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Probing mild-tempered neutralino dark matter through top-squark production at the LHC

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In Supersymmetry, the lightest neutralino turns out to be a promising WIMP dark matter(DM) candidate. In the Minimal Supersymmetric Standard Model(MSSM), a pure neutralino state can be a thermal DM if it has mass

$\mathcal{O}(1)$ TeV. So a WIMP dark matter(DM) of mass

$\mathcal{O}(100)$ GeV or less should be a “tempered neutralino”. Taking into account current constraints from direct detection(DD) experiments, it turns out that this DM should mostly be a bino-dominated “mild-tempered” neutralino, where a small Higgsino component is necessary to achieve the observed relic density. This DM candidate can be produced indirectly through heavier Higgsino-like electroweakino states, which, in turn, can appear from the decay of top-squark. Keeping that in mind, we shall discuss how in a DM motivated MSSM scenario at the LHC, a common robust feature is the presence of the Standard Model(SM) Higgs boson, along with $t\bar{t}$ and the indispensable E_T . We shall also present how this “mild-tempered” neutralino DM can be probed at the LHC through a Higgs-mediated channel at the center of mass energy $\sqrt{s} = 13$ TeV and integrated luminosity options

$\mathcal{L} = 300 \text{ fb}^{-1}$ and 3000 fb^{-1} .

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