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Data Driven Study of Neutron Response Using Quasielastic Neutrino Scattering in the Minerva Experiment EVAN PETERS, Oregon State Univ, MINERVA COLLABORATION — Understanding how particles behave in detectors is a critical part of analyzing data from neutrino experiments, but neutral particles are difficult to characterize. The purpose of this project was to calibrate the neutron response in Quasielastic antineutrino scattering (QE) events in the Minerva detector. We applied quasi-elastic assumptions to estimate the outgoing neutron kinematics in QE scattering, and then added modifications to improve the model's predictions for neutron response in data. We compared these kinematic predictions of neutron energy and angle to Monte Carlo simulations of QE scattering and to the behavior of reconstructed energy blobs that characterize neutral particle behavior in simulated and real Minerva data. Filtering events for neutron energy, angle, and distance from the interaction vertex, we derive calibration functions for both the simulation and real data. Future work will include potential changes to the blobbing algorithms and refinement of the calibration technique using rigorous statistical methods.

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