Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Simulating Neutron Rotations in Magnetic Fields[1] JUSTIN CHOVANEC, Gettysburg College — Neutron polarization can be used to study the weak interaction and to look for fifth forces. This is done by analyzing deviations in the polarization of a neutron beam as it passes through a non-polarized substance. For example, to study the weak interaction, a beam of neutrons is sent through liquid helium, which can cause a rotation of the neutron polarization through the weak interaction. These changes can be detected with a neutron polarimeter that has been developed by the Neutron Spin Rotation collaboration. To search for fifth forces, a different target is used, but the experiment is very similar. In both cases, ambient magnetic fields can also affect the polarization of the neutron beam and lead to systematic errors. This project focused on improving pre-existing neutron spin transport code and writing new code to improve the computer model for the experiment, with a heavy emphasis on writing code to select statistically relevant sets of data from various histograms. Once the improvements to the code are made, simulations will be run on a high-speed computer cluster to study small systematic effects due to magnetic field simulations. This work supports measurements to be conducted on the cold neutron beam at the NIST Center for Neutron Research in the coming year. As experiments are run, the neutron polarimeter will be utilized to measure deviations in the polarity of the neutrons, which will aid in the understanding of the weak interaction and the search for fifth forces.

[1]The Kolbe Fund

Justin Chovanec
Gettysburg College

Date submitted: 31 Jul 2020 Electronic form version 1.4