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Exploring Supersymmetry Parameter Space for heavy neutralino as Dark Matter: A Comparative Study between MSSM and NMSSM.

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In this work, we compare two SUSY extensions of the Standard Model, the MSSM and the NMSSM. Through numerical simulations, as well as utilizing MicrOMEGA's we perform a parameter space scan for each model, aiming to obtain a heavy first neutralino $M_{\chi_1^0} \in [1, 10]$ TeV to be the LSP as well as the values for its Photon Flux and Relic Density. Our research aims to provide possible values for the free Parameters in these supersymmetric models, resulting in two viable candidates for Dark Matter containing a consistent Higgs Sector with the observations of the Higgs Boson mass $M_h \sim 125$ GeV done by ATLAS and CMS (2012), and heavy enough to be detected by the HAWC Gamma Ray Observatory.

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