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Perturbative analysis of the electron electric dipole moment and CP violation in two-Higgs-doublet models

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I consider a general two-Higgs-doublet model with CP violation. I give a perturbative expansion for the mass eigenstates in terms of the small CP-violating phase. I use these analytical expressions to show that $O(0.01)$ CP violation is allowed by the experimental bounds on the electron electric dipole moment in some regions of the parameter space. These regions also include parameters that are expected to give a strongly first-order electroweak phase transition required for electroweak baryogenesis. I also comment on how to incorporate the CP violation into the searches for a strongly first-order electroweak phase transition which could explain the matter/antimatter asymmetry in the Universe.

Summary

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