

B-Anomalies from flavorful $U(1)'$ extensions, safely

$U(1)'$ extensions of the standard model with generation-dependent couplings to quarks and leptons are investigated as an explanation of anomalies in rare B-decays, with an emphasis on stability and predictivity up to the Planck scale. To these ends, we introduce three generations of vector-like standard model singlet fermions, an enlarged, flavorful scalar sector, and, possibly, right-handed neutrinos, all suitably charged under the $U(1)'$ gauge interaction. We identify several gauge-anomaly free benchmarks consistent with B_s -mixing constraints, with hints for electron-muon universality violation, and the global $b \rightarrow s$ fit. We further investigate the complete two-loop running of gauge, Yukawa and quartic couplings up to the Planck scale to constrain low-energy parameters and enhance the predictive power. A characteristic of models is that the Z' with TeV-ish mass predominantly decays to invisibles, i.e. new fermions or neutrinos. Z' -production can be studied at a future muon collider. While benchmarks feature predominantly left-handed couplings $C_{\mu 9}$ and $C_{\mu 10}$, right-handed ones can be accommodated as well.

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Session Classification: Physics beyond the standard model