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Sterile Neutrino Search via Neutral-Current Disappearance with Antineutrinos in NOvA

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Observations of neutrino oscillations from the majority of neutrino oscillation experiments are consistent with a three-flavor framework. However, the excess of events seen by LSND and MiniBooNE may be incompatible with this model and, to explain these data using neutrino mixing, require an additional, sterile, neutrino. These intriguing results are not conclusive and are in tension with findings from other short-baseline and long-baseline experiments.

The NOvA experiment, which uses two functionally identical liquid scintillator detectors over an 810 km baseline in the Fermilab NuMI beam, has the potential to set world-leading limits on the θ_{24} and θ_{34} parameters governing sterile neutrino oscillations by searching for a deficit of neutral current interactions compared to that predicted at the two detectors. The results of this analysis when applied to the full NOvA $12.3e20$ POT antineutrino dataset will be presented. Limits on the sterile neutrino mixing parameters, the first from a long-baseline analysis with antineutrinos, will be shown, and plans for future analyses, including a two-detector joint fit utilizing a covariance matrix to constrain systematics, will be discussed.

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