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Non-standard neutrino interaction search with IceCube DeepCore

Non-standard neutrino interactions (NSI) generically emerge in various types of new physics. By modifying the matter potential encountered by atmospheric neutrinos, NSI can lead to deviations from the expected dominant two-neutrino vacuum oscillations $\nu_\mu \rightarrow \nu_\tau$. Their signature can be probed by high-statistics neutrino experiments such as IceCube. We present NSI constraints based on 3 years of IceCube-DeepCore data and sensitivities for an improved 8-year event selection. Both samples make use of the few-GeV energy threshold of DeepCore and reach up to energies of 100 GeV or above. Apart from increased statistics, the new sample includes significant enhancements related to background rejection, event reconstruction, and the treatment of systematic uncertainties. The inclusion of neutrinos of all flavours allows us to not only consider flavour-violating and -nonuniversal NSI in the $\mu - \tau$ sector, but also search for NSI involving the electron flavour.

Mini-abstract

Current status of searches for non-standard neutrino interactions with IceCube DeepCore

Experiment/Collaboration

IceCube

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