

The Higgs mass, the SUSY breaking scale and String Theory

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We consider a scheme in which SUSY is broken at a large scale M_{SS} well above the electroweak scale M_{EW} , such that it does not provide a solution to the hierarchy problem but rather stabilizes the SM vacuum. Under standard unification assumptions, we compute the Higgs mass as a function of the SUSY breaking scale, obtaining for $M_{SS} \geq 10^{10}$ GeV a very constrained result: $m_H = 126 \pm 3$ GeV, consistent with CMS and ATLAS results. This large scale for M_{SS} can be motivated by the recent BICEP2 results. We explore the possible value of M_{SS} consistent with gauge coupling unification and closed string fluxes as the main source of SUSY breaking, in the context of SU(5) F-theory GUT's. These two requirements fix M_{SS} at an intermediate scale around 10^{10} GeV. We also study how the fine-tuning of a light SM Higgs constrains the structure of soft SUSY breaking terms.

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