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Cross section model tuning and multiplicity studies in NOvA

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NOvA is a long baseline neutrino experiment based at Fermilab that studies neutrino oscillation parameters via electron neutrino appearance and muon neutrino disappearance. The oscillation measurements compare the Far Detector data to an oscillated prediction which accounts for the Near Detector (ND) data and our understanding of neutrino interactions and cross-sections by using GENIE simulation. By tuning the cross section model to better represent neutrino scattering data from NOvA's ND and other experiments, we can extract oscillation parameters with a more accurate representation of cross section uncertainties. This tuning process is performed in the ND, before the oscillations occur. The effectiveness of the tuning will be discussed through studies of subsets of different multiplicities in the final state. Potential improvements to the cross section tune used for NOvA's 2018 joint neutrino and antineutrino analysis will also be discussed.

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