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Probing Light Sterile Neutrino at ICAL-INO over a wide Δm^2_{41} range

The Iron CALorimeter (ICAL) detector at the India-based Neutrino Observatory(INO) is an upcoming atmospheric neutrino oscillation experiment. The ICAL is designed to measure muon energy and direction with fine resolutions and high detection efficiency. The detector will have a fiducial mass of 50 kt and be magnetized to distinguish between ν_μ and $\overline{\nu}_\mu$.

In this poster, we show the limits that the ICAL can put on the sterile neutrino mixing element $|U_{\mu 4}|^2$ over a broad range of $\Delta m^2_{41} \sim (10^{-5} - 10)$ eV^2.
We also quantify the importance of the spectral information and hadron energy calibration. The ICAL sensitivity is the largest in the range $\Delta m^2_{41} \sim (0.5 - 5) \times 10^{-3}$ eV^2, where matter effects in the Earth play an important role.
If sterile neutrinos exist, ICAL would be able to determine the sign of Δm^2_{41} with a high significance ($> 3\sigma$ with an exposure of 500 kt-yr) in the same range.

Authorship annotation

for the INO Collaboration

Session and Location

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Poster included in proceedings:

yes

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