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Light singlino DM of the natural NMSSM

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Inspired by the fact that relatively small values of the effective higgsino mass parameter of the Z_3 -symmetric Next-to-Minimal Supersymmetric Standard Model (NMSSM) could render the scenario ‘natural’, we explore the plausibility of having relatively light neutralinos and charginos (the electroweakinos or the ewinos) in such a scenario with a rather light singlino-like Lightest Supersymmetric Particle (LSP), which is a Dark Matter (DM) candidate, and singlet-dominated scalar excitations. By first confirming the indications in the existing literature that finding simultaneous compliance with results from the Large Hadron Collider (LHC) and those from various DM experiments with such light states is, in general, a difficult ask, we proceed to demonstrate, with the help of a few representative benchmark points, how exactly and to what extent could such a highly motivated ‘natural’ setup with a singlino-like DM candidate still remains plausible.

Authors: Dr CHATTERJEE, Arindam (Department of Physics, Shiv Nadar University, Gautam Buddha Nagar 201314, India); Dr ABDALLAH, Waleed (Faculty of Science, Cairo University, Giza 12613, Egypt); Prof. DATTA, AseshKrishna (Harish-Chandra Research Institute, HBNI, Allahabad 211019, India)

Presenter: Dr ABDALLAH, Waleed (Faculty of Science, Cairo University, Giza 12613, Egypt)

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