

Novel Neutrino Self-interaction Can Save Sterile Neutrino Dark Matter

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Sterile neutrino, a gauge-singlet fermion with a small active neutrino mixture, is a simple and one of the oldest dark matter candidates. In its first incarnation, proposed by Dodelson and Widrow, sterile neutrino dark matter can be produced via neutrino oscillation in the early universe, which is a very elegant mechanism. However, it has been completely ruled out by astrophysical observations including X-ray line searches. The leading alternative that resorts to a large lepton asymmetry, suggested by Shi and Fuller, has also been excluded by the recent DES experiment. These place a tantalizing challenge to the sterile neutrino dark matter hypothesis. In this talk, I will show that novel self-interaction among the active neutrinos can come to the rescue, allowing sterile neutrino to make up all the dark matter in the universe while passing all existing limits. The resulting framework offers rich tests and opportunities for the upcoming experiments at various frontiers.

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