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A-terms at tree level and composite sectors

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In the MSSM, a Higgs mass of 126[GeV] requires either heavy stops, leading to a little hierarchy problem, or maximal mixing. The latter alternative requieres models that generate sizable A-terms.

On the other hand, a mechanism for SUSY breaking is required in the MSSM. Gauge mediation is one of the most popular mechanisms, since it is both very general and it does not introduce flavor problems. However, gauge mediation only generates small A-terms through two loop diagrams.

One of the simplest ways to solve this problem is to generate A-terms by directly coupling messengers with the MSSM fields in the superpotential. These models suffer from the little A/mh problem, namely, if an A-term is generated in this way, a similar contribution is induced for the soft mass of the Higgs field, leading to large tuning.

In this work we present a bound that quantifies the tree level A/mh problem in the most general case. The results indicate that the problem is alleviated by considering large superpotential Yukawa couplings. These couplings lead to Landau poles at a low energy scale, which we explain in terms of a composite, Fat Higgs like theory. The resulting model alleviates the tuning problems of similar models, does not introduce large flavor violation, and shares some of the nice features of Fat Higgs models, including a natural explanation for the large size of the top yukawa coupling.

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