



Contribution ID: 893

Type: Parallel Talk

Measurement of the Λ Baryon Production Cross Section in Neutrino Interactions with MicroBooNE

Friday, 8 July 2022 09:15 (15 minutes)

The MicroBooNE detector is a liquid argon time projection chamber (LArTPC) with an 85 ton active mass that receives flux from the Booster Neutrino and the Neutrinos from the Main Injector (NuMI) beams, providing excellent spatial resolution of the reconstructed final state particles. Since 2015 MicroBooNE has accumulated many neutrino and anti-neutrino scattering events with argon nuclei enabling searches for rare interaction channels.

The Cabibbo suppressed production of hyperons in anti-neutrino-nucleus interactions provides sensitivity to a range of effects, including second class currents, SU(3) symmetry violations and reinteractions between the hyperon and the nuclear remnant. This channel exclusively involves anti-neutrinos, offering an unambiguous constraint on wrong sign contamination. The effects of nucleon structure and final state interactions are distinct from those affecting the quasielastic channel and modify the Λ and Σ production cross sections in different ways, providing new information that could help to break their degeneracy. Few measurements of this channel have been made, primarily in older experiments such as Gargamelle [1,2].

We present the measurement of the cross section for direct (Cabibbo suppressed) Λ production in muon anti-neutrino interactions with argon nuclei in the MicroBooNE detector, using neutrinos from the off-axis NuMI beam. The event selection and treatment of systematic uncertainties will also be described.

[1] O. Erriquez et al., Nucl. Phys. B140, 123 (1978)

[2] O. Erriquez et al., Phys. Lett. B 70, 383 (1977)

In-person participation

Yes

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Session Classification: Neutrino Physics

Track Classification: Neutrino Physics