Heavy FLavor AVeraging group (HFLAV) - May 2018

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

Preliminary Updated results not included in PDG Live as of Dec. 31, 2017

RPP#	Mode	PDG2017 Avg.	Belle		CDF		D0	LHCb		CMS	ATLAS	Our Avg.
85	$\pi^+\pi^-$	0.68 ± 0.08	< 12	[1]	$0.60 \pm 0.17 \pm 0.04$ ‡	[2]		$0.691 \pm 0.083 \pm 0.044$ ‡	[3]			0.671 ± 0.083
90	$\eta'\eta'$	33 ± 7						$33.1 \pm 7.0 \pm 1.2$ †	[4]			33.1 ± 7.1
91	$\phi f_0(980), f_0(980) \to \pi^+\pi^-$	1.12 ± 0.21						$1.12 \pm 0.18 \pm 0.11$	[5]			1.12 ± 0.21
92	$\phi f_2(1270), f_2(1270) \to \pi^+\pi^-$	$0.61^{+0.18}_{-0.15}$						$0.61^{+0.18}_{-0.14} \pm 0.06$	[5]			$0.61^{+0.19}_{-0.15}$
93	$\phi\rho^0(770)$	0.27 ± 0.08						$0.27 \pm 0.07 \pm 0.02$	[5]			0.27 ± 0.07
94	$\phi\pi^+\pi^-$	3.5 ± 0.5						$3.48 \pm 0.29 \pm 0.35$ [3]	[5]			3.48 ± 0.46
95	$\phi\phi$	18.7 ± 1.5			$19.1 \pm 2.6 \pm 1.6$ †	[6]		$18.4 \pm 0.5 \pm 1.8$ §	[7]			18.6 ± 1.6
96	π^+K^-	5.6 ± 0.6	< 26	[1]	$5.3 \pm 0.9 \pm 0.3$ †	[8]		$5.6 \pm 0.6 \pm 0.3$ †	[9]			5.5 ± 0.5
97	K^+K^-	25.4 ± 1.6	$38^{+10}_{-9} \pm 7$	[1]	$25.9 \pm 2.2 \pm 1.7$ †	[10]		$23.7 \pm 1.6 \pm 1.5$ †	[9]			24.8 ± 1.7
98	$K^0\overline{K}^0$	20 ± 6	$19.6^{+5.8}_{-5.1} \pm 1.0 \pm 2.0$ ‡	[11]								$19.6^{+6.2}_{-5.6}$
99	$K^0\pi^+\pi^-$	15 ± 4						$9.5 \pm 1.3 \pm 1.5 \pm 0.4$ §	[12]			9.5 ± 2.0
100	$K^0K^-\pi^+$ ¶	77 ± 10						$84.3 \pm 3.5 \pm 7.4 \pm 3.4$ §	[12]			84.3 ± 8.9
101	$K^{*-}\pi^+$	3.3 ± 1.2						$3.3 \pm 1.1 \pm 0.5$	[13]			3.3 ± 1.2
102	$K^{*\pm}K^{\mp}$	12.5 ± 2.6						$12.7 \pm 1.9 \pm 1.9$	[13]			12.7 ± 2.7
103	$K^0\overline{K}^{*0}$ ¶	16 ± 4						$16.4 \pm 3.4 \pm 2.3$	[14]			16.4 ± 4.1
104	$K^0K^+K^-$	< 3.5						< 2.5	[12]			< 2.5
106	$K^{*0}\overline{K}^{*0}$	11.1 ± 2.7						$10.8 \pm 2.1 \pm 1.4 \pm 0.6$ §	[15]			10.8 ± 2.6
107	$\phi\overline{K}^{*0}$	1.14 ± 0.3						$1.13 \pm 0.29 \pm 0.06$ †	[16]			1.13 ± 0.30
108	$p\overline{p}$	$0.028^{+0.022}_{-0.017}$						< 0.015	[17]			< 0.015
111	$\gamma\gamma$	< 3.1	< 3.1	[18]								< 3.1
112	$\phi\gamma$	35.2 ± 3.4	$36 \pm 5 \pm 7$	[18]				$35.1 \pm 3.5 \pm 1.2$ †	[19]			35.2 ± 3.4
113	$\mu^+\mu^-$	$0.0024^{+0.0009}_{-0.0007}$			$0.013^{+0.009}_{-0.007}$	[20]	< 0.012[21]	$0.0030 \pm 0.0006^{+0.0003}_{-0.0002}$	[22]	$0.0030^{+0.0010}_{-0.0009}$[23]	< 0.003 [1][24]	0.0031 ± 0.0007
114	e^+e^-	< 0.28			< 0.28	[25]						< 0.28
	$\tau^+\tau^-$							< 5200	[26]			< 5200
115	$\mu^+\mu^-\mu^+\mu^-$	< 0.012						< 0.0025 [1]	[27]			< 0.0025 [1]
117	$\phi\mu^+\mu^-$	0.83 ± 0.12					< 3.2 [28]	$0.797^{+0.045}_{-0.043} \pm 0.068$	[29]			$0.797^{+0.082}_{-0.080}$
118	$\pi^+\pi^-\mu^+\mu^-$	0.084 ± 0.017						$0.086 \pm 0.015 \pm 0.010$ [2]	[30]			0.086 ± 0.018
120	$e^{\pm}\mu^{\mp}$	< 0.011			< 0.20	[25]		< 0.0054	[31]			< 0.0054
	$p\overline{\Lambda}K^- + \overline{p}\Lambda K^+$							$5.46 \pm 0.61 \pm 0.57 \pm 0.50 \pm 0.32$ [4]	[32]			5.46 ± 1.02
	$p\overline{p}K^+K^-$							$4.2 \pm 0.3 \pm 0.2 \pm 0.3 \pm 0.2$ [4]	[33]			4.2 ± 0.5
	$p\overline{p}K^+\pi^-$							$1.30 \pm 0.21 \pm 0.11 \pm 0.09 \pm 0.08$ [4]	[33]			1.30 ± 0.27
	$p\overline{p}\pi^+\pi^-$							< 0.66	[33]			< 0.66
	$\eta'\phi$							< 0.82	[34]			< 0.82
	$\overline{K}^{*0}\mu^+\mu^-$							$0.029 \pm 0.010 \pm 0.002 \pm 0.003$ §	[35]			0.029 ± 0.011

Channels with no RPP# are not reported by PDG.
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) - May 2018

Compilation of B_s^0 Relative Branching Fractions

Preliminary Updated results not included in PDG Live as of Dec. 31, 2017

RPP#	Mode	PDG2017 Avg.	CDF		LHCb		Our Avg.
85/257	$f_s\mathcal{B}(B_s^0 \to \pi^+\pi^-)/f_d\mathcal{B}(B^0 \to K^+\pi^-)$		$0.008 \pm 0.002 \pm 0.001$	[2]	$0.00915 \pm 0.00071 \pm 0.00083$	[3]	0.00880 ± 0.00090
85/387	$f_s\mathcal{B}(B_s^0 \to \pi^+\pi^-)/f_d\mathcal{B}(B^0 \to \pi^+\pi^-)$				$0.050^{+0.011}_{-0.009} \pm 0.004$	[9]	$0.050^{+0.012}_{-0.010}$
95/46	$\mathcal{B}(B_s^0 \to \phi\phi)/\mathcal{B}(B_s^0 \to J/\psi\phi)$		$0.0178 \pm 0.0014 \pm 0.0020$	[6]			0.0180 ± 0.0020
95/343	$\mathcal{B}(B_s^0 \to \phi\phi)/\mathcal{B}(B^0 \to \phi K^*)$				$1.84 \pm 0.05 \pm 0.13$	[30]	1.84 ± 0.14
96/257	$f_s\mathcal{B}(B_s^0 \to K^+\pi^-)/f_d\mathcal{B}(B_d^0 \to K^+\pi^-)$		$0.071 \pm 0.010 \pm 0.007$	[8]	$0.074 \pm 0.006 \pm 0.006$	[9]	0.073 ± 0.007
97/257	$f_s\mathcal{B}(B_s^0 \to K^+K^-)/f_d\mathcal{B}(B_d^0 \to K^+\pi^-)$		$0.347 \pm 0.020 \pm 0.021$	[10]	$0.316 \pm 0.009 \pm 0.019$	[9]	0.327 ± 0.017
99/291	$\mathcal{B}(B_s^0 \to K^0\pi^+\pi^-)/\mathcal{B}(B^0 \to K^0\pi^+\pi^-)$				$0.191 \pm 0.027 \pm 0.031 \pm 0.011$	[12]	0.191 ± 0.043
100/322	$\mathcal{B}(B_s^0 \to K^0K^-\pi^+)/\mathcal{B}(B^0 \to K^0K^-\pi^+)$ †				$1.70 \pm 0.07 \pm 0.11 \pm 0.10$	[12]	1.70 ± 0.16
101/294	$\mathcal{B}(B_s^0 \to K^{*-}\pi^+)/\mathcal{B}(B^0 \to K^{*+}\pi^-)$				$0.39 \pm 0.13 \pm 0.05$	[13]	0.39 ± 0.14
102/294	$\mathcal{B}(B_s^0 \to K^{*-}K^+)/\mathcal{B}(B^0 \to K^{*+}\pi^-)$				$1.49 \pm 0.22 \pm 0.18$	[13]	1.49 ± 0.28
103/291	$\mathcal{B}(B_s^0 \to K_S^0K^{*0})/\mathcal{B}(B^0 \to K_S^0\pi^+\pi^-)$ †				$0.33 \pm 0.07 \pm 0.04$	[14]	0.33 ± 0.08
104/329	$\mathcal{B}(B_s^0 \to K^0K^+K^-)/\mathcal{B}(B^0 \to K^0K^+K^-)$				< 0.051	[12]	< 0.051
106/294	$\mathcal{B}(B_s^0 \to K^{*0}\overline{K}^{*0})/\mathcal{B}(B^0 \to K^{*+}\pi^-)$				$1.11 \pm 0.22 \pm 0.13$	[15]	1.11 ± 0.26
107/343	$\mathcal{B}(B_s^0 \to \phi\overline{K}^{*0})/\mathcal{B}(B^0 \to \phi K^{*0})$				$0.113 \pm 0.024 \pm 0.016$	[16]	0.113 ± 0.029
112/371	$\mathcal{B}(B_s^0 \to \phi\gamma)/\mathcal{B}(B^0 \to K^{*0}\gamma)$				$0.81 \pm 0.04 \pm 0.07$	[19]	0.81 ± 0.08
117/46	$\mathcal{B}(B_s^0 \to \phi\mu^+\mu^-)/\mathcal{B}(B_s^0 \to J/\psi\phi) \times 10^3$	0.76 ± 0.09	$1.13^{+0.19}_{-0.07}$	[36]	$0.741^{+0.042}_{-0.040} \pm 0.029$	[29]	0.876 ± 0.041
	$\mathcal{B}(B_s^0 \to p\bar{p}K^+\pi^-)/\mathcal{B}(B^0 \to p\bar{p}K^+\pi^-)$				$0.22 \pm 0.04 \pm 0.02 \pm 0.01$	[33]	0.22 ± 0.05
	$\mathcal{B}(B_s^0 \to p\bar{p}K^+\pi^-)/\mathcal{B}(B_s^0 \to p\bar{p}K^+K^-)$				$0.31 \pm 0.05 \pm 0.02$	[33]	0.31 ± 0.05
	$\mathcal{B}(B_s^0 \to \overline{K}^{*0}\mu^+\mu^-)/\mathcal{B}(B_s^0 \to J/\psi\overline{K}^{*0})$ ¶				$0.014 \pm 0.004 \pm 0.001 \pm 0.001$ ‡	[35]	0.014 ± 0.004
	$\mathcal{B}(B_s^0 \to \overline{K}^{*0}\mu^+\mu^-)/(\mathcal{B}(\overline{B}^0 \to \overline{K}^{*0}\mu^+\mu^-)$				$0.033 \pm 0.011 \pm 0.003 \pm 0.002$ §	[35]	0.033 ± 0.012

Channels with no RPP# are not reported by PDG.

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

¶ The denominator is multiplied by $\mathcal{B}(J/\psi \to \mu^+\mu^-)$.

‡ Last error is from the S-wave fraction in $B_s^0 \to \overline{K}^{*0}\mu^+\mu^-$ and $B_s^0 \to J/\psi\overline{K}^{*0}$.

§ Last error is from the S-wave fraction in $B_s^0 \to \overline{K}^{*0}\mu^+\mu^-$ and $\overline{B}^0 \to \overline{K}^{*0}\mu^+\mu^-$, and f_d/f_s.

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