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New physics sensitivity in $\Lambda_b \to \Lambda^{(*)}\mu^+\mu^-$ and $\Lambda_b \to \Lambda^{(*)}\nu\bar{\nu}$ baryonic decays

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The flavor changing neutral b decays with di-leptons and di-neutrinos in the final state provide a great platform to explore physics beyond the standard model(SM). The recent measurements predicted by LHCb on R_K, R_{K_S}, R_{K*+}, $\mathcal{B}(B_s \to \phi\mu^+\mu^-)$ and $\mathcal{B}(B_s \to \mu^+\mu^-)$ proceeding via $b \to s\ell^+\ell^-$ quark level transitions show a significant deviation from the standard model expectations. Very recently, Belle II collaboration reported a more precise upper bound of the branching fraction of $\mathcal{B}(B \to K^+\nu\bar{\nu}) < 4.1 \times 10^{-5}$ by employing a new inclusive tagging approach. The $b \to s\ell^+\ell^-$ and $b \to s\nu\bar{\nu}$ decay channels are related in the SM as well as in beyond the SM physics. In the beyond SM physics, they are related via $SU(2)_L$ gauge symmetry and can be studied simultaneously in a model independent standard model effective field theory(SMEFT) approach. Moreover, $b \to s\nu\bar{\nu}$ decay channels are theoretically cleaner than the corresponding $b \to s\ell^+\ell^-$ decays due to the absence of non factorizable corrections and photonic penguin contributions. In this context, we perform a combined analysis of $\Lambda_b \to \Lambda^{(*)}\mu^+\mu^-$ and $\Lambda_b \to \Lambda^{(*)}\nu\bar{\nu}$ decay modes and study the implication of $b \to s\ell^+\ell^-$ anomalies in a model independent SMEFT approach. We give predictions of several physical observables within SM and within several new physics scenerios.

In-person participation

No

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