Investigating Background Sources in the DIANNA Experiment using GEANT4 and MCNPX

CATRISH PAGAN, RICHARD SHOWALTER-BUCHER, DAVID YAGER-ELORRIAGA, BRETT CRAWFORD, SHARON STEPHENSON, Gettysburg College, DIANNA COLLABORATION

The DIANNA collaboration is pursuing a direct measurement of the $^1S_0$ neutron-neutron scattering length at the YAGUAR reactor. The neutron background is predicted to depend linearly on the neutron flux, while the neutron-neutron signal should have a quadratic dependence, and therefore, variation in the pulse power of the reactor provides a mechanism for separating the signal from the background. Initial measurements show a non-linear contribution to the background, which could be from both desorption in the aluminum vacuum pipe as well as physical movement of the moderator during the reactor pulse. To study the background effects of various desorption processes, GEANT4 was used. MCNPX was used to model the possible background effects of the moderator movement during the YAGUAR reactor pulse. Results will be presented.

This project was made possible by funding from the National Science Foundation under Grant No. 0555602.

Catrish Pagan
Gettysburg College

Date submitted: 26 Jun 2008

Electronic form version 1.4