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Impact of a CP Violating Higgs Boson

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We observe a generic connection between LHC Higgs data and electroweak baryogenesis: the particle that contributes to CP violating hgg or $h\gamma\gamma$ vertex would provide a CP violating source during first order phase transition. It is illustrated in the 2HDM that a common CP violating phase controls the lightest Higgs properties at the LHC, electric dipole moments and the CP violating source for electroweak baryogenesis. We perform a general parametrization of Higgs effective couplings and a global fit to the LHC Higgs data. Current LHC measurements prefer a nonzero CP violating phase for $\tan\beta$
$lesssim1$ and EDM constraints still allow an order one phase for $\tan\beta \sim 1$, which gives sufficient room for generating the correct cosmic baryon asymmetry. We also give some prospects in the direct measurements of CP violation in the Higgs sector at the LHC.

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