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Higgs Phenomenology of UV Complete Model with Vector-like Leptons

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The vector-like leptons provide an anomaly free minimal extension of the standard model. Such a model provides a good handle on the Higgs to diphoton decay rate as well as a good dark matter candidate. Due to the yukawa couplings of the new leptons, the Higgs quartic coupling runs negative at the scale of a few TeVs. The presence of the super-partners of the new leptons below the TeV scale can alleviate this problem.
In this talk, we discuss the phenomenology of the supersymmetric extension of vector-like lepton model. A full 16+\bar{16} of SO(10)is introduced to preserve the gauge unification, where colored particles have masses above the TeV scale. The perturbativity of the yukawa couplings at the GUT scale is demanded. Presence of the new light scalars may result in charge breaking vacua deeper than the electroweak vacuum. The interesting implications on the Higgs mass and the diphoton decay width, due to the constraints from the absolute stability and the metastability of the electroweak vacuum as well as the direct searches for the new charged particles, are presented.

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