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Gauged Two Higgs Doublet Model and The LHC 750 GeV Diphoton Anomaly

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A novel model embedding the two Higgs doublets in the popular two Higgs doublet models into a doublet of a non-abelian gauge group $SU(2)_H$ is presented.

The Standard Model $SU(2)_L$ right-handed fermion singlets are paired up with new heavy fermions to form $SU(2)_H$ doublets,

while $SU(2)_L$ left-handed fermion doublets are singlets under $SU(2)_H$.

Two of distinctive features of this anomaly-free model are:

(1) Electroweak symmetry breaking is induced from spontaneous symmetry breaking of $SU(2)_H$ via its triplet vacuum expectation value;

(2) One of the Higgs doublet can be inert, with its neutral component being a dark matter candidate as protected by the $SU(2)_H$ gauge symmetry and Lorentz invariance instead of an ad hoc Z_2 symmetry.

I will discuss the model implications on collider constraints, Higgs physics, bounds from the electroweak precision data and dark matter relic density.

In addition, this model can account for the LHC 750 GeV diphoton anomaly as well as the muon $g-2$ with the help of the heavy fermions and an $SU(2)_H$ scalar doublet.

Summary

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