

# Exclusive leptonic and radiative B meson decays at Belle

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Measurement of the Differential Branching Fraction and Forward-Backward Asymmetry for  $B \rightarrow K^{(*)} \ell^+ \ell^-$

We study  $B \rightarrow K^{(*)} \ell^+ \ell^-$  decays based on a data sample of 657 million  $B\bar{B}$  pairs collected with the Belle detector at the KEKB  $e^+e^-$  collider. We report the differential branching fraction, isospin asymmetry,  $K^*$  polarization, and the forward-backward asymmetry ( $A_{FB}$ ) as functions of  $q^2 = M_{\ell\ell}^2 c^2$ . The fitted  $A_{FB}$  spectrum tends to be higher than the Standard Model expectation in all  $q^2$  bins. The measured branching fractions are  $\mathcal{B}(B \rightarrow K^* \ell^+ \ell^-) = (10.7_{-1.0}^{+1.1} \pm 0.9) \times 10^{-7}$  and  $\mathcal{B}(B \rightarrow K \ell^+ \ell^-) = (4.8_{-0.4}^{+0.5} \pm 0.3) \times 10^{-7}$ , with the muon to electron ratios  $R_{K^*} = 0.83 \pm 0.17 \pm 0.05$  and  $R_K = 1.03 \pm 0.19 \pm 0.06$ , respectively.

Search for purely leptonic decays  $B^+ \rightarrow l^+ \nu$

The purely leptonic decay  $B^+ \rightarrow l^+ \nu$  ( $l = e, \mu$ ) is highly suppressed in the Standard Model due to lepton helicity mismatch but can be strongly enhanced in New Physics scenarios. We present a search for the decays  $B^+ \rightarrow e^+ \nu$  and  $B^+ \rightarrow \mu^+ \nu$  using a large data sample recorded by the Belle detector at the KEKB energy-asymmetric  $e^+e^-$  collider.

Evidence for  $B \rightarrow K \eta' \gamma$

We report the results of a search for the radiative decay  $B \rightarrow K \eta' \gamma$  and find evidence for  $B^+ \rightarrow K^+ \eta' \gamma$ . The results are obtained from a  $605 \text{ fb}^{-1}$  data sample collected at the  $\Upsilon(4S)$  resonance with the Belle detector at the KEKB asymmetric-energy  $e^+e^-$  collider.

Measurements of time-dependent  $CP$  violation and branching fractions in radiative  $B \rightarrow \phi K \gamma$  and  $B \rightarrow \omega K \gamma$  decays

We report measurements of time-dependent  $CP$ -violation parameters in radiative  $B^0 \rightarrow \phi K_S^0 \gamma$  and  $B^0 \rightarrow \omega K_S^0 \gamma$  decays using a large data sample collected at the  $\Upsilon(4S)$  resonance with the Belle detector at the KEKB energy-asymmetric  $e^+e^-$  collider. These measurements are sensitive to right-handed currents from new physics. We also report updated measurements of branching fractions in  $B \rightarrow \phi K^+(K_S^0) \gamma$  decays and new measurements of  $B \rightarrow \omega K^+(K_S^0) \gamma$  decays.

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