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Semileptonic heavy flavored meson decays in a QCD-inspired model

Recognizing that flavor changing processes can probe new physics (NP) at scales beyond the reach of current experiments, we analyze semileptonic heavy meson decays: B, B_s and B_c mesons 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 also provide a detailed study of form factors across the full kinematic range. While the lack of clear deviations in high energy collider data challenges the TeV - scale NP paradigm, semileptonic decays of heavy mesons 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.

Autor: PATNAIK, Sonali (NISER, India)

Vortragende(r): PATNAIK, Sonali (NISER, India)

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