

Demonstrating MeV-Scale Physics Capabilities of Large Neutrino LArTPCs with Ambient Blip Activity in MicroBooNE

Large neutrino liquid argon time projection chamber (LArTPC) experiments can broaden their physics reach by incorporating isolated MeV-scale features present in their data. We use data from MicroBooNE, an 85-tonnes LArTPC exposed to Fermilab neutrino beams from 2015 until 2021, to demonstrate new calorimetric and particle discrimination capabilities for isolated $\sim O(1 \text{ MeV})$ energy depositions referred to as “blips”. We observe concentrations of blips near fiberglass support struts along the TPC edge, with an energy spectrum indicative of specific gamma-ray decays. These and other blip sources are being used to validate calibrations in MicroBooNE’s data by leveraging spectral features. This work further reports on the progress towards distinguishing between low-energy protons and electrons in large LArTPCs using cosmogenic data. The composition of proton-like blips selected using this new technique is being studied to evaluate the accuracy of cosmic ray flux models used in LArTPCs.

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