

Implications of recent LHCb data on CPV in b-baryon four body decays

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Motivated by the recent CPV observation, we investigate the CPV of b-baryon charmless four body decays under the U-spin symmetry. However, we find that only U-spin symmetry cannot provide effective predictions, particularly for Λ_b decays. For giving more useful predictions, we also give a simple dynamic analysis. By counting the power($\lambda = \sqrt{\frac{\Lambda_{QCD}}{m_b}}$) of each topological diagram, we find that for the specific decay $B_b^2 \rightarrow R(B_1^2 M^2 M^2) M^2$, only one U-spin amplitude can contribute in the leading power, while for $B_b^2 \rightarrow R(B_1^2 M^2) R(M^2 M^2)$, only two U-spin amplitudes can contribute in this leading power. Then the most effective prediction can be given as

\begin{align}

$$\mathcal{A}_{\text{CP}}^{\text{dir}}(\Lambda_b^0 \rightarrow R(p \pi^- \pi^+ \pi^-)) = (-12.99 \pm 2.83 \pm 2.59 \pm 0.65)\%$$

\end{align}

Considering the Λ_b can effectively produced in LHCb, we strongly encourage a more precise experimental investigation of it.

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