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Scalar dark matter interacting through an extra $U(1)$ gauge interaction

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We propose models of a thermal relic DM with the present annihilation cross-section being very suppressed. This property can be realized in an extra $U(1)$ gauge interacting complex scalar DM. We consider scalar dark matter in $U(1)_{B-L}$, $U(1)_{(B-L)^3}$ and $U(1)_{L\mu-L\tau}$ extended models and identify viable parameter regions. We also discuss various implication to future DM detection experiments, the DM interpretation of the gamma ray excess in the globular cluster 47 Tucanae, the muon anomalous magnetic moment, the Hubble Tension and others.

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