Title:	Pseudo-Dirac Higgsino dark matter in GUT scale supersymmetry
Authors:	Mummidi, V.S. (/jspui/browse?type=author&value=Mummidi%2C+V.S.) Patel, K.M. (/jspui/browse?type=author&value=Patel%2C+K.M.)
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Abstract:	We investigate a scenario in which supersymmetry is broken at a scale MS ≥ 1014 GeV leaving only a pair of Higgs doublets, their superpartners (Higgsinos) and a gauge singlet fermion (singlino) besides the standard model fermions and gauge bosons at low energy. The Higgsino-singlino mixing induces a small splitting between the masses of the electrically neutral components of Higgsinos which otherwise remain almost degenerate in GUT scale supersymmetry. The lightest combination of them provides a viable thermal dark matter if the Higgsino mass scale is close to 1 TeV. The small mass splitting induced by the singlino turns the neutral components of Higgsinos into pseudo-Dirac fermions which successfully evade the constraints from the direct detection experiments if the singlino mass is $\lesssim$ 108 GeV. We analyse the constraints on the effective framework, arising from the stability of electroweak vacuum, observed mass and couplings of the Higgs, and the limits on the masses of the other scalars, by matching it with the next-to-minimal supersymmetric standard model at MS. It is found that the presence of singlino at an intermediate scale significantly improves the stability of electroweak vacuum and allows a stable or metastable vacuum for almost all the values of tan β while the observed Higgs mass together with the limit on the charged Higgs mass favours tan $\beta \lesssim 3$.
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