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Measurement of Proton Quenching in the MicroCHANDLER Prototype Neutrino Detector

MicroCHANDLER is a prototype detector for surface-level reactor antineutrino detection made with plastic scintillator cubes (EJ-260). We measured the proton quenching effect in the scintillator with neutron beams of 5-27 MeV at the Triangle Universities Nuclear Laboratory (TUNL). We extracted the Birks' constants from our data. This result improves the energy non-linearity modeling of plastic scintillator detectors in an unprecedented energy range. In addition, the updated energy response function for recoil protons will lead to an improved modeling of fast neutrons, which is needed to optimize the shielding design.

Mini-abstract

Proton quenching is measured in a prototype neutrino detector with neutron beams.

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