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# Study of the Branching Ratio of $B \rightarrow \rho\rho$ 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  $B^+ \rightarrow \rho^+ \rho^0$ . The measurement is based on a  $78 \text{ fb}^{-1}$  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  $\mathcal{B}(B^+ \rightarrow \rho^+ \rho^0) = (31.7 \pm 7.1(\text{stat.}) \pm 3.9(\text{sys.})_{-2.1}^{+1.0}(\text{pol.})) \times 10^{-6}$ . From an analysis of the  $\rho$  helicity-angle distributions, we obtain a longitudinal polarization ratio,  $\Gamma_L/\Gamma = (94.8 \pm 10.6(\text{stat.}) \pm 2.1(\text{sys.}))\%$ . We also measure a partial rate asymmetry  $\mathcal{A}_{CP}(B^\mp \rightarrow \rho^\mp \rho^0) = (0.1 \pm 22.4(\text{stat.})_{-2.8}^{+2.6}(\text{sys.}))\%$ .

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