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Impact of nonstandard interactions on sterile neutrino searches at IceCube

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We analyze the energy and zenith angle distributions of the latest 2-year IceCube dataset of upward going atmospheric neutrinos to constrain sterile neutrinos at the eV scale in the 3+1 scenario. We find that the parameters favored by a combination of LSND and MiniBooNE data are excluded at about the 99% C.L. We explore the impact of nonstandard matter interactions on this exclusion, and find that the exclusion holds for nonstandard interactions (NSI) that are within the stringent model-dependent bounds set by collider and neutrino scattering experiments. However, for large NSI parameters subject only to model-independent bounds from neutrino oscillation experiments, the LSND and MiniBooNE data are consistent with IceCube.

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