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Constraining non-standard neutrino scenarios with Planck 2015

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Cosmological observations represent a powerful tool to constrain neutrino physics. In particular, observations of the temperature and polarization anisotropies of the cosmic microwave background (CMB) have the potential to constrain the properties of relic neutrinos, and possibly of additional light relic particles in the Universe. Even if all current cosmological data are well in agreement with the standard scenario of just three active neutrinos with negligible masses, interacting only through the weak force, and having an equilibrium spectrum with vanishing chemical potential, nevertheless deviations from this simple scenario are possible. For example, “hidden”(i.e. beyond the standard model of particle physics) neutrino interactions, mediated by a scalar particle like the Majoron, could exist and affect the evolution of cosmic relic neutrinos. Another possibility is that neutrinos do not have an equilibrium distribution, like e.g. in scenarios with a low reheating temperature. In my talk I will discuss constraints on these deviations from the standard scenario that can be obtained using the recently released data from the Planck satellite, possibly in combination with other astrophysical and cosmological probes.

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