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Study of LFV Baryonic Decays with the effect of Non-universal Z' boson

The study on lepton flavour violating (LFV) decays in the framework of the non-universal Z' model delves into several fascinating aspects of particle physics. Focusing on the $\Sigma_b \rightarrow \Sigma l_1 l_2$ decays, which are induced by the quark-level transition $b \rightarrow s l_1 l_2$, is especially relevant given the existing experimental constraints on LFV processes. The lepton flavour violating decays are suppressed in the Standard Model (SM) as their expected branching fractions at the SM are very lower than the current experimental findings. The branching fractions of these transitions are calculated in the SM. In reference [1], we can observe that the branching ratios for $B^0 \rightarrow \pm$ and $B_s \rightarrow \pm$ decays are of the order of 10^{-54} whereas experimentally they are constrained at the order of 10^{-5} by BaBar and LHCb with 90% and 95% confidence level respectively [2, 3]. The LFV transitions and other anomalies of b hadron sector are explained by various theoretical considerations proposing various theoretical models [4, 5]. Although the accelerators have provided the experimental bounds, there are no experimental evidence till now. The colliders are trying to see the LFV decays nowadays so that the anomaly can be explained successfully. In this work we will study several observables of LFV decays $\Sigma_b \rightarrow \Sigma l_1 l_2$ induced by the quark level transition $b \rightarrow s l_1 l_2$ with the contribution of non-universal Z' boson where l_1 and l_2 are charged leptons of different flavours. We will constrain the NP couplings using several experimental upper limits. We have already explored the LFV λ_b decays [6]. Here, we will explore the LFV Σ_b decays and get a comparative study of the lepton flavour violation in the baryonic sector in different NP theories. It is expected that the study would be very interesting and that might emboss the footprints of NP more aesthetically.

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Field of contribution

Phenomenology

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