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Neutron beam test with 3D-projection scintillator tracker prototypes for long-baseline neutrino oscillation experiments

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The long-baseline neutrino oscillation experiments rely on detailed models of neutrino interactions on nuclei to relate observations made at near detector locations to far detector locations in order to extract precision measurements on the oscillation parameters. These models constitute an important source of systematic uncertainty, driven in part because detectors to date have been blind to the neutrons produced in neutrino interactions. We are proposing a 3D-projection scintillator tracker as a near detector component in the next generation long-baseline neutrino experiments such as T2K upgrade and DUNE. Such a detector consists of a large number of 1 cm x 1 cm x 1 cm scintillator cubes with three orthogonal optical fibers crossing through each cube. Benefitted by the good timing resolution and fine granularity, this detector will be capable of measuring neutrons including its kinetic energy in neutrino interactions on an event-by-event basis and thus will provide valuable data for refining neutrino interaction models. Two prototypes have been exposed to the neutron beamline in Los Alamos National Lab (LANL) with neutron energy ranged from 0 to 800 MeV. This beam test, aimed at characterizing the detectors' response to neutrons, is a critical step in demonstrating the potential of this technology. In this presentation, the prototype detectors and the LANL beam test setup will be describes, and the preliminary data analysis results will be shown.

I read the instructions

Secondary track (number)

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