

Amanda Lewis, Nicholas Thompson, Adam M. Daskalakis, Ezekiel Blain, Yaron Danon

Rensselaer Polytechnic Institute

2014 American Nuclear Society Winter Meeting

Data Analysis for Neutron Capture Measurements in Lead Slowing Down Spectrometer

Accurate neutron cross section data are essential for the design of nuclear reactors, certain medical applications, and non-proliferation. Research is being done at Rensselaer Polytechnic Institute to further develop methods to measure neutron capture cross sections using a Lead Slowing-Down Spectrometer (LSDS). The LSDS has an extremely high flux, which allows for measurements of reactions with small cross sections and of small samples. The neutrons lose energy through successive scattering interactions with the lead, and the average energy of the neutrons as a function of time can be calculated with the equation

$$E[eV] = 165000[eV*\mu s^2] / (t[\mu s]-0.3[\mu s])^2$$

This relationship is used to determine the energy of neutrons that are captured in the sample. Through this process, the neutron capture rate of materials can be measured.