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First observation of NuMI anti-neutrinos by MINOS

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The MINOS long-baseline neutrino experiment has confirmed the disappearance of accelerator muon-neutrinos and measured the $|\Delta m^2_{23}|$ mass splitting with the best precision to date. The MINOS experiment is now set to measure the disappearance of muon anti-neutrinos and their oscillation parameters, which can be used to test CPT violation and other exotic models. The magnetic field of the detectors is utilized to separate muon neutrinos and anti-neutrinos event-by-event by identifying the charge sign of the muon created in charged current interactions. We report the first direct observation of muon anti-neutrinos in the MINOS far detector in the current muon-neutrino dominated beam and the constraint the data place on the $\sin^2\bar{\theta}_{23}$ and $|\Delta\bar{m}^2_{23}|$ parameters. We will also discuss the prospect of the measurement when the polarity of the magnetic focusing horns will be reversed this Fall to create a dedicated muon anti-neutrino beam.

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