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Natural Standard Model Alignment in the Two Higgs Doublet Model

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In order to satisfy the current LHC Higgs data, which require the couplings of the observed 125 GeV Higgs boson to be close to the Standard Model (SM) expectations, any extended Higgs sector must lead to the so-called SM 'alignment limit'. In the context of the Two Higgs Doublet Model (2HDM), this alignment is often associated with either decoupling of the heavy Higgs sector or accidental cancellations in the 2HDM potential. In this talk, we present a symmetry justification for 'natural' alignment without decoupling or fine-tuning. We show that there exist only three different symmetry realizations which could lead to a natural alignment. We discuss some phenomenological implications of the Maximally-Symmetric 2HDM and propose new collider signals for the heavy Higgs sector, which could be searched for during the Run-II phase of the LHC.

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