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A sub-GeV dark matter model

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An extension of the Standard Model gauge symmetry by the gauge group $U(1)_{T3R}$ is proposed in order to understand the Yukawa coupling hierarchy in the SM. Only the right-handed fermions of the first two generations are charged under the $U(1)_{T3R}$. In addition to the new dark gauge boson, a dark scalar particle acquires a vacuum expectation value (vev) which breaks the $U(1)_{T3R}$ symmetry down to Z_2 symmetry and also explains the hierarchy problem. A vev of $calO$(GeV) is required to explain the mass parameters of the light flavor sector naturally. The dark matter (DM) particle naturally has mass in the $calO(1 - 100)$ MeV range. We discuss the various prospects of the direct detection of the dark matter. The dark matter satisfies the correct thermal relic abundance.

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