

New physics prospects in semileptonic $\Lambda_b \rightarrow \Lambda_c^*$ decays

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Observations of flavor anomalies in the b -sector, particularly the deviations in the measurements of the lepton flavor universality ratios in the $b \rightarrow c\tau\nu_\tau$ transitions from the standard model (SM) predictions, suggest the existence of possible new physics beyond the SM. In the pursuit of new physics in similar decays involving $b \rightarrow c\ell\nu_\ell$ transitions, we scrutinize the decay modes $\Lambda_b \rightarrow \Lambda_c^*(2595, 2625)\tau^-\bar{\nu}_\tau$ beyond the SM. In particular, we examine the impact of the presence of leptoquarks in these decay modes, within the framework of the vector leptoquark U_1 model. We employ form factors obtained from lattice QCD (LQCD) calculations to predict various q^2 -dependent observables. Some of these observables include the differential branching fraction, the ratio of branching fractions and the forward-backward asymmetry of the charged lepton. The new couplings are constrained using current $b \rightarrow c\ell\nu_\ell$ experimental data.

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