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Search for heavy neutrinos using T2K near detector ND280

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The analysis presented in this work aims at the study of heavy neutrinos (N) with masses $< 493 \text{ MeV}/c^2$ produced in charged kaon and pion decays and subsequently decaying in the T2K off-axis near detector ND280. Two- and three-body decay modes are considered:

$$N \rightarrow l_{\alpha}^{\pm} \pi^{\mp}, \quad N \rightarrow l_{\alpha}^{\pm} l_{\beta}^{-} \nu(\bar{\nu}), \quad \text{where } (\alpha, \beta = e, \mu)$$

Time Projection Chambers (TPCs) volume is used to reduce background from neutrino interactions. The T2K data accumulated in years 2010 – 2018 will be used. First estimations of signal selection efficiency show improvement in comparison with previous results [1,2]. Improvement of current upper limits on mixing elements between heavy and active neutrinos is expected due to increased statistics, inclusion of pion decays and additional heavy neutrino three-body decay channels. In this talk, systematic uncertainties, background estimations and expected sensitivity towards mixing elements will be presented.

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1. Abe K., et al. “Search for heavy neutrinos with the T2K near detector ND280.” *Physical Review D* 100.5 (2019): 052006
2. Antel C., et. al. “Feebly Interacting Particles: FIPs 2022 workshop report”. arXiv.2305.01715, pp. 278-281

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