

Charmed baryon nonleptonic decays in $SU(3)_F$ symmetry

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We study the nonleptonic three-body charmed baryon weak decays of $\mathbf{B}_c \rightarrow \mathbf{B}_n PP'$ and the two-body decays of $\mathbf{B}_c \rightarrow \mathbf{B}_D P$ under the $SU(3)_F$ flavor symmetry, in which \mathbf{B}_c denotes the anti-triplet charmed baryon, comprising $(\Xi_c^0, -\Xi_c^+, \Lambda_c^+)$, while \mathbf{B}_D , \mathbf{B}_n , and $P(P')$ represent the decuplet baryon, octet baryon, and pseudoscalar meson states, respectively. Through a more comprehensive consideration of the contribution from $H(15)$ in $\mathbf{B}_c \rightarrow \mathbf{B}_n PP'$, and the non-negligible $SU(3)$ -breaking effects in $\mathbf{B}_c \rightarrow \mathbf{B}_D P$, we achieve significantly better fitting results compared to previous works. In addition to the reconstructed branching ratios and decay parameters for these two processes, we also present some interesting findings, such as the potential $SU(3)$ -breaking effects in $\Xi_c^+ \rightarrow p\pi^+ K^-$ and $\Lambda_c^+ \rightarrow \Sigma^+ \pi^- K^+$, as well as the inconsistency from $Br(\Xi_c^0 \rightarrow \Xi^- \pi^+)$ in theoretical analysis and observed by the Belle collaboration, which warrant further experimental verification.

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