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Study of heavy flavored B meson system in a QCD-inspired model

Recognizing that flavor changing processes can probe new physics at scales beyond the reach of current experiments, we analyze semileptonic heavy meson, B, B_s and B_c decays using \emph{Relativistic Independent Quark Model - a QCD inspired model} emphasizing the harmonic potential model-dependent analysis. Our predicted branching fractions and physical observables such as $P_\tau(D_{(s)}^{(*)})$, $F_L(D_{(s)}^{(*)})$ in the B decays show good agreement with the lattice and experimental measurements. In particular, our predictions for $P_\tau(D^{(*)})$ in B_c decays offer valuable information in the absence of lattice data for this observable. We perform a comprehensive analysis of the form factors across the whole accessible kinematic range of q^2. Furthermore, we evaluated the clean ratios of B_s to B_0 in the semimuonic mode that are in accordance with the LHCb measurements, and support the validity of the SU(3) flavor symmetry. While the lack of clear deviations in high energy collider data challenges the TeV - scale NP paradigm, B meson decays always remain a powerful probe of NP, especially beyond the reach of direct searches. Therefore, while lattice QCD remains the gold standard for theoretical predictions, QCD-inspired models serve as valuable alternatives in regions where lattice results are unavailable.

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