Wenqiang Gu – HEP seminar – February 8, 2022
BNL

**Title:** Measurement of Energy-dependent Inclusive Muon Neutrino Charged-Current Cross Sections on Argon with the MicroBooNE Detector

**Abstract:** MicroBooNE is a liquid argon time projection chamber that operates in the Booster Neutrino Beam at Fermilab. The detector provides high-resolution imaging of neutrino interactions with a low threshold and full angular coverage. Thanks to a high event rate and several years of continuous operation, the MicroBooNE collaboration has obtained the world's largest dataset of neutrino-argon scattering events. A detailed understanding of these interactions, especially the impact of nuclear physics effects, will be critical to the success of future precision neutrino oscillation efforts, particularly the argon-based Deep Underground Neutrino Experiment (DUNE) and the Short-Baseline Neutrino (SBN) program. This talk presents a measurement of the energy-dependent total charged-current cross section $\sigma(E\nu)$ for inclusive muon neutrinos scattering on argon, as well as measurements of flux-averaged differential cross sections as a function of muon energy and hadronic energy transfer ($\nu$). The modeling of the missing hadronic energy and its associated uncertainties are verified by a new method that compares reconstructed hadronic energy distributions between data and an MC prediction after constraining reconstructed muon kinematic distributions to those of data. The success of this validation gives confidence that the missing energy in the MicroBooNE detector is well-modeled and underpins first-time measurements of both the total cross section $\sigma(E\nu)$ and the differential cross section $d\sigma/d\nu$ on argon.