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Hidden strangeness in meson weak decays to baryon pair

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Our study focuses on the weak decay of \(D_sˆ+ \to p \overline{n} \), which is the only possible two-body baryonic decay in the \(D \) meson system. An analysis using perturbative quantum chromodynamics (pQCD) is challenging in this decay due to the small amount of energy released. In particular, naive factorization, suppressed by the light quark masses, results in a minor contribution to this channel. In the framework of final state interactions, the hidden strangeness in the intermediate state naturally avoids this chiral suppression from light quark masses. The branching fraction is predicted to be \({\cal B}(D_sˆ+ \to p\overline{n}) = (1.43 \pm 0.10) \times 10ˆ{-3} \), in agreement with the experimental value of \((1.22 \pm 0.11) \times 10ˆ{-3} \).We also analyze the decays of \(B \) mesons into two charmed baryons involving annihilation-type topological diagrams. In these decays, we conduct a joint analysis of naive factorization and final state interactions. Using the experimental upper bound of \({\cal B}(B_sˆ0 \to \Lambda_cˆ+ \overline{\Lambda}*cˆ-) < 8 \times 10ˆ{-5} \), we set a constraint on the coupling constant \(g*{Dˆ+ \Lambda_cˆ+ n} < 7.5 \).Final state interactions lead to a prediction of the decay parameter \(\gamma(B_sˆ0 \to \Lambda_cˆ+ \overline{\Lambda}_cˆ-) > 0.8 \), whereas pQCD predicts it to be negative.We propose future measurements of \(Bˆ0 \to \Xi_cˆ+ \overline{\Xi}_cˆ- \), predicting a significant \(SU(3)_F \) breaking effect with \(\frac{{\cal B}(Bˆ0 \to \Xi_cˆ+ \overline{\Xi}_cˆ-)}{{\cal B}(B_sˆ0 \to \Lambda_cˆ+ \overline{\Lambda}_cˆ-)} = 1.4\% \), contrary to the naive estimate of \(5.3\% \).We strongly recommend future measurements.

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