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Probing new physics in $B \to K^*\tau^+\tau^-$ decay

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We analyze the implications of current $b \to s\ell\ell$ ($\ell = e,\ \mu$) measurements on several $B \to K^*\tau^+\tau^-$ observables under the assumption that the possible new physics can have both universal as well as nonuniversal couplings to leptons. For these new physics solutions, we intend to identify observables with large deviations from the Standard Model (SM) predictions as well as to discriminate between various new physics scenarios. For this we consider the $B \to K^*\tau^+\tau^-$ branching fraction, the K^* longitudinal fraction, the tau forward-backward asymmetry and the optimized angular observables. Further, we construct the $\tau - \mu$ lepton-flavor differences ($Q_{\tau\mu}$) between these tau observables and their muonic counterparts in $B \to K^*\mu^+\mu^-$ decay along with the lepton-flavor ratios ($R_{\tau\mu}$) of all of these observables. We find that the current data allows for deviations ranging from 25% up to an order of magnitude from the SM value in a number of observables. A precise measurement of these observables can also discriminate between a number of new physics solutions.

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