

Phenomenology of theories with colorless top quark partners

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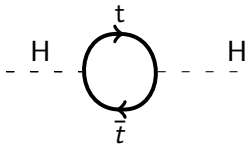
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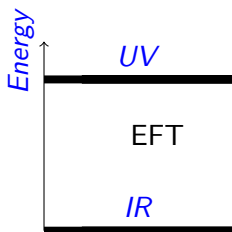
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Hierarchy Problem

- $m_H = 125\text{ GeV} \rightarrow \lambda \simeq 0.13$
- m_H is not protected by a symmetry
- Radiative corrections to Higgs boson mass are quadratic on Λ_{top}



- Fine Tuning
- New physics in TeV scale



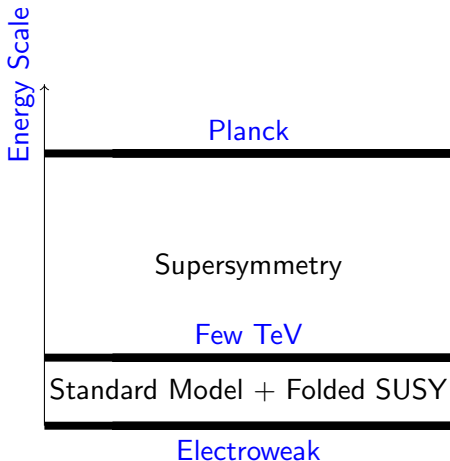
Colorless top partners

- New color group
- Folded Supersymmetry
- Twin Higgs
- Little Higgs

[Burdman, Chacko, Harnik, de Lima, Verhaaren] {arxiv:1411.3310}

Folded Supersymmetry

[Burdman, Chacko, Goh, Harnik]{arxiv:0609152}



Toy Model

- F-particles
- $SU(3)_A \times SU(3)_B \times Z_2$

$$T_A = \begin{pmatrix} \tilde{t} \\ t \end{pmatrix}, \quad T_B = \begin{pmatrix} \tilde{t}' \\ t' \end{pmatrix} \quad (0.1)$$

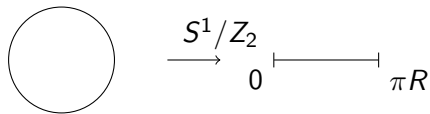
- Superpotential

$$W = \lambda S \bar{Q}_i Q_i \quad (0.2)$$

- Z_2 Symmetry

$$S \rightarrow \Gamma S = S \quad Q_i \rightarrow \Gamma Q_i = -Q_i \quad \bar{Q}_i \rightarrow \Gamma^* \bar{Q}_i = Q_i \quad (0.3)$$

Scherk-Schwarz boundaries conditions



Orbifolding

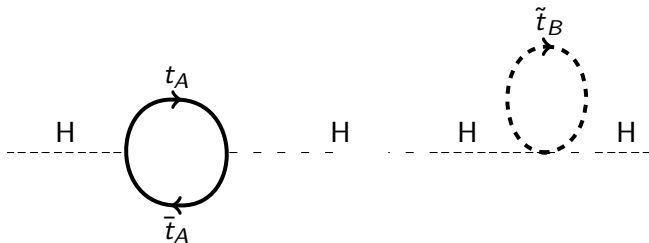
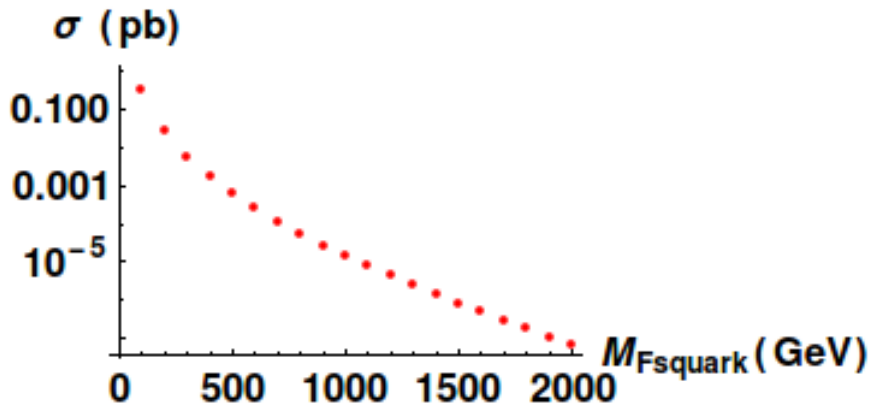


Figure: One loop diagrams corresponding to m_H^2 radiative corrections.

Cross Section at 13 TeV

$p p \rightarrow (\gamma \text{ or } Z) \rightarrow f \bar{q} f q .$



Signals in LHC

- Photons
- Z bosons
- Glueballs

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