

Sbottoms as probes to MSSM with Nonholomorphic Soft Interactions

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Presence of nonholomorphic soft SUSY breaking terms is known to be a possibility in the popular setup of the Minimal Supersymmetric Standard Model (MSSM). It has been shown that such a scenario known as NonHolomorphic Supersymmetric Standard Model (NHSSM) could remain 'natural' (i.e., not fine-tuned) even in the presence of a rather heavy higgsino-like LSP. However, it turns out that distinguishing such a scenario from the MSSM is unlikely to be an easy task, in particular at the Large Hadron Collider (LHC). In a first study of such a scenario at colliders (LHC), we explore a possible way that focuses on the sbottom phenomenology. This exploits the usual $\tan \beta$ -dependence (enhancement) of the bottom Yukawa coupling but reinforced/altered in the presence of non-vanishing nonholomorphic soft trilinear parameter A' for sbottom sector. For a given set of masses of the sbottom(s) and the light electroweakinos (LSP, lighter chargino etc.) which are known from experiments, the difference between the two scenarios could manifest itself via event rate in the $2b$ -jets + MET final state, which could be characteristically different from its MSSM expectation. Impact on the phenomenology of the stops at the LHC is also touched upon.

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