

Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Proposed Study of Tagged Neutrons in Liquid Scintillator

BRINDEN CARLSON, DANIEL KAPLAN, Illinois Institute of Technology — Neutrino and antineutrino events in scintillator detectors (as in the NOvA experiment at Fermilab) are classified based on the behavior of charged particles traversing the scintillator. Antineutrino events tend to produce neutrons in the detector, but neutron interactions in NOvA detectors are currently difficult to reconstruct. Introducing a method to record data on real neutron events in scintillator would thus be beneficial to NOvA. Currently, the NOvA collaboration is commissioning a test-beam calibration of a NOvA detector. This calibration is accomplished by magnetically deflecting charged particles into the detector; the deflection angle is used to calculate the particle's momentum. However, this technique will not work for neutrons, since they have no charge. "Tagging" the neutron is a viable alternative in order to determine its momentum before it interacts in the detector: If a neutron is produced in a target together with charged particles, the charged particles' momenta can be measured, and conservation of momentum used to determine the neutron momentum vector. This technique has been studied in simulation and found to be reliable for neutron kinetic energy above ≈ 100 MeV.

Brinden Carlson
Illinois Institute of Technology

Date submitted: 17 Jan 2020

Electronic form version 1.4