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Higgs Phenomenology of the Supersymmetric Grand Unification with the Hosotani Mechanism

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The supersymmetric SU(5) grand unified theory whose gauge symmetry is broken by virtue of the Hosotani mechanism naturally realizes the huge mass splitting between the colored Higgs triplet and the electroweak Higgs doublet superfields, and predicts the existence of adjoint chiral multiplets with masses of the order of the supersymmetry breaking scale as a byproduct. The low-energy Higgs sector is extended to contain an SU(2)_L triplet chiral superfield with hypercharge zero and a neutral singlet as well as the ordinary electroweak Higgs doublets. We investigate the effects from the new triplet and singlet chiral multiplets on the predictions of the couplings of the standard model-like Higgs boson and the masses of the additional Higgs bosons. We show that our model can be differentiated from others through precision measurements of the couplings and masses of the Higgs sector particles. Our model serves as a good example of grand unification testable at colliders such as the luminosity up-graded Large Hadron Collider and future electron-positron colliders.

Summary

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