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Freeze-in of light dark matter

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We investigate the production of keV sterile neutrino dark matter via the decay of a frozen-in complex scalar with a feeble Higgs portal coupling. Sterile neutrinos at the keV range is an attractive class of model because it can naturally explain Standard Model neutrino masses and can be cosmologically warm dark matter. This is the first time a complex scalar has been considered in this scenario, and the presence of a light pseudo-Nambu Goldstone boson component, caused by spontaneously breaking a U(1) global sterile neutrino number symmetry, leads to highly interesting behaviour. Moreover, this is a robust model that can be applied to generic light fermion dark matter candidates.

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