Study of the Branching Ratio of $B \to \rho\rho$ Decays at the Belle Experiment

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Abstract

In this dissertation, we report the first observation of the charmless vector-vector decay mode $B^+ \to \rho^+\rho^0$. The measurement is based on a $78\,\mathrm{fb}^{-1}$ data sample collected with the Belle detector at the KEKB asymmetric e^+e^- collider operating at the $\Upsilon(4S)$ resonance. We obtain the branching fraction of $\mathcal{B}(B^+ \to \rho^+\rho^0) = (31.7 \pm 7.1(\mathrm{stat.}) \pm 3.9(\mathrm{sys.})^{+1.0}_{-2.1}(\mathrm{pol.})) \times 10^{-6}$. From an analysis of the ρ helicity-angle distributions, we obtain a longitudinal polarization ratio, $\Gamma_L/\Gamma = (94.8 \pm 10.6(\mathrm{stat.}) \pm 2.1(\mathrm{sys.}))\%$. We also measure a partial rate asymmetry $\mathcal{A}_{CP}(B^\mp \to \rho^\mp\rho^0) = (0.1 \pm 22.4(\mathrm{stat.})^{+2.6}_{-2.8}(\mathrm{sys.}))\%$.

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