

## Exploring Non-Holomorphic Soft Terms in the Framework of Gauge Mediated Supersymmetry Breaking

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It is known that in the absence of a gauge singlet field, a specific class of supersymmetry (SUSY) breaking non-holomorphic (NH) terms can be soft breaking in nature so that they may be considered along with the Minimal Supersymmetric Standard Model (MSSM) and beyond. There have been studies related to these terms in minimal supergravity based models. Consideration of an F-type SUSY breaking scenario in the hidden sector with two chiral superfields however showed Planck scale suppression of such terms. In an unbiased point of view for the sources of SUSY breaking, the NH terms in a phenomenological MSSM (pMSSM) type of analysis showed a possibility of a large SUSY contribution to  $\mu$ on  $g-2$ , a reasonable amount of corrections to the Higgs boson mass and a drastic reduction of the electroweak fine-tuning for a higgsino dominated neutralino in some regions of parameter space. We investigate here the effects of the NH terms in a low scale SUSY breaking scenario. In our analysis with minimal gauge mediated supersymmetry breaking (mGMSB) we probe how far the results can be compared with the previous pMSSM plus NH terms based study. We particularly analyze the Higgs, stop and the electroweakino sectors focusing on a higgsino dominated neutralino and chargino, a feature typically different from what appears in mGMSB. The effect of a limited degree of RG evolutions and vanishing of the trilinear coupling terms at the messenger scale can be overcome by choosing a non-minimal GMSB scenario, such as one with a matter-messenger interaction.

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