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Extended Higgs Sector @ LHC

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We investigate the scalar sector in an extension of the Minimal Supersymmetric Standard Model (MSSM) containing a $SU(2)$ Higgs triplet of zero hypercharge and a gauge singlet. In particular, we focus on a scenario of this model which allows a light pseudoscalar, lighter than the discovered Higgs boson, consistent with the most recent data from the LHC and the earlier data from the LEP experiments. Such an extra hidden Higgs boson, if exist, will then decays into lighter fermion pairs. Apart from the neutral Higgs bosons, we investigate in great detail the charged Higgs bosons of this model. Specifically, we search for their new decay modes in order to distinguish between Higgs fields belonging to $SU(2)$ doublet and triplet representations and also to show the existence of a light pseudoscalar which belong to the singlet representation. Finally we consider a classical scale/conformal invariant extension of the Standard Model and we investigate the production and decay of the dilaton. The breaking scale of the scale/conformal symmetry is constrained with the bounds derived from Higgs boson searches at the LHC.

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