First Measurements with a Lead Slowing Down Spectrometer at WNR

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The Lead Slowing Down Spectrometer (LSDS) recently installed at the Los Alamos Neutron Science Center (LANSCE) consists of a 1.2 meter cube of lead surrounding a tungsten target, which is bombarded by pulses of 800 MeV protons from the Proton Storage Ring (PSR). Neutrons are produced by spallation from the interaction of the proton pulse with the target. The aim of the LSDS is to keep the neutrons inside the lead volume for few hundreds of microseconds and to slow them down by small steps in energy before they leave the spectrometer. The advantage of the LSDS is the large amount of neutrons available in the lead volume compared to traditional time-of-flight experiments. Driving the LSDS with a pulsed proton beam increases the neutron flux per watt of beam power significantly over similar spectrometers driven by electron linear accelerators. With this flux, fission cross-section on very small samples (about tens of nanograms) can be studied. Our goal is the measurement of fission cross sections of highly radioactive nuclei including short-lived isomers. The characteristics of the LSDS (energy-time relation, energy resolution) are presented as well as the performance different detectors used for these measurements. These results are compared to MCNPX simulations. Results of initial measurements of fission and capture cross sections on microgram samples of actinides are presented in order to prepare the measurements with nanogram samples.

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