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Solving flavor anomalies in the 2HDM with flavor symmetries

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The 3.1σ R_K anomaly after Moriond 2021 and 3.3σ Δa_μ from Fermilab Muon $g-2$ Experiment implicate that the lepton flavor universality violation (LFUV) may play a role in the exploration of new physics. Aiming at solving these flavor anomalies both in quark and lepton sectors, a specific Two-Higgs Doublet Model (2HDM) with particular U(1) gauge symmetry, which is designed to get rid of the redundancy in generic 2HDM-III Yukawa couplings, is proposed and investigated. Among three additional new particles in the flavor gauged 2HDM, FCNC processes can be induced by heavy neutral scalar and Z' only in down-type quark sector, which provide solutions to anomalies in $b \rightarrow s\ell\bar{\ell}$ and anomalous magnetic dipole moment (AMDM) for leptons. The charged Higgs, on the other hand, explains anomalies in $b \rightarrow c\ell\nu$ processes. Combining other typical flavor observables, the allowed parameter space for explaining all the three different types of flavor anomalies, within one consistent UV-complete model, can be obtained.

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