Contribution ID: **103** Type: **Poster**

A Novel Neutron-Based Calibration System for DUNE

Tuesday, May 14, 2024 3:45 PM (35 minutes)

The Deep Underground Neutrino Experiment (DUNE) is a next-generation long baseline neutrino experiment, which will measure the oscillation probabilities of neutrinos and antineutrinos at unprecedented precision to quantify the Charge-Parity (CP) violation in the leptonic sector. These measurements require a precision detector calibration that constrains the uncertainties from relevant detector response parameters. However, traditional calibration methods have limitations due to the lower cosmic ray muon flux at the deep underground location. As such, new strategies are needed to meet DUNE's stringent calibration needs. One of the main energy scale and resolution calibration systems being developed for DUNE includes the Pulsed Neutron Source (PNS). This is a device which can inject neutrons into the detector modules, where their capture signatures can be used as a standard candle for energy scale and resolution calibration. To show the effectiveness of such a calibration for a DUNE Prototype detector (ProtoDUNE) we have produced simulations using the Liquid Argon Simulation Software (LArSoft) framework. We have determined through simulation that the most effective calibration technique for a surface detector will rely on identifying energy deposits from one of the highest intensity gammas released in neutron capture on argon. By carefully selecting these events we analyze a spectrum which includes two prominent features: the Compton edge, and the double escape peak.

Primary authors: Dr WANG, Jingbo (South Dakota School of Mines and Technology); JOHNSON, Walker (South Dakota School of Mines and Technology)

Presenter: JOHNSON, Walker (South Dakota School of Mines and Technology)

Session Classification: Poster Session

Track Classification: Neutrino Oscillations