

Title: Metastability bounds on the two Higgs doublet model

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Abstract: In the two Higgs doublet model, there is the possibility that the vacuum where the universe resides in is metastable. We present the tree-level bounds on the scalar potential parameters which have to be obeyed to prevent that situation. Analytical expressions for those bounds are shown for the most used potential, that with a softly broken $Z(2)$ symmetry. The impact of those bounds on the model's phenomenology is discussed in detail, as well as the importance of the current LHC results in determining whether the vacuum we live in is or is not stable. We demonstrate how the vacuum stability bounds can be obtained for the most generic CP-conserving potential, and provide a simple method to implement them.

Author Keywords: Spontaneous Symmetry Breaking; Scattering Amplitudes

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