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Spontaneous CP and Scalar FCNC in a 2HDM

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A viable Two Higgs Doublet Model with CP violation of spontaneous origin is presented. In this model, based on a generalised Branco-Grimus-Lavoura model with a flavoured Z_2 symmetry, the lagrangian respects CP invariance, while the vacuum has a CP violating phase, which is able to generate a complex CKM matrix. Scalar mediated flavour changing neutral couplings are analysed, stressing the connection between the generation of a complex CKM matrix and the unavoidable presence of scalar FCNC. The scalar sector is also presented in detail, showing that the new scalars are necessarily lighter than 1 TeV. Finally, a phenomenological analysis of the model including the most relevant constraints is discussed, exploring, in particular, definite implications for the observation of New Physics signals.

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