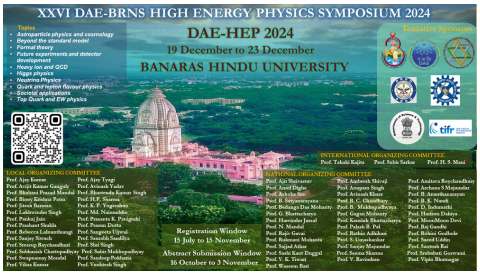

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Unveiling the role of new physics in lepton flavour violating decays $b \to s\mu^{\pm}\tau^{\mp}$ through SMEFT approach

Motivated by the recently observed anomalies associated with several observables in the decay modes mediated through flavor-changing neutral current (FCNC) transitions $b \to s\ell^+\ell^-$, we undertake a comprehensive investigation of the lepton flavor violating decay modes mediated through $b \to s\ell_1\ell_2$ (where $\ell_1 \neq \ell_2$) transitions. Adopting Standard Model Effective Field Theory approach, in this work we perform a comprehensive study of LFV decay modes, i.e., $B_{(s)} \to (\phi, K^*, K_2^*)\ell_1\ell_2$ and $\Lambda_b \to \Lambda\ell_1\ell_2$, where ℓ_1, ℓ_2 represent μ or τ. Assuming the new physics couplings are real, the upper bounds of the branching fractions of the $B_s \to \tau\mu$ and $B \to K\tau\mu$ processes are used to constrain the new physics parameters. Next, we examine the important observables, including the longitudinal polarisation fractions, branching fractions, and forward-backward asymmetries of the $B \to (K^*, \phi, K_2^*)\tau^{\pm}\mu^{\mp}$ decays. We also look into how the new physics couplings affect the baryonic $\Lambda_b \to \Lambda\tau^{\pm}\mu^{\mp}$ decay channels, which are mediated via the $b \to s$ quark level transition. We also predict the upper bounds of the aforementioned observables based on the experimental prospects at Belle II and the LHCb upgrade, which may be interesting for the new physics search in these channels.

Field of contribution

Phenomenology

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