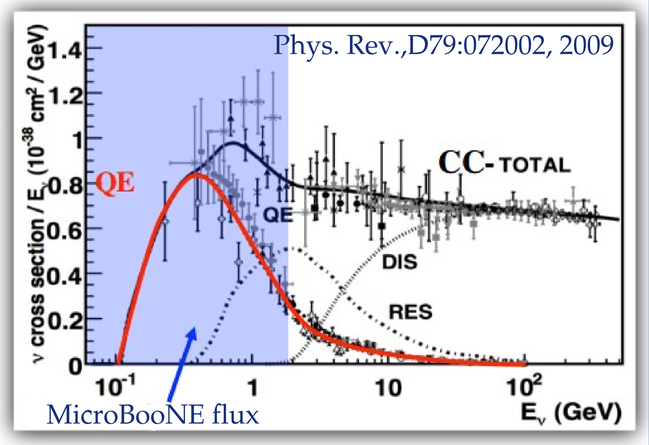
First Measurement of Differential Charged Current Quasielastic-like ν_μ -Argon Scattering Cross Sections with the MicroBooNE Detector

A. Papadopoulou on behalf of the MicroBooNE Collaboration

arXiv:2006.00108

Submitted to PRL

Why Charged Current Quasi-Elastic Interactions?



CCQE: Charged Current Quasi-Elastic Interactions

·Simplest nuclear process

·Dominant at low energies

·Ideal channel for high precision oscillation studies

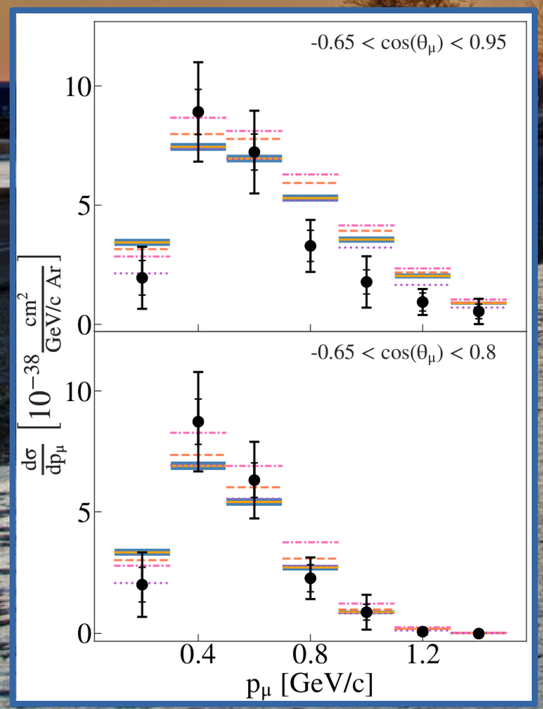
Topological Signal Definition

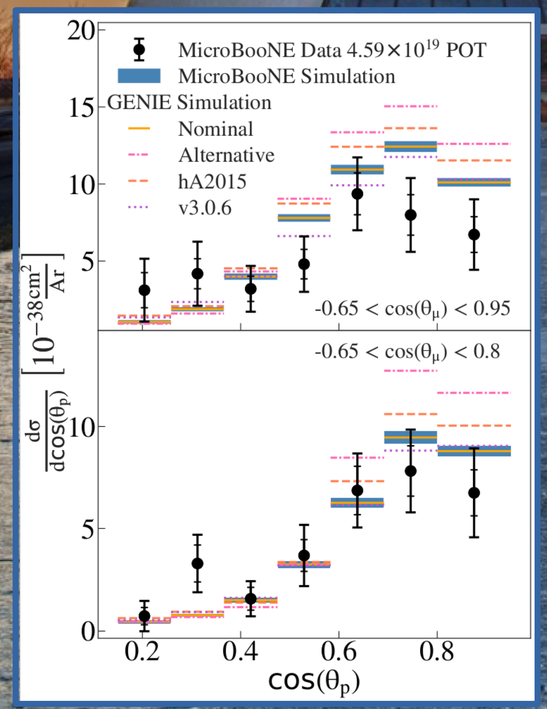
- Reconstructed vertex of 2 tracks at close proximity
- Minimally ionizing muon with P > 100 MeV/c
- Proton with P > 300 MeV/c, tagged with Bragg peak

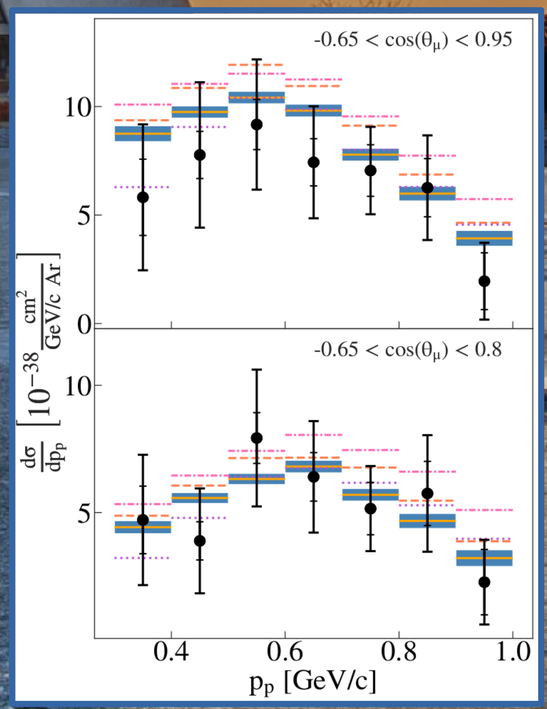
Event selection based on detector level (energy deposition, track length, scintillation light) and interaction level cuts (vertex activity, coplanarity, transverse momentum imbalance)

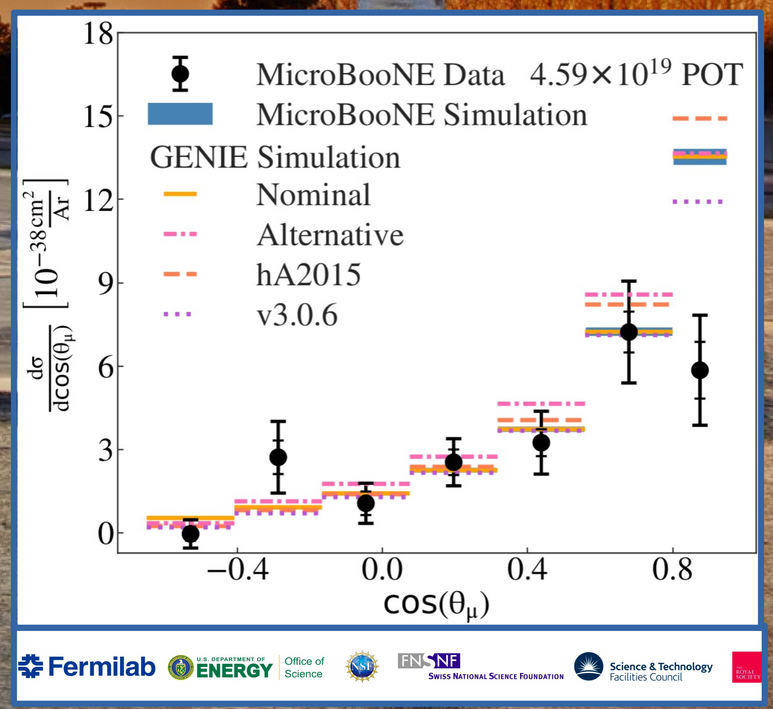
First measurement of CCQE-like cross sections using a surface Liquid Argon time projection chamber

- Discrepancy in low Q^2 region
- Better agreement when forward region is excluded









Fermilab · U.S. Department of Energy Office of Science · NSF · Swiss National Science Foundation · Science & Technology Facilities Council · Royal Society