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Neutrino Energy Estimation using CNNs in the NOvA Experiment NITISH NAYAK, University of California, Irvine, NOVA COLLABORATION — NOvA is a long-baseline neutrino oscillation experiment that is designed to probe the neutrino mass hierarchy and mixing structure by looking for a ν_e ($\bar{\nu}_e$) appearance signal. It uses two functionally identical liquid scintillator detectors 14.6 mrad off-axis from the NuMI beamline at Fermilab, allowing for a tightly focused ν_μ flux peaked at around 2 GeV. In order to make oscillation parameter measurements with high precision, it is important to reconstruct neutrino energies with good resolution as the oscillation probability is a function of neutrino energy. This is not straightforward due to complicated event topologies and large uncertainties on the underlying interaction models. To address this, NOvA has developed a deep learning based CNN that is able to estimate ν_e energies non-parametrically. This approach not only gives superior energy resolutions to traditional kinematic-based estimations, but also shows better behavior under changes to the interaction model; thus enabling us to reduce systematic uncertainties on the final measurement. In this talk, I shall present a summary of the CNN approach and highlight its response to the underlying physical model.

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