

Light Exotic Higgs Bosons in the Supersymmetric Georgi-Machacek Model

Thursday 23 May 2019 15:20 (15 minutes)

We show that the well known Georgi-Machacek (GM) model can be realized as a limit of the recently constructed Supersymmetric Custodial Higgs Triplet Model (SCTM) which in general contains a significantly more complex scalar spectrum. We dub this limit as the Supersymmetric GM (SGM) model, which gives a weakly coupled origin for the GM model at the electroweak scale. We derive a mapping between the SGM and GM models using it to show how a supersymmetric origin implies constraints on the Higgs potential in conventional GM model constructions which would generically not be present. We point it out under what circumstance, the SGM can mimic the GM model, and when they can be distinguished. Then we perform the phenomenological study of the collider searches, such as the di-Boson signals (diphoton, WW, ZZ) and the global collider constraints. We also consider the possibility of the Lightest Supersymmetric Particles (LSP) in the SGM model as a Dark Matter candidate and explore the relic density and direct detection constraints.

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Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Track Classification: Supersymmetry: Models, Phenomenology and Experimental Results