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Data-Driven cross checks for electron neutrino selection efficiency in NOvA

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NOvA is a long-baseline neutrino oscillation experiment, designed to make precision neutrino oscillation measurements using ν_μ disappearance and ν_e appearance. It consists of two functionally equivalent detectors and utilizes the Fermilab NuMI neutrino beam. NOvA uses a convolutional neural network for particle identification of ν_e events in each detector. As part of the validation process of this classifier's performance, we apply a data-driven technique called Muon Removal. In a Muon-Removed Electron-Added study we select ν_μ charged current candidates from both data and simulation in our Near Detector and then replace the muon candidate with a simulated electron of the same energy. In a Muon-Removed Decay-in-Flight study we remove the muonic hits from events where cosmic muons entering the detector have decayed in flight, resulting in samples of pure electromagnetic showers. Each sample is then evaluated by our classifier to obtain selection efficiencies. Our recent analysis found agreement between the selection efficiencies of data and simulation within our uncertainties, showing that our classifier selection is generally robust in ν_e charged current signal selection.

Are you are a member of the APS Division of Particles and Fields?

Yes

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