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Sterile neutrino search in the NOvA Far Detector.

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The majority of neutrino oscillation experiments have obtained evidence for neutrino oscillations that are compatible with the three-flavor model. Explaining the apparent neutrino flavor change observed in short-baseline experiments such as LSND and MiniBooNE in terms of neutrino oscillations requires the existence of sterile neutrinos.

The search for sterile neutrino mixing conducted in NOvA is unique that it uses a long base-line of 810 km between Near Detector at Fermilab and Far Detector at Minnesota, with a well-defined neutrino beam peaked at an energy of 2 GeV. The tell-tale signal for sterile neutrino oscillations in NOvA is a deficit of neutral-current neutrino interaction at the Far Detector with respect to the Near Detector prediction. The neutral-current rate is insensitive to three-flavor oscillations, so such a deficit would indicate some of the beam muon neutrinos oscillated into non-interacting sterile neutrinos. I will present the first results of this search which demonstrate NOvA's ability to look for sterile neutrinos, and will discuss the improvements being readied for future analyses.

These improvements include a shape fit of the Far Detector energy spectrum, enabled by improved modeling of the detector response and of neutrino interactions, and a joint fit of the Far and Near detectors, extending the range of sterile mass-squared splittings NOvA can probe to larger values.

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