

Abstract

The next generation of neutrino oscillation detectors rely on accurate cross section models in order to achieve their stated goal of measuring the charge conjugation parity (CP) violating phase in the lepton sector, δ_{cp} . A key component for model improvements are neutrino interaction measurements. Today's models particularly lack proper understanding of secondary interactions in the target nucleus. For this reason experiments with the same target materials can improve each other's measurements. Since one of the next generation oscillation experiments will use liquid argon time projection chambers (LArTPCs) as their primary detectors, it is evident that neutrino interaction measurements on argon atoms are of special interest. Such measurements can be provided by MicroBooNE which is also a LArTPC based experiment. In this thesis two ν_μ charged current (CC) inclusive event rate measurements are presented using MicroBooNE data. In order to reduce model dependency and uncertainties, the analysis is presented in a forward-folded manner. This means that models are forward-folded to represent the measured raw data rates, rather than unfolding the data to match the cross section format provided by model. The results are presented as differential and double-differential muon kinematic distributions. The latter shows tensions between our data and various models of different event generators, with the best performing model provided by NEUT (v5.4.0.1) exhibiting a $\chi^2/\text{NDF} = 12.34$. The deviation is greatest at high muon momentum. As an additional result, the total ν_μ CC inclusive cross section of MicroBooNE is found to be $\sigma_{\nu_\mu} = (0.933 \pm 0.045(\text{stat.}) \pm 0.146(\text{syst.})) \times 10^{-38} \text{ cm}^2$. This is in agreement with other total cross section measurements using MicroBooNE.