

**Determination of direct CP asymmetries for
 $B^+ \rightarrow K_S^0 \pi^+$ and $B^+ \rightarrow K_S^0 K^+$ decays and
measurement of the ratio of their branching
fractions, and search for the rare decay $B_c^+ \rightarrow K_S^0 K^+$**

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An analysis of the decays $B^+ \rightarrow K_S^0 \pi^+$ and $B^+ \rightarrow K_S^0 K^+$ is performed using pp collision data collected by the LHCb experiment at a centre-of-mass energy of 13TeV, corresponding to an integrated luminosity of $5.4fb^{-1}$. This study provides the world's most precise measurements of direct CP asymmetries in these modes. In particular, the measurement precision in the theoretically clean $B^+ \rightarrow K_S^0 \pi^+$ channel reaches the $\mathcal{O}(0.01)$ level for the first time, enabling a stringent test of the Standard Model prediction of vanishing CP asymmetry and offering crucial input to address the long-standing $K\pi$ puzzle.

In addition, a simultaneous search for the rare decay $B_c^+ \rightarrow K_S^0 K^+$, highly suppressed in the Standard Model but potentially enhanced in new physics scenarios, yields the world's most stringent upper limit. These results constitute a major advance in the study of charmless B^+ decays, providing sensitive probes of the Standard Model and possible new sources of CP violation.

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