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processes.

Exploring $b \rightarrow c \tau \nu$ mediated baryonic decay modes in SMEFT framework

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Motivated by the interplay between the LEFT and SMEFT operators at the electroweak scale, we study the interrelation among the transitions $b \to c\ell\nu_{\ell}$, $b \to s\nu_{\ell}\nu_{\ell}$ and $b \to s\ell\ell$ ($\ell = e, \mu, \tau$). We explore this correlation within the context of six - SMEFT operators: $Q_{\ell q}^{(3)}$, $Q_{\ell eqq}$, $Q_{\ell equ}^{(1)}$, $Q_{\ell equ}^{(3)}$, $Q_{\phi q}^{(3)}$ and $Q_{\ell q}^{(1)}$. We constrain the new physics parameter space through a comprehensive global fit incorporating the observables: R_D , R_D^* , $P_\tau(D)$, $P_\tau(D^*)$, $F_L(D^*)$, $\mathcal{B}(B_0 \to K^*\nu\nu)$, $\mathcal{B}(B \to K^+\nu\nu)$, $\mathcal{B}(B \to K^+\tau^+\tau^-)$ and $\mathcal{B}(B_s \to \tau^+\tau^-)$. We then investigate the sensitivity of new physics in the semileptonic decay modes of bbaryons, specifically $\Xi_b \to \Xi_c \tau^- \bar{\nu}_{\tau}$ and $\Sigma_b \to \Sigma_c^{(*)} \tau^- \bar{\nu}_{\tau}$. We also provide the predictions of several observables such as the branching ratio, forward-backward asymmetry, longitudinal polarisation asymmetry, convexity parameter, and the lepton flavor non-universality observable of $\Xi_b \to \Xi_c \tau^- \bar{\nu}_{\tau}$ and $\Sigma_b \to \Sigma_c^{(*)} \tau^- \bar{\nu}_{\tau}$

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