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$b \to s\gamma$, electron EDM, and electroweak baryogenesis: a study in 2HDM

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Baryon asymmetry of the Universe (BAU) provides unambiguous evidence for need of New Physics (NP). In this context, a general two Higgs doublet model (g2HDM) without Z_2 symmetry is appealing because it can solve BAU via electroweak baryogenesis (EWBG), while the scenario can be tested in direct searches as well as in low energy precision measurements of flavor observables. We discuss electric dipole moment (EDM) of electron and $b \to s\gamma$ as probes of EWBG scenarios. The consistency with the current electron EDM bound demands cancellation between different NP contributions, hinting at NP extra Yukawa couplings that have hierarchical structure similar to the Standard Model. We point out that $b \to s\gamma$ provides an independent crucial bound on EWBG, as the corresponding NP effects are chirally enhanced. In particular, we show that projected improvements in measurements of $b \to s\gamma$ CP asymmetries at Belle II, in conjunction with electron EDM, will provide key probe of parameter space of the extra top and bottom Yukawa couplings.

Collaboration / Activity

N/A

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