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## Sterile Neutrino searches with MINOS and MINOS+

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Three-flavour neutrino oscillations have proved very successful in describing the observed neutrino oscillation data. However, there are also some anomalies, including the excesses of appeared electron neutrino interactions in LSND and MiniBooNE, and a sterile neutrino state at a larger mass-splitting scale can provide an explanation for these results.

The MINOS/MINOS+ experiment was a long-baseline neutrino experiment in the US, collecting beam and atmospheric neutrino interactions from 2003 until 2016. MINOS was optimised for the study of muon neutrino disappearance in the NuMI beam at Fermilab. The continuation of the experiment with a medium energy beam configuration is called MINOS+. A sterile neutrino in MINOS/MINOS+ would appear as a perturbation on the three-flavour oscillations in both muon neutrino disappearance and electron neutrino appearance channels. A search for sterile neutrinos has been performed using charged-current and neutral-current interactions in two detectors separated by 734km. The inclusion of two years of MINOS+ data and an improved fit method provides a much increased sensitivity over the previous MINOS result that was combined with Daya Bay. The magnetised nature of the MINOS detectors has been used to perform a similar analysis using antineutrinos. Finally, a search for sterile-driven anomalous appearance of electron neutrinos has been performed with MINOS+.

### Experimental Collaboration

MINOS/MINOS+

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