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Search for Heavy Neutral Leptons with T2K Near Detector ND280

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Current work aims at the study of heavy neutral leptons, or heavy neutrinos (N), in the mass range $< 493\,\mathrm{MeV}/c^2$ [1]. These particles can be produced in charged pion and kaon decays in the T2K standard neutrino beam: $M^{\pm} \to l^{\pm}_{\alpha} N$, where $(M = \pi, K;\ \alpha = e, \mu)$. Then, heavy neutrinos can decay in ND280 via the following two- and three-body decay modes: $N \to l^{\pm}_{\alpha}\pi^{\mp}$, $N \to l^{+}_{\alpha} l^{-}_{\beta}\nu(\bar{\nu})$, where $(\alpha, \beta = e, \mu)$. In order to reduce background from neutrino interactions, we search for heavy neutrino decays in the volume of the Time Projection Chambers (TPCs). The heavy neutrino mass range considered in the current work is wider compared to the previous T2K analysis [2, 3] due to the inclusion of pion decays. Moreover, additional statistics, new Monte Carlo model and updated TPC reconstruction algorithm are used in current analysis. Preliminary constraints on mixing elements between heavy and active neutrinos will be presented.

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Primary author(s) : GORSHANOV, Konstantin (The Institute for Nuclear Research of the Russian Academy of Sciences)

Co-author(s) : IZMAYLOV, Alexander (The Institute for Nuclear Research of the Russian Academy of Sciences)

Presenter(s) : GORSHANOV, Konstantin (The Institute for Nuclear Research of the Russian Academy of Sciences)

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