

# Recent Nuclear Data Activity at the RPI Gaertner LINAC Center

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**Abstract:** The nuclear data group at the RPI Gaertner LINAC Laboratory uses a 60 MeV pulsed electron LINAC to produce short pulses of neutrons and perform cross section and other nuclear data measurements in a wide energy range from thermal to about 20 MeV. This talk will cover several recent activities that are of interest to nuclear applications.

Recently there has been a growing activity in thermal neutron scattering evaluations which prompted the need for accurate thermal total cross section measurements for validation. To improve the neutron flux in the sub-thermal region (below 0.01 eV) a cold moderator was designed and installed. A polyethylene moderator operating at about 26K resulted in a factor of 8 increase in neutron flux below 0.01 eV. Using this new capability, several transmission measurements were performed with samples of polyethylene, polystyrene, Plexiglas, and yttrium hydride. A second thermal system designed to measure thermal neutron die-away is under development and will provide experimental validation for new evaluations.

New neutron capture and transmission measurements in the keV energy range were made for Fe-54, which are aiding an evaluation effort that is underway. Capture measurements were collected on an array of C<sub>6</sub>D<sub>6</sub> detectors that was expanded from 4 to 7 detectors, a complementary transmission measurement was also performed.

A new project aimed at validation of capture gamma production is underway. This project measures the energy dependent capture gamma cascades with the RPI 16-segment gamma multiplicity detector. Measurements are compared to cascades generated from nuclear structure evaluations processed with DICEBOX and transported with a modified version of MCNP. This system provides important information on the completeness of primary gamma-ray databases. The group is also working on evaluations of Pb and Zr isotopes. Lastly, the capabilities for analysis of unresolved resonance experiments were improved by adding a resonance self-shielding correction module to the SAMMY code that enables fitting of transmission and capture yield data.