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Sizable D-term contribution as a signature of $E_6 \times SU(2)_F \times U(1)_A$ SUSY GUT model

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Content :

We show that the sizable D-term contributions to sfermion mass spectrum can be signatures of certain GUT, $E_6\times SU(2)_F\times U(1)_A$ GUT. Note that these D-term contributions deviate the degenerate sfermion masses among different generations in this model. This is different from the previous works which have argued the D-term contributions, which deviate masses only between sfermions with different quantum charges, as a signature of GUT with larger rank unification group. Such D-terms are strongly constrained by the FCNC processes if the SUSY breaking scale is the weak scale. However, in $E_6\times SU(2)_F\times U(1)_A$, natural SUSY type sfermion mass spectrum is obtained, and if the masses of ${\bf 10}_3$ sfermions are larger than $O(1{\rm TeV})$ to realize 126 GeV Higgs and the other sfermion masses are $O(10{\rm TeV})$, then sizable D-term contribution is allowed. If the deviations by these D-terms can be observed in future experiments like 100 TeV proton collider or muon collider, we may confirm the $E_6\times SU(2)_F\times U(1)_A$ GUT. And we produce some predictions for FCNC phenomena. This talk is based on arXiv:1405.4193 [hep-ph].

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