

Phenomenology 2020 Symposium



Contribution ID: 1037

Type: Parallel Talk

Mirror color symmetry breaking in Twin Higgs models

Monday 4 May 2020 14:45 (15 minutes)

We investigate extensions of the Twin Higgs model in which the twin color gauge symmetry and the Z_2 mirror symmetry are spontaneously broken, by introducing a single new colored triplet, sextet, or octet scalar field and its twin along with a suitable scalar potential. This spontaneous Z_2 breaking allows for a viable electroweak vacuum, and leads to dramatic differences between the visible and mirror sectors in terms of the low energy residual gauge symmetries, color confinement scales, and particle spectra. Several of our models feature a remnant $SU(2)$ or $SO(3)$ twin color gauge symmetry with a very low confinement scale in comparison to QCD. Couplings between the colored scalar and matter provide a new dynamical source of twin fermion masses, and lead to a variety of correlated visible sector effects that can be probed through precision measurements and collider searches.

Summary

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Session Classification: BSM I

Track Classification: BSM