

New production mechanism for keV neutrino dark matter

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In previous work [2004.12904] we have shown that sterile neutrino dark matter can in principle be produced by thermal freeze-out if the Yukawa coupling is effectively dynamic in the early universe. This is realised (for example) within a Froggatt-Nielsen model, if the flavon vev is shifted during a phase transition, as the scalar potential relaxes to its true minimum in field space, thus implementing effectively dynamic Yukawa couplings during the phase transition. Here we formulate a class of models which simultaneously account for the light neutrino masses, the flavour hierarchy in the lepton sector and provide a viable Dark Matter neutrino with masses in the keV range or higher. The Dark Matter relic abundance is here not produced by oscillations or decays (which are tightly constrained mechanisms) but by thermal freeze-out, much like a typical WIMP.

Author: JARAMILLO, Carlos

Co-authors: LINDNER, Manfred (Max-Planck-Institut fuer Kernphysik, Heidelberg, Germany); RODEJOHANN, Werner (MPIK, Heidelberg)

Presenter: JARAMILLO, Carlos

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