

Study of Neutron Production Changes with the Proton Beam Position on Spallation Production Target

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Abstract

The Los Alamos Neutron Science Center (LANSCE) operates a short pulse spallation neutron source, providing thermal and cold neutron beams for materials research, chemistry and biology (Lujan Neutron Scattering Center). The spallation neutrons are produced by bombarding a solid tungsten target by the 800-MeV proton beam generated by the LANSCE linear accelerator. In an attempt to study how the thermal and cold neutron production changes with the proton beam position (and size) on the spallation production target, we have carried out a sequence of experiments during the run cycles of 2009 and 2010. We have monitored the thermal and cold neutron beam flux at multiple beamlines of the Lujan Center while changing the proton beam parameters. We investigated the influence of proton beam spot size, position and intensity on the thermal and cold neutron production. Our experimental study is a follow up on an earlier study by G. D. Baker et al. [1] that focused on thermal-hydraulic properties of an operating spallation target (also carried out at the LANSCE facility). We will discuss the results of our experiments in light of the modeling predictions. We believe that our experiments can be used as an effective tool for detecting potential damage to solid spallation production targets.

References:

[1] G.D. Baker, et al., Nucl. Instrum. Meth. In Phys. Res. A **359** (1995) 451-462