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$\Lambda_b \to p\tau\bar{\nu}$ decay in U_1 leptoquark model.

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The measurements of several lepton flavor universality (LFU) violating observables in the decays induced by the quark level transition $b \to c\tau\bar{\nu}$ provide the hint of physics beyond the standard model. These deviations can be resolved by adding a single vector leptoquark to the Standard Model. To further explore this leptoquark, we estimate the leverage of new physics in $b \to c\tau\bar{\nu}$ on $\Lambda_b \to p\tau\bar{\nu}$ decay in the context of U_1 leptoquark model. In this model, the new physics couplings in $b \to u\tau\bar{\nu}$ transition can be written in terms of $b \to c\tau\bar{\nu}$ couplings and hence the extent of allowed new physics in $\Lambda_b \to p\tau\bar{\nu}$ would be determined by $b \to c\tau\bar{\nu}$ transition. The new physics parameter space is obtained by performing a fit to all $b \to c\tau\bar{\nu}$ data and we obtain predictions of several $\Lambda_b \to p\tau\bar{\nu}$ observables. We find that the current $b \to c\tau\bar{\nu}$ data allows an order of magnitude enhancement in the branching ratio as well as in the LFU ratio. The other observables such as convexity parameter, lepton forward-backward asymmetry, longitudinal polarization of final state baryon and tau lepton are consistent with the SM value.

Session

Quark and Lepton Flavour Physics

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