

Abstract Submitted
for the APR14 Meeting of
The American Physical Society

GEANT4 Simulation of the NPDGamma Experiment¹ EMIL FRIEZ, University of Virginia, NPDGAMMA COLLABORATION — The $\vec{n} + p \rightarrow d + \gamma$ experiment, currently taking data at the Oak Ridge SNS facility, is a high-precision measurement of weak nuclear forces at low energies. Detecting the correlation between the cold neutron spin and photon direction in the capture of neutrons on Liquid Hydrogen (LH) target, the experiment is sensitive to the properties of neutral weak current. We have written a GEANT4 Monte Carlo simulation of the NPDGamma detector that, in addition to the active CsI detectors, also includes different targets and passive materials as well as the beam line elements. The neutron beam energy spectrum, its profiles, divergencies, and time-of-flight are simulated in detail. We have used the code to cross-calibrate the positions of (i) polarized LH target, (ii) Aluminum target, and (iii) CCl₄ target. The responses of the 48 CsI detectors in the simulation were fixed using data taken on the LH target. Both neutron absorption as well as scattering and thermal processes were turned on in the GEANT4 physics lists. We use the results to simulate in detail the data obtained with different targets used in the experiment within a comprehensive analysis.

¹This work is supported by NSF grant PHY-1307328

Emil Friez
University of Virginia

Date submitted: 10 Jan 2014

Electronic form version 1.4