

First Measurement of Differential Cross Sections for Muon Neutrino Charged Current Interactions on Argon with a Two-proton Final State with the MicroBooNE Detector

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We present the first measurement of differential cross sections for charged-current muon neutrino interactions on argon with one muon, two protons, and no pions in the final state, using the MicroBooNE Liquid Argon Time Projection Chamber. Such interactions leave the target nucleus in a two-particle two-hole state; these states are of great interest, but currently, there is limited information about their production in neutrino-nucleus interactions. Detailed investigations of the production of two-particle two-hole states are vital to support upcoming experiments exploring the nature of the neutrino, and the development of the liquid-argon time-projection-chamber has made possible the isolation of such final states in neutrino scattering. Among the many kinematic quantities we measure, the opening angle between the two protons, the angle between the total proton momentum and the muon, and the total transverse momentum of the final state system are most sensitive to the underlying physics processes as embodied in a variety of models.

Working Group

WG 2: Neutrino Scattering Physics

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