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Xenon-1T excess as a possible signal of a sub-GeV hidden sector dark matter

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We present a particle physics model to explain the observed enhancement in the Xenon-1T data at an electron recoil energy of 2.5 keV. The model is based on a $U(1)$ extension of the Standard Model where the dark sector consists of two essentially mass degenerate Dirac fermions in the sub-GeV region with a small mass splitting interacting with a dark photon. The dark photon is unstable and decays before the big bang nucleosynthesis, which leads to the dark matter constituted of two essentially mass degenerate Dirac fermions. The Xenon-1T excess is computed via the inelastic exothermic scattering of the heavier dark fermion from a bound electron in xenon to the lighter dark fermion producing the observed excess events in the recoil electron energy. The model can be tested with further data from Xenon-1T and in future experiments such as SuperCDMS.

In-person participation

Yes

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