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Neutrino Energy Reconstruction in NOvA

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NOvA is a long-baseline neutrino oscillation experiment. Situated 14.6 mrad off-axis of the NuMI beam produced at Fermilab, the detectors are exposed to a ν_μ ($\bar{\nu}_\mu$) beam peaked at 2 GeV. By measuring ν_μ ($\bar{\nu}_\mu$) disappearance and ν_e ($\bar{\nu}_e$) appearance between the NOvA Near Detector and the 14 kiloton Far Detector, the experiment is probing the neutrino mass hierarchy, the existence of leptonic CP violation, and making precise measurements of neutrino mixing parameters. The most precise measurements are achieved when fits can be performed to the shape of the observed neutrino energy spectra as well as the overall rate. Therefore, NOvA utilizes highly segmented tracking calorimeters to estimate neutrino energies via a combination of range based measurements and/or calorimetric information depending on the event and particle types determined by a neutral network trained on event topologies. This poster describes these energy estimation methods and outlines ongoing developments of improved deep learning based estimation techniques.

Summary

Description of neutrino energy estimation techniques used by the the NOvA experiment with some details on future improvements.

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