

# Baryonic Bd decays at Belle

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Study of  $B^+ \rightarrow p\bar{\Lambda}\pi^+\pi^-$  at Belle

We study charmless  $B^+$  decays to  $p\bar{\Lambda}\pi^+\pi^-$  final state using 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. There are significant signals found with  $p\bar{\Lambda}$  mass peaking near threshold. The branching fraction as well as the differential branching fraction as a function of the mass of the  $p\bar{\Lambda}$  system are presented. We also search for intermediate three-body decays using the same final state particles. Observation or evidence of possible intermediate three-body decays are reported.

Observation of  $B^0 \rightarrow \Lambda\bar{\Lambda}K^0$  and  $B^0 \rightarrow \Lambda\bar{\Lambda}K^{*0}$  at Belle

We study the charmless decays  $B \rightarrow \Lambda\bar{\Lambda}h$ , where  $h$  stands for  $\pi^+$ ,  $K^+$ ,  $K^0$ ,  $K^{*+}$ , or  $K^{*0}$ , using 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. We observe  $B^0 \rightarrow \Lambda\bar{\Lambda}K^0$  and  $B^0 \rightarrow \Lambda\bar{\Lambda}K^{*0}$  with branching fractions of  $(4.76_{-0.68}^{+0.84}(\text{stat.}) \pm 0.61(\text{syst.})) \times 10^{-6}$  and  $(2.46_{-0.72}^{+0.87} \pm 0.34) \times 10^{-6}$ , respectively. The significances of these signals in the threshold-mass enhanced mass region,  $M_{\Lambda\bar{\Lambda}} < 2.85 \text{ GeV}/c^2$ , are  $12.4\sigma$  and  $9.3\sigma$ , respectively. We also update the branching fraction  $\mathcal{B}(B^+ \rightarrow \Lambda\bar{\Lambda}K^+) = (3.38_{-0.36}^{+0.41} \pm 0.41) \times 10^{-6}$  with better accuracy, and report the following measurement or 90% confidence level upper limit in the threshold-mass-enhanced region:  $\mathcal{B}(B^+ \rightarrow \Lambda\bar{\Lambda}K^{*+}) = (2.19_{-0.88}^{+1.13} \pm 0.33) \times 10^{-6}$  with  $3.7\sigma$  significance;  $\mathcal{B}(B^+ \rightarrow \Lambda\bar{\Lambda}\pi^+) < 0.94 \times 10^{-6}$ . A related search for  $B^0 \rightarrow \Lambda\bar{\Lambda}\bar{D}^0$  yields a branching fraction  $\mathcal{B}(B^0 \rightarrow \Lambda\bar{\Lambda}\bar{D}^0) = (1.05_{-0.44}^{+0.57} \pm 0.14) \times 10^{-5}$ . This may be compared with the large,  $\sim 10^{-4}$ , branching fraction observed for  $B^0 \rightarrow p\bar{p}\bar{D}^0$ . The  $M_{\Lambda\bar{\Lambda}}$  enhancements near threshold and related angular distributions for the observed modes are also reported.

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