

Hints for the scale of new CP-violating physics from B-CP anomalies

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We consider several hints for new physics involving CP-asymmetries in B-decays and interpret them in terms of generic contributions to effective Wilson coefficients. The effects we focus on are: the differences in the fitted value of $\sin(2\beta)$ versus the ones directly measured via the time dependent CP asymmetries in $B \rightarrow J/\psi K$ or via $B \rightarrow (\phi, \eta') K$; the difference between the direct CP asymmetries in $B^- \rightarrow K^- \pi^0$ and $B^0 \rightarrow K^- \pi^+$ and the ~ 2.2 sigma indications for the CP-asymmetry in $B_s \rightarrow J/\psi \phi$. To alleviate concerns regarding the disagreement between inclusive and exclusive V_{ub} , we show that our results hold even without the inclusion of V_{ub} in the analysis. We find that no matter what kind of new physics (NP) is invoked to explain these effects, its effective scale is bounded from above from a few hundred GeV to a few TeV depending on specific assumptions regarding the type of new physics. The only exception to this is when the NP contribution is assumed to reside entirely in LR operators in K mixing, then the scale of NP can be as high as around 24 TeV; however, this case cannot account for CP asymmetry in $B_s \rightarrow J/\psi \phi$ or a difference in $\sin(2\beta)$ from penguin modes compared to that from $J/\psi K$ or for that matter the large difference seen between direct CP asymmetries in $K^- \pi^+$ and in $K^- \pi^0$.

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