

High Energy Physics - Phenomenology

CP Asymmetries in $B \rightarrow K \pi$, $K^* \pi$, ρK Decays

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We show that ratios of tree and penguin amplitudes in $B \rightarrow K^* \pi$ and $B \rightarrow \rho K$ are two to three times larger than in $B \rightarrow K \pi$. This allows for considerably larger CP asymmetries in the former processes than the 10% asymmetry measured in $B^0 \rightarrow K^+ \pi^-$. We study isospin sum rules for rate asymmetries in $B \rightarrow K \pi$, $K^* \pi$, ρK , estimating small violation from interference of tree and electroweak penguin amplitudes. The breaking of the $K \pi$ asymmetry sum rule is estimated to be one to two percent and negative. Violation of $K^* \pi$ and ρK sum rules can be estimated from $B \rightarrow \rho \pi$ amplitudes using flavor SU(3), while breaking of a sum rule combining $K^* \pi$ and ρK asymmetries can be measured directly in a Dalitz analysis of $B^0 \rightarrow K^+ \pi^- \pi^0$. The three sum rules can be tested at the LHCb and at a future Super Flavor Factory, providing precision searches for new $\Delta S = \Delta I = 1$ operators in the low energy effective Hamiltonian.

Comments: References and acknowledgment added, submitted to Physical Review D

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