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Impact of High Energy Electron Neutrino (Anti-neutrino) Events on NOvA Oscillation Sensitivities

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NOvA is a two-detector, long-baseline neutrino oscillation experiment located at Fermilab, Batavia, IL, USA. It is primarily designed to constrain neutrino oscillation parameters using muon neutrino (anti-neutrino) disappearance data and electron neutrino (anti-neutrino) appearance data. NOvA detects neutrinos from Fermilab's Neutrinos at Main Injector (NuMI) beamline. The unoscillated muon neutrino and beam ν_e events are observed by the NOvA Near Detector (ND), which is 100m underground and at a distance of 1km from the beam source. The Far Detector (FD), situated 809 km from the ND, is in Ash River, MN, USA, and observes ν_μ and ν_e events after oscillations.

Traditionally, NOvA has used ν_e events in the energy range $1 < E_\nu < 4$ GeV for 3-flavor neutrino oscillation analyses to constraint the neutrino oscillation parameters. In this study, we looked at the impact of including high-energy neutrino events with energies up to 12 GeV in the analysis with the aim of constraining the beam electron neutrino/antineutrino background events. Event count predictions after adding these high-energy sample events and the latest three flavor oscillation results of the NOvA experiment are presented.

Session

Neutrino Physics

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