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Electroweak symmetry breaking by a neutral sector: Dynamical relaxation of the little hierarchy problem

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We propose a new dynamical relaxation mechanism for the little hierarchy problem, based on a singlet extension of the minimal supersymmetric standard model (MSSM).

In this scenario, a small soft mass parameter of an MSSM singlet is responsible for the electroweak symmetry breaking and the non-zero Higgs vacuum expectation value, whereas the effect of a large soft mass parameter of the Higgs boson, $m_{h_u}^2$ is dynamically compensated by a flat direction of MSSM singlets.

The small singlet's soft mass and the Z boson mass can be protected, even if the stop mass is heavier than 10 or 20 TeV, since the gravity-mediated supersymmetry breaking effects and the relevant Yukawa couplings are relatively small.

A “focus point” of the singlet's soft mass parameter can emerge around the stop mass scale, and so various fine-tuning measures can reduce well below 100.

Due to the relatively large gauge-mediated effects, the MSSM superpartners are much heavier than the experimental bounds, and the unwanted flavor changing processes are adequately suppressed.

Parallel Session

Electroweak, Top and Higgs Physics

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