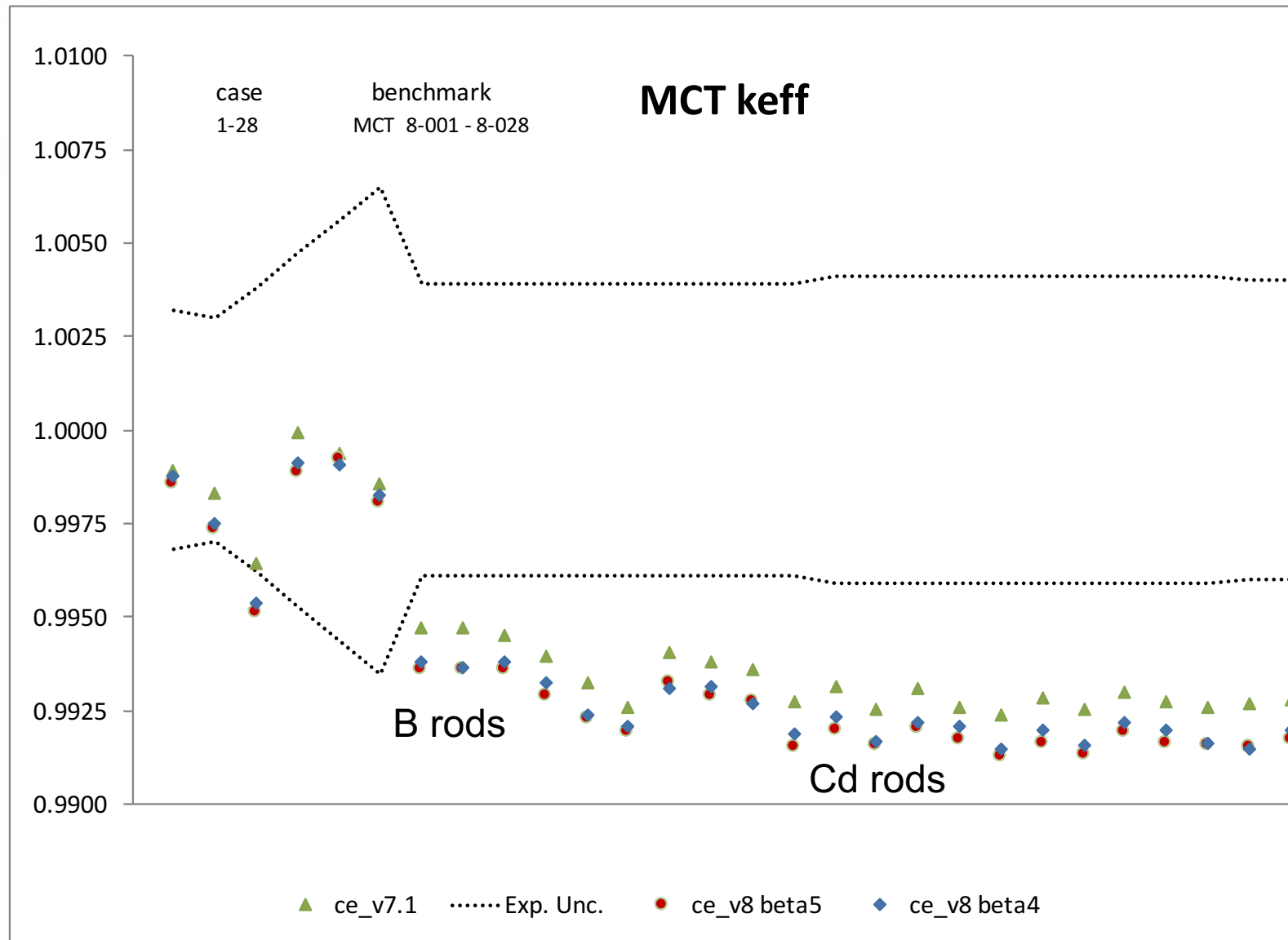
# Results for Thermal LEU Lattices



# Results for Thermal U-Pu Lattices

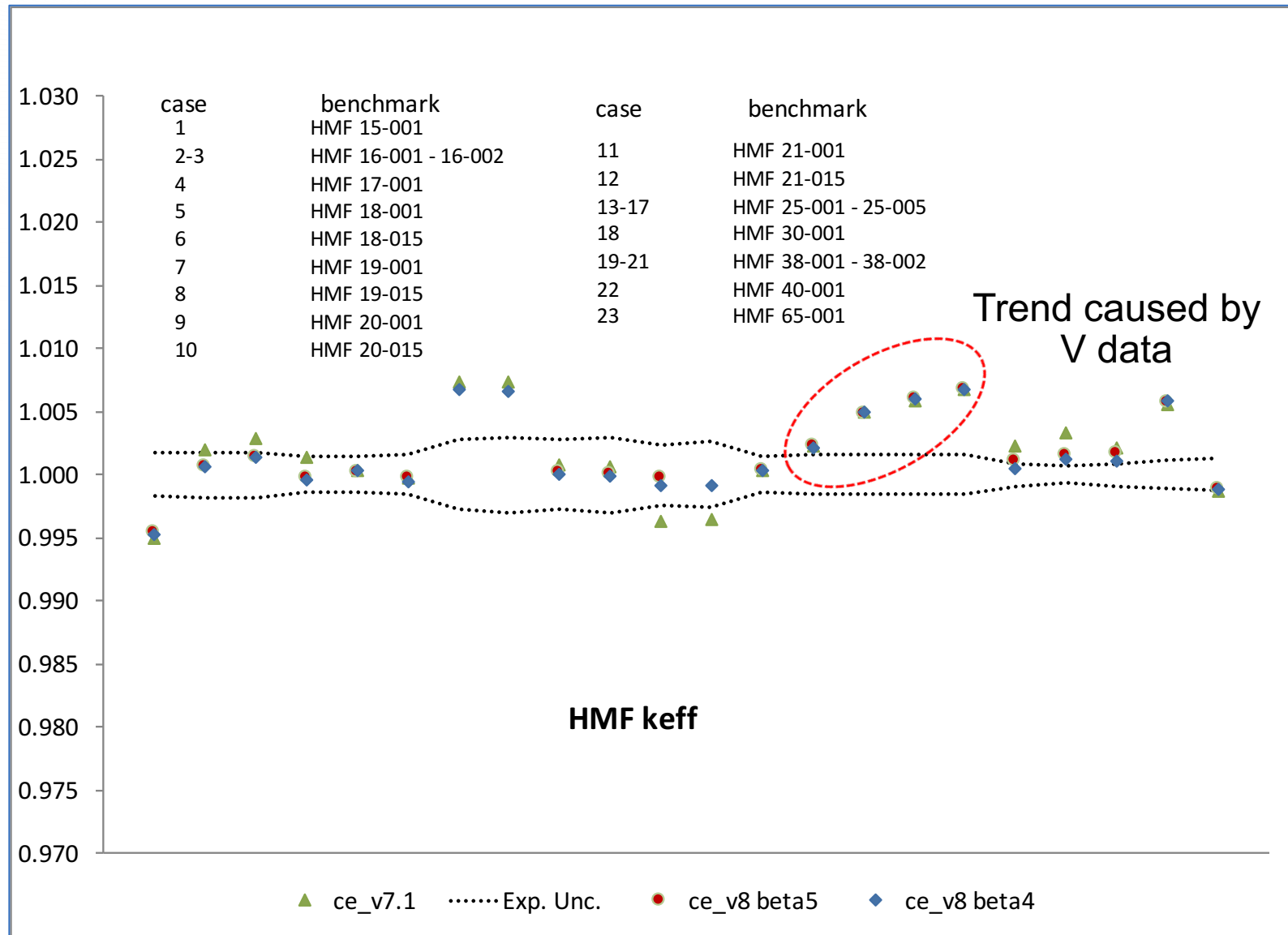


# Results for MCT-008 Thermal U-Pu Lattices

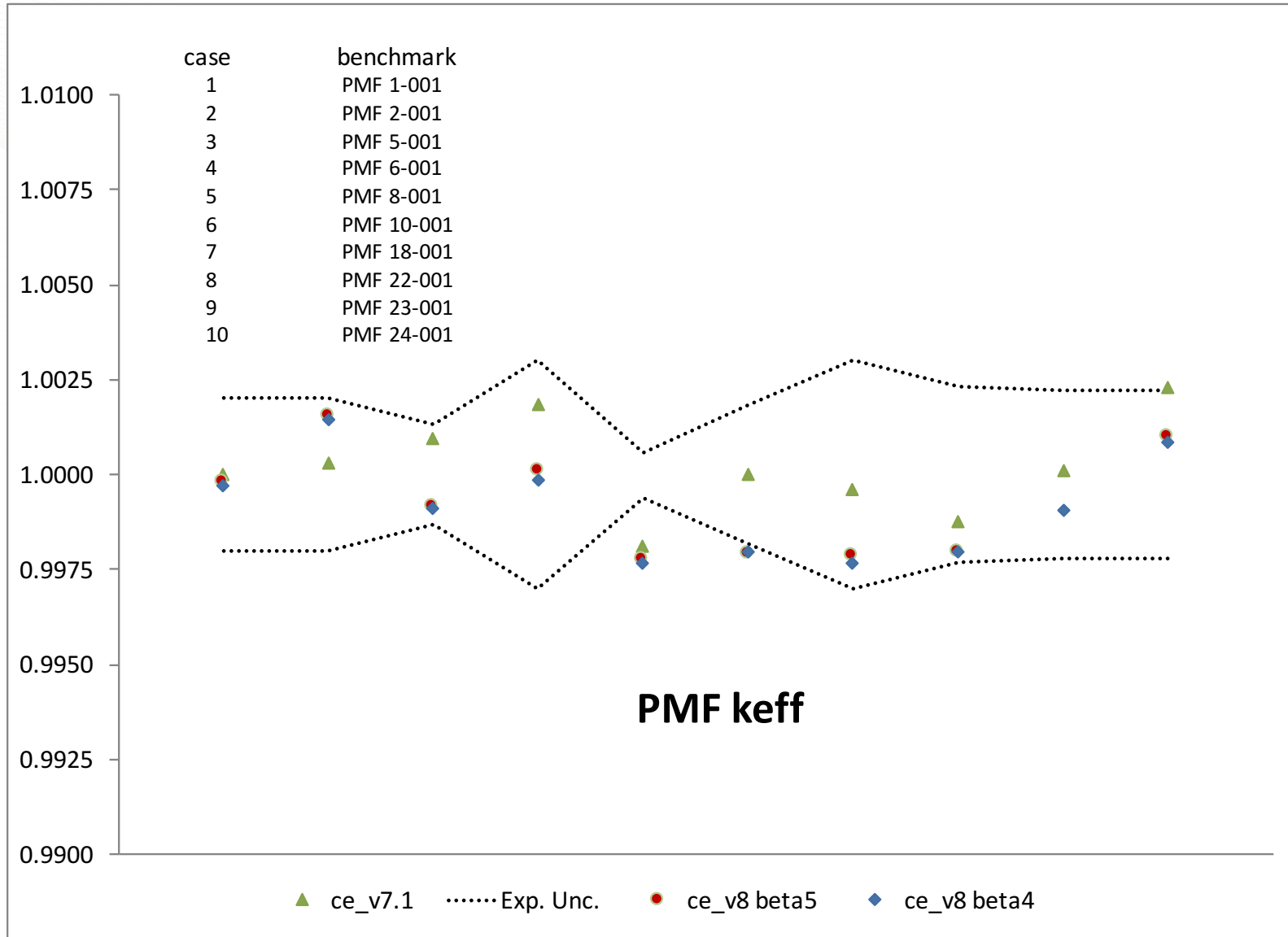




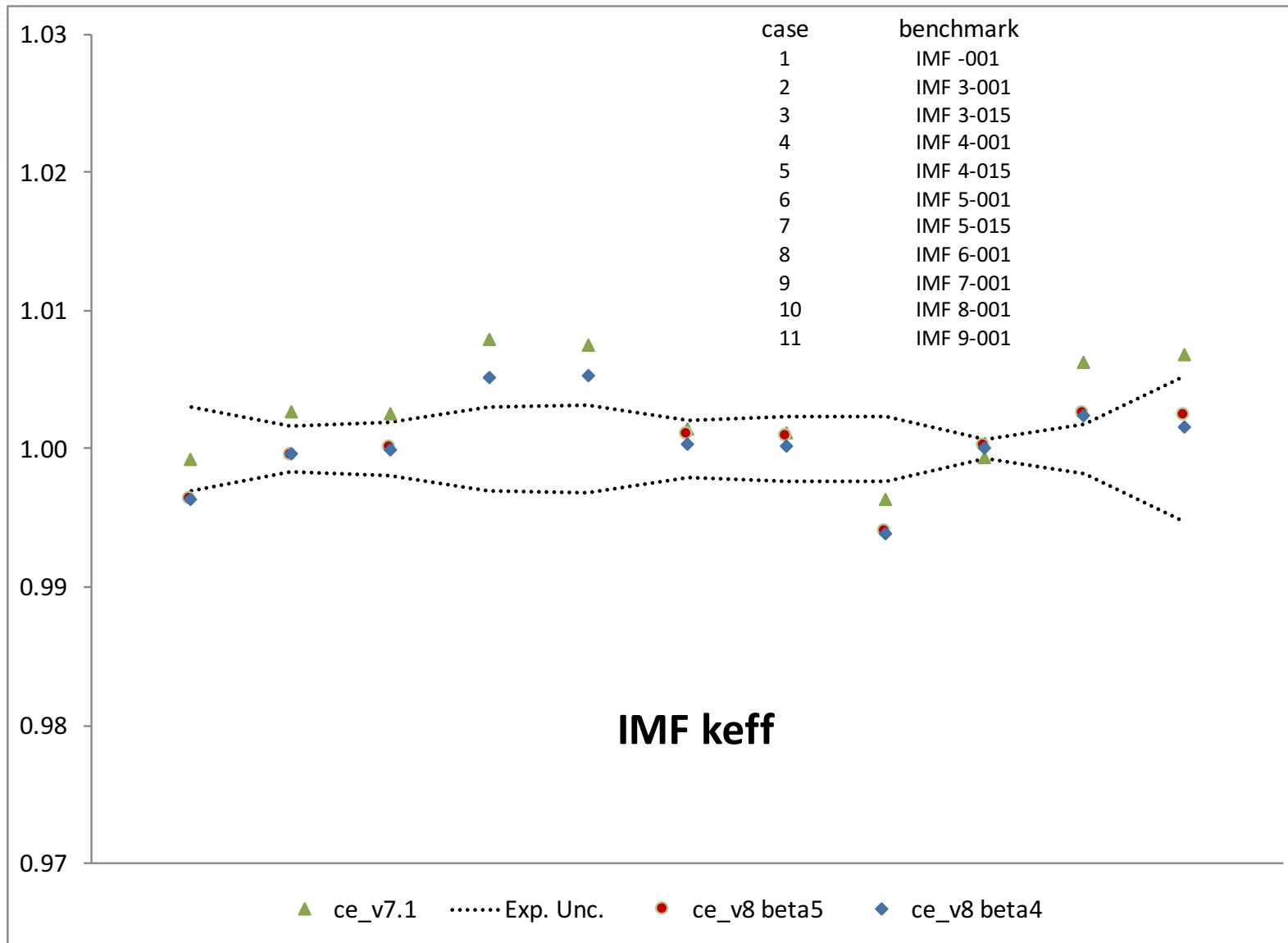
# Results for Fast HEU Metal Systems



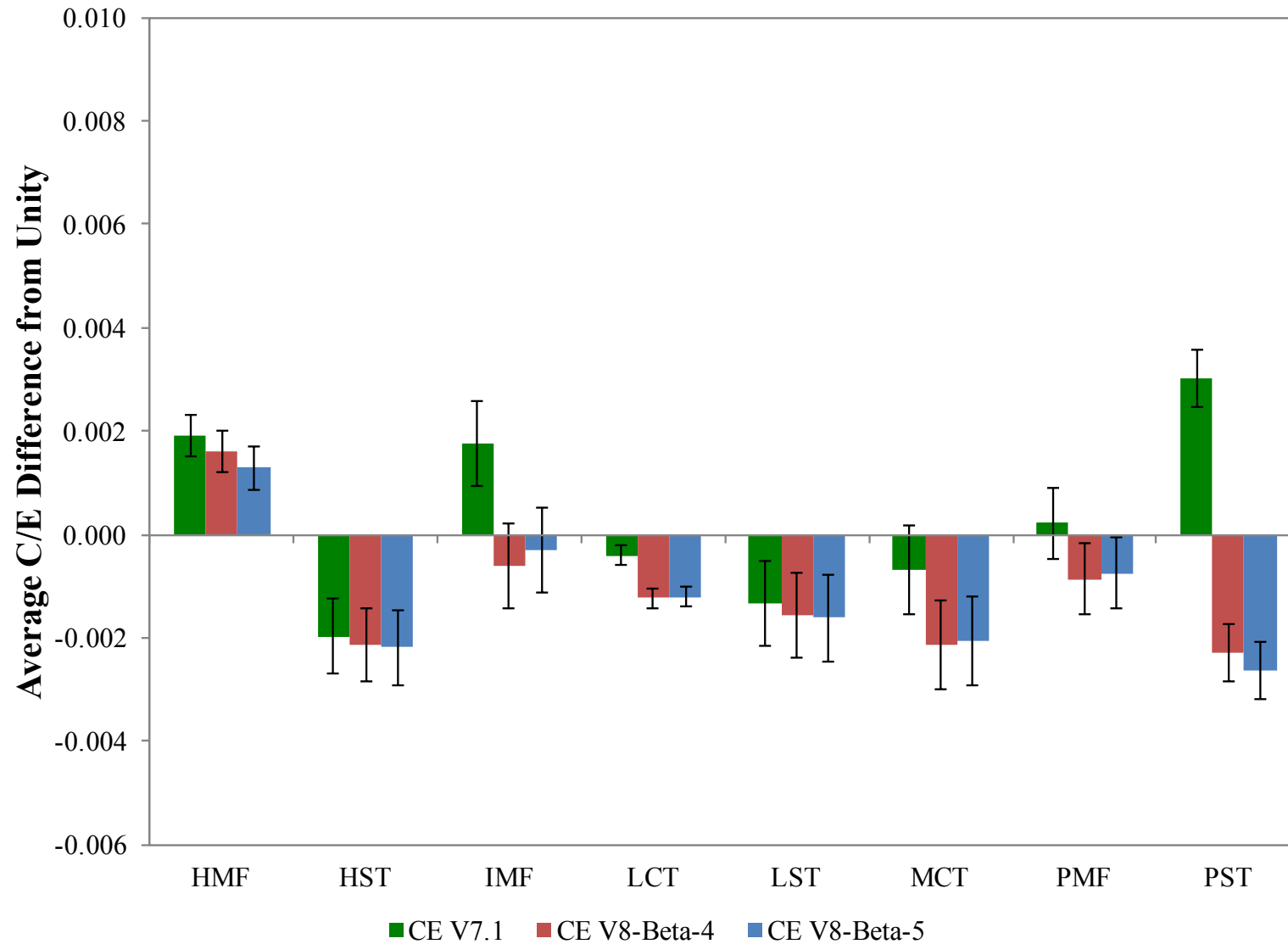
# Results for Fast Pu Metal Systems



# Results for Fast IEU Systems



# C/E Average over all experiments for benchmark type

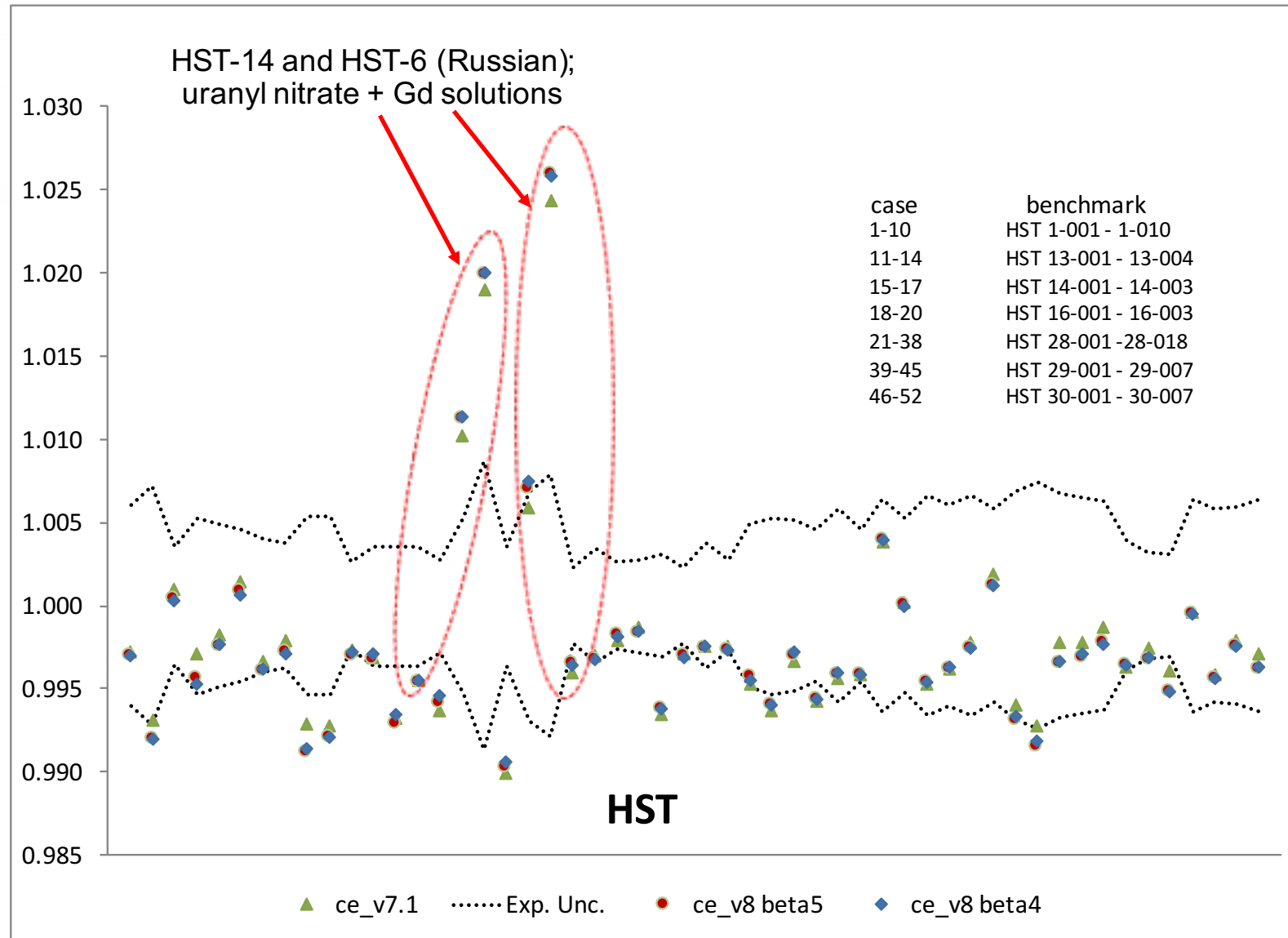




# SUMMARY of CHANGES FROM VII.1 to VIII-beta5

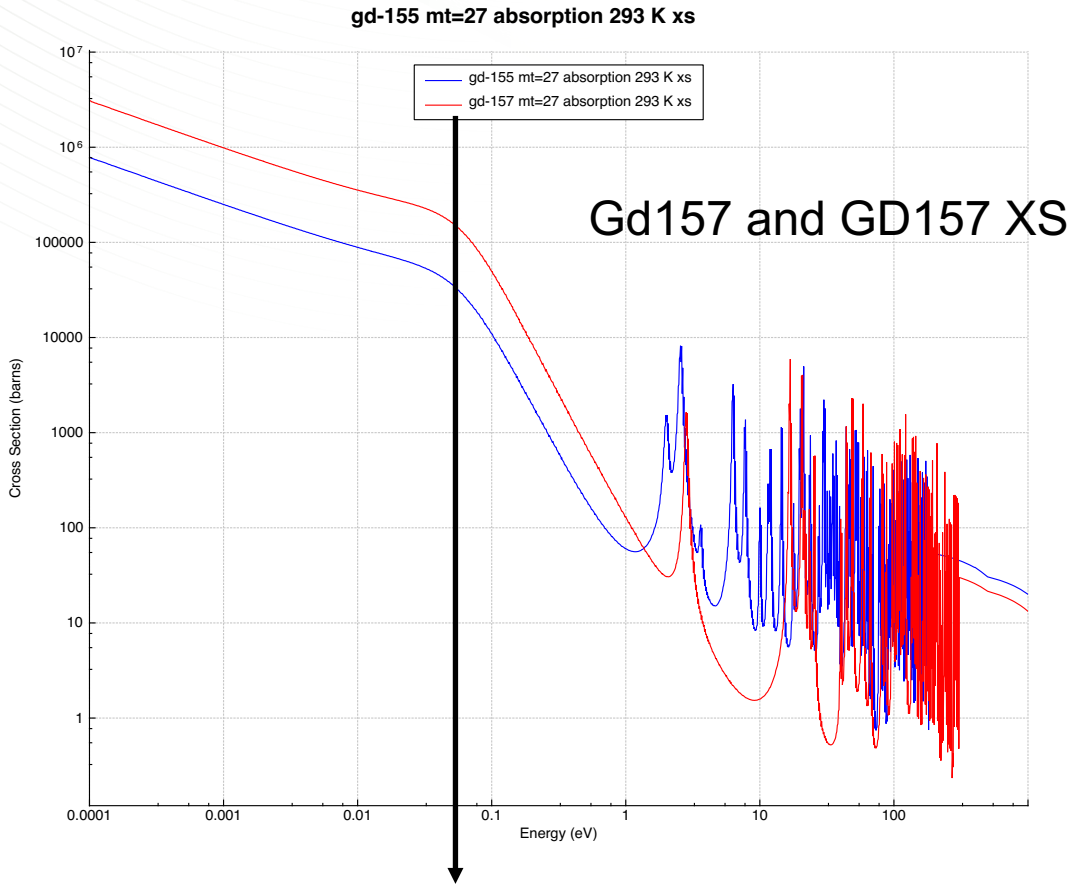
- Beta-5 gives similar results as beta-4
- Little change for HST compared to ENDF/B-VII.1
  - $k_{\text{eff}}$  is typically low by 200-500 pcm; 70% of cases are within exp. uncertainty
  - Trend with dissolved Gd is noted or two series
- LST slightly worse on average
- Slight improvement for LEU lattices compared to ENDF/B-VII.1
  - C/E is within 300 pcm
  - Most beta-5 C/E's within experiment uncertainty
- Slight improvement for HMF cases compared to ENDF/B-VII.1
  - Several cases remain ~500 pcm high
  - HMF-025 trend caused by vanadium data is still present
- VIII-beta Pu data is less reactive VII.1
  - Improves high  $k_{\text{eff}}$  for some PST criticals; but makes others too low
  - $k_{\text{eff}}$  for U-Pu thermal lattices are lower and worse; typically 500-750 pcm low
  - Average PMF  $k_{\text{eff}}$  reduced slightly; agreement within +/- 250 pcm of experiment
- IMF cases are improved compared to ENDF/B-VII.1; average C/E <100 pcm

# HST-14 and HST-16 Have Strong Trend vs. Dissolved Gd Content

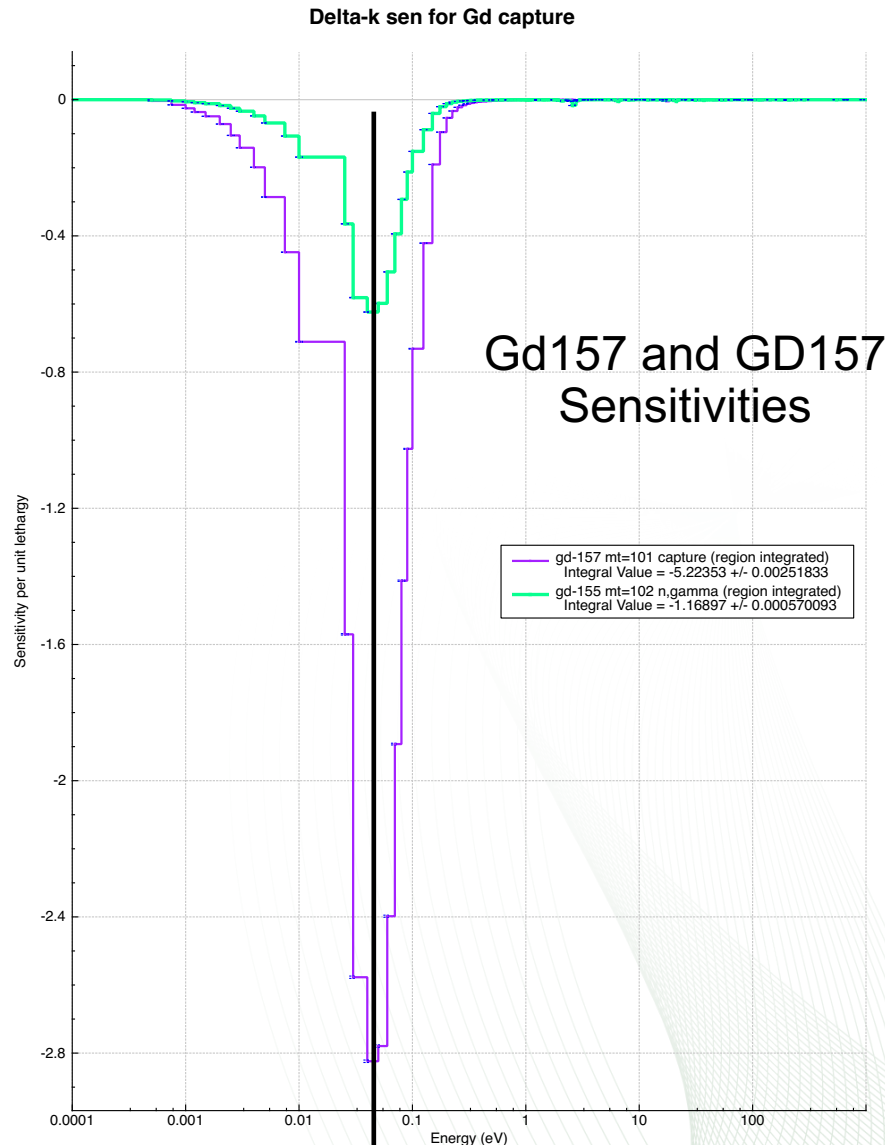


# Gd157 and Gd155 Sensitivities of HST-014-003 minus HST-014-001

$$S_{\alpha}^{(k_2-k_1)} = \frac{\alpha \partial \Delta k}{\Delta k \partial \alpha} \rightarrow \frac{k_2}{\Delta k} S_{\alpha}^{(k_2)} - \frac{k_1}{\Delta k} S_{\alpha}^{(k_1)}$$



0.04 eV



0.04 eV