Signal for CP violation in $B^{\pm} \to P\bar{P}\pi^{\pm}$ decays

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ABSTRACT

We analyze CP violating signal in the partial rate asymmetry of $B^{\pm} \to P\bar{P}\pi^{\pm}$ decays ($P = \pi^+, K^+, \pi^0, \eta$) which results from the interference of the nonresonant decay amplitude and $B^{\pm} \to \chi_{c0}\pi^{\pm}$ followed by decay $\chi_{c0} \to P\bar{P}$. The branching ratios of nonresonant decays $B^{\pm} \to P\bar{P}\pi^{\pm}$ ($P = \pi^+, K^+, \pi^0, \eta$) are calculated using the model which combines heavy quark effective theory and the chiral perturbation theory. In the analysis of the decay amplitudes we follow the factorization approach. For the calculations of the matrix element $< \bar{P}P|\bar{d}b|B >$ we use the results obtained in the analysis of the $D \to K\pi l\nu_l$ nonresonant decay. The partial rate asymmetries and the branching ratios of nonresonant $B^{\mp} \to P\bar{P}\pi^{\mp}$ decays are rather dependent on the choice of parameters required by model. We chose parameters which give the branching ratios for $B^+ \to \pi^+\pi^-\pi^+$, $B^+ \to K^+K^-\pi^+$ in agreement with CLEO upper limits. We find that the asymmetry for $B^{\pm} \to \pi^+\pi^-\pi^{\pm}$ is typically $0.3 sin\gamma$, while for $B^{\pm} \to K^+K^-\pi^{\pm}$ it is $0.2 sin\gamma$.