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P3.022 Search for muon neutrino disappearance due to sterile neutrino oscillations with the MINOS/MINOS+ experiment

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Three-flavor neutrino oscillations have successfully explained a wide range of neutrino oscillation data. However, anomalous results, such as the electron antineutrino appearance excesses seen by LSND and MiniBooNE, can be explained by the addition of a sterile neutrino at a larger mass scale than the existing three neutrino mass states.

MINOS is a two-detector, long-baseline neutrino oscillation experiment optimized to measure muon neutrino disappearance in the NuMI neutrino beam. MINOS+ is the continuation of the MINOS experiment with the NuMI beam in a medium energy configuration. In the model with one sterile neutrino flavor added to the three active neutrino flavors, a sterile neutrino causing electron antineutrino appearance at LSND and MiniBooNE would also cause muon neutrino disappearance at MINOS. The sterile neutrino signature would be seen as modulations at high energy in the charged-current muon neutrino spectrum and a depletion of events in the neutral current spectrum. In this poster, new results from fitting neutral-current and charged-current energy spectra from MINOS and MINOS+ data to a neutrino oscillation model assuming one sterile neutrino are presented, along with a combination of these results with data from Daya Bay that allows a direct comparison to the excesses seen by LSND and MiniBooNE.