

Measurements of Pion and Muon Nuclear Capture at Rest on Argon in the LArIAT Test Beam Experiment

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LArIAT is a liquid argon time projection chamber (LArTPC) experiment in a test beam at Fermilab from 2015 to 2017 to understand and characterize interactions of particles in LAr which are commonly observed in neutrino-Ar final-states. Tracks for pions and muons in LArTPCs are difficult to differentiate since both particles exhibit very similar ionization profiles for muon and pion that stop in the TPC. We are exploring unique new particle discrimination capabilities by exploiting information from small, isolated ionization depositions, referred to as “blips”, reconstructed near the endpoint of stopping tracks. These blips are formed by gammas emitted when an at-rest pion or muon captures on the argon nucleus. The relatively low beam energy provided by LArIAT makes it uniquely suited for performing this demonstration. In this poster, we present an overview of event candidate selection, blip reconstruction, and background subtraction corresponding to our signal of interest, nuclear captures of pions and muons at rest inside LArIAT’s TPC.

Poster prize

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