

The neutral scalars to Dark matter under the LHC

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The 2HDM+S is the singlet extension of 2HDM, which can accommodate more physics potential beyond the SM. We summarize the type II 2HDM+S model with various Higgs potential structures, and discuss several scenarios with different mass hierarchy. In this study, we concentrate on the mass eigenstate of the 2HDM+S, and test the parameter space of Higgs mixing angles and masses against the experimental constraints, including 125 GeV Higgs measurements, BSM Higgs direct searches, STU and B -physics observables. In particular, we study the exotic channels of $h_{125} \rightarrow A_S A_S$ and $h_{125} \rightarrow h_S h_S$ decays for the light singlet-like Higgs scenarios $m_{h_S/A_S} < 62.5$ GeV, and determine the limit of Higgs mixing angles. Furthermore, we study the phenomenological distinction between 2HDM+S and 2HDM, and explore the indirect impact of the singlet admixture on the parameter space of $\cos(\beta - \alpha_1)$, $\tan \beta$ and m_A .

Collaboration (if any)

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