Contribution ID: **403** Type: **Poster**

Medium Energy Neutron Detector Response in NOvA

Tuesday, 18 June 2024 17:30 (2 hours)

Neutrons pose a significant challenge in neutrino experiments where energy reconstruction is critical. The behavior of neutrons is particularly model-dependent because they can take away interaction energy that is largely unseen owing to their non-ionizing nature. Below 20 MeV, many interaction models, like Geant4, employ measurements of final-state particle content to produce accurate neutron interaction topologies. However, there is a lack of data for higher energies, and we must rely on statistical models tuned only to the inclusive interaction cross-section. This can alter the expected visibility of neutrons. NOvA is a long-baseline accelerator neutrino experiment that can leverage its segmented, liquid scintillator-based, high-rate Near Detector to probe neutron interaction models. In this poster, we describe the development and application of an algorithm capable of identifying energy deposits linked to primary neutrons in antineutrino interactions. Additionally, we present the results of a neutron-on-carbon inelastic scattering model as a replacement for Geant4's intranuclear cascades between 20-O(100) MeV and show an improvement in data-simulation agreement.

Poster prize

Yes

Given name

Andrew

Surname

Sutton

First affiliation

Florida State University

Second affiliation

Institutional email

asutton2@fsu.edu

Gender

Male

Collaboration (if any)

NOvA

Primary authors: SUTTON, Andrew (Florida State University); RABELHOFER, Miranda

Presenters: SUTTON, Andrew (Florida State University); RABELHOFER, Miranda

Session Classification: Poster session and reception 1

Track Classification: Accelerator neutrinos