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TALK: New Constraints on Neutrino-Dark Matter Interactions

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We present a comprehensive analysis of nonstandard neutrino interactions with the dark sector in an effective field theory framework. We implement a full catalog of constraints on the parameter space of the neutrino-dark matter/mediator couplings and masses, including bounds coming from cosmology, astrophysics, as well as new laboratory constraints, such as from invisible Z decays and rare meson decays. We find that most of the benchmarks in the dark matter mass-coupling plane adopted in previous studies to get an observable effect are actually ruled out by a combination of these constraints. Finally, as an application of our results, we consider the case of galactic supernova neutrinos, identify new benchmark points for future observational prospects of the attenuation of the galactic supernova neutrino flux, compute the full set of cascade equations and sky maps for different dark matter density profiles in the Galaxy, and comment on their implications for the detection prospects in future large-volume neutrino experiments such as DUNE, Hyper-K and JUNO.

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