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Rejecting Non-MIP-Like Tracks using Boosted Decision Trees with the T2K Pi-Zero Subdetector MATTHEW HOGAN, JACKLYN SCHWEHR, DANIEL CHERDACK, ROBERT WILSON, Colorado State Univ, T2K COLLABORATION — Tokai-to-Kamioka (T2K) is a long-baseline neutrino experiment with a narrow band energy spectrum peaked at 600 MeV. The Pi-Zero detector (PØD) is a plastic scintillator-based detector located in the off-axis near detector complex 280 meters from the beam origin. It is designed to constrain neutral-current induced π^0 production background at the far detector using the water target which is interleaved between scintillator layers. A PØD-based measurement of charged-current (CC) single charged pion ($1\pi^+$) production on water is being developed which will have expanded phase space coverage as compared to the previous analysis. The signal channel for this analysis, which for T2K is dominated by Δ production, is defined as events that produce a single muon, single charged pion, and any number of nucleons in the final state. The analysis will employ machine learning algorithms to enhance CC$1\pi^+$ selection by studying topological observables that characterize signal well. Important observables for this analysis are those that discriminate a minimum ionizing particle (MIP) like a muon or pion from a proton at the T2K energies. This work describes the development of a discriminator using Boosted Decision Trees to reject non-MIP-like PØD tracks.

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