

Axion-Higgs interplay in the two Higgs-doublet model

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We study the Dine-Fischler-Srednicki (DFS) model in the light of the recent Higgs LHC results and electroweak precision data. The DFS model is a natural extension of the two-Higgs doublet model endowed with a Peccei-Quinn symmetry and leading to a physically acceptable axion. For generic couplings, the model reproduces the minimal Standard Model showing only tiny deviations (extreme decoupling scenario) whereas all additional degrees of freedom (with the exception of the axion) are very heavy. Recently, new corners of this model have been highlighted where it may exhibit enlarged global symmetries making the corresponding models technically natural (naturalness scenario). In some cases an additional Higgs could be present at the weak scale. In this case, the new light 0^+ state would be accompanied by relatively light charged and neutral pseudoscalar Higgses. We will use the oblique corrections, particularly $\Delta\rho$, to constrain the mass spectrum in this case. As a final result, we also work out the non-linear parametrization of the DFS model in the generic case where all scalars except the lightest Higgs and the axion have masses at or beyond the TeV scale

Primary author: ESPRIU CLIMENT, Domenec (University of Barcelona (ES))

Presenter: ESPRIU CLIMENT, Domenec (University of Barcelona (ES))

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