Heavy FLavor AVeraging group (HFLAV) - August 2017

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

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

RPP#	Mode	PDG2014 Avg.	Belle		CDF		D0	LHCb		CMS	ATLAS	Our Avg.
45	$\pi^+\pi^-$	0.76 ± 0.19	< 12	[1]	$0.60 \pm 0.17 \pm 0.04$ ‡	[2]		$0.691 \pm 0.083 \pm 0.044$ ‡	[3]			0.671 ± 0.083
51	$\phi\phi$	19.1 ± 3.1			$19.1 \pm 2.6 \pm 1.6$ †	[4]		$18.4 \pm 0.5 \pm 1.8$ §	[5]			18.6 ± 1.6
52	π^+K^-	5.5 ± 0.6	< 26	[1]	$5.3 \pm 0.9 \pm 0.3$ †	[6]		$5.6 \pm 0.6 \pm 0.3$ †	[7]			5.5 ± 0.5
53	K^+K^-	24.9 ± 1.7	$38^{+10}_{-9} \pm 7$	[1]	$25.9 \pm 2.2 \pm 1.7$ †	[8]		$23.7 \pm 1.6 \pm 1.5$ †	[7]			24.8 ± 1.7
54	$K^0\overline{K}^0$	< 66	$19.6^{+5.8}_{-5.1} \pm 1.0 \pm 2.0$ ‡	[9]								$19.6^{+6.2}_{-5.6}$
55	$K^0\pi^+\pi^-$	19 ± 5						$9.5 \pm 1.3 \pm 1.5 \pm 0.4$ §	[10]			9.5 ± 2.0
56	$K^0K^-\pi^+$ ¶	97 ± 17						$84.3 \pm 3.5 \pm 7.4 \pm 3.4$ §	[10]			84.3 ± 8.9
57	$K^0K^+K^-$	< 4						< 2.5	[10]			< 2.5
	$K^{*\pm}K^{\mp}$							$12.7 \pm 1.9 \pm 1.9$	[11]			12.7 ± 2.7
	$K^{*-}\pi^+$							$3.3 \pm 1.1 \pm 0.5$	[11]			3.3 ± 1.2
59	$K^{*0}\overline{K}^{*0}$	$28.1 \pm 4.6 \pm 5.6$						$10.8 \pm 1.4 \pm 1.5$ §	[12]			10.8 ± 2.1
60	$\phi\overline{K}^{*0}$	1.13 ± 0.3						$1.13 \pm 0.29 \pm 0.06$ †	[13]			1.13 ± 0.30
61	$p\overline{p}$	$0.028^{+0.022}_{-0.017}$						< 0.015	[14]			< 0.015
63	$\gamma\gamma$	< 8.7	< 3.1	[15]								< 3.1
64	$\phi\gamma$	36 ± 4	$36 \pm 5 \pm 7$	[15]				$35.1 \pm 3.5 \pm 1.2$ †	[16]			35.2 ± 3.4
65	$\mu^+\mu^-$	0.0031 ± 0.0007			$0.013^{+0.009}_{-0.007}$	[17]	< 0.012 [18]	$0.0030 \pm 0.0006^{+0.0003}_{-0.0002}$	[19]	$0.0030^{+0.0010}_{-0.0009}$ [20]	< 0.003 [1] [21]	0.0031 ± 0.0007
66	e^+e^-	< 0.28			< 0.28	[22]						< 0.28
66	$\tau^+\tau^-$	< 0.28						< 5200	[23]			< 5200
67	$e^{\pm}\mu^{\mp}$	< 0.011			< 0.20	[22]		< 0.011	[24]			< 0.011
68	$\mu^+\mu^-\mu^+\mu^-$	< 0.012						< 0.0025 [1]	[25]			< 0.0025 [1]
70	$\phi\mu^+\mu^-$	0.76 ± 0.15					< 3.2 [26]	$0.797^{+0.045}_{-0.043} \pm 0.068$	[27]			$0.797^{+0.082}_{-0.080}$
	$\eta'\eta'$							$33.1 \pm 7.0 \pm 1.2$ †	[28]			33.1 ± 7.1
	$\pi^+\pi^-\mu^+\mu^-$							$0.086 \pm 0.015 \pm 0.010$ [2]	[5]			0.086 ± 0.018
	$K^0\overline{K}^{*0}$ ¶							$16.4 \pm 3.4 \pm 2.3$	[29]			16.4 ± 4.1
	$\phi\pi^+\pi^-$							$3.48 \pm 0.29 \pm 0.35$ [3]	[30]			3.48 ± 0.46
	$\phi f_0(980), f_0(980) \to \pi^+\pi^-$							$1.12 \pm 0.18 \pm 0.11$	[30]			1.12 ± 0.21
	$\phi f_2(1270), f_2(1270) \to \pi^+\pi^-$							$0.61^{+0.18}_{-0.14} \pm 0.06$	[30]			$0.61^{+0.19}_{-0.15}$
	$\phi\rho^0(770)$							$0.27 \pm 0.07 \pm 0.02$	[30]			0.27 ± 0.07
	$p\overline{\lambda}K^- + \overline{p}\lambda K^+$							$5.46 \pm 0.61 \pm 0.57 \pm 0.50 \pm 0.32$ [4]	[31]			5.46 ± 1.02
	$p\overline{p}K^+K^-$							$4.2 \pm 0.3 \pm 0.2 \pm 0.3 \pm 0.2$ [4]	[32]			4.2 ± 0.5
	$p\overline{p}K^+\pi^-$							$1.30 \pm 0.21 \pm 0.11 \pm 0.09 \pm 0.08$ [4]	[32]			1.30 ± 0.27
	$p\overline{p}\pi^+\pi^-$							< 0.66	[32]			< 0.66
	$\eta'\phi$							< 0.82	[33]			< 0.82

Results for CDF, D0, LHCb, CMS and ATLAS are relative BFs converted to absolute BFs.

† The first error is experimental, and the second is from the reference BF.

‡ Last error represents the uncertainty due to the total number of $B_s^0\bar{B}_s^0$ pairs.

§ Last error takes into account error the reference BF and f_d/f_s.

¶ Includes two distinct decay processes: $\mathcal{B}(B_s^0 \to f) + \mathcal{B}(B_s^0 \to \bar{f})$.

[1] UL at 95% CL.

[2] Muon pairs do not originate from resonances and $0.5 < m(\pi^+\pi^-) < 1.3$ GeV/c^2.

[3] In the mass range $400 < m(\pi^+\pi^-) < 1600$ GeV/c^2.

[4] The third error is due to the reference BF and the fourth to f_d/f_s.

Heavy FLavor AVeraging group (HFLAV) - August 2017

Compilation of B_s^0 Relative Branching Fractions

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

RPP#	Mode	PDG2014 Avg.	CDF	LHCb	Our Avg.
45	$f_s\mathcal{B}(B_s^0 \to \pi^+\pi^-)/f_d\mathcal{B}(B^0 \to K^+\pi^-)$		$0.008 \pm 0.002 \pm 0.001$ [2]	$0.00915 \pm 0.00071 \pm 0.00083$ [3]	0.00880 ± 0.00090
45	$f_s\mathcal{B}(B_s^0 \to \pi^+\pi^-)/f_d\mathcal{B}(B^0 \to \pi^+\pi^-)$			$0.050^{+0.011}_{-0.009} \pm 0.004$ [7]	$0.050^{+0.012}_{-0.010}$
51	$\mathcal{B}(B_s^0 \to \phi\phi)/\mathcal{B}(B_s^0 \to J/\psi\phi)$		$0.0178 \pm 0.0014 \pm 0.0020$[4]		0.0180 ± 0.0020
	$\mathcal{B}(B_s^0 \to \phi\phi)/\mathcal{B}(B^0 \to \phi K^*)$			$1.84 \pm 0.05 \pm 0.13$ [5]	1.84 ± 0.14
52	$f_s\mathcal{B}(B_s^0 \to K^+\pi^-)/f_d\mathcal{B}(B_d^0 \to K^+\pi^-)$		$0.071 \pm 0.010 \pm 0.007$ [6]	$0.074 \pm 0.006 \pm 0.006$ [7]	0.073 ± 0.007
53	$f_s\mathcal{B}(B_s^0 \to K^+K^-)/f_d\mathcal{B}(B_d^0 \to K^+\pi^-)$		$0.347 \pm 0.020 \pm 0.021$ [8]	$0.316 \pm 0.009 \pm 0.019$ [7]	0.327 ± 0.017
55	$\mathcal{B}(B_s^0 \to K^0\pi^+\pi^-)/\mathcal{B}(B^0 \to K^0\pi^+\pi^-)$			$0.191 \pm 0.027 \pm 0.031 \pm 0.011$[10]	0.191 ± 0.043
56	$\mathcal{B}(B_s^0 \to K^0K^-\pi^+)/\mathcal{B}(B^0 \to K^0K^-\pi^+)$ †			$1.70 \pm 0.07 \pm 0.11 \pm 0.10$ [10]	1.70 ± 0.16
57	$\mathcal{B}(B_s^0 \to K^0K^+K^-)/\mathcal{B}(B^0 \to K^0K^+K^-)$			< 0.051 [10]	< 0.051
	$\mathcal{B}(B_s^0 \to K^{*-}K^+)/\mathcal{B}(B^0 \to K^{*+}\pi^-)$			$1.49 \pm 0.22 \pm 0.18$ [11]	1.49 ± 0.28
	$\mathcal{B}(B_s^0 \to K^{*-}\pi^+)/\mathcal{B}(B^0 \to K^{*+}\pi^-)$			$0.39 \pm 0.13 \pm 0.05$ [11]	0.39 ± 0.14
59	$\mathcal{B}(B_s^0 \to K^{*0}\overline{K}^{*0})/\mathcal{B}(B^0 \to K^{*+}\pi^-)$			$1.11 \pm 0.22 \pm 0.13$ [12]	1.11 ± 0.26
60	$\mathcal{B}(B_s^0 \to \phi\overline{K}^{*0})/\mathcal{B}(B^0 \to \phi K^{*0})$			$0.113 \pm 0.024 \pm 0.016$ [13]	0.113 ± 0.029
64	$\mathcal{B}(B_s^0 \to \phi\gamma)/\mathcal{B}(B^0 \to K^{*0}\gamma)$			$0.81 \pm 0.04 \pm 0.07$ [16]	0.81 ± 0.08
70	$\mathcal{B}(B_s^0 \to \phi\mu^+\mu^-)/\mathcal{B}(B_s^0 \to J/\psi\phi) \times 10^4$	7.1 ± 1.3		$7.41^{+0.42}_{-0.40} \pm 0.29$ [27]	$7.41^{+0.51}_{-0.49}$
	$\mathcal{B}(B_s^0 \to K_S^0K^{*0})/\mathcal{B}(B^0 \to K_S^0\pi^+\pi^-)$ †			$0.33 \pm 0.07 \pm 0.04$ [29]	0.33 ± 0.08
	$\mathcal{B}(B_s^0 \to p\bar{p}K^+\pi^-)/\mathcal{B}(B^0 \to p\bar{p}K^+\pi^-)$			$0.22 \pm 0.04 \pm 0.02 \pm 0.01$ [32]	0.22 ± 0.05
	$\mathcal{B}(B_s^0 \to p\bar{p}K^+\pi^-)/\mathcal{B}(B_s^0 \to p\bar{p}K^+K^-)$			$0.31 \pm 0.05 \pm 0.02$ [32]	0.31 ± 0.05

† Numerator includes two distinct decay processes: $\mathcal{B}(B_s^0 \to f) + \mathcal{B}(B_s^0 \to \bar{f})$.

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