

Detection of MeV-Scale Gammas from Pion/Muon Nuclear Capture With the LArIAT Liquid Argon TPC

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LArIAT (Liquid Argon In A Testbeam) is a LArTPC experiment which aims to understand and characterize interactions of neutrino final-state products with Argon. Differentiation between muons and pions in LArTPCs is difficult since the tracks for both particles exhibit very similar ionization densities. We are exploring unique new particle discrimination capabilities for pions and muons 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 talk, I will provide an overview of how we select candidate events and reconstruct blips corresponding to our signal of interest, nuclear captures of pions and muons at rest inside LArIAT’s TPC, and how we estimate and subtract backgrounds from these capture-at-rest blip signals.

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