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Towards The First Measurement of Differential Charged Current Single Transverse Variable $\nu\mu$ -Argon Scattering Cross Sections with the MicroBooNE Detector

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Current and future generation neutrino oscillation experiments aim towards a high-precision measurement of the oscillation parameters and that requires an unprecedented understanding of neutrino-nucleus scattering. In this work, we present the first charged current differential cross-sections with no final state pions and a single final state proton above threshold (300 MeV/c) in single transverse variables using data recorded by the MicroBooNE LArTPC detector. Such variables characterise the kinematic imbalance in the plane transverse to an incoming neutrino, which act as a direct probe of nuclear effects, such as final state interactions, Fermi motion and multi-nucleon processes. These measurements will allow us to constraint the systematic uncertainties associated with neutrino oscillation and scattering measurements, both in the near future for experiments of the Short Baseline Neutrino (SBN) Program, as well as for forthcoming experiments like DUNE and other experiments with similar energy neutrino beams.

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