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Low-mass dark matter in the complex NMSSM

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The Higgs sector of the Next-to-Minimal Supersymmetric Standard Model can accommodate explicit CP-violating phases at the tree level, unlike the minimal scenario. In particular, the phase of the parameter that governs the singlet-singlino mass is relevant for the phenomenology of the dark matter in the model also, when R-parity is conserved. A small magnitude of this parameter can yield a fairly light, $O(1)$ GeV, singlino-dominated neutralino dark matter, which still satisfies the observed relic abundance of the Universe. We performed a detailed investigation of the impact of the CP-violating phase on the properties of such a dark matter, in parameter space regions of the model that are consistent with a variety of current experimental data.

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