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Singlet Scalar Top Partners from Accidental Supersymmetry

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We present a model wherein the Higgs mass is protected from the quadratic one-loop top quark corrections by scalar particles that are complete singlets under the Standard Model (SM) gauge group. While bearing some similarity to Folded Supersymmetry, the construction is purely four dimensional and enjoys more parametric freedom, allowing electroweak symmetry breaking to occur easily. The cancelation of the top loop quadratic divergence is ensured by a Z_3 symmetry that relates the SM top sector and two hidden top sectors, each charged under its own hidden color group. In addition to the singlet scalars, the hidden sectors contain electroweak-charged supermultiplets below the TeV scale, which provide the main access to this model at colliders. The phenomenology presents both differences and similarities with respect to other realizations of neutral naturalness. Generally, the glueballs of hidden color have longer decay lengths. The production of hidden sector particles results in quirk or squirk bound states, which later annihilate. We survey the possible signatures and corresponding experimental constraints.

Summary

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