

# Constraining Cross Section and Beam Systematics for Future NOvA Sterile Neutrino Search

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With detectors at both Fermilab and Ash River, Minnesota, in the United States, NOvA was built to investigate the intricate properties of neutrinos, with a principal emphasis on active three-flavour neutrino mixing phenomena. Comprising two functionally identical detectors, with the Near Detector located 1 km below ground at Fermilab and the Far Detector, located 810 km away and 14 mrad off the beam axis in Northern Minnesota, NOvA capitalizes on the expansive distance to scrutinize neutrino behaviour.

NOvA not only probes active neutrino mixing but also explores exotic oscillations, including sterile neutrinos. Uncertainties on the neutrino flux, cross-section, and detector systematics significantly contribute, complicating the disentanglement of genuine physics events from background noise. In this poster, we show the impact of systematic reduction via neutral current samples and its implications on oscillation parameters, leveraging results primarily from Monte Carlo simulations. We aim to enhance the precision of neutrino research and illuminate pathways towards a deeper comprehension of particle physics phenomena.

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