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MicroBooNE's approach to inclusive cross-section measurements

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MicroBooNE is a liquid argon time projection chamber (LArTPC) located along the Fermilab Booster Neutrino Beam with a mean neutrino energy of approximately 0.8 GeV. The analysis of neutrino interactions leverage the mm level spatial resolutions of LArTPCs to provide a detailed description of the interaction in the detector. As a result, MicroBooNE has collected the largest neutrino-argon scattering dataset to date and can probe many questions related to the nuclear state and the interplay between different interaction pathways. A particular focus is the ν_μ-CC inclusive channel and it's energy dependence, especially in the GeV and sub-GeV regime. Understanding this is crucial for the next generation of neutrino oscillation experiments such as DUNE. At MicroBooNE, we introduce a novel conditional constraint approach that validates the hadronic model, in particular the mapping between reconstructed visible hadronic energy to true hadronic energy. This enables an extraction of neutrino energy-dependent cross-sections with suitable model discrimination power and a comprehensive measurement of the inclusive scattering channel. This provides a foundation from which one can begin to probe modelling strengths and weaknesses in relevant regions of phase space. This talk will outline such a complementary approach to extracting cross-sections and invite feedback on how such an analysis fits into the larger goal of understanding neutrino scattering in this energy regime.

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