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Characterization of a New Lead Slowing Down Spectrometer GLEN WARREN, MICHAEL CANTALOUB, ANDY CASELLA, EMILY MACE, BEN MCDONALD, CORY OVERMAN, SHARON PRATT, ERIC SMITH, SEAN STAVE, RICK WITTMAN, Pacific Northwest National Laboratory, PNNL ANDAS TEAM — Pacific Northwest National Laboratory is studying the application of Lead Slowing Down Spectrometry (LSDS) to measure the mass of actinides in used nuclear fuel. LSDS has been used for decades to make cross-section measurements on relatively small isotopic samples of well know masses. In LSDS, a pulse of fast neutrons is injected into a large lead stack ($\sim$ 1m^3). The neutrons quickly down-scatter to the point at which elastic scattering dominates. At this point, the energy of the neutron and the time the neutron has been in the lead become correlated. By measuring this elapsed time, it is possible to measure interactions of the neutrons with the fuel in the 0.1 to 1,000 eV range. Many of the actinides have strong resonances in this region, making it possible, through careful measurements and analysis, to extract isotopic masses from LSDS measurements. This paper will present results of the effort to construct and characterize a new lead slowing down spectrometer. To characterize the spectrometer, a series of (n, γ) experiments were conducted to measure the correlation between the time after the neutrons enter the lead and the energy of the interaction. Results from these measurements as well as plans for future development of the spectrometer will be discussed.

Glen Warren
Pacific Northwest National Laboratory

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