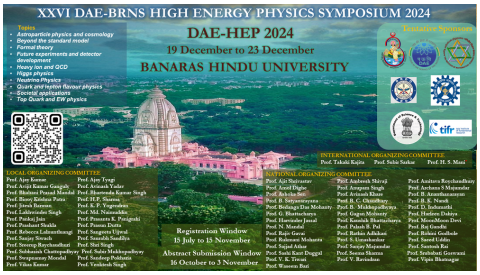

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Unveiling the role of new physics in lepton flavor violating decays $b \to s\ell_1\ell_2$ through model independent analysis

Driven by the recent anomalies observed in various measurements related to flavor-changing neutral current (FCNC) transitions like $b \to s\ell^+\ell^-$, we conduct a thorough examination of lepton flavor-violating (LFV) decay modes through $b \to s\ell_1\ell_2$ transitions (where $\ell_1 \neq \ell_2$). While LFV transitions are not permitted in the Standard Model, they can naturally arise in many extensions of the model, such as those featuring additional vector-like fermions or extra Z' bosons. Although LFV has been extensively investigated in mesonic decays, similar baryonic decays that involve the same quark-level transitions have largely been overlooked. By considering the most general effective Hamiltonian for $b \to s\ell_1\ell_2$ transitions—which includes vector, axial-vector, scalar, and pseudo-scalar operators—we derive the angular decay distribution for these processes. Taking a model-independent approach, we explore LFV decay modes such as $B \to K^*\ell_1\ell_2$, $B \to \phi\ell_1\ell_2$, $B \to K_2^*\ell_1\ell_2$, and $\Lambda_b \to \Lambda\ell_1\ell_2$. In particular, we establish bounds on the branching ratios and analyze the parameters related to leptonic forward-backward asymmetry.

Field of contribution

Phenomenology

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