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CP Violation In and Beyond The Standard Model: Two Higgs Doublet Model Type II Corrections to Flavour Observables

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Abstract: In this preliminary report, we test the Two Higgs Doublet Model (2HDM) of Type II as an extension of the Standard Model (SM) using indicative flavour observables, with particular focus on leptonic decays of B and D mesons, $B\bar{B}$ mixing, and the $b \to s\gamma$ radiative decay. Testing the 2HDM parameter space $m_{H^+}, \tan\beta$ to find alignment between theoretical calculations and experiment, constraints on the parameters were found for the above flavour phenomena both individually and then as a global fit. Strongly dominated by the $b \to s\gamma$ branching ratio, the mass of a charged Higgs particle would be expected to lie between 370 GeV and 891 GeV. The 2HDM vacuum expectation value ratio $\tan\beta$ is calculated to lie between 2.16 and 33.0. Discussions on the goals of the study from here are ongoing, likely a further study into the 2HDM and its validity as a SM extension.