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New physics from oscillations: sensitivity for the DUNE near detector

We study the capabilities of the DUNE near detector to probe deviations from unitarity of the leptonic mixing matrix, the 3+1 sterile formalism and NSI in detection and production, clarifying the relation and possible mappings among the three formalisms. We add to the current analyses in the literature the use of the charged current events for the $\nu\tau$ appearance channel and the consideration of the energy spectral uncertainty (shape uncertainty) of the background. We find that this plays an important role on the results, and is usually overlooked in the literature. Even with this more conservative and realistic approach, we still obtain an improvement in the sensitivity with respect to the current bounds.

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