Contribution ID: **133** Type: **not specified**

Search for electron neutrino appearance in the MINOS experiment

Monday 27 July 2009 15:40 (15 minutes)

MINOS is a long baseline neutrino oscillation experiment situated along Fermilab's high-intensity NuMI neutrino beam. The beam traverses two large iron-scintillator tracking calorimeters: the 0.98 kton near detector located 1 km from the production target and the 5.4 kton far detector sited 735 km downstream in the Soudan mine in northern Minnesota. By looking for an excess of candidate ν_e events at the far detector, MINOS has performed a preliminary search for subdominant $\nu_\mu \rightarrow \nu_e$ oscillations in the atmospheric regime. We present the analysis developed for this search and the $\sin^2 2\theta_{13}$ limits obtained. We also describe the upgrades and outlook for the full analysis, which uses 2.3$\times$ more data and is expected out next year. MINOS has the sensitivity to provide the first hint of a non-zero θ_{13} or to set a new upper limit, surpassing that from the CHOOZ reactor experiment.

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Session Classification: Neutrino Physics I

Track Classification: Neutrino Physics