

MEASUREMENT OF NEUTRON TRANSMISSION THROUGH IRON SPHERES

Thomas N. Massey¹, Steven M. Grimes¹, Allan D. Carlson², James M. Adams²,
Michael T. Wenner³, Alireza Haghghat³

¹ *Institute of Nuclear and Particle Physics, Department of Physics and Astronomy, Ohio University*

² *National Institute of Standards and Technology*

³ *Department of Nuclear and Radiological Engineering, University of Florida*

We have measured the transmission of neutrons through two iron spheres with several different sources. We have used a quasi-monoenergetic source with 3.0, 5.0, and 7.0 MeV deuterons incident on a deuteron gas cell and 5.1 MeV protons incident on a ¹⁵N gas cell. These reactions were found to be the most suitable sources below 11 MeV for minimizing the energy spread of the neutrons produced.

The Ohio University Beam Swinger Facility was used in these measurements. This allowed a single fixed detector to be used for all angles in a well shielded time-of-flight tunnel. This also allowed a large reduction in the background from room scattered neutrons. NE213 and lithium glass detectors, that were calibrated relative to the neutron spectrum from the B(d,n) or Al(d,n) reaction were used in the experiments. The B(d,n) and Al(d,n) spectra have been measured relative to the primary neutron cross section standard, ²³⁵U(n,f).

We have measured the source reactions at a number of angles to allow modeling that is being done for these measurements. The transmitted neutrons have been measured for the two different spheres at several angles for the source reactions used. The results of this investigation will be presented.