

Rethinking Quantum Field Theory



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**Rethinking
Quantum Field Theory**

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A stable vacuum: why we found no SUSY

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The discovery of the Higgs boson puts a severe constraint on the available parameter space in any SUSY model. In the MSSM, a 125 GeV Higgs together with relatively light stops needs a very large stop mixing, therefore large trilinear terms in the scalar potential. Those are known to destabilize the electroweak ground state and induce a true vacuum in association with squark vevs. Previous analyses of vacuum stability in the MSSM usually follow rather arbitrary constraints in the field space configuration. Relaxing the bounds on field alignment, we find distinct excluded regions and constrain the allowed parameters even further by imposing the correct light Higgs mass. As result, generically squark masses in the multi TeV regime are needed to avoid an unstable vacuum - a result which agrees with the observation of no hints of SUSY so far.

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