Contribution ID: **20** Type: **not specified**

Examination of C, Be, Mo, U-238, Fe-nat using the RPI HES Data with Current ENDF, JEFF, and JENDL Evaluations

Tuesday 10 October 2023 09:00 (35 minutes)

Quasi-differential scattering measurements were performed at the RPI Gaerttner Linear Accelerator (LINAC) Center with the High Energy Scattering (HES) System, which relies on the time-of-flight method to determine the incident neutron energy. The HES system relied on eight proton recoil fast neutron liquid scintillators detectors to collect neutron data. Each detector was optimized to measure neutrons with energies between 0.5 and 20 MeV, and their locations about the scattering samples were predetermined based on where significant discrepancies between evaluated nuclear data libraries were observed. Data collected from these measurements contain single and multiple scattering collisions from elastic collisions, various inelastic states, and fission. The measurement data were compared to simulations of the experiment using OpenMC and MCNP models using reaction probabilities found in evaluated nuclear data files. This work examines how the current nuclear data library evaluations, ENDF/B-VIII.1, JEFF-3.3, and JENDL-5.0, perform with HES quasi-differential measurements of carbon, beryllium, molybdenum, uranium-238, and iron.

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Track Classification: Nuclear Data Evaluations