

Review of ENDF/B-VII.0 Validation

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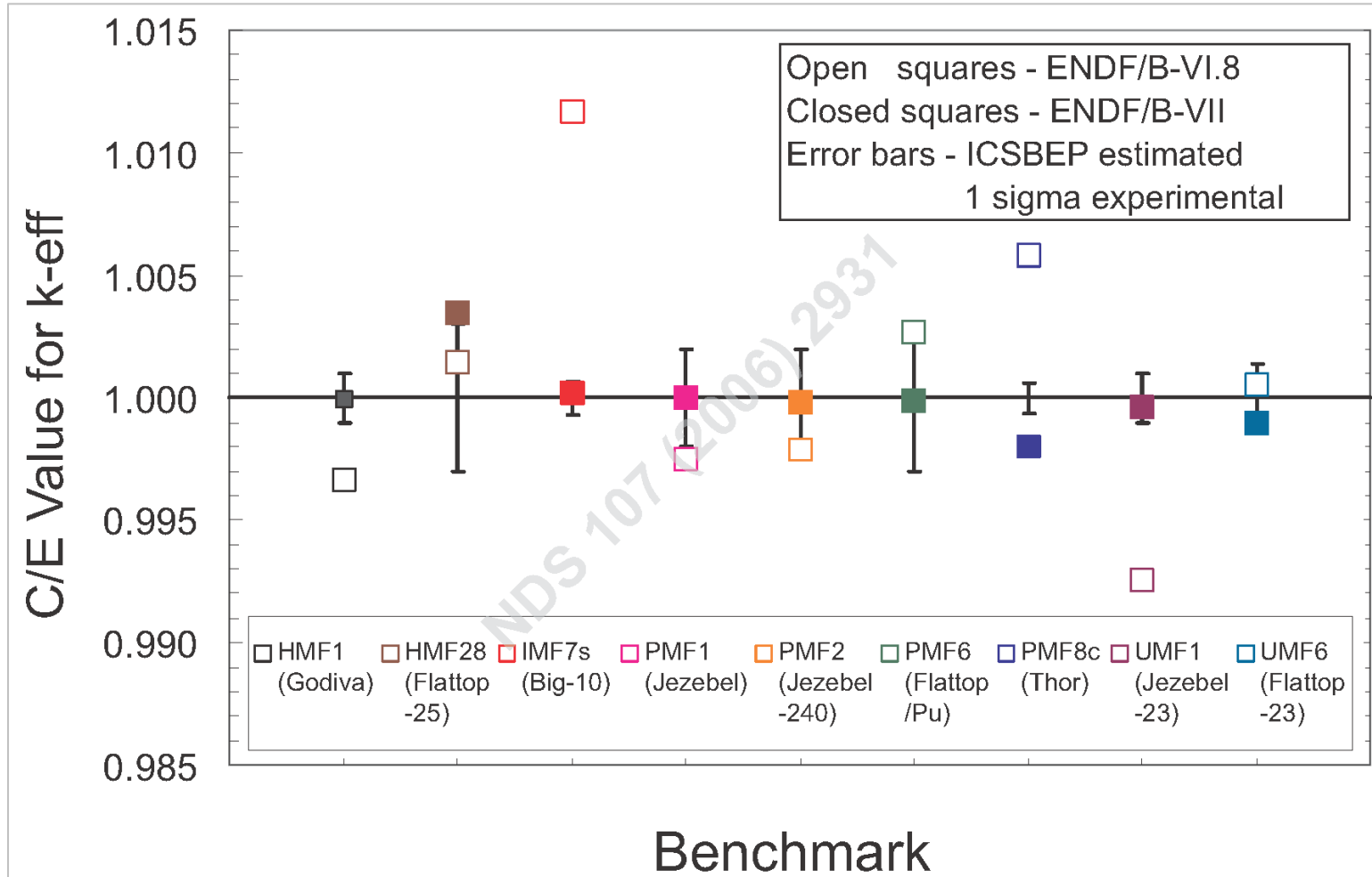
Introduction

- This presentation is strictly a brief review of the validation results presented 1-year ago which supported the release of ENDF/B-VII.0
- The validation work presented at that time was comprehensive – spanning the entire range of the validation effort
- All of these validation results were presented in the “Big Paper” and this review presentation has been summarized from that reference.

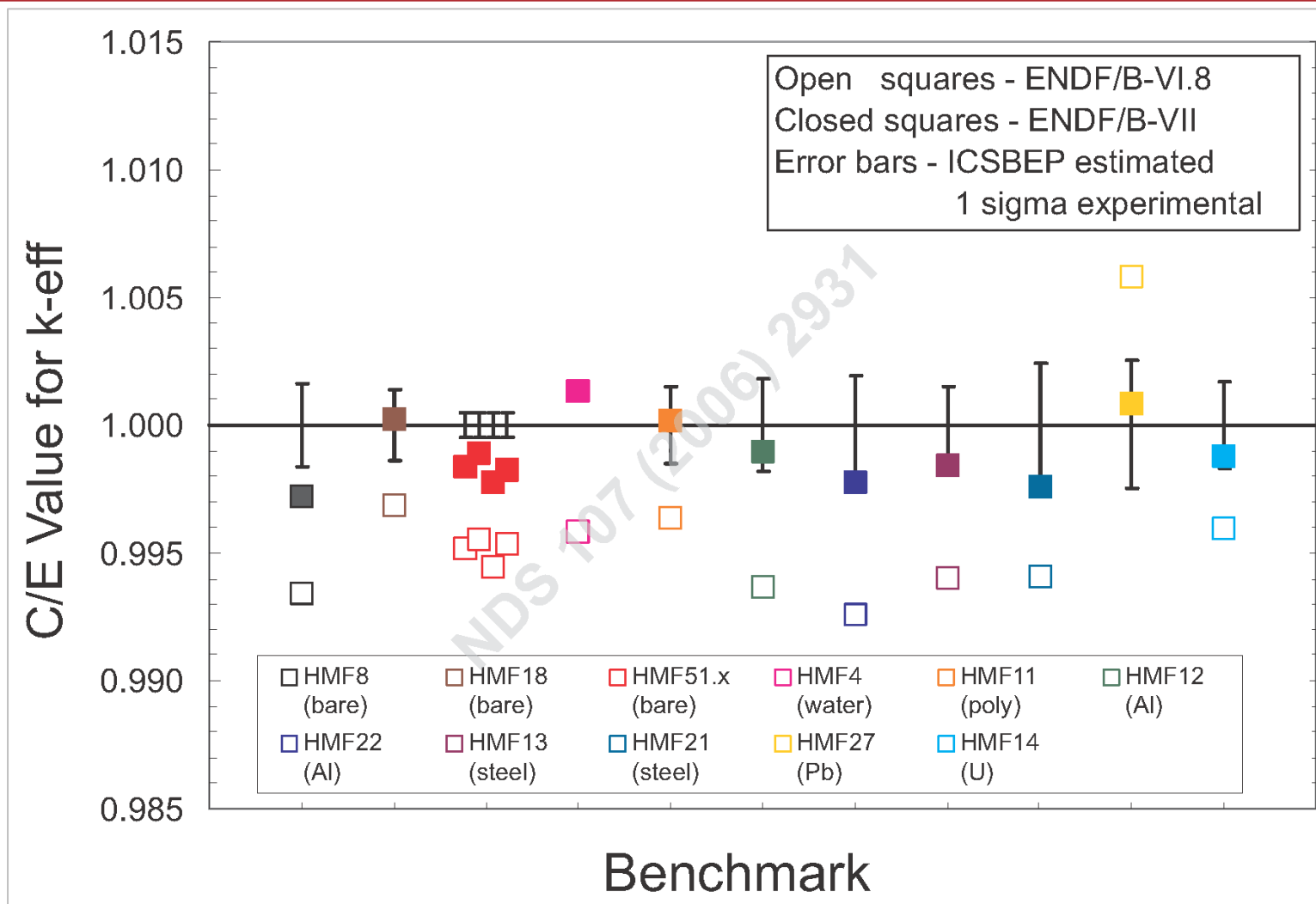
Summary of Criticality Results

- Overall the agreement with experiment is improved in many cases
 - Including bare and reflected U and Pu systems and arrays of LEU fuel rod lattices
- C/E's for HEU and Pu are increased and closer to unity
- The reflector bias for the ^{238}U reflected Flattop assemblies has been largely eliminated

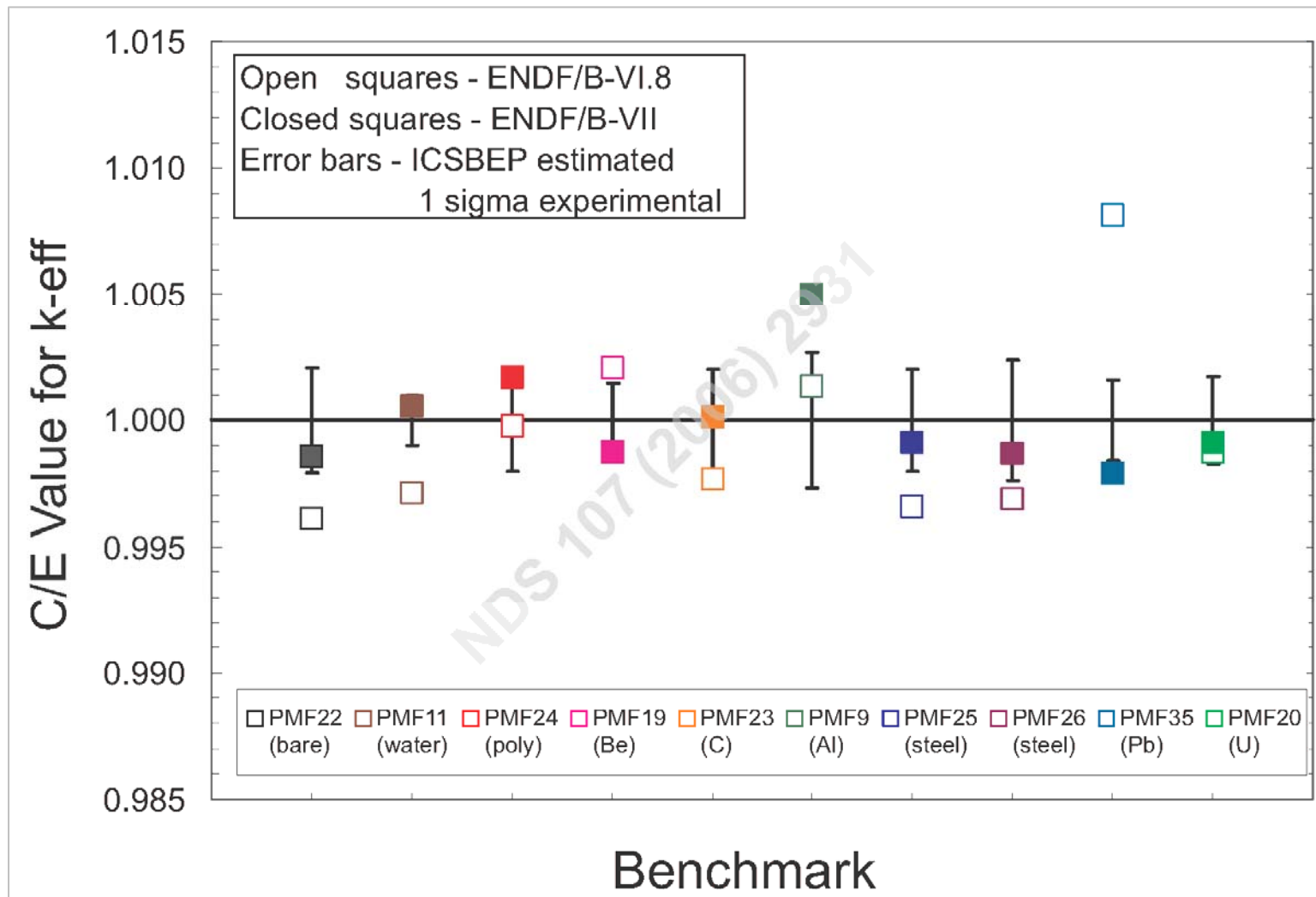
Bare and ^{238}U Reflected Assemblies



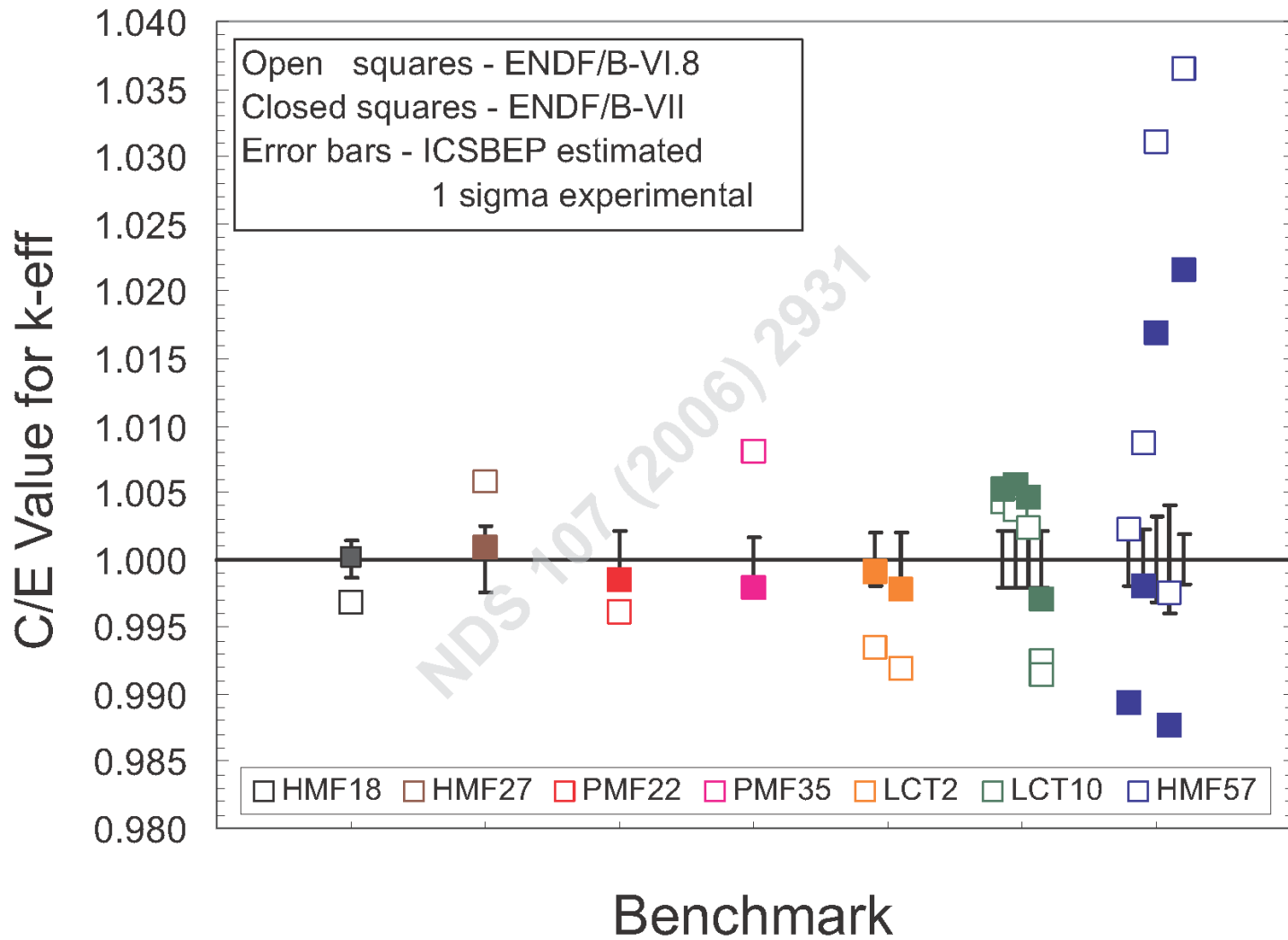
HEU-MET-FAST Assemblies with Various Reflectors



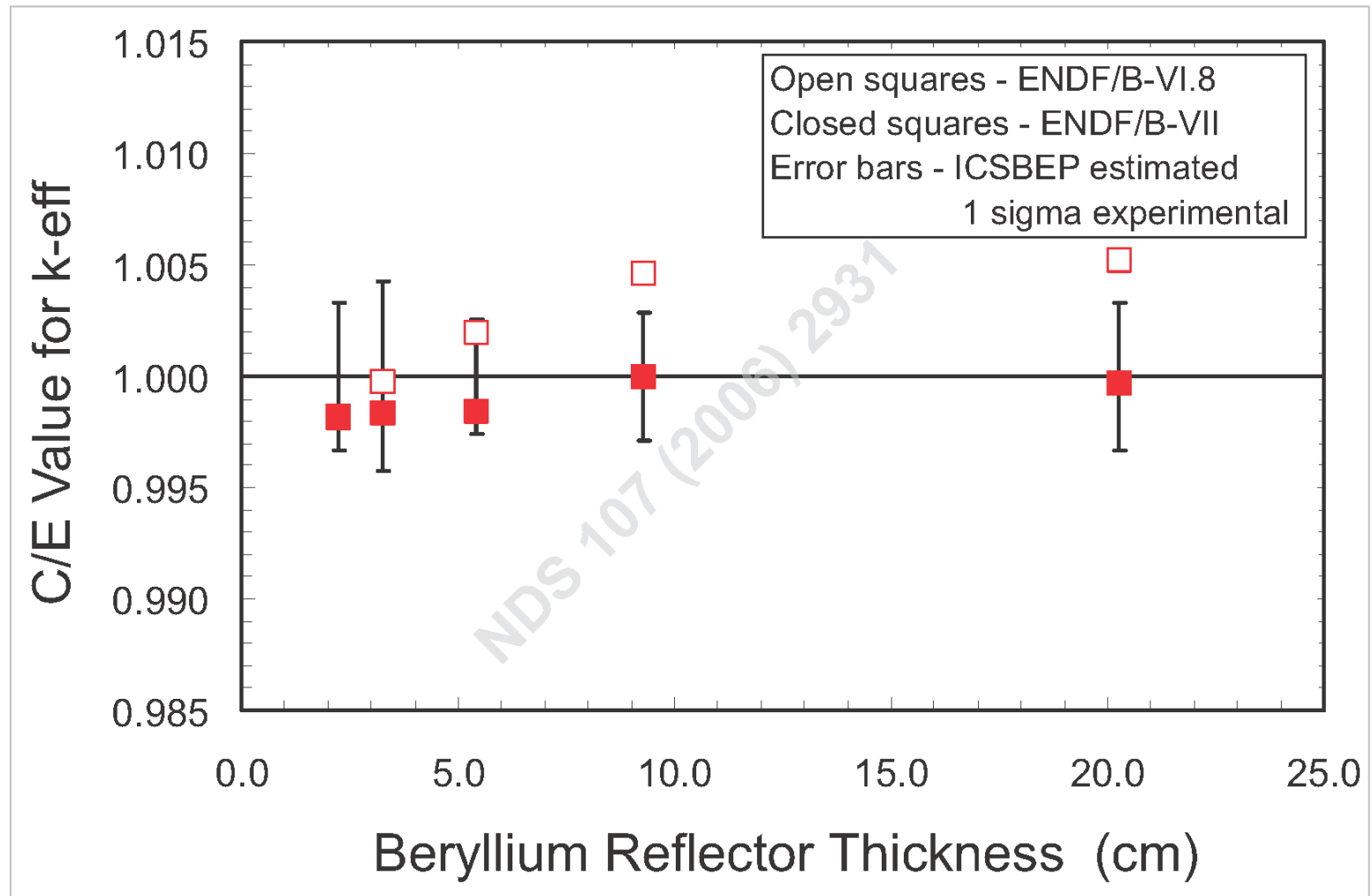
PU-MET-FAST Assemblies with Various Reflectors



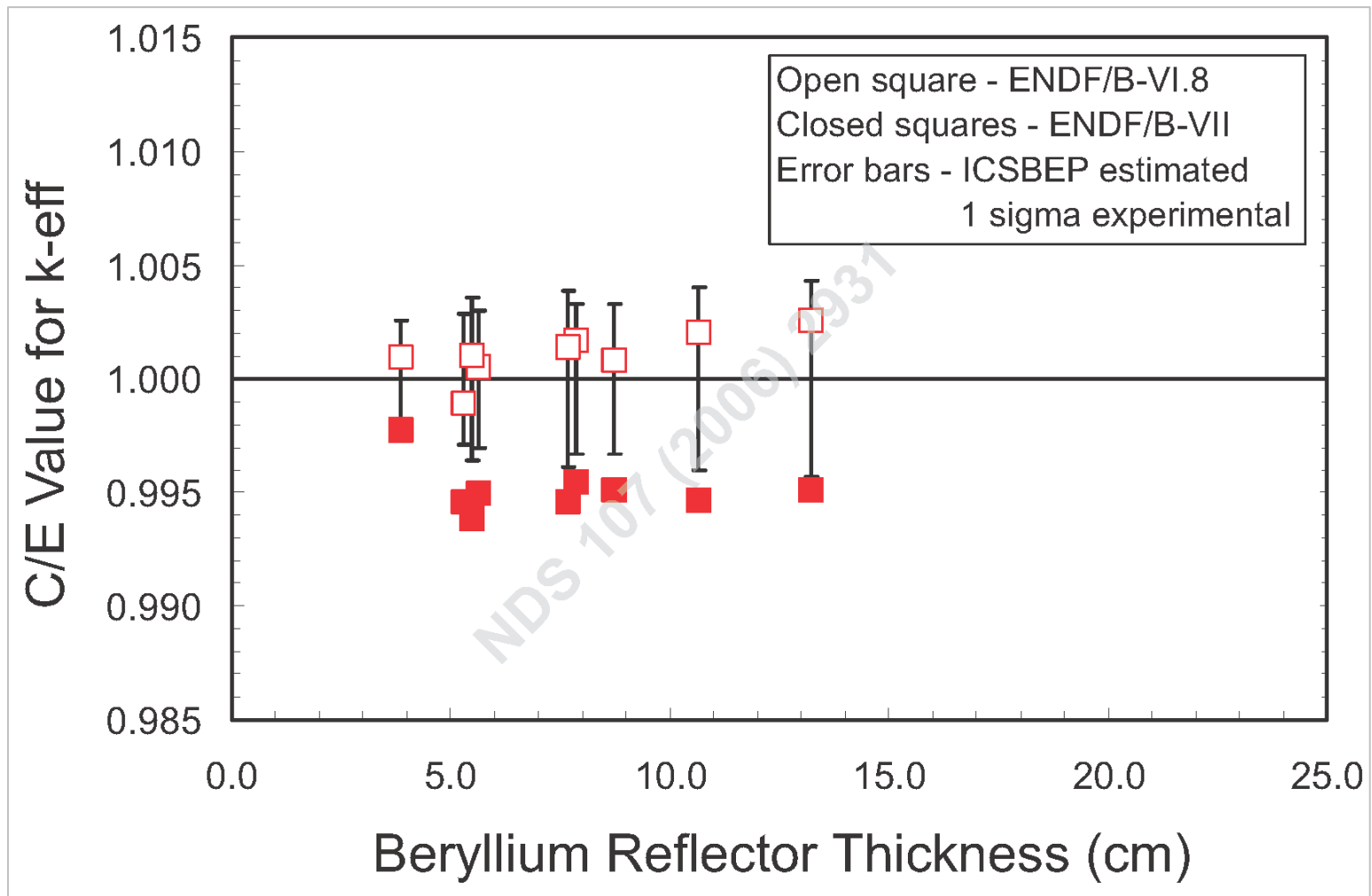
Pb reflected Assemblies



Be reflected Assemblies



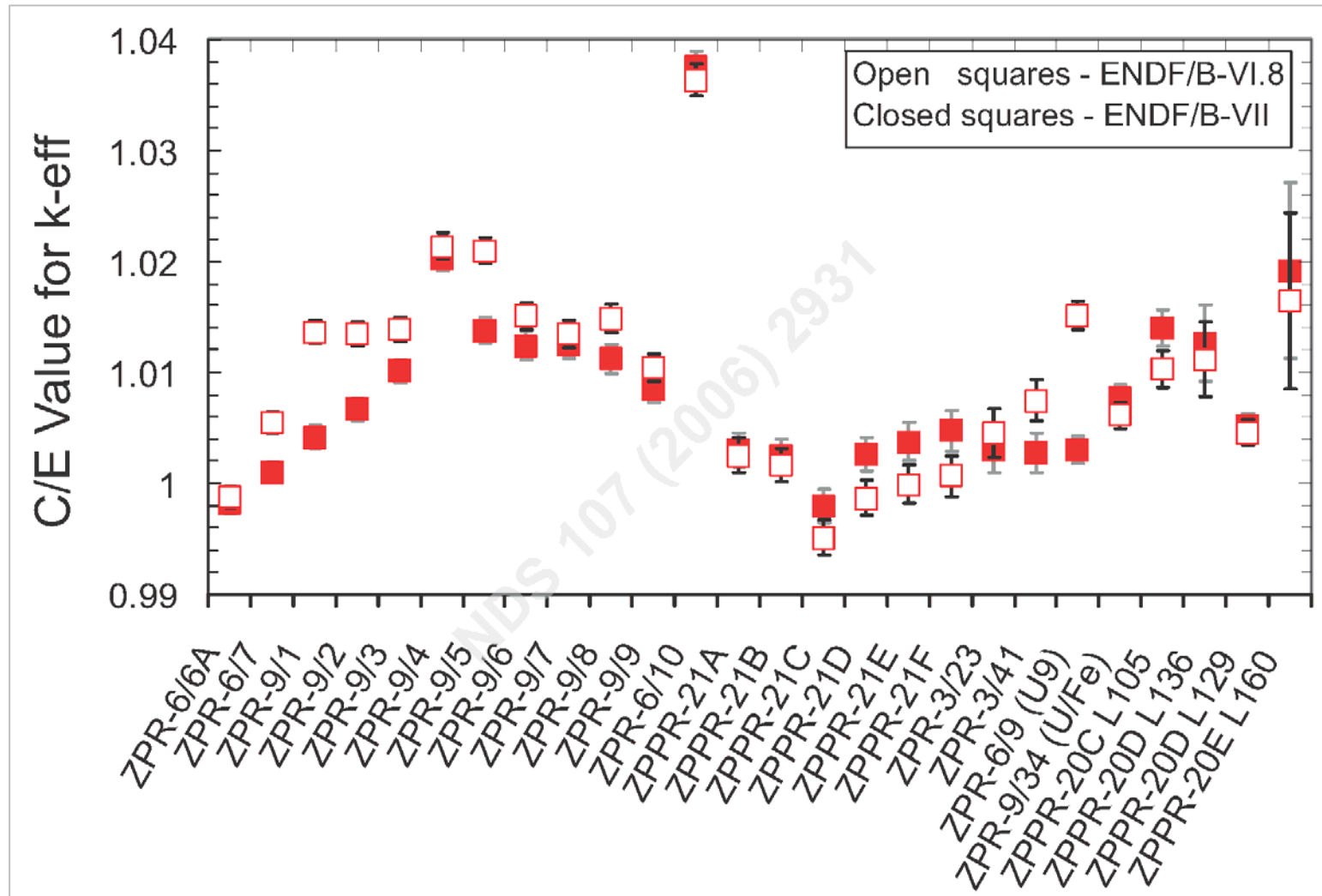
Be reflected Assemblies (Continued)



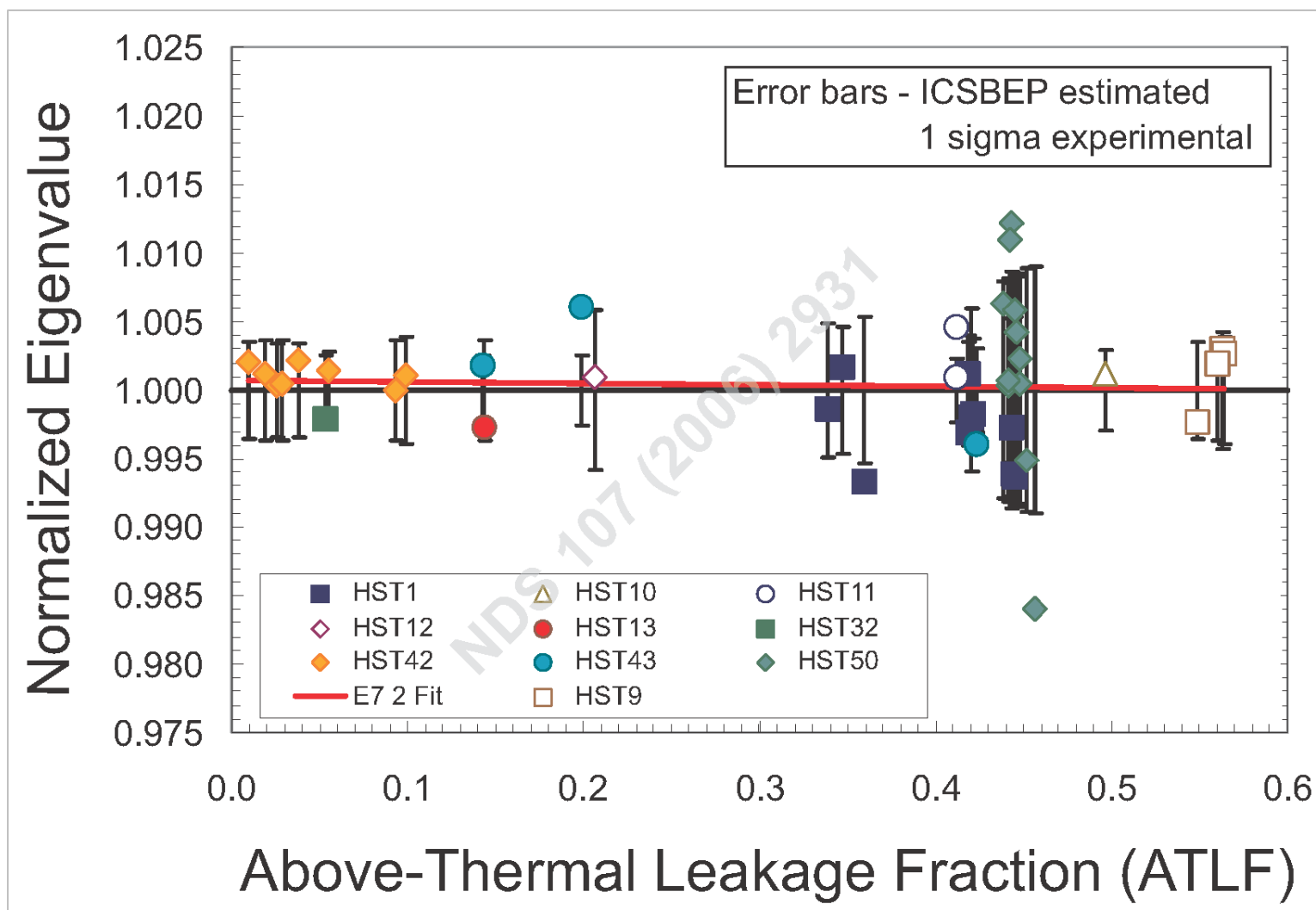
Summary of Criticality Results (Continued)

- Major improvements for the intermediate spectra assemblies
 - Particularly for Big Ten
 - Lesser extent for some of the ZPR assemblies
- Improved result for fast ^{237}Np assembly
- Excellent agreement for (HEU and LEU) uranium solution assemblies
- Elimination of underprediction for thermal low-enriched U fuel rod lattice assemblies
- Much improved performance for fast and thermal systems with ^{233}U and ^{232}Th
- Large bias and trends for unmoderated and moderated Zeus assemblies question ^{235}U scattering data and Cu data

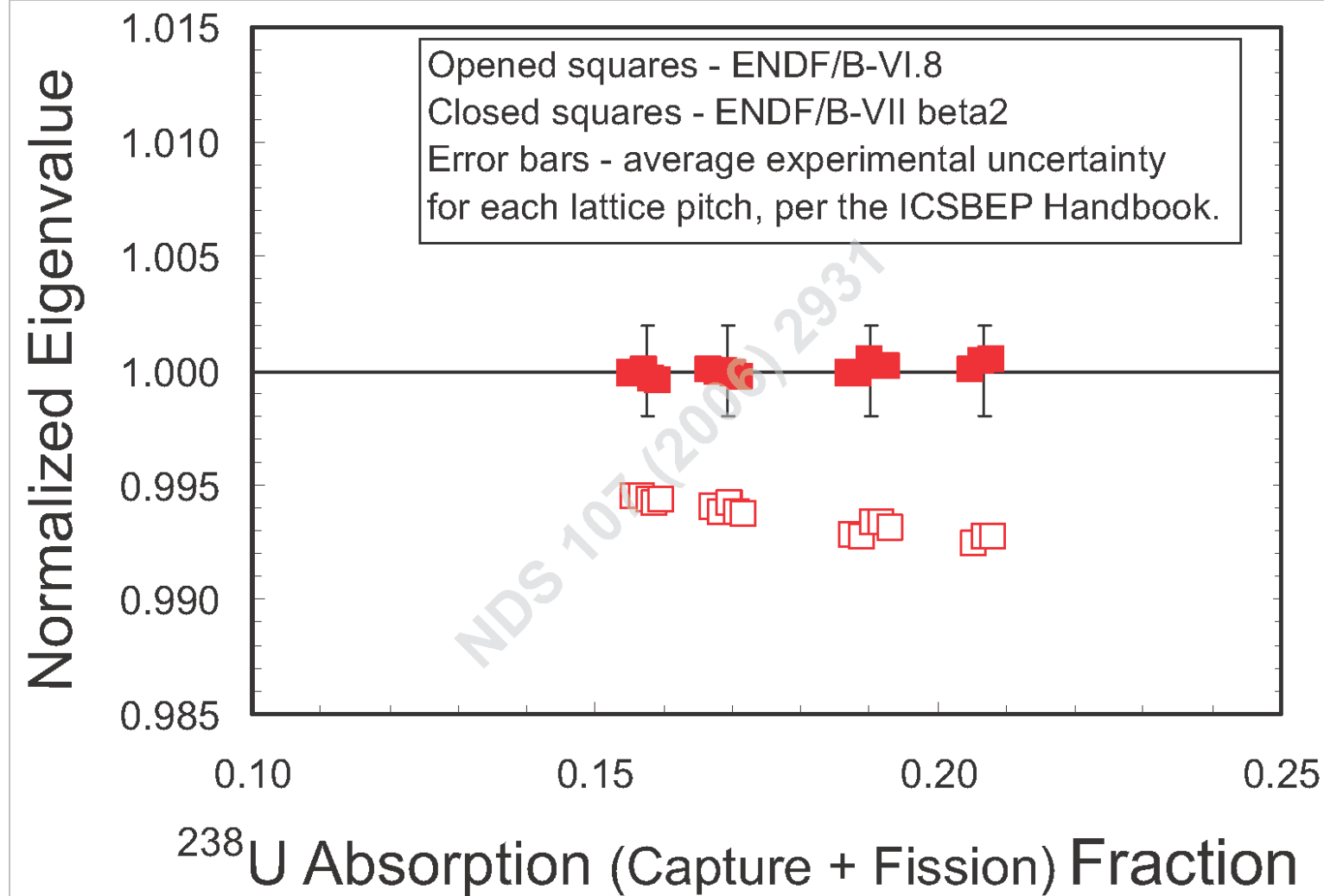
ZPR Assemblies



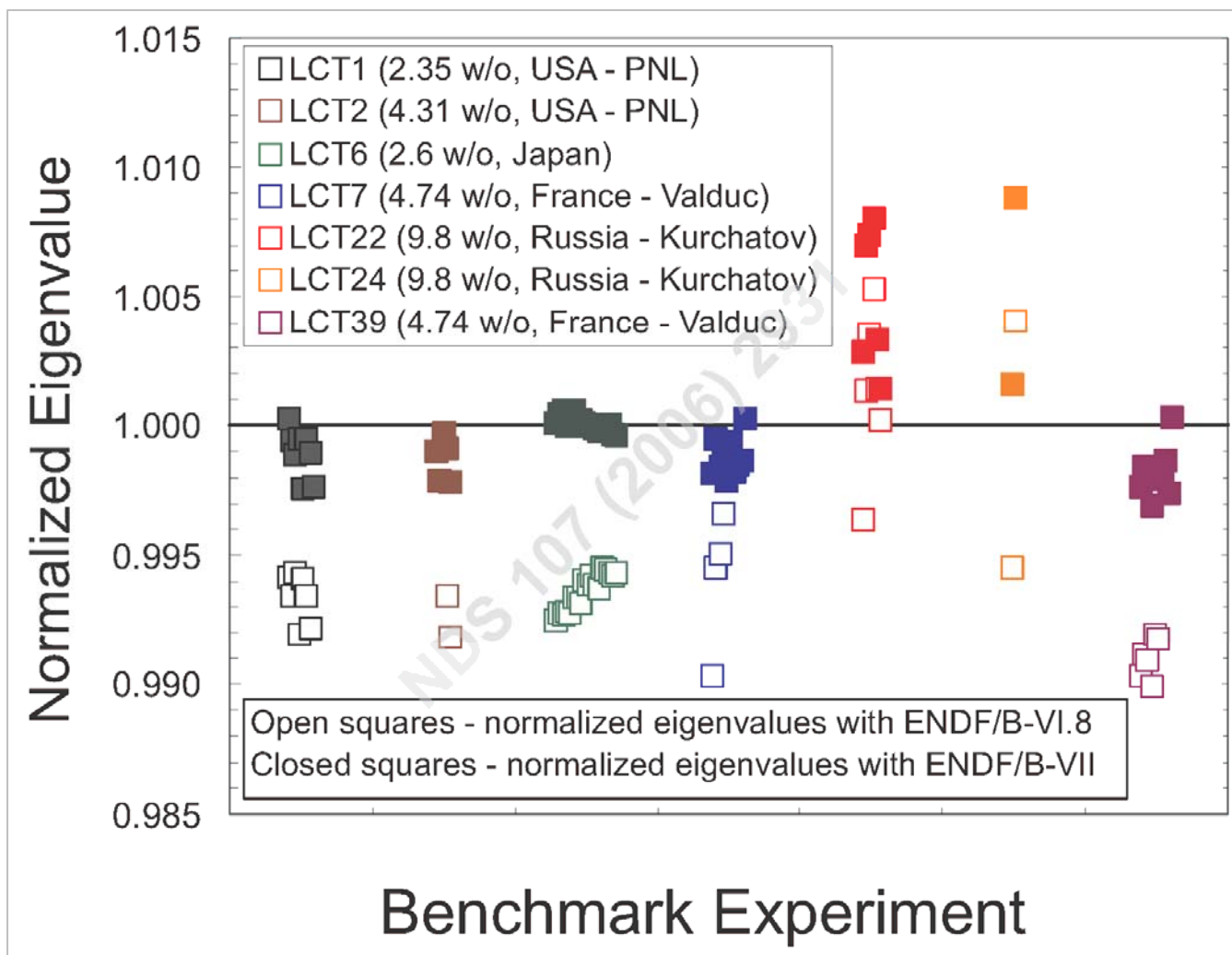
HEU-SOL-THERM Assemblies



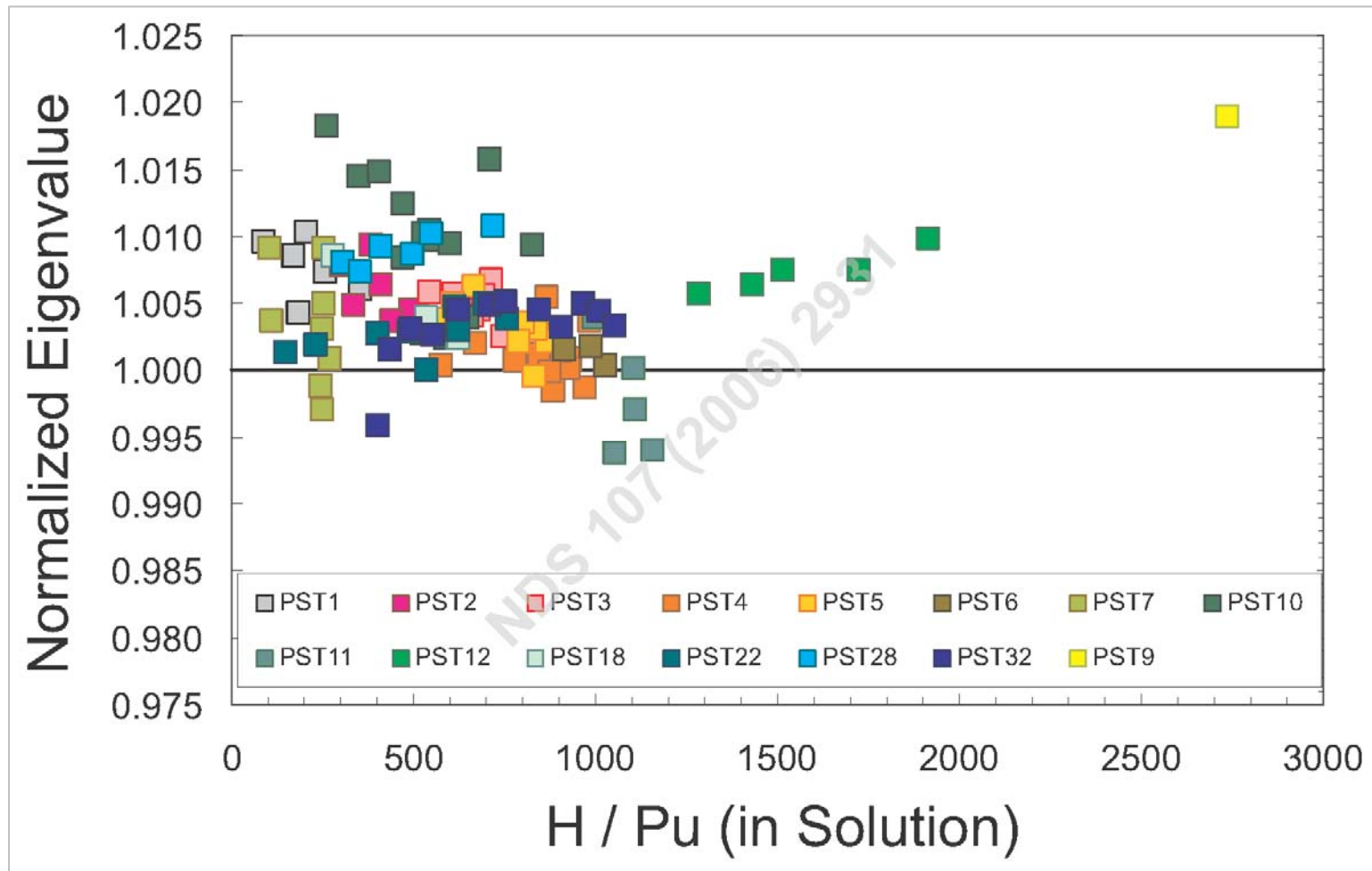
LEU-COMP-THERM-006 Assemblies



LEU-COMP-THERM Assemblies



PU-SOL-THERM Assemblies

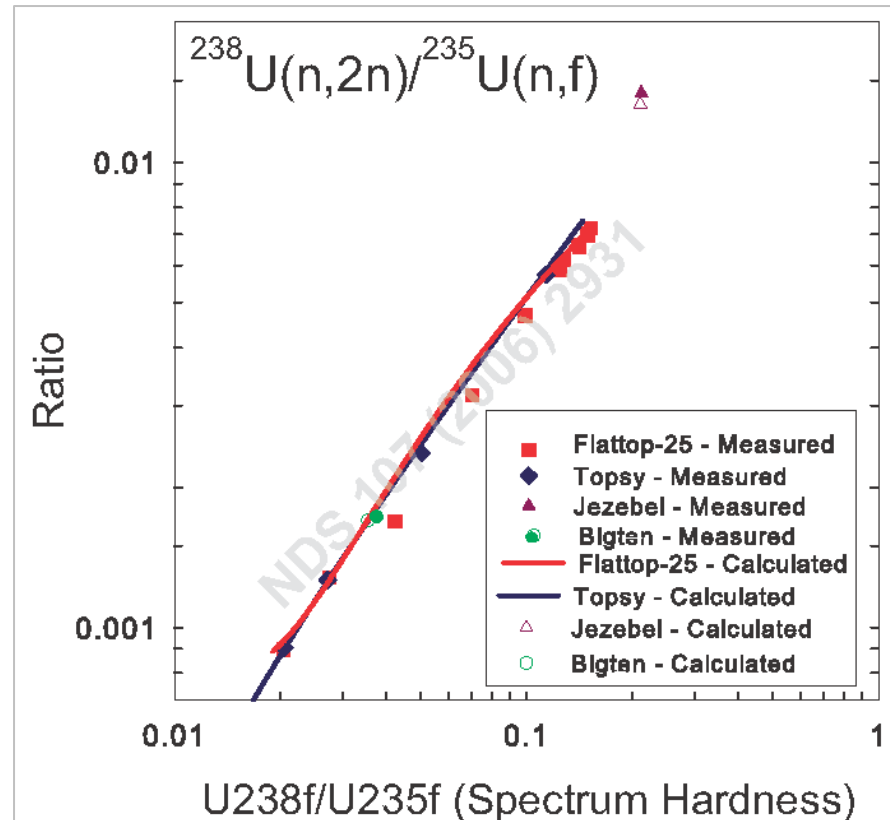
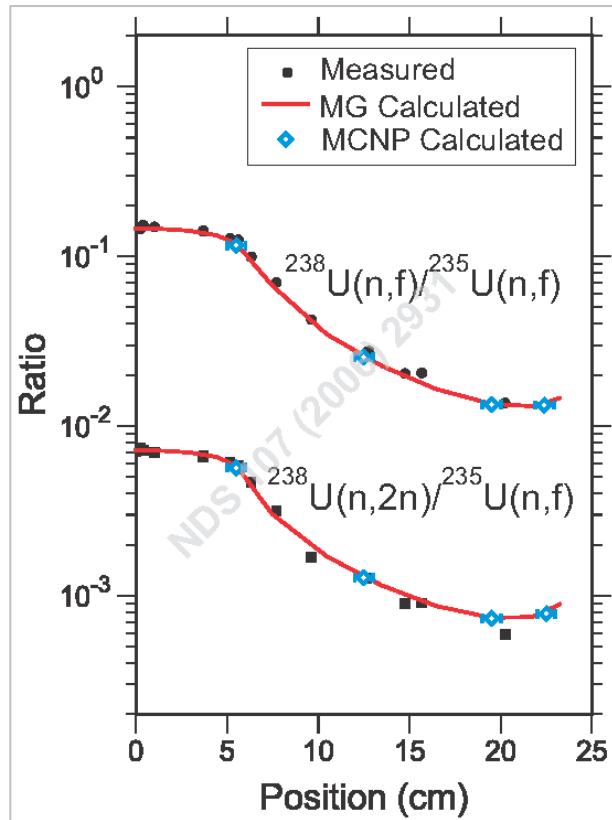


Delayed Neutron Results (β_{eff})

- Modest improvements based on limited testing
 - Thermal ^{235}U systems
 - *~5% decrease in β_{eff} resulting in C/E's close to unity*
 - Fast Pu/U systems
 - *Smaller (2% positive and negative) changes yielding slightly better or worse results*

Reaction Rates in Critical Assemblies

- Excellent results for spatial measurements spanning a variety of LANL fast critical assemblies



- Persistent discrepancies in spectral indices in several LANL fast critical assemblies

Shielding and Pulse-Sphere Testing

- Results based on FNS (Fusion Neutronics Source) benchmark
 - Improved results for several new evaluations
 - $^{235,238}\text{U}$, ^{239}Pu , *Pb*, *Li*, and *Be*
 - Persistent discrepancies for older evaluations, e.g., *W*
- Pulsed sphere results confirm quality of inelastic scattering data for ^{235}U and ^{239}Pu

Apparent Data Discrepancies from ENDF/B-VII.0 Validation Effort

1. Large discrepancies in ^{239}Pu in thermal (e.g., solutions) and intermediate spectra systems
2. RR/URR range of Cr as evidenced in Pu/C/SST assembly
3. RR/URR range of Mn as evidenced in Pu/C/SST assembly
4. Very poor trend for assemblies with clean assemblies with W
5. Still puzzling results with ^{233}U data testing
6. Some issues remain with Zr isotopes
7. Although largely improved, some large discrepancies remain with ^9Be
8. Some discrepancies with ^{238}U capture
9. Many polyethylene moderated and reflected critical assemblies very high (also Teflon)
10. Some Pb biases remain in thermal systems