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Self-interacting neutrinos in light of recent CMB and LSS data

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We update constraints on a simple model of self-interacting neutrinos involving a heavy scalar mediator with universal flavor coupling. According to past literature, such a model is allowed by Cosmic Microwave Background (CMB) data, with some CMB and large-scale structure data even favoring a strongly-interacting neutrino ($SI\nu$) scenario over Λ CDM. In this work, we re-evaluate the constraints on this model in light of the new Planck NPIPE data, DESI BAO data, and the Effective Field Theory of Large Scale Structures (EFTofLSS) applied to BOSS data. We find that Planck NPIPE are more permissive to the $SI\nu$ scenario and that DESI data favor the $SI\nu$ over Λ CDM. However, when considering EFTofBOSS data, this mode is no longer preferred. Therefore, new DESI data analyzed under the EFTofLSS are particularly awaited to shed light on this disagreement.

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