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Probing New Physics Effects in $b \to sll'$ transitions

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Continued attempts to find new physics beyond the standard model remains elusive. In this context, we focus on long standing discrepancies between the theory and experiments, mediated by FCNC $b \to sll$ quark level transitions. In particular, we consider discrepancies observed by LHCb experiment in BR ($B_s \to \phi ll$), which has deviations at the level of 3.6 σ. Additionally, standard deviation of 3.3 σ and 1.2 σ, respectively for P_5' in $B \to K^* \mu^+ \mu^-$ and the branching ratio in $B_s \to \mu^+ \mu^-$ processes are also observed. We find out the constraints on the new physics coupling parameters in the presence of a non-universal Z' model. We then probe the exclusive leptonic decay channels $B_s \to ll$', $B_{(s)} \to (K^{(*)}, \phi, f_2', K_2^*)ll$' induced by the neutral current transition $b \to sll'$. Thereafter, we find that the q^2 variation of the observables, such as, branching ratio, forward-backward asymmetry, lepton polarization asymmetry, and the very sensible observable, so called non-universality observables for LFV decays, display interesting sensitivity of new physics parameters. Furthermore, implications for rare charm decays in this framework are discussed. These findings along with more results from experiments will be crucial in our quest for the nature of new physics beyond the standard model.

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