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Search for electron-like low energy excess using Wire-Cell event reconstruction at MicroBooNE

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The liquid argon time projection chamber (LArTPC) is an advanced technology to detect neutrinos with its superb imaging and calorimetry capabilities in a fully active volume. The MicroBooNE detector, which is a single-phase LArTPC of 85-ton active mass located near the Earth's surface, was built to primarily investigate the low energy excess (LEE) of electron neutrino charged-current events and to measure the neutrino-argon scattering cross sections, using the Booster Neutrino Beam (BNB) at Fermilab. The search for LEE is of great scientific interest in the context of the existence of light sterile neutrinos.

In this talk, an end-to-end reconstruction, selection, and analysis chain of electron neutrino charged-current events based on the novel Wire-Cell reconstruction paradigm will be presented. The unique challenges of the large cosmic-ray muon backgrounds at a surface detector and the overwhelming charged-current and neutral-current backgrounds from the beam muon neutrinos are well addressed in this procedure. Validation of this electron neutrino selection using the Neutrinos at the Main Injector Beam (NuMI) will be shown as well.

Collaboration name

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