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Longitudinal polarization asymmetry of Σ_b decays with the effect of non-universal Z' boson

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Rare baryonic decays induced by flavour changing neutral current (FCNC) have been of immense interest in recent years because of their sensitivities towards new physics (NP) beyond the standard model (SM). The exploration had been triggered with the observation of $b \rightarrow s^+ s^-$ transition at the Fermilab [1] and the LHCb [2]. Theoretically these decays are also studied at different NP models [3-5]. Inspired by these results obtained for baryonic decays [3-7], we are interested to study the polarization asymmetry for b baryon with the effect of NP. Various theoretical studies of branching fractions for $b \rightarrow l^+ l^-$ decays in the standard model (SM) [8] proclaim the possibility of observation of these decays at the LHC. In this work, we will mainly concentrate on longitudinal polarization asymmetries for muonic, electronic and taunic channels in family non-universal Z' model [9, 10]. Asymmetry parameters characterize the angular dependence of differential decay width with polarized and unpolarized heavy baryons. We will investigate the observables with the contribution of Z' boson. The phenomenology of Z' is one of the important sectors to the accelerators. Due to its heavy mass, it may be used to calibrate the upcoming runs of the experiments. Here, we will introduce the NP couplings and use their constrained values. We will show the variation of the observables throughout the whole allowed kinematic region. These results for b decays will help the experimental community to observe the decays in colliders and will unlock a new horizon to the theoretical community to probe NP with heavy baryons.

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Session

Beyond the Standard Model

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