

Slides for the WANDA session on “Expanded Benchmarks & Validation for Nuclear Data”

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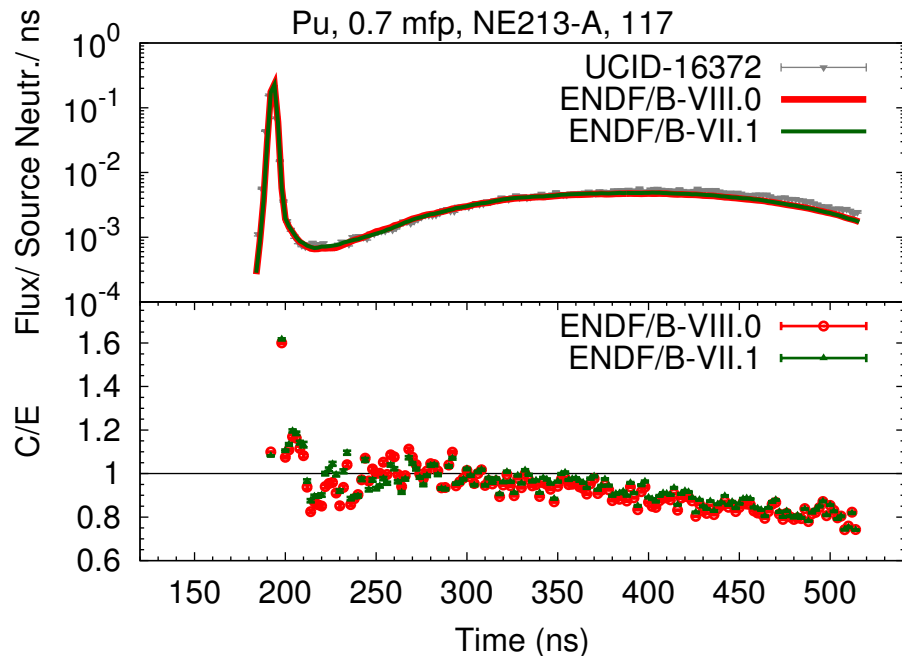
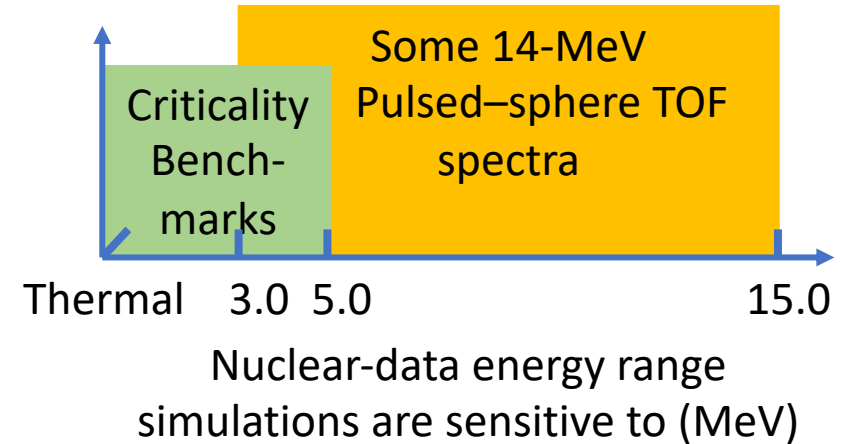
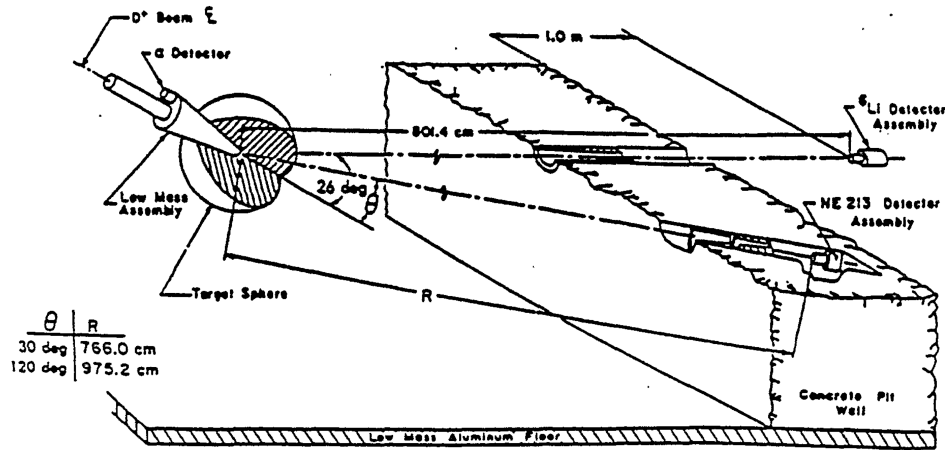
WANDA, 1/27/2021

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Criticality on its own does not allow to validate conclusively pertinent nuclear data. TOF spectra can yield an important piece to the puzzle.



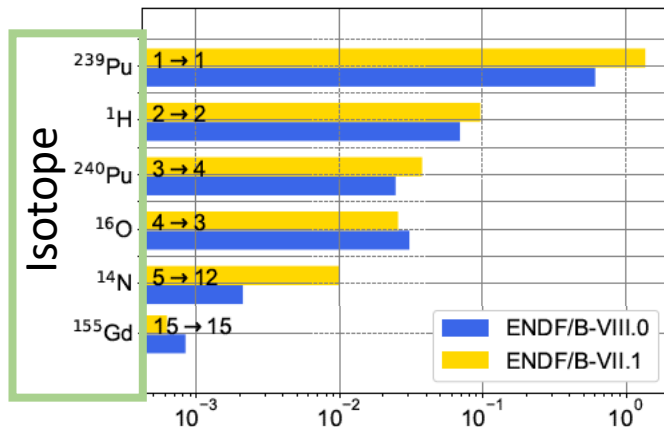
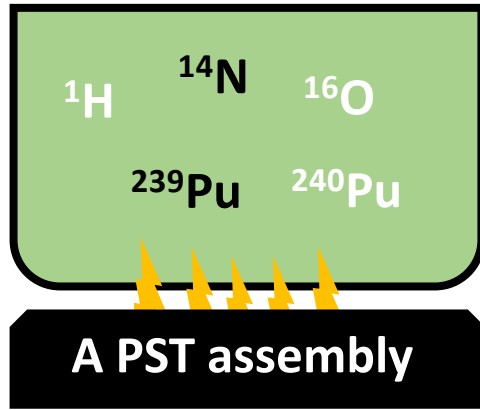
14-MeV LLNL pulsed-sphere TOF spectra extend validation of nuclear data from 5 to 15 MeV compared to criticality.

Caveat: currently experiments and uncertainties not as stringently quantified as criticality experiments BUT work is ongoing to include into SINBAD (WPEC SG-47).

Experiments: Wong et al., UCRL-51144, UCRL-ID-91774, Webster et al. UCID-17332.

Pulsed Sphere TOF spectra allow us to investigate the following nuclear data separately: light elements, structural isotopes, fuels.

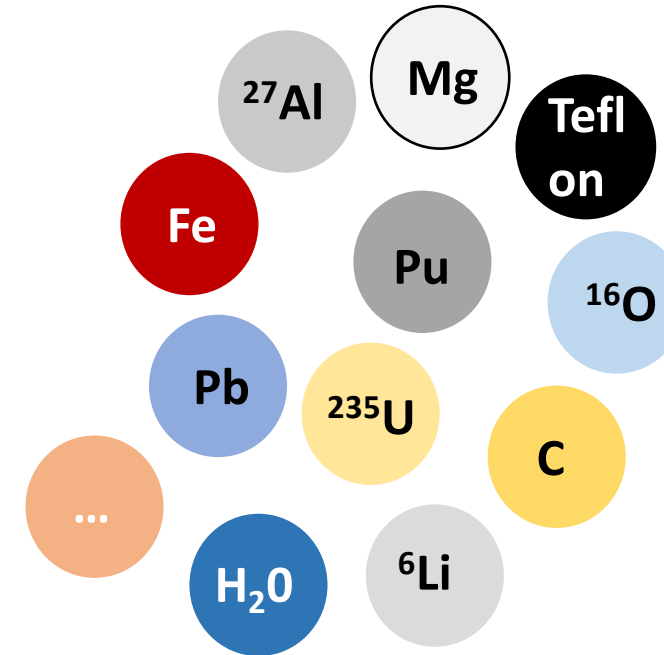
Criticality Benchmarks



Importance of Nuclear Data for Bias

Neudecker et al., NDS 167, 36 (2020).

14-MeV LLNL pulsed spheres



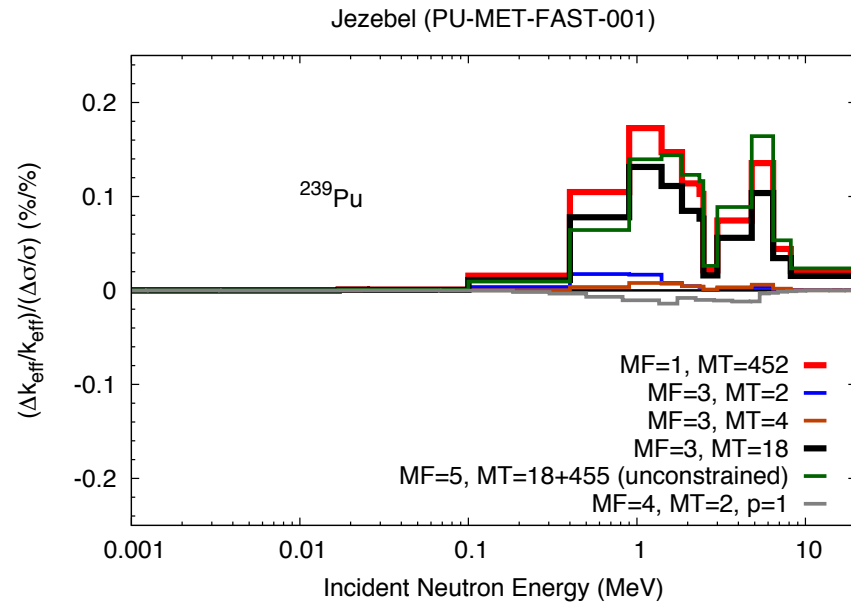
Neudecker et al., LA-UR- 20-28636, submitted: “Issues could be in ^6Li , ^{12}C , ^{16}O , $^{24-26}\text{Mg}$, ^{27}Al , ^{48}Ti , ^{56}Fe , and ^{208}Pb nuclear data.

Good agreement is found with $^1,^2\text{H}$, ^7Li , ^9Be , ^{14}N , $^{235,238}\text{U}$, and ^{239}Pu nuclear data.”

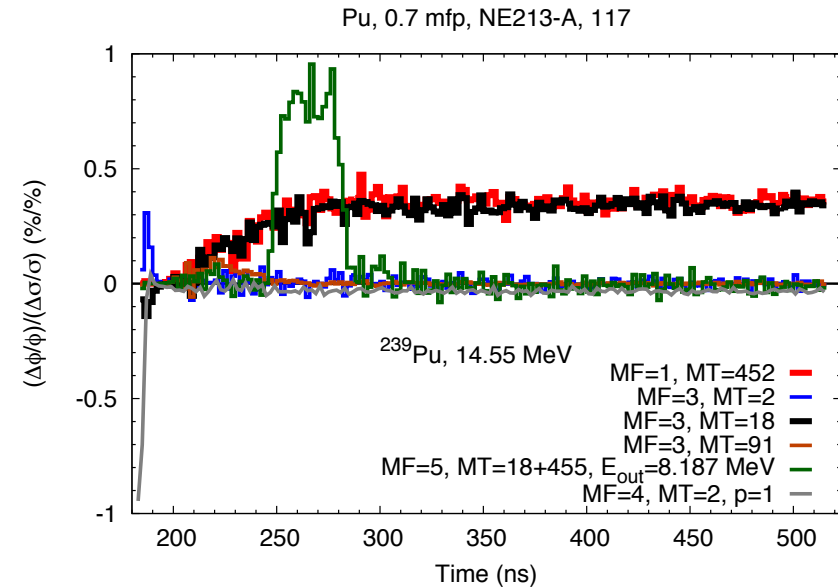


Pulsed Sphere TOF spectra enable studying fission-source term observables and angular distributions differently than criticality.

Criticality Benchmarks



14-MeV LLNL pulsed spheres



Relative sensitivity of average fission neutron multiplicity versus, fission neutron spectrum, fission cross section similar for criticality benchmarks.

Impact of angular distributions and fission-neutron spectrum for TOF spectra different from criticality benchmarks.

TOF spectra at overlapping pulse energy to criticality allow to disentangle angular distributions and fission source term.