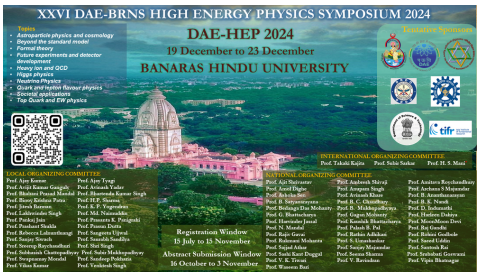

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Study of transverse polarization asymmetry $\Lambda_b \to n l^+ l^-$ with non-universal Z' model

Baryonic decays which involve $b \to d$ are very sensitive to new physics effects. Recent experimental observations of $\Lambda_b^0 \to p K^- \mu^+ \mu^-$ decay motivate the theorist to study baryonic decay [1]. The $\Lambda_b \to n l^+ l^-$ decays are forbidden at the tree level in SM. It provides opportunities to test NP models like the leptoquark model [2], two-Higgs doublet model (2HDM) [3], non-universal Z' model [4] and fermion fourth generation model [5]. In the theoretical background, many attempts have been made in different approaches like light cone sum rule (LCSR), lattice quantum chromodynamics (LQCD), the 2HDM and the Bethe-Salpeter equation approach. In the Bethe-Salpeter equation approach the obtained branching ratios $Br(\Lambda_b \to n l^+ l^-) \times 10^8$ are $6.79^{+8.66}_{-1.82}$ (for $l = e$), $4.08^{+5.44}_{-1.19}$ (for $l =$) and $(2.9)^{+3.7}_{-0.78}$ (for $l =$) [6]. In the context of LQCD and LCSR [7] branching ratios $Br(\Lambda_b \to n l^+ l^-) \times 10^8$ are obtained as (3.19±0.32),(3.79±0.46) (for $l = e$), (3.15±0.29),(3.76±0.42) (for $l =$) and (1.42±0.32),(1.65±0.19) (for $l =$) respectively. Later on these results are updated in LCSR [8] $Br(\Lambda_b \to n l^+ l^-) \times 10^8$ as (8±2) (for $l = e$), (7±2) (for $l =$) and (2±0.4) (for $l =$). In the relativistic quark-diquark model of baryons, the branching ratios $Br(\Lambda_b \to n l^+ l^-) \times 10^8$ are 3.81 (for $l = e$), 3.75 (for $l =$) and 1.21 (for $l =$) [9]. In this work, we intend to study $\Lambda_b \to n l^+ l^-$ decays in non-universal $Z^{'}$ model. We will estimate the transverse polarization asymmetry for $\Lambda_b \to n l^+ l^-$ decays. To determine new physics, we will use quark coupling from $B_d^0 - B_d^0$ mixing. We hope these results will help the experimental community to explore these kinds of decays at the LHCb/Belle II detector in the upcoming time.

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Field of contribution

Phenomenology

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