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Multi-scalar signature of self-interacting dark matter in the NMSSM and beyond

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As the standard model of the Big Bang cosmology, the Λ CDM model can account for most observations of the Universe, especially on the large scale structure of the Universe. However, the predictions on small scale structures exist some anomalies: missing satellites, cusp vs core, too big to fail. The issues can be resolved if the DM has strong self-interactions with light mediator (~ 1 MeV) where the cross section is constrained. The self-interacting DM with scalar mediator can be naturally realized in the NMSSM. In this work, we focus on the SIDM scenario in the general NMSSM, and discuss the possible LHC signatures of the SIDM in the NMSSM basing on our selected benchmark points.

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