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Shedding New Light on Sterile Neutrinos

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Theories with sterile neutrinos are well-motivated extensions to the Standard Model that can account for the observed dark matter abundance, the baryon asymmetry and neutrino masses. The recent astrophysical detection of a possible “smoking gun” signature of sterile neutrino dark matter decay gives further impetus to the study of sterile neutrino models. I give a comprehensive overview of the physical mechanisms responsible for dark matter production and the baryon asymmetry, showing that substantial tuning of model parameters is necessary for the minimal model to correctly account for either baryogenesis or dark matter. Motivated by this observation, I show how new forces and/or extended Higgs sectors can substantially enhance the production of the baryon asymmetry and dark matter, obviating the need for any tuning among model parameters, and providing new experimental probes of sterile neutrino cosmology.

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