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Classifying Continuous Symmetries in n-HDM

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Content :

In this talk, I will discuss the construction of the multi-Higgs Doublet Model (n-HDM) based on the Maximal symmetry $Sp(2n)/Z_2$. The maximal symmetry n-HDM provides the natural SM alignment limit which is a phenomenologically rich framework with a special feature of unification of all quartic couplings. The list of most possible accidental symmetries as subgroups of symplectic group $Sp(2n)/Z_2$ realizable with n-HDM will be presented. We also introduce the prime invariant and irreducible representation in bilinear field space to set up the scalar sector of n-HDMs potential. In particular, will showcase this framework for the Two Higgs Doublet Model (2HDM) and Three Higgs Doublet Model (3HDM) and present the list of all possible symmetries including the parameter spaces allowed by these symmetries in 2HDM and 3HDM.

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