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Sterile neutrino dark matter in a U(1) extension of the standard model

We explore the parameter space of a U(1) extension of the standard model — also called the super-weak model [1] — from the point of view of explaining the observed dark matter energy density in the Universe. The new particle spectrum contains a complex scalar singlet and three right-handed neutrinos, among which the lightest one is the dark matter candidate. We explore both freeze-in and freeze-out mechanisms of dark matter production. In both cases, we find regions in the plane of the super-weak coupling g_z versus the mass of the new gauge boson Z' that reproduce the measured dark matter densities. For freeze-out we need to exploit resonant annihilation of dark matter to standard model particles to evade strong constraints on the new gauge coupling. The parameter regions are distinct for the two scenarios and the one for freeze-out will be explored in searches for neutral gauge boson in the near future.

Talk based on:
S. Iwamoto, K. Seller and Z. Trócsányi, "Sterile neutrino dark matter in a U(1) extension of the standard model" [arXiv:2104.11248].

[1] Z. Trócsányi, "Super-weak force and neutrino masses,"Symmetry **12** (2020) 107 [arXiv:1812.11189].

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