

Precision measurement of CP violation and branching fractions in $B^\pm \rightarrow K_S^0 h^\pm$ ($h = \pi, K$) decays and search for the rare decay $B_c^\pm \rightarrow K_S^0 K^\pm$

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This Letter presents the world's most precise measurements of direct CP asymmetries in $B^+ \rightarrow K_S^0 \pi^+$ and $B^+ \rightarrow K_S^0 K^+$ decays. The measurement precision in the theoretically clean $B^+ \rightarrow K_S^0 \pi^+$ mode reaches the $\text{cal}O(0.01)$ level for the first time, providing a stringent test of the Standard Model prediction of zero CP asymmetry, and offering input to resolve the long-standing ' $K\pi$ puzzle', where hadronic effects limited the interpretation. These results represent a significant step forward in the study of charmless B decays for testing the Standard Model and probing new sources of CP violation.

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