

Peer Review

Review of: "Attractive Features of Higgsino Dark Matter in the Next-to-Minimal Supersymmetric Standard Model"

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The article is devoted to testing a special supersymmetric extension of the Standard Model intended to explain dark matter.

Namely, the authors consider the NMSSM, where the minimal supersymmetric extension is accompanied by a singlino supermultiplet. In principle, this type of research is well known, but new experimental results constantly force us to test all known models more and more. The absence of supersymmetry signals at the LHC forces us to increase the mass scale of the SM extension. Experiments with astroparticles set stronger and stronger constraints on the interaction of dark matter with SM particles. At the same time, the scenario of freezing production of the relic density of dark matter requires a weak scale of interaction between dark matter and SM.

The current article confirms that, according to the known experimental results, the NMSSM with a Higgsino-like DM is an allowed model of dark matter and satisfies all known experimental constraints. The article is written quite well. The methods of study correspond to the modern level. The description of the allowed region of parameters is accompanied by several benchmark points that allow readers to check the obtained results and apply new tests.

At the same time, I should point out two weak sides of the study. The authors do not take into account loop corrections to the masses of the particles of the Dark Sector and the extended Higgs sector. Taking such a correction into account may change the results of the article. I should also note that the authors use the results of the LZ-2022 experiment of Direct Detection, while there are new results from the LZ experiment obtained in 2024, which set a significantly stronger limit on the DM-SM interaction.

Declarations

Potential competing interests: No potential competing interests to declare.