Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

UCNA Field Profile Analysis BRIAN ALLGEIER, Undergraduate Student, University of Kentucky, BRAD PLASTER, Associate Professor, University of Kentucky, MICHAEL BROWN, Graduate Student, University of Kentucky, UCNA COLLABORATION[1] — The UCNA experiment, located at the Los Alamos Neutron Science Center (LANSCE), is the first of its kind, using ultra-cold neutrons (UCN) to measure the neutron β-decay asymmetry parameter A_0. This coefficient is a measure of the correlation between a neutron's spin and the decay electron's emission direction. An accurate extraction of such a parameter allows for significant consequences in the understanding of weak interactions. UCNA implements a 1 T superconducting solenoid to send decay electrons toward detectors at either end of the experimental cylinder. The magnetic field strength as a function of position along the length of the cylinder (the field profile) plays an important role in the movement of these electrons. A $\sim$0.5% dip in strength near the center of all field profiles allows for the deflection or entrapment of a small yet significant fraction of decay electrons. Such a phenomenon leads to a potential false asymmetry to be measured in UCNA, depending upon the shape of the field profile during experimentation. Monte Carlo simulations were used to generate large data sets of β-decay events in various field profiles. The focus of this work is to analyze the effects of the best and worst field profiles on the asymmetries measured by the UCNA experiment.

[1]Ultra-Cold Neutron Asymmetry Experiment, Los Alamos Neutron Science Center

Brian Allgeier
Undergraduate Student, University of Kentucky

Date submitted: 22 Jul 2015 Electronic form version 1.4