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Search for sterile neutrinos with the T2K near detector

In the last decades, several anomalies in different neutrino experiments have been observed that could be explained assuming the existence of sterile neutrinos.

Sterile neutrinos are right handed particles ν_s , with a mass at the eV scale

that do not interact via the electroweak force but can mix with the Standard Model active neutrinos.

A first search for sterile neutrino oscillations at the T2K near detector

(ND280), located at 280-m from the target, through the ν_e disappearance channel ($\nu_e \rightarrow \nu_s$) is presented.

ν_e interactions at ND280 are selected exploiting the combined particle identification performances of a Time Projection Chamber and of a set of electromagnetic calorimeters.

A 3+1 sterile neutrino model that can lead to ν_e

disappearance has been tested. All the data collected up to summer 2013, corresponding to an exposure of 5.9×10^{20} protons on target (~10% of T2K final goal) have been analysed.

Exclusion regions are built as a function of the oscillation amplitude ($\sin^2 2\theta$) and the squared mass splitting between the new state and the SM neutrinos (Δm^2).

The region $\sin^2 2\theta > 0.2$ and Δm^2

$> 8 \text{ eV}^2$ is excluded at 95% CL.

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