Abstract

Many modern long baseline neutrino oscillation experiments use the $\nu_\mu/\bar{\nu}_\mu$-nucleus charged-current (CC) interactions to infer oscillation parameters. A good understanding of the CC interactions is crucial to the precise measurements of the oscillation parameters. The NOvA experiment uses the off-axis NuMI beam with a neutrino energy spectrum peaking at about 2 GeV. In this energy range, the quasielastic, the resonant production, and the deep inelastic scattering processes come into play in the total cross section. An inclusive measurement including all channels, together with measurements of individual channels, could provide a more complete picture. I will be analysing a small dataset of the reversed horn current (RHC) data taken right before the 2016 summer shutdown. This dataset could not only shed light on questions remaining for the forward horn current (FHC) runs, but also provide a measurement of the $\bar{\nu}_\mu$-nucleus CC inclusive cross section measurement, which is even less measured than that for ν_μ in NOvA's energy range. One of the topics of particular interest is the data Monte Carlo disagreement in the reconstructed visible hadronic energy. It is known that neutrinos could interact with 2 nucleons as a whole. This process is modeled by the meson exchange current (MEC). By including MEC, the FHC data agree with Monte Carlo well. However, the data for RHC still disagree with Monte Carlo even with MEC included. Besides, there is data excess over Monte Carlo in very small hadronic energy, which is not seen in the FHC case. These are also interesting and important topics to be understood with this RHC run.