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Improving our understanding of B -> D pi l nu and B -> pi pi l nu decays

Tuesday, September 24, 2024 2:00 PM (30 minutes)

In this talk, we present studies of two semileptonic decays with two hadrons in the final state. First, we'll discuss $B \to D\pi\ell\nu$ decays that not only constitute a sizeable background for $R(D^{(*)})$ determinations, but also comprise a largely unknown signal component for inclusive $B \to X_c\ell\nu$ decays. The dominant decay chain proceeds through resonant $B \to D^*/D_2^*(\to D\pi)\ell\nu$ decays, but also includes a poorly understood broad component. We study the composition of this broad component by using our newly developed formalism for $B \to D\pi\ell\nu$ decays, together with experimental spectral measurements, and investigate the plausibility of the two-pole structure in the $D\pi$ S-wave. In addition, we provide recommendations for possible future measurements to systematically improve current understanding of $B \to D\pi\ell\nu$ decays kinematics.

In the second part of the talk we present new results on $B \to \pi\pi\ell\nu$ decays, relevant to studies of $B \to \rho\ell\nu$ and V_{ub} determinations. We discuss the separation of signal P-wave from background S-wave contributions in the ρ-region and the use of $e^+e^- \to \pi^+\pi^-$ data to describe the ρ-lineshape. In addition, we briefly discuss the inclusion of the leading isospin breaking effects in $B \to \pi\pi\ell\nu$ decays.

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