

Democratic three Higgs-doublet models: the custodial limit and wrong-sign Yukawa

Thursday 10 July 2025 17:45 (15 minutes)

We study two novel aspects of democratic 3HDMs – the custodial limit and the possibility of wrong-sign Yukawa couplings. In the custodial limit, the democratic 3HDMs can easily negotiate the constraints from the electroweak T-parameter. We also uncover the possibility of having wrong-sign Yukawa couplings in democratic 3HDMs, as in the case of 2HDMs. We show that a democratic 3HDM encompasses all the wrong-sign possibilities entertained by 2HDMs, and has considerably more leeway in the wrong-sign limit as compared to the 2HDM case. Our study underscores the importance of reporting analysis in the kappa-formalism without any implicit assumptions on the signs of the kappas.

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Session Classification: Parallel 4