Abstract Submitted
for the SES15 Meeting of
The American Physical Society

Measurement of Liquid Scintillator non-linearity for NOvA neutrino experiment with Compton Gamma Spectrometer[1] CAMERON ERICKSON, YURI KAMYSHKOV, ERIC FLUMERFELT, YURI EFREMENKO, LAURA GUNDERSON, Univ of Tennessee, Knoxville — A future NOvA experiment at Fermilab plans to explore neutrino mass hierarchy and CP-violation in neutrino oscillations. This experiment calls for large-mass detectors, on the 10 kT scale. These detectors are composed of many smaller cells, allowing measurement of neutrino energy as well as neutrino direction. Practical considerations lead to liquid scintillator as the detection material in NOvA. However, the nonlinear energy response of each cell is unknown and must be obtained experimentally. A NOvA detector prototype cell was studied with the UT Compton Spectrometer to measure this non-linearity. A high-resolution Germanium semi-conductor detector is set a known angle and able to pivot about the liquid scintillator at a fixed radius. Both the NOvA cell and Ge-detector are fed into an electronic system capable of recognizing time coincidence. Once a collimated beam of gamma rays strikes the liquid scintillator and is scattered, the germanium detector selects events at a certain scattering angle, and therefore energy, to be recorded. Using relativistic equations for Compton Scattering, the energy deposited in both detectors can be determined. Repeating this process at various angles allows for a mapping of the liquid scintillators response to electrons in the 0 to 1 MeV range.

[1]DOE HEP program for NOvA project

Cameron Erickson
Univ of Tennessee, Knoxville

Date submitted: 02 Oct 2015 Electronic form version 1.4