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Study of charmonium decays to $K^0_S K\pi$ in the $B \to (K^0_S K\pi)K$ channels

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A study of the $B^+ \to K^0_S K^+ K^- \pi^+$ and $B^+ \to K^0_S K^+ K^+ \pi^-$ decays is performed using proton-proton collisions at center-of-mass energies of 7, 8 and 13 TeV at the LHCb experiment. The $K^0_S K\pi$ invariant mass spectra from both decay modes reveal a rich content of charmonium resonances. New precise measurements of the η_c and $\eta_c(2S)$ resonance parameters are performed and branching fraction measurements are obtained for B^+ decays to η_c, J/ψ, $\eta_c(2S)$ and χ_{c1} resonances. In particular, the first observation and branching fraction measurement of $B^+ \to \chi_{c0} K^0 \pi^+$ is reported as well as first measurements of the $B^+ \to K^0_S K^+ K^- \pi^+$ and $B^+ \to K^0_S K^+ K^+ \pi^-$ branching fractions. Dalitz plot analyses of $\eta_c \to K^0_S K\pi$ and $\eta_c(2S) \to K^0_S K\pi$ decays are performed. A new measurement of the amplitude and phase of the $K\pi$ S-wave as functions of the $K\pi$ mass is performed, together with measurements of the $K^*_0(1430)$, $K^*_0(1950)$ and $a_0(1700)$ parameters. Finally, the branching fractions of χ_{c1} decays to K^* resonances are also measured.

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