

## Heavy Flavor Averaging Group - October 2016

Compilation of  $B^+$  Baryonic Branching Fractions ( $\times 10^{-6}$ ) - UL at 90% CL  
 In PDG2014    New since PDG2014 (preliminary)    New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	BABAR	Belle	LHCb	Our Avg.
417	$p\bar{p}\pi^+$	$1.62 \pm 0.20$	$1.69 \pm 0.29 \pm 0.26$ †	$1.60^{+0.22}_{-0.19} \pm 0.12$		$1.62^{+0.21}_{-0.20}$
417	$p\bar{p}\pi^+$ §				<span style="color: red;"><math>1.07 \pm 0.11 \pm 0.11</math> ¶</span>	$1.07 \pm 0.16$
420	$p\bar{p}K^+$	$5.9 \pm 0.5$	$6.7 \pm 0.5 \pm 0.4$ †	$5.54^{+0.27}_{-0.25} \pm 0.36$	<span style="color: red;"><math>4.46 \pm 0.21 \pm 0.27</math> ¶ ◊</span>	$5.14 \pm 0.25$
421	$\Theta^{++}\bar{p}$ <sup>1</sup>	$< 0.091$	$< 0.09$	$< 0.091$		$< 0.09$
422	$f_J(2221)K^+$ <sup>2</sup>	$< 0.41$		$< 0.41$		$< 0.41$
423	$p\bar{\Lambda}(1520)$	$< 1.5$	$< 1.5$		<span style="color: red;"><math>0.315 \pm 0.048 \pm 0.027</math> ¶</span>	$0.315 \pm 0.055$
425	$p\bar{p}K^{*+}$	$3.6^{+0.8}_{-0.7}$	$5.3 \pm 1.5 \pm 1.3$ †	$3.38^{+0.73}_{-0.60} \pm 0.39$ ‡		$3.64^{+0.79}_{-0.70}$
426	$f_J(2221)K^{*+}$ <sup>2</sup>	$< 0.77$	$< 0.77$			$< 0.77$
427	$p\bar{\Lambda}$	$< 0.32$		$< 0.32$		$< 0.32$
429	$p\bar{\Lambda}\pi^0$	$3.00^{+0.7}_{-0.6}$		$3.00^{+0.61}_{-0.53} \pm 0.33$		$3.00^{+0.69}_{-0.62}$
430	$p\bar{\Sigma}(1385)^0$	$< 0.47$		$< 0.47$		$< 0.47$
431	$\Delta^+\bar{\Lambda}$	$< 0.82$		$< 0.82$		$< 0.82$
433	$p\bar{\Lambda}\pi^+\pi^-$ (NR)	$5.9 \pm 1.1$		$5.92^{+0.88}_{-0.84} \pm 0.69$		$5.92^{+1.12}_{-1.09}$
434	$p\bar{\Lambda}\rho^0$	$4.8 \pm 0.9$		$4.78^{+0.67}_{-0.64} \pm 0.60$		$4.78^{+0.90}_{-0.88}$
435	$p\bar{\Lambda}f_2(1270)$	$2.0 \pm 0.8$		$2.03^{+0.77}_{-0.72} \pm 0.27$		$2.03^{+0.82}_{-0.77}$
436	$\Lambda\bar{\Lambda}\pi^+$	$< 0.94$		$< 0.94$ §		$< 0.94$ §
437	$\Lambda\bar{\Lambda}K^+$	$3.4 \pm 0.6$		$3.38^{+0.41}_{-0.36} \pm 0.41$ ‡		$3.38^{+0.58}_{-0.55}$
438	$\Lambda\bar{\Lambda}K^{*+}$	$2.2^{+1.2}_{-0.9}$		$2.19^{+1.13}_{-0.88} \pm 0.33$ §		$2.19^{+1.18}_{-0.94}$
439	$\bar{\Delta}^0 p$	$< 1.38$		$< 1.38$ §		$< 1.38$ §
440	$\Delta^{++}\bar{p}$	$< 0.14$		$< 0.14$ §		$< 0.14$ §

§ Di-baryon mass is less than 2.85 GeV/c.

† Charmonium decays to  $p\bar{p}$  have been statistically subtracted;

¶ Relative BF converted to absolute BF.

◊ Includes contribution where  $p\bar{p}$  is produced in charmonia decays.

<sup>1</sup>  $\Theta(1540)^{++} \rightarrow K^+p$  (pentaquark candidate);

<sup>2</sup> Product BF — daughter BF taken to be 100%;

‡ The charmonium mass region has been vetoed;

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RPP#	Mode	PDG2014 Avg.	BABAR	Belle	LHCb	Our Avg.
407	$p\bar{p}$	$0.015^{+0.007}_{-0.005}$	$< 0.27$	$< 0.11$	$0.0147^{+0.0062+0.0035}_{-0.0051-0.0014}$	$0.0150^{+0.0070}_{-0.0050}$
409	$p\bar{p}K^0$	$2.66 \pm 0.32$	$3.0 \pm 0.5 \pm 0.3$ †	$2.51^{+0.35}_{-0.29} \pm 0.21$ ‡		$2.66^{+0.34}_{-0.32}$
410	$\Theta^+\bar{p}$ <sup>1</sup>	$< 0.05$	$< 0.05$	$< 0.23$		$< 0.05$
411	$f_J(2221)K^0$ <sup>2</sup>	$< 0.45$	$< 0.45$			$< 0.45$
412	$p\bar{p}K^{*0}$	$1.24^{+0.28}_{-0.25}$	$1.47 \pm 0.45 \pm 0.40$ †	$1.18^{+0.29}_{-0.25} \pm 0.11$ ‡		$1.24^{+0.28}_{-0.25}$
413	$f_J(2221)K^{*0}$ <sup>2</sup>	$< 0.15$	$< 0.15$			$< 0.15$
414	$p\bar{\Lambda}\pi^-$	$3.14 \pm 0.29$	$3.07 \pm 0.31 \pm 0.23$	$3.23^{+0.33}_{-0.29} \pm 0.29$		$3.14^{+0.29}_{-0.28}$
415	$p\bar{\Sigma}(1385)^-$	$< 0.26$		$< 0.26$		$< 0.26$
416	$\Delta^0\bar{\Lambda}$	$< 0.93$		$< 0.93$		$< 0.93$
417	$p\bar{\Lambda}K^-$	$< 0.82$		$< 0.82$		$< 0.82$
418	$p\bar{\Sigma}^0\pi^-$	$< 3.8$		$< 3.8$		$< 3.8$
419	$\bar{\Lambda}\Lambda$	$< 0.32$		$< 0.32$		$< 0.32$
420	$\bar{\Lambda}\Lambda K^0$	$4.8^{+1.0}_{-0.9}$		$4.76^{+0.84}_{-0.68} \pm 0.61$ ‡		$4.76^{+1.04}_{-0.91}$
421	$\Lambda\bar{\Lambda}K^{*0}$	$2.5^{+0.9}_{-0.8}$		$2.46^{+0.87}_{-0.72} \pm 0.34$ ‡		$2.46^{+0.93}_{-0.80}$

† Charmonium decays to  $p\bar{p}$  have been statistically subtracted.

‡ The charmonium mass region has been vetoed.

<sup>1</sup>  $\Theta(1540)^+ \rightarrow pK^0$  (pentaquark candidate).

<sup>2</sup> Product BF — daughter BF taken to be 100%.

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 Compilation of  $B^+$  and  $B^0$  Baryonic Relative Branching Fractions  
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RPP#	Mode	PDG2014 Avg.	LHCb	Our Avg.
417	$\mathcal{B}(B^+ \rightarrow p\bar{p}\pi^+, m_{p\bar{p}} < 2.85 \text{ GeV}/c) / \mathcal{B}(B^+ \rightarrow J/\psi(\rightarrow p\bar{p})\pi^+)$		<span style="color: red;"><math>12.0 \pm 1.2 \pm 0.3</math></span>	$12.0 \pm 1.2$
420	$\mathcal{B}(B^+ \rightarrow p\bar{p}K^+) / \mathcal{B}(B^+ \rightarrow J/\psi(\rightarrow p\bar{p})K^+)$		$4.91 \pm 0.19 \pm 0.14$ <sup>†</sup>	$4.91 \pm 0.24$
420	$\mathcal{B}(B^+ \rightarrow p\bar{p}K^+) / \mathcal{B}(B^+ \rightarrow J/\psi K^+)$	$0.0104 \pm 0.0005 \pm 0.0001$	$0.0104 \pm 0.0005 \pm 0.0001$ <sup>† §</sup>	$0.0100 \pm 0.0010$
423	$\mathcal{B}(B^+ \rightarrow \bar{\Lambda}(1520)(\rightarrow K^+\bar{p})p) / \mathcal{B}(B^+ \rightarrow J/\psi(\rightarrow p\bar{p})\pi^+)$		<span style="color: red;"><math>0.033 \pm 0.005 \pm 0.007</math></span>	$0.033 \pm 0.009$

<sup>†</sup> Includes contribution where  $p\bar{p}$  is produced in charmonia decays.

<sup>§</sup> Original experimental relative BF multiplied by the best values (PDG2014) of certain reference BFs. The first error is experimental, the second is from reference BF.

# Charmless Baryonic Decay References

- [1] Belle Collaboration (Y.-T. Tsai, P. Chang *et al.*), Phys. Rev. D **75**, 111101 (2007).
- [2] Belle Collaboration, (J.-H. Chen, M.-Z. Wang *et al.*), Phys. Rev. Lett. **100**, 251801 (2008).
- [3] Belle Collaboration (M.-Z. Wang *et al.*), Phys. Rev. Lett. **90**, 201802 (2003).
- [4] *BABAR* Collaboration, (B. Aubert *et al.*), Phys. Rev. D **79**, 112009 (2009).
- [5] Belle Collaboration (J.-T. Wei, M.-Z. Wang *et al.*), Phys. Lett. B **659**, 80 (2008).
- [6]
- [7]
- [8]
- [9] Belle Collaboration (M.-Z. Wang, Y.-J. Lee *et al.*), Phys. Rev. D **76**, 052004 (2007).
- [10] *BABAR* Collaboration, (B. Aubert *et al.*), Phys. Rev. D **69**, 091503 (2004).
- [11] Belle Collaboration (Y.-W. Chang, M.-Z. Wang *et al.*), Phys. Rev. D **79** 052006 (2009).
- [12] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **72** 051101 (2005).
- [13] Belle Collaboration (M.-Z. Wang *et al.*), Phys. Lett. B **617**, 141 (2005).
- [14] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76** 092004 (2007).
- [15] Belle Collaboration, Phys. Rev. D **80** 111103 (2009).
- [16] LHCb Collaboration, (R. Aaij *et al.*), Eur. Phys. J. C **73** 2462 (2013).
- [17] LHCb Collaboration, (R. Aaij *et al.*), Phys. Rev. Lett. **113** 141801 (2014).
- [18] LHCb Collaboration (R. Aaij *et al.*), J. High Energ. Phys. **1310**, 005 (2013).