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Recent measurements of branching fractions and CP asymmetries of charmless hadronic B meson decays at Belle

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Hadronic B decays without a charm quark constitute a powerful probe to search for physics beyond the standard model as well as provide constraints of CP -violation parameters. We report the final measurements from Belle of the branching fraction and CP asymmetry for the decays $B^0 \rightarrow \pi^0\pi^0$, $B^\pm \rightarrow K^+K^-\pi^\pm$ and preliminary results for $B^\pm \rightarrow K_S^0 K_S^0 h^\pm$ ($h = K, \pi$) and $B^\pm \rightarrow \pi^+\pi^-\pi^\pm$. All investigations employ the full data sample delivered by the KEKB e^+e^- collider. The $B^0 \rightarrow \pi^0\pi^0$ measurements enable improved constraints on the angle ϕ_2 of the CKM unitarity triangle. For $B^\pm \rightarrow K^+K^-\pi^\pm$ we measure CP asymmetry as a function of the invariant-mass of the K^+K^- system, where we find strong evidence for large direct CP -violation as well as a large increase in yield at low mass. This measurement challenges conventional theoretical approaches since the result requires a large enhancement in both tree and loop diagrams in the same small region of phase-space. The three-body decay final states $\pi^+\pi^-\pi^\pm$ and $K_S^0 K_S^0 h^\pm$ ($h = K, \pi$) proceed mostly via flavor-changing neutral currents and are thus sensitive to new physics via enhanced CP -asymmetry due to interference from non-SM amplitudes in loops. The final measurement plays an important role in understanding the B decay dynamics and improving the deviation boundary of $\sin 2\phi_1$ obtained in $b \rightarrow c\bar{c}s$ and $b \rightarrow sq\bar{q}$ decays.

Experimental Collaboration

Belle

Primary author: KWON, Youngjoon (Yonsei University)

Presenter: KALIYAR, Abdul Basith (IIT Madras)

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