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Total neutron cross section measurement on CH with a novel 3D-projection scintillator detector

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Long-baseline neutrino oscillation experiments rely on detailed models of neutrino interactions on nuclei. These models constitute an important source of systematic uncertainty, in part because current detectors have been blind to final state neutrons. A novel three-dimensional projection scintillator, called SuperFGD, will be the tracker of the upgraded off-axis near detector of the T2K experiment. Due to its good timing resolution and fine granularity, this technology is capable of measuring neutrons in (anti)neutrino interactions on an event-by-event basis and will provide valuable data for refining neutrino interaction models and ways to reconstruct neutrino energy. Two prototypes have been exposed to the neutron beamline at Los Alamos National Laboratory (LANL) in both 2019 and 2020 with neutron energies between 0 and 800 MeV. In order to demonstrate the capability of neutron detection, the total neutron cross section on CH is measured with one of the prototypes and compared to external measurements. The total neutron cross section in scintillator between 98 and 688 MeV was measured and will be presented in this talk.

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