

# Heavy FLavor AVeraging group (HFLAV) - August 2017

Compilation of  $\Lambda_b^0$  Branching Fractions ( $\times 10^{-6}$ ) - UL at 90% CL

In PDG2014 New since PDG2014 (preliminary) New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	CDF	LHCb	Our Avg.
19	$p\pi^-$	$3.5 \pm 0.8 \pm 0.6$	$3.5 \pm 0.8 \pm 0.6$ [1]		$3.5 \pm 1.0$
20	$pK^-$	$5.5 \pm 1.0 \pm 1.0$	$5.5 \pm 1.0 \pm 1.0$ [1]		$5.5 \pm 1.4$
21	$\Lambda\mu^+\mu^-$	$1.73 \pm 0.42 \pm 0.55$	$1.73 \pm 0.42 \pm 0.55$ [2]	$0.96 \pm 0.16 \pm 0.25$ [3]	$1.08 \pm 0.27$
	$\Lambda\eta$			$9.3^{+7.3}_{-5.3}$ ¶ [4]	$9.3^{+7.3}_{-5.3}$
	$\Lambda\eta'$			$< 3.1$ [4]	$< 3.1$
	$\Lambda\phi$			$5.18 \pm 1.04 \pm 0.35^{+0.67}_{-0.62}$ ‡ [5]	$5.18^{+1.29}_{-1.26}$
	$\bar{K}^0 p\pi^-$			$1.26 \pm 0.19 \pm 0.09 \pm 0.34 \pm 0.05$ § [6]	$1.26 \pm 0.40$
	$K^0 pK^-$			$< 3.5$ [6]	$< 3.5$
	$\Lambda\pi^+\pi^-$			$4.6 \pm 1.2 \pm 1.4 \pm 0.6$ † [7]	$4.6 \pm 1.9$
	$\Lambda K^+\pi^-$			$5.6 \pm 0.8 \pm 0.8 \pm 0.7$ † [7]	$5.6 \pm 1.3$
	$\Lambda K^+K^-$			$15.9 \pm 1.2 \pm 1.2 \pm 2.0$ † [7]	$15.9 \pm 2.6$
	$\Lambda p\pi^- \mu^+\mu^-$			$0.069 \pm 0.019 \pm 0.011^{+0.013}_{-0.010}$ † [8]	$0.069^{+0.026}_{-0.024}$

Results for CDF and LHCb are relative BF's converted to absolute BF's.

† Last quoted uncertainty is due to the precision with which the normalization channel branching fraction is known.

‡ Third uncertainty is related to external inputs.

§ Third uncertainty is from the ratio of fragmentation fractions  $f_{\Lambda_b^0}/f_d$ , and the fourth is due to the uncertainty on  $\mathcal{B}(B^0 \rightarrow K^0\pi^+\pi^-)$ .

¶ Result at 68% CL.

# Heavy FLavor AVeraging group (HFLAV) - August 2017

Partial Branching Fractions of  $B \rightarrow \Lambda_b^0\mu^+\mu^-$  decays ( $\times 10^{-6}$ )

In PDG2014 New since PDG2014 (preliminary) New since PDG2014 (published)

RPP#	Mode	$q^2$ [GeV $^2/c^4$ ] †	PDG2014 Avg.	CDF	LHCb	Our Avg.
21	$\Lambda\mu^+\mu^-$ ‡	$< 2.0$	$0.15 \pm 2.01 \pm 0.05$	$0.15 \pm 2.01 \pm 0.05$ [2]	$0.56 \pm 0.76 \pm 0.80$ [3]	$0.41 \pm 0.87$
	$\Lambda\mu^+\mu^-$	[2.0, 4.3]	$1.8 \pm 1.7 \pm 0.6$	$1.8 \pm 1.7 \pm 0.6$	$0.71 \pm 0.60 \pm 0.10$	$0.91 \pm 0.55$
	$\Lambda\mu^+\mu^-$	[4.3, 8.68]	$-0.2 \pm 1.6 \pm 0.1$	$-0.2 \pm 1.6 \pm 0.1$	$0.66 \pm 0.72 \pm 0.16$	$0.40 \pm 0.62$
	$\Lambda\mu^+\mu^-$	[10.09, 12.86]	$3.0 \pm 1.5 \pm 1.0$	$3.0 \pm 1.5 \pm 1.0$	$1.55 \pm 0.58 \pm 0.55$	$1.96 \pm 0.68$
	$\Lambda\mu^+\mu^-$	[14.18, 16.00]	$1.0 \pm 0.7 \pm 0.3$	$1.0 \pm 0.7 \pm 0.3$	$1.44 \pm 0.44 \pm 0.42$	$1.19 \pm 0.40$
	$\Lambda\mu^+\mu^-$	$> 16.00$	$7.0 \pm 1.9 \pm 2.2$	$7.0 \pm 1.9 \pm 2.2$	$4.7 \pm 0.8 \pm 1.2$	$5.5 \pm 1.2$

Results for CDF and LHCb are relative BF's converted to absolute BF's.

† See the original paper for the exact  $m^2(\mu^+\mu^-)$  selection.

‡ The LHCb measurement was superseded with a more accurate result in different  $m^2(\mu^+\mu^-)$  bins (see list of not-included results).

# Heavy FLavor AVeraging group (HFLAV) - August 2017

Compilation of  $\Xi_b^0$  Branching Fractions ( $\times 10^{-6}$ )

In PDG2014 New since PDG2014 (preliminary) New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	LHCb	Our Avg.
	$f_{\Xi_b^0}/f_{\Lambda_b^0}\mathcal{B}(\Xi_b^0 \rightarrow \Lambda\pi^+\pi^-)$		$< 1.7$ [7]	$< 1.7$
	$f_{\Xi_b^0}/f_{\Lambda_b^0}\mathcal{B}(\Xi_b^0 \rightarrow \Lambda K^+\pi^-)$		$< 0.8$ [7]	$< 0.8$
	$f_{\Xi_b^0}/f_{\Lambda_b^0}\mathcal{B}(\Xi_b^0 \rightarrow \Lambda K^+K^-)$		$< 0.3$ [7]	$< 0.3$
	$f_{\Xi_b^0}/f_d\mathcal{B}(\Xi_b^0 \rightarrow \bar{K}^0 p\pi^-)$		$< 1.6$ [6]	$< 1.6$
	$f_{\Xi_b^0}/f_d\mathcal{B}(\Xi_b^0 \rightarrow \bar{K}^0 pK^-)$		$< 1.1$ [6]	$< 1.1$

Results for LHCb are relative BF's converted to absolute BF's.

# Heavy FLavor AVeraging group (HFLAV) - August 2017

Compilation of  $\Xi_b^-$  Branching Fractions ( $\times 10^{-5}$ )

In PDG2014 New since PDG2014 (preliminary) New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	LHCb	Our Avg.
	$f_{\Xi_b^-}\mathcal{B}(\Xi_b^- \rightarrow pK^-K^-)/(f_u\mathcal{B}(B^- \rightarrow K^+K^-K^-))$		$265 \pm 35 \pm 47$ [9]	$265 \pm 58$
	$f_{\Xi_b^-}\mathcal{B}(\Xi_b^- \rightarrow pK^-\pi^-)/(f_u\mathcal{B}(B^- \rightarrow K^+K^-K^-))$		$259 \pm 64 \pm 49$ [9]	$259 \pm 80$
	$f_{\Xi_b^-}\mathcal{B}(\Xi_b^- \rightarrow p\pi^-\pi^-)/(f_u\mathcal{B}(B^- \rightarrow K^+K^-K^-))$		$< 147$ [9]	$< 147$

Heavy FLavor AVeraging group (HFLAV) - August 2017  
 Compilation of  $\Omega_b^-$  Branching Fractions ( $\times 10^{-5}$ )

In PDG2014    [New since PDG2014 \(preliminary\)](#)    [New since PDG2014 \(published\)](#)

RPP#	Mode	PDG2014 Avg.	LHCb	Our Avg.
	$f_{\Omega_b^-} \mathcal{B}(\Omega_b^- \rightarrow pK^-K^-)/(f_u \mathcal{B}(B^- \rightarrow K^+K^-K^-))$		< 18 [9]	< 18
	$f_{\Omega_b^-} \mathcal{B}(\Omega_b^- \rightarrow pK^-\pi^-)/(f_u \mathcal{B}(B^- \rightarrow K^+K^-K^-))$		< 51 [9]	< 51
	$f_{\Omega_b^-} \mathcal{B}(\Omega_b^- \rightarrow p\pi^-\pi^-)/(f_u \mathcal{B}(B^- \rightarrow K^+K^-K^-))$		< 109 [9]	< 109

# References

- [1] T. Aaltonen *et al.*, (CDF collaboration), Phys. Rev. Lett. **103**, 031801, (2009), [arXiv:0812.4271 \[hep-ex\]](#).
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- [3] R. Aaij *et al.*, (LHCb collaboration), Phys. Lett. **B725**, 25, (2013), [arXiv:1306.2577 \[hep-ex\]](#).
- [4] R. Aaij *et al.*, (LHCb collaboration), JHEP **09**, 006, (2015), [arXiv:1505.03295 \[hep-ex\]](#).
- [5] R. Aaij *et al.*, (LHCb collaboration), Phys. Lett. **B759**, 282, (2016), [arXiv:1603.02870 \[hep-ex\]](#).
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- [8] R. Aaij *et al.*, (LHCb collaboration), JHEP **04**, 029, (2017), [arXiv:1701.08705 \[hep-ex\]](#).
- [9] R. Aaij *et al.*, (LHCb collaboration), Phys. Rev. Lett. **118**, no. 7, 071801, (2017), [arXiv:1612.02244 \[hep-ex\]](#).