B^0_s

$I(J^P) = 0(0^-)$

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

B^0_s MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
5366.92±0.10 OUR FIT					
5366.91±0.11 OUR AVERAGE					
5366.98±0.07±0.13		[1] AAIJ	21C	LHCB	pp at 7, 8, 13 TeV
5366.85±0.19±0.13		[2] AAIJ	19U	LHCB	pp at 7, 8, 13 TeV
5366.83±0.25±0.27		[3] AAIJ	18AC	LHCB	pp at 7, 8, 13 TeV
5367.08±0.38±0.15	128	[4] AAIJ	16U	LHCB	pp at 7, 8 TeV
5366.90±0.28±0.23		[5] AAIJ	12E	LHCB	pp at 7 TeV
5364.4 ±1.3 ±0.7		LOUVOT	09	BELL	$e^+e^- \to \Upsilon(5S)$
5366.01±0.73±0.33		[6] ACOSTA	06	CDF	$p\overline{p}$ at 1.96 TeV
5369.9 ±2.3 ±1.3	32	[7] ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV
5374 ±16 ±2	3	ABREU	94D	DLPH	$e^+e^- \to Z$
5359 ±19 ±7	1	[7] AKERS	94J	OPAL	$e^+e^- \to Z$
5368.6 ±5.6 ±1.5	2	BUSKULIC	93G	ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5370 ±1 ±3		DRUTSKOY	07A	BELL	Repl. by LOUVOT 09
5370 ±40	6	[8] AKERS	94J	OPAL	$e^+e^- \to Z$
5383.3 ±4.5 ±5.0	14	ABE	93F	CDF	Repl. by ABE 96B

[1] Uses $B^0_s \to J/\psi \pi^+\pi^- K^+K^-$ decays.
[2] Uses $B^0_s \to J/\psi p\overline{p}$ decays.
[3] Uses $B_s \to \chi_{c1} K^+K^-$ mode.
[4] Uses $J/\psi \to \mu^+\mu^-$, $\phi \to K^+K^-$ decays, and observes 128 ± 13 events of $B^0_s \to J/\psi\phi\phi$.
[5] Uses $B^0_s \to J/\psi\phi$ fully reconstructed decays.
[6] Uses exclusively reconstructed final states containing a $J/\psi \to \mu^+\mu^-$ decays.
[7] From the decay $B_s \to J/\psi(1S)\phi$.
[8] From the decay $B_s \to D^-_s \pi^+$.

$m_{B^0_s} - m_B$

m_B is the average of our B masses $(m_{B^\pm}+m_{B^0})/2$.

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
87.42±0.14 OUR FIT					
87.42±0.24 OUR AVERAGE					
87.60±0.44±0.09		[1] AAIJ	15U	LHCB	pp at 7, 8 TeV
87.42±0.30±0.09		[2] AAIJ	12E	LHCB	pp at 7 TeV
86.64±0.80±0.08		[3] ACOSTA	06	CDF	$p\overline{p}$ at 1.96 TeV
• • • We use the following data for averages but not for fits. • • •					
89.7 ±2.7 ±1.2		ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

80 to 130	68	LEE-FRANZINI 90	CSB2	$e^+e^- \to \Upsilon(5S)$

[1] The reported result is $m_{B^0_s} - m_{B^0} = 87.45 \pm 0.44 \pm 0.09$ MeV. We convert it to the mass difference with respect to the average of $(m_{B^\pm} + m_{B^0})/2$. Uses the mode $B^0_s \to \psi(2S)K^-\pi^+$.

[2] The reported result is $m_{B^0_s} - m_{B^+} = 87.52 \pm 0.30 \pm 0.12$ MeV. We convert it to the mass difference with respect to the average of $(m_{B^\pm} + m_{B^0})/2$.

[3] The reported result is $m_{B^0_s} - m_{B^0} = 86.38 \pm 0.90 \pm 0.06$ MeV. We convert it to the mass difference with respect to the average of $(m_{B^\pm} + m_{B^0})/2$.

$m_{B^0_{sH}} - m_{B^0_{sL}}$

See the B^0_s-$\overline{B}^0_s$ MIXING section near the end of these B^0_s Listings.

B^0_s MEAN LIFE

"OUR EVALUATION" is provided by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/).

The mean B^0_s lifetime is defined and computed as $1/\Gamma_{B^0_s}$, where $\Gamma_{B^0_s}$ is the average decay width of the B^0_s mass eigenstates.

VALUE (10^{-12} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.520±0.005 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.518 \pm 0.041 \pm 0.027$		[1] AALTONEN	11AP	CDF	$p\overline{p}$ at 1.96 TeV
$1.398 \pm 0.044 ^{+0.028}_{-0.025}$		[2] ABAZOV	06V	D0	$p\overline{p}$ at 1.96 TeV
$1.42 ^{+0.14}_{-0.13} \pm 0.03$		[3] ABREU	00Y	DLPH	$e^+e^- \to Z$
$1.53 ^{+0.16}_{-0.15} \pm 0.07$		[4] ABREU,P	00G	DLPH	$e^+e^- \to Z$
$1.36 \pm 0.09 ^{+0.06}_{-0.05}$		[5] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
$1.72 ^{+0.20}_{-0.19} {}^{+0.18}_{-0.17}$		[6] ACKERSTAFF	98F	OPAL	$e^+e^- \to Z$
$1.50 ^{+0.16}_{-0.15} \pm 0.04$		[5] ACKERSTAFF	98G	OPAL	$e^+e^- \to Z$
$1.47 \pm 0.14 \pm 0.08$		[4] BARATE	98C	ALEP	$e^+e^- \to Z$
1.51 ± 0.11		[7] BARATE	98C	ALEP	$e^+e^- \to Z$
$1.56 ^{+0.29}_{-0.26} {}^{+0.08}_{-0.07}$		[5] ABREU	96F	DLPH	Repl. by ABREU 00Y
$1.65 ^{+0.34}_{-0.31} \pm 0.12$		[4] ABREU	96F	DLPH	Repl. by ABREU 00Y
$1.76 \pm 0.20 ^{+0.15}_{-0.10}$		[8] ABREU	96F	DLPH	Repl. by ABREU 00Y
$1.60 \pm 0.26 ^{+0.13}_{-0.15}$		[9] ABREU	96F	DLPH	Repl. by ABREU,P 00G

1.67 ±0.14			[10] ABREU	96F	DLPH	$e^+e^- \to Z$
1.61 $^{+0.30}_{-0.29}$	$^{+0.18}_{-0.16}$	90	[4] BUSKULIC	96E	ALEP	Repl. by BARATE 98C
1.54 $^{+0.14}_{-0.13}$	±0.04		[5] BUSKULIC	96M	ALEP	$e^+e^- \to Z$
1.42 $^{+0.27}_{-0.23}$	±0.11	76	[5] ABE	95R	CDF	Repl. by ABE 99D
1.74 $^{+1.08}_{-0.69}$	±0.07	8	[11] ABE	95R	CDF	Sup. by ABE 96N
1.54 $^{+0.25}_{-0.21}$	±0.06	79	[5] AKERS	95G	OPAL	Repl. by ACKERSTAFF 98G
1.59 $^{+0.17}_{-0.15}$	±0.03	134	[5] BUSKULIC	95O	ALEP	Sup. by BUSKULIC 96M
0.96 ±0.37		41	[12] ABREU	94E	DLPH	Sup. by ABREU 96F
1.92 $^{+0.45}_{-0.35}$	±0.04	31	[5] BUSKULIC	94C	ALEP	Sup. by BUSKULIC 95O
1.13 $^{+0.35}_{-0.26}$	±0.09	22	[5] ACTON	93H	OPAL	Sup. by AKERS 95G

[1] AALTONEN 11AP combines the fully reconstrcuted $B^0_s \to D^-_s\pi^+$ decays and partially reconstructed $B^0_s \to D_s X$ decays.
[2] Measured using $D_s\mu^+$ vertices.
[3] Uses $D^-_s\ell^+$, and $\phi\ell^+$ vertices.
[4] Measured using D_s hadron vertices.
[5] Measured using $D^-_s\ell^+$ vertices.
[6] ACKERSTAFF 98F use fully reconstructed $D^-_s \to \phi\pi^-$ and $D^-_s \to K^{*0}K^-$ in the inclusive B^0_s decay.
[7] Combined results from $D^-_s\ell^+$ and D_s hadron.
[8] Measured using $\phi\ell$ vertices.
[9] Measured using inclusive D_s vertices.
[10] Combined result for the four ABREU 96F methods.
[11] Exclusive reconstruction of $B_s \to \psi\phi$.
[12] ABREU 94E uses the flight-distance distribution of D_s vertices, ϕ-lepton vertices, and $D_s\mu$ vertices.

$\Gamma_{B^0_s}$

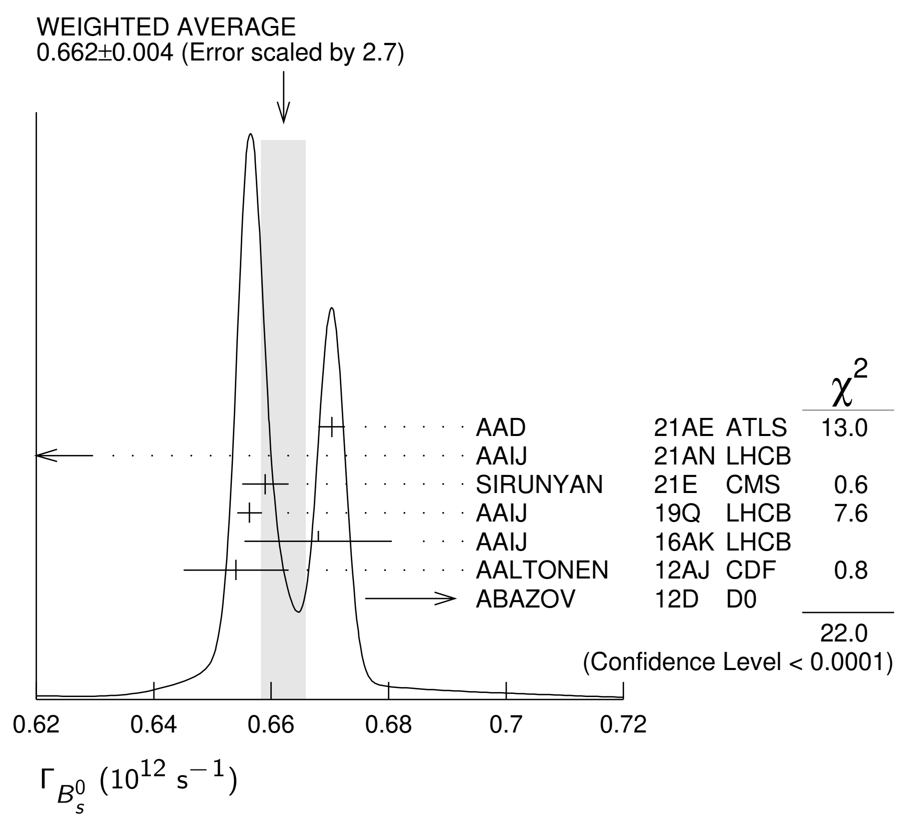
"OUR EVALUATION" is an average performed by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) as described in our "Review on B-$\overline{B}$ Mixing" in the B^0 section of these Listings. It includes the measurements of $\Gamma_{B^0_s}$ and $\Delta\Gamma_{B^0_s}$ listed in this section, as well as constraints from effective lifetimes with pure CP modes and flavor-specific modes.

VALUE (10^{12} s^{-1})	DOCUMENT ID		TECN	COMMENT
0.6578±0.0024 OUR EVALUATION Error includes scale factor of 2.6.				
0.662 ±0.004 OUR AVERAGE Error includes scale factor of 2.7. See the ideogram below.				
0.6703±0.0014±0.0018	[1] AAD	21AE	ATLS	pp at 7, 8, 13 TeV
0.608 ±0.018 ±0.012	[2] AAIJ	21AN	LHCB	pp at 7, 8 TeV

$0.6590 \pm 0.0032 \pm 0.0023$	[1] SIRUNYAN	21E	CMS	pp at 8, 13 TeV
0.6563 ± 0.0021	[3] AAIJ	19Q	LHCB	pp at 7, 8, 13 TeV
$0.668 \pm 0.011 \pm 0.006$	[4] AAIJ	16AK	LHCB	pp at 7, 8 TeV
$0.654 \pm 0.008 \pm 0.004$	[1] AALTONEN	12AJ	CDF	$p\overline{p}$ at 1.96 TeV
$0.693 {}^{+0.018}_{-0.017}$	[1] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.6531 \pm 0.0042 \pm 0.0026$	[1] SIRUNYAN	21E	CMS	pp at 13 TeV
$0.650 \pm 0.006 \pm 0.004$	[3] AAIJ	17V	LHCB	Repl. by AAIJ 19Q
$0.675 \pm 0.003 \pm 0.003$	[1] AAD	16AP	ATLS	Repl. by AAD 21AE
$0.6704 \pm 0.0043 \pm 0.0055$	[1] KHACHATRY...	16S	CMS	pp at 8 TeV
$0.6603 \pm 0.0027 \pm 0.0015$	[5] AAIJ	15I	LHCB	Repl. by AAIJ 19Q
$0.677 \pm 0.007 \pm 0.004$	[1] AAD	14U	ATLS	Repl. by AAD 16AP
$0.661 \pm 0.004 \pm 0.006$	[6] AAIJ	13AR	LHCB	Repl. by AAIJ 15I
$0.677 \pm 0.007 \pm 0.004$	[1] AAD	12CV	ATLS	Repl. by AAD 14U
$0.657 \pm 0.009 \pm 0.008$	[1] AAIJ	12D	LHCB	Repl. by AAIJ 13AR
$0.654 \pm 0.011 \pm 0.005$	[1,7] AALTONEN	12D	CDF	Repl. by AALTONEN 12AJ
$0.672 \pm 0.027 \pm 0.013$	[1] ABAZOV	09E	D0	Repl. by ABAZOV 08AM
$0.658 \pm 0.017 \pm 0.009$	[1,8] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$0.658 \pm 0.022 \pm 0.004$	[1] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
$0.658 \pm 0.035 {}^{+0.0130}_{-0.004}$	[1,8] ABAZOV	07	D0	Repl. by ABAZOV 09E
$0.714 {}^{+0.007}_{-0.008} \pm 0.010$	[1,8] ACOSTA	05	CDF	Repl. by AALTONEN 08J



[1] Measured using a time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

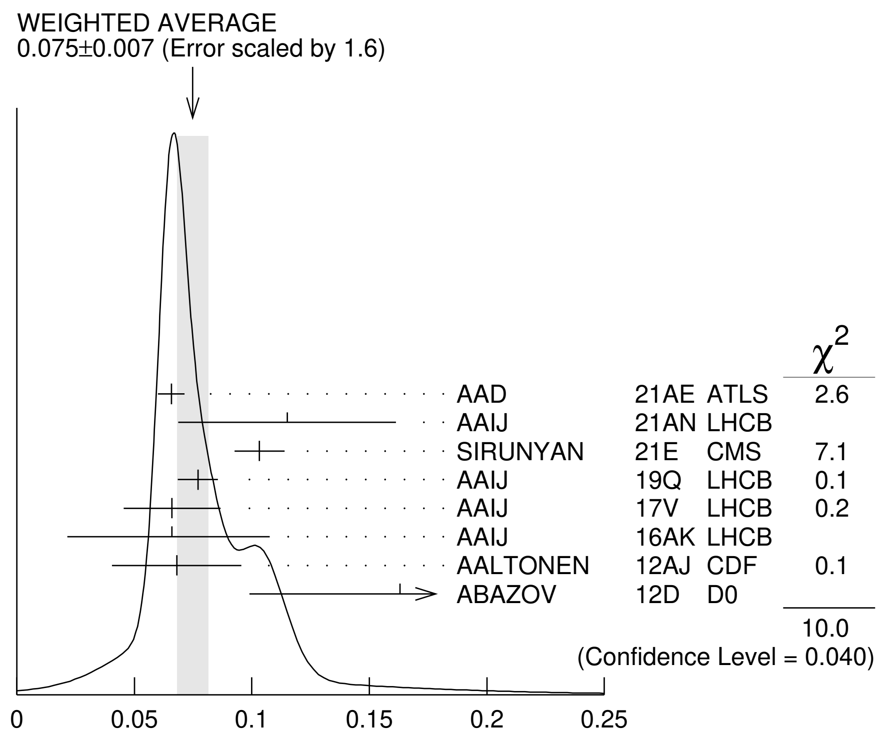
[2] Measured using a time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays with $J/\psi \to e^+e^-$.
[3] Measured using time-dependent angular analysis of $B_s^0 \to J/\psi K^+ K^-$ in the region m(KK) > 1.05 GeV.
[4] Measured using a time-dependent angular analysis of $B_s^0 \to \psi(2S)\phi$ decays.
[5] Measured using a time-dependent angular analysis of $B_s^0 \to J/\psi K^+ K^-$ decays.
[6] Measured using a combined time-dependent angular analysis of $B_s^0 \to J/\psi K^+ K^-$ and $B_s^0 \to J/\psi \pi^+ \pi^-$ decays.
[7] Assuming CPV phase $\phi_s = -0.04$.
[8] Assuming CPV phase $\phi_s = 0$.

$\Delta\Gamma_{B_s^0}$

"OUR EVALUATION" is an average performed by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) as described in our "Review on B-$\overline{B}$ Mixing" in the B^0 section of these Listings. It includes the measurements of $\Gamma_{B_s^0}$ and $\Delta\Gamma_{B_s^0}$ listed in this section, as well as constraints from effective lifetimes with pure CP modes and flavor-specific modes.

VALUE (10^{12} s^{-1})	DOCUMENT ID	TECN	COMMENT
0.084 ±0.005 OUR EVALUATION Error includes scale factor of 1.7.			
0.075 ±0.007 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.			
0.0657±0.0043±0.0037	[1] AAD 21AE	ATLS	pp at 7, 8, 13 TeV
0.115 ±0.045 ±0.011	[2] AAIJ 21AN	LHCB	pp at 7, 8 TeV
0.1032±0.0095±0.0048	[1] SIRUNYAN 21E	CMS	pp at 8, 13 TeV
0.077 ±0.008 ±0.003	[3] AAIJ 19Q	LHCB	pp at 13 TeV
0.066 ±0.018 ±0.010	[4] AAIJ 17V	LHCB	pp at 7, 8 TeV
0.066 $^{+0.041}_{-0.044}$ ±0.007	[5] AAIJ 16AK	LHCB	pp at 7, 8 TeV
0.068 ±0.026 ±0.009	[1] AALTONEN 12AJ	CDF	$p\overline{p}$ at 1.96 TeV
0.163 $^{+0.065}_{-0.064}$	[1,6] ABAZOV 12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.114 ±0.014 ±0.007	[1] SIRUNYAN 21E	CMS	pp at 13 TeV
0.085 ±0.011 ±0.007	[1] AAD 16AP	ATLS	Repl. by AAD 21AE
0.095 ±0.013 ±0.007	[1] KHACHATRY... 16S	CMS	pp at 8 TeV
0.0805±0.0091±0.0032	[3] AAIJ 15I	LHCB	Repl. by AAIJ 19Q
0.053 ±0.021 ±0.010	[1] AAD 14U	ATLS	Repl. by AAD 16AP
0.106 ±0.011 ±0.007	[7] AAIJ 13AR	LHCB	Repl. by AAIJ 15I
0.053 ±0.021 ±0.010	[1] AAD 12CV	ATLS	Repl. by AAD 14U
0.123 ±0.029 ±0.011	[1] AAIJ 12D	LHCB	Repl. by AAIJ 13AR
0.075 ±0.035 ±0.006	[8] AALTONEN 12D	CDF	Repl. by AALTONEN 12AJ
0.085 $^{+0.072}_{-0.078}$ ±0.001	[9] ABAZOV 09E	D0	Repl. by ABAZOV 08AM
0.076 $^{+0.059}_{-0.063}$ ±0.006	[10] AALTONEN 08J	CDF	Repl. by AALTONEN 12D

0.19	± 0.07	$^{+0.02}_{-0.01}$	[1,11] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
0.12	$^{+0.08}_{-0.10}$	± 0.02	[10,12] ABAZOV	07	D0	Repl. by ABAZOV 07N
0.13	± 0.09		[13] ABAZOV	07N	D0	Repl. by ABAZOV 09E
0.47	$^{+0.19}_{-0.24}$	± 0.01	[10] ACOSTA	05	CDF	Repl. by AALTONEN 08J



$\Delta\Gamma_{B^0_s}$ (10^{12} s^{-1})

[1] Measured using the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[2] Measured using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays with $J/\psi \to e^+e^-$.

[3] Measured using time-dependent angular analysis of $B^0_s \to J/\psi K^+K^-$ decays.

[4] Measured using time-dependent angular analysis of $B^0_s \to J/\psi K^+K^-$ in the region m$(KK) > 1.05$ GeV.

[5] Measured using time-dependent angular analysis of $B^0_s \to \psi(2S)\phi$ decays.

[6] The error includes both statistical and systematic uncertainties.

[7] AAIJ 13AR result comes from a combined fit to $B^0_s \to J/\psi K^+K^-$ and $B^0_s \to J/\psi\pi^+\pi^-$ data sets. Also reports $\Delta\Gamma_s = 0.100 \pm 0.016 \pm 0.003$ ps^{-1} from a fit to $B^0_s \to J/\psi K^+K^-$ decays.

[8] Uses the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays and assuming *CP*-violating angle $\beta_s(B^0 \to J/\psi\phi) = 0.02$.

[9] Measured the angular and lifetime parameters for the time-dependent angular untagged decays $B^0_d \to J/\psi K^{*0}$ and $B^0_s \to J/\psi\phi$.

[10] Measured using the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays and assuming *CP*-violating phase $\phi_s = 0$.

[11] Obtaines 90% CL interval $-0.06 < \Delta\Gamma_s < 0.30$.
[12] ABAZOV 07 reports $0.17 \pm 0.09 \pm 0.02$ with *CP*-violating phase ϕ_s as a free parameter.
[13] Combines D^0 measurements of time-dependent angular distributions in $B_s^0 \rightarrow J/\psi\phi$ and charge asymmetry in semileptonic decays. There is a 4-fold ambiguity in the solution.

$\Delta\Gamma_{B_s^0}/\Gamma_{B_s^0}$

$\Gamma_{B_s^0}$ and $\Delta\Gamma_{B_s^0}$ are the decay rate average and difference between two B_s^0 *CP* eigenstates (light − heavy).

"OUR EVALUATION" is provided by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/). It is derived from the averages of $\Gamma_{B_s^0}$ and $\Delta\Gamma_{B_s^0}$ (and their correlation).

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.128±0.007 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.090 \pm 0.009 \pm 0.023$		[1] ESEN	13	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
		[2] AAIJ	12D	LHCB	pp at 7 TeV
		[3] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
		[4] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
$0.147^{+0.036}_{-0.030}{}^{+0.042}_{-0.041}$		[1] ESEN	10	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
$0.072 \pm 0.021 \pm 0.022$		[5] ABAZOV	09I	D0	$p\overline{p}$ at 1.96 TeV
>0.012	95	[5] AALTONEN	08F	CDF	$p\overline{p}$ at 1.96 TeV
$0.116^{+0.09}_{-0.10} \pm 0.010$		[6] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$0.079^{+0.038}_{-0.035}{}^{+0.031}_{-0.030}$		[5] ABAZOV	07Y	D0	Repl. by ABAZOV 09I
$0.24\ ^{+0.28}_{-0.38}\ ^{+0.03}_{-0.04}$		[6,7] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$0.65\ ^{+0.25}_{-0.33} \pm 0.01$		[6] ACOSTA	05	CDF	Repl. by AALTONEN 08J
<0.46	95	[8] ABREU	00Y	DLPH	$e^+e^- \rightarrow Z$
<0.69	95	[9] ABREU,P	00G	DLPH	$e^+e^- \rightarrow Z$
$0.25\ ^{+0.21}_{-0.14}$		[10] BARATE	00K	ALEP	$e^+e^- \rightarrow Z$
<0.83	95	[11] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
<0.67	95	[12] ACCIARRI	98S	L3	$e^+e^- \rightarrow Z$

[1] Assumes *CP* violation is negligible.
[2] Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays.
[3] Uses the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays and assuming *CP*-violating angle $\beta_s(B^0 \rightarrow J/\psi\phi) = 0.02$.
[4] Measured using fully reconstructed $B_s \rightarrow J/\psi\phi$ decays.
[5] Assumes $2\,B(B_s^0 \rightarrow D_s^{(*)} D_s^{(*)}) \simeq \Delta\Gamma_s^{CP} / \Gamma_s$.
[6] Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays.
[7] Uses $|A_0|^2 - |A_{||}|^2 = 0.355 \pm 0.066$ from ACOSTA 05.
[8] Uses $D_s^- \ell^+$, and $\phi\ell^+$ vertices.
[9] Measured using D_s hadron vertices.

[10] Uses $\phi\phi$ correlations from $B^0_s \to D^{(*)+}_s D^{(*)-}_s$.
[11] ABE 99D assumes $\tau_{B^0_s} = 1.55 \pm 0.05$ ps.
[12] ACCIARRI 98S assumes $\tau_{B^0_s} = 1.49 \pm 0.06$ ps and PDG 98 values of b production fraction.

B^0_{sH} MEAN LIFE

B^0_{sH} is the heavy mass state of two B^0_s CP eigenstates.

"OUR EVALUATION" is provided by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/). It is derived from the averages of $\Gamma_{B^0_s}$ and $\Delta\Gamma_{B^0_s}$ (and their correlation).

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.624±0.009 OUR EVALUATION				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.07 \pm 0.29 \pm 0.03$	[1] AAIJ	22	LHCB	pp at 7, 8, 13 TeV
$1.70\ ^{+0.60}_{-0.43} \pm 0.09$	[1] SIRUNYAN	20AG	CMS	pp at 7, 8, 13 TeV
$1.677 \pm 0.034 \pm 0.011$	[2] SIRUNYAN	18BY	CMS	pp at 8 TeV
$2.04 \pm 0.44 \pm 0.05$	[1] AAIJ	17AI	LHCB	pp at 7, 8, 13 TeV
$1.70 \pm 0.14 \pm 0.05$	[3] ABAZOV	16C	D0	$p\overline{p}$ at 1.96 TeV
$1.75 \pm 0.12 \pm 0.07$	[4] AAIJ	13AB	LHCB	pp at 7 TeV
$1.652 \pm 0.024 \pm 0.024$	[5] AAIJ	13AR	LHCB	pp at 7 TeV
$1.700 \pm 0.040 \pm 0.026$	[6] AAIJ	12AN	LHCB	pp at 7 TeV
	[7] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$1.70\ ^{+0.12}_{-0.11} \pm 0.03$	[6] AALTONEN	11AB	CDF	$p\overline{p}$ at 1.96 TeV
$1.613\ ^{+0.123}_{-0.113}$	[8,9] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$1.58\ ^{+0.39}_{-0.42}\ ^{+0.01}_{-0.02}$	[9] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$2.07\ ^{+0.58}_{-0.46} \pm 0.03$	[9] ACOSTA	05	CDF	Repl. by AALTONEN 08J

[1] Measured using $B_s \to \mu^+\mu^-$ decays which, in the Standard Model, correspond to B^0_{sH} decays. Assumes $-2\ \mathrm{Re}(\lambda)/(1 + |\lambda|^2) = 1$.
[2] Measured using $B^0_s \to J/\psi\pi^+\pi^-$ decays with $0.9240 < \mathrm{m}(\pi\pi) < 1.0204$ GeV, which is dominated by the $f_0(980)$ resonance, making it a CP-odd state.
[3] Measured using $J/\psi\pi^+\pi^-$ mode with $0.880 < m(\pi\pi) < 1.080$ GeV/c^2, which is mostly $J/\psi f(0)(980)$ mode, a pure CP-odd final state.
[4] Measured using a pure CP-odd final state $J/\psi K^0_S$ with the assumption that contributions from penguin diagrams are small.
[5] Measured using $B_s \to J/\psi\pi^+\pi^-$ decays which, in the limit of $\phi_s = 0$ and $|\lambda| = 1$, correspond to B^0_{sH} decays.
[6] Measured using a pure CP-odd final state $J/\psi f_0(980)$.
[7] Uses the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays assuming CP-violating angle $\beta_s(B^0 \to J/\psi\phi) = 0.02$.
[8] Obtained from $\Delta\Gamma_s$ and Γ_s fit with a correlation of 0.6.
[9] Measured using the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

B^0_{sL} MEAN LIFE

B^0_{sL} is the light mass state of two B^0_s *CP* eigenstates.

"OUR EVALUATION" is provided by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/). It is derived from the averages of $\Gamma_{B^0_s}$ and $\Delta\Gamma_{B^0_s}$ (and their correlation).

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.429±0.007 OUR EVALUATION				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.40 ±0.02	[1] SIRUNYAN	18BY	CMS	pp at 8 TeV
1.479±0.034±0.011	[2] AAIJ	16AL	LHCB	pp at 7, 8 TeV
1.379±0.026±0.017	[3] AAIJ	14F	LHCB	pp at 7, 8 TeV
1.407±0.016±0.007	[4] AAIJ	14R	LHCB	pp at 7 TeV
1.440±0.096±0.009	[4] AAIJ	12	LHCB	Repl. by AAIJ 14R
1.455±0.046±0.006	[4] AAIJ	12R	LHCB	Repl. by AAIJ 14R
	[5] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$1.437^{+0.054}_{-0.047}$	[6,7] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$1.24\ ^{+0.14}_{-0.11}\ ^{+0.01}_{-0.02}$	[7] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$1.05\ ^{+0.16}_{-0.13}\ \pm0.02$	[7] ACOSTA	05	CDF	Repl. by AALTONEN 08J
1.27 ±0.33 ±0.08	[8] BARATE	00K	ALEP	$e^+e^- \rightarrow Z$

[1] Measured using results in SIRUNYAN 18BY for the heavy B^0_s lifetime obtained from $B^0_s \rightarrow J/\psi\pi^+\pi^-$ decays and the average effective $B^0_s \rightarrow J/\psi\phi$ lifetime, and magnitude squared of the *CP*-odd amplitude $|A_\perp|^2 = 0.250 \pm 0.006$. The uncertainty includes all statistical and systematic contributions.

[2] Measured using $B^0_s \rightarrow J/\psi\eta$ decays.

[3] Measured using $B^0_s \rightarrow D^-_s D^+_s$. The effective lifetime is translated into a decay width of $\Gamma_L = 0.725 \pm 0.014 \pm 0.009\ \text{ps}^{-1}$.

[4] Measured using $B^0_s \rightarrow K^+K^-$ decays. There may still be CPV in the decay.

[5] Uses the time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays and assuming *CP*-violating angle $\beta_s(B^0 \rightarrow J/\psi\phi) = 0.02$.

[6] Obtained from $\Delta\Gamma_s$ and Γ_s fit with a correlation of 0.6.

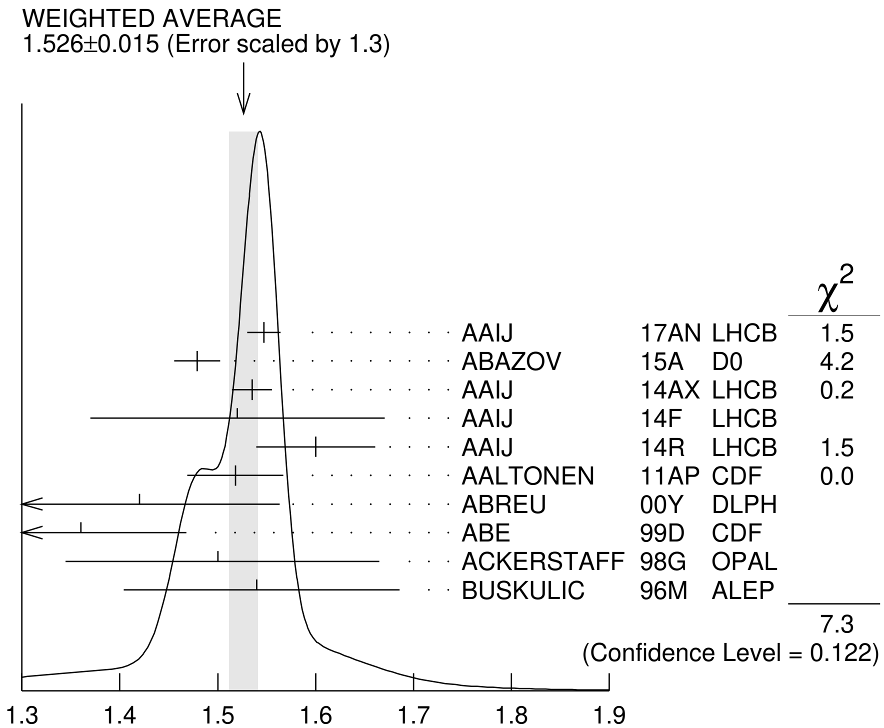
[7] Measured using the time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays.

[8] Uses $\phi\phi$ correlations from $B^0_s \rightarrow D^{(*)+}_s D^{(*)-}_s$.

B^0_s MEAN LIFE (Flavor specific)

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.527±0.011 OUR EVALUATION				
1.526±0.015 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
1.547±0.013±0.011	[1] AAIJ	17AN	LHCB	pp at 7, 8 TeV
1.479±0.010±0.021	[2] ABAZOV	15A	D0	$p\overline{p}$ at 1.96 TeV
1.535±0.015±0.014	[3] AAIJ	14AX	LHCB	pp at 7 TeV
1.52 ±0.15 ±0.01	[4] AAIJ	14F	LHCB	pp at 7, 8 TeV
1.60 ±0.06 ±0.01	[5] AAIJ	14R	LHCB	pp at 7 TeV

$1.518 \pm 0.041 \pm 0.027$	[6] AALTONEN	11AP	CDF	$p\overline{p}$ at 1.96 TeV
$1.42\ ^{+0.14}_{-0.13}\ \pm 0.03$	[7] ABREU	00Y	DLPH	$e^+ e^- \to Z$
$1.36\ \pm 0.09\ ^{+0.06}_{-0.05}$	[8] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
$1.50\ ^{+0.16}_{-0.15}\ \pm 0.04$	[8] ACKERSTAFF	98G	OPAL	$e^+ e^- \to Z$
$1.54\ ^{+0.14}_{-0.13}\ \pm 0.04$	[8] BUSKULIC	96M	ALEP	$e^+ e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.398 \pm 0.044\ ^{+0.028}_{-0.025}$	[9] ABAZOV	06V	D0	Repl. by ABAZOV 15A



B^0_s MEAN LIFE (Flavor specific) (10^{-12} s)

[1] AAIJ 17AN value was measured using $B^0_s \to D^{(*)-}_s \mu^+ \nu_\mu$ decays relative to $B^0 \to D^{(*)-} \mu^+ \nu_\mu$ decays.

[2] Measured using $B^0_s \to D^-_s \mu^+ \nu_\mu X$ decays.

[3] Measured using the $B^0_s \to D^-_s \pi^+$ decays.

[4] Measured using $B^0_s \to D^+ D^-_s$.

[5] Measured using $B^0_s \to \pi^+ K^-$ decays.

[6] AALTONEN 11AP combines the fully reconstrcuted $B^0_s \to D^-_s \pi^+$ decays and partially reconstructed $B^0_s \to D_s X$ decays.

[7] Uses $D^-_s \ell^+$, and $\phi \ell^+$ vertices.

[8] Measured using $D^-_s \ell^+$ vertices.

[9] Measured using $D^-_s \mu^+$ vertices.

B_s^0 MEAN LIFE ($B_S \to J/\psi\phi$)

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.480±0.007 OUR EVALUATION				
1.480±0.007 OUR AVERAGE				
1.481±0.007±0.005	[1] SIRUNYAN	18BY	CMS	pp at 8 TeV
1.480±0.011±0.005	[1] AAIJ	14E	LHCB	pp at 7 TeV
$1.444^{+0.098}_{-0.090}\pm0.020$	[1] ABAZOV	05B	D0	$p\overline{p}$ at 1.96 TeV
$1.34\ ^{+0.23}_{-0.19}\ \pm0.05$	[2] ABE	98B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.39\ ^{+0.13}_{-0.16}\ ^{+0.01}_{-0.02}$	[2] ABAZOV	05W	D0	$p\overline{p}$ at 1.96 TeV
$1.34\ ^{+0.23}_{-0.19}\ \pm0.05$	[3] ABE	96N	CDF	Repl. by ABE 98B

[1] Measured using fully reconstructed $B_s \to J/\psi\phi$ decays.
[2] Measured using the time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.
[3] ABE 96N uses 58 ± 12 exclusive $B_s \to J/\psi\phi$ events.

$\tau_{B_s^0}/\tau_{B^0}$ MEAN LIFE RATIO

$\tau_{B_s^0}/\tau_{B^0}$ (direct measurements)

VALUE	DOCUMENT ID		TECN	COMMENT
0.980±0.006±0.003	[1] SIRUNYAN	18BY	CMS	pp at 8 TeV

[1] Measured using $B_s^0 \to J/\psi\phi(1020)$ and $B^0 \to J/\psi K^*(892)^0$ decays.

$\Gamma_{B_s^0} - \Gamma_{B^0}$

VALUE (10^{12} s^{-1})	DOCUMENT ID		TECN	COMMENT
−0.0041±0.0024±0.0015	[1] AAIJ	19Q	LHCB	pp at 13 TeV

[1] Measured using time-dependent angular analysis of $B_s^0 \to J/\psi K^+ K^-$ decays.

$\Gamma_{B^0_{sH}} - \Gamma_{B^0}$

VALUE (10^{12} s^{-1})	DOCUMENT ID		TECN	COMMENT
−0.05±0.004±0.004	[1] AAIJ	19AF	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B_s^0 \to J/\psi\pi^+\pi^-$ decays.

B_s^0 DECAY MODES

These branching fractions all scale with B($\overline{b} \to B_s^0$).

The branching fraction B($B_s^0 \to D_s^- \ell^+ \nu_\ell$anything) is not a pure measurement since the measured product branching fraction B($\overline{b} \to B_s^0$) × B($B_s^0 \to D_s^- \ell^+ \nu_\ell$anything) was used to determine B($\overline{b} \to B_s^0$), as described in the note on "B^0-$\overline{B}^0$ Mixing"

For inclusive branching fractions, *e.g.*, $B \to D^\pm$anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	D_s^- anything		(62 ± 6) %	
Γ_2	$\ell\nu_\ell X$		(9.6 ± 0.8) %	
Γ_3	$e^+\nu X^-$		(9.1 ± 0.8) %	
Γ_4	$\mu^+\nu X^-$		(10.2 ± 1.0) %	
Γ_5	$D_s^-\ell^+\nu_\ell$ anything	[a]	(8.1 ± 1.3) %	
Γ_6	$D_s^{*-}\ell^+\nu_\ell$ anything		(5.4 ± 1.1) %	
Γ_7	$D_s^-\mu^+\nu_\mu$		(2.44± 0.23) %	
Γ_8	$D_s^{*-}\mu^+\nu_\mu$		(5.3 ± 0.5) %	
Γ_9	$D_{s1}(2536)^-\mu^+\nu_\mu,\ D_{s1}^-\to D^{*-}K_S^0$		(2.7 ± 0.7) $\times 10^{-3}$	
Γ_{10}	$D_{s1}(2536)^-X\mu^+\nu,\ D_{s1}^-\to \overline{D}^0K^+$		(4.4 ± 1.3) $\times 10^{-3}$	
Γ_{11}	$D_{s2}(2573)^-X\mu^+\nu,\ D_{s2}^-\to \overline{D}^0K^+$		(2.7 ± 1.0) $\times 10^{-3}$	
Γ_{12}	$K^-\mu^+\nu_\mu$		(1.06± 0.09) $\times 10^{-4}$	
Γ_{13}	$D_s^-\pi^+$		(2.98± 0.14) $\times 10^{-3}$	
Γ_{14}	$D_s^-\rho^+$		(6.8 ± 1.4) $\times 10^{-3}$	
Γ_{15}	$D_s^-\pi^+\pi^+\pi^-$		(6.1 ± 1.0) $\times 10^{-3}$	
Γ_{16}	$D_{s1}(2536)^-\pi^+,\ D_{s1}^-\to D_s^-\pi^+\pi^-$		(2.4 ± 0.8) $\times 10^{-5}$	
Γ_{17}	$D_s^\mp K^\pm$		(2.25± 0.12) $\times 10^{-4}$	
Γ_{18}	$D_s^-K^+\pi^+\pi^-$		(3.2 ± 0.6) $\times 10^{-4}$	
Γ_{19}	$D_s^+D_s^-$		(4.4 ± 0.5) $\times 10^{-3}$	
Γ_{20}	$D_s^-D^+$		(2.8 ± 0.5) $\times 10^{-4}$	
Γ_{21}	D^+D^-		(2.2 ± 0.6) $\times 10^{-4}$	
Γ_{22}	$D^{*+}D^-$			
Γ_{23}	$D^{*-}D^+$			
Γ_{24}	$D^0\overline{D}^0$		(1.9 ± 0.5) $\times 10^{-4}$	
Γ_{25}	$D_s^{*-}\pi^+$		($1.9\ ^{+\ 0.5}_{-\ 0.4}$) $\times 10^{-3}$	
Γ_{26}	$D_s^{*\mp}K^\pm$		($1.32^{+\ 0.40}_{-\ 0.32}$) $\times 10^{-4}$	
Γ_{27}	$D_s^{*-}\rho^+$		(9.5 ± 2.0) $\times 10^{-3}$	
Γ_{28}	$D_s^{*+}D_s^- +\ D_s^{*-}D_s^+$		(1.39± 0.17) %	
Γ_{29}	$D_s^{*+}D_s^{*-}$		(1.44± 0.21) %	S=1.1
Γ_{30}	$D_s^{(*)+}D_s^{(*)-}$		(4.5 ± 1.4) %	
Γ_{31}	$D^{*-}D_s^+$		(3.9 ± 0.8) $\times 10^{-4}$	
Γ_{32}	$\overline{D}^{*0}\overline{K}^0$		(2.8 ± 1.1) $\times 10^{-4}$	
Γ_{33}	$\overline{D}^0\overline{K}^0$		(4.3 ± 0.9) $\times 10^{-4}$	

Γ_{34}	$\overline{D}^0 K^- \pi^+$	$(1.04 \pm 0.13) \times 10^{-3}$	
Γ_{35}	$\overline{D}^0 \overline{K}^*(892)^0$	$(4.4 \pm 0.6) \times 10^{-4}$	
Γ_{36}	$\overline{D}^0 \overline{K}^*(1410)$	$(3.9 \pm 3.5) \times 10^{-4}$	
Γ_{37}	$\overline{D}^0 \overline{K}^*_0(1430)$	$(3.0 \pm 0.7) \times 10^{-4}$	
Γ_{38}	$\overline{D}^0 \overline{K}^*_2(1430)$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{39}	$\overline{D}^0 \overline{K}^*(1680)$	$< 7.8 \times 10^{-5}$	CL=90%
Γ_{40}	$\overline{D}^0 \overline{K}^*_0(1950)$	$< 1.1 \times 10^{-4}$	CL=90%
Γ_{41}	$\overline{D}^0 \overline{K}^*_3(1780)$	$< 2.6 \times 10^{-5}$	CL=90%
Γ_{42}	$\overline{D}^0 \overline{K}^*_4(2045)$	$< 3.1 \times 10^{-5}$	CL=90%
Γ_{43}	$\overline{D}^0 K^- \pi^+$ (non-resonant)	$(2.1 \pm 0.8) \times 10^{-4}$	
Γ_{44}	$D^*_{s2}(2573)^- \pi^+$, $D^*_{s2} \to \overline{D}^0 K^-$	$(2.6 \pm 0.4) \times 10^{-4}$	
Γ_{45}	$D^*_{s1}(2700)^- \pi^+$, $D^*_{s1} \to \overline{D}^0 K^-$	$(1.6 \pm 0.8) \times 10^{-5}$	
Γ_{46}	$D^*_{s1}(2860)^- \pi^+$, $D^*_{s1} \to \overline{D}^0 K^-$	$(5 \pm 4) \times 10^{-5}$	
Γ_{47}	$D^*_{s3}(2860)^- \pi^+$, $D^*_{s3} \to \overline{D}^0 K^-$	$(2.2 \pm 0.6) \times 10^{-5}$	
Γ_{48}	$\overline{D}^0 K^+ K^-$	$(5.6 \pm 0.9) \times 10^{-5}$	
Γ_{49}	$\overline{D}^0 f_0(980)$	$< 3.1 \times 10^{-6}$	CL=90%
Γ_{50}	$\overline{D}^0 \phi$	$(3.0 \pm 0.5) \times 10^{-5}$	
Γ_{51}	$\overline{D}^{*0} \phi$	$(3.7 \pm 0.6) \times 10^{-5}$	
Γ_{52}	$D^{*\mp} \pi^\pm$	$< 6.1 \times 10^{-6}$	CL=90%
Γ_{53}	$\eta_c \phi$	$(5.0 \pm 0.9) \times 10^{-4}$	
Γ_{54}	$\eta' X_{s\overline{s}}$		
Γ_{55}	$\eta_c \pi^+ \pi^-$	$(1.8 \pm 0.7) \times 10^{-4}$	
Γ_{56}	$J/\psi(1S) \phi$	$(1.04 \pm 0.04) \times 10^{-3}$	
Γ_{57}	$J/\psi(1S) \phi \phi$	$(1.20^{+0.14}_{-0.16}) \times 10^{-5}$	
Γ_{58}	$J/\psi(1S) \pi^0$	$< 1.2 \times 10^{-3}$	CL=90%
Γ_{59}	$J/\psi(1S) \eta$	$(4.0 \pm 0.7) \times 10^{-4}$	S=1.4
Γ_{60}	$J/\psi(1S) K^0_S$	$(1.92 \pm 0.14) \times 10^{-5}$	
Γ_{61}	$J/\psi(1S) \overline{K}^*(892)^0$	$(4.1 \pm 0.4) \times 10^{-5}$	
Γ_{62}	$J/\psi(1S) \eta'$	$(3.3 \pm 0.4) \times 10^{-4}$	
Γ_{63}	$J/\psi(1S) \pi^+ \pi^-$	$(2.02 \pm 0.17) \times 10^{-4}$	S=1.7
Γ_{64}	$J/\psi(1S) f_0(500)$, $f_0 \to \pi^+ \pi^-$	$< 4 \times 10^{-6}$	CL=90%
Γ_{65}	$J/\psi(1S) \rho$, $\rho \to \pi^+ \pi^-$	$< 3.4 \times 10^{-6}$	CL=90%
Γ_{66}	$J/\psi(1S) f_0(980)$, $f_0 \to \pi^+ \pi^-$	$(1.24 \pm 0.15) \times 10^{-4}$	S=2.1
Γ_{67}	$J/\psi(1S) f_2(1270)$, $f_2 \to \pi^+ \pi^-$	$(1.0 \pm 0.4) \times 10^{-6}$	
Γ_{68}	$J/\psi(1S) f_2(1270)_0$, $f_2 \to \pi^+ \pi^-$	$(7.3 \pm 1.7) \times 10^{-7}$	

Γ_{69}	$J/\psi(1S) f_2(1270)_{\parallel}$, $f_2 \to \pi^+\pi^-$	$(1.05 \pm 0.33) \times 10^{-6}$	
Γ_{70}	$J/\psi(1S) f_2(1270)_{\perp}$, $f_2 \to \pi^+\pi^-$	$(1.3 \pm 0.7) \times 10^{-6}$	
Γ_{71}	$J/\psi(1S) f_0(1370)$, $f_0 \to \pi^+\pi^-$	$(4.4 {}^{+0.6}_{-4.0}) \times 10^{-5}$	
Γ_{72}	$J/\psi(1S) f_0(1500)$, $f_0 \to \pi^+\pi^-$	$(2.04 {}^{+0.32}_{-0.24}) \times 10^{-5}$	
Γ_{73}	$J/\psi(1S) f'_2(1525)_0$, $f'_2 \to \pi^+\pi^-$	$(1.03 \pm 0.22) \times 10^{-6}$	
Γ_{74}	$J/\psi(1S) f'_2(1525)_{\parallel}$, $f'_2 \to \pi^+\pi^-$	$(1.2 {}^{+2.6}_{-0.8}) \times 10^{-7}$	
Γ_{75}	$J/\psi(1S) f'_2(1525)_{\perp}$, $f'_2 \to \pi^+\pi^-$	$(5 \pm 4) \times 10^{-7}$	
Γ_{76}	$J/\psi(1S) f_0(1790)$, $f_0 \to \pi^+\pi^-$	$(4.9 {}^{+10.0}_{-1.0}) \times 10^{-6}$	
Γ_{77}	$J/\psi(1S)\pi^+\pi^-$ (nonresonant)	$(1.74 {}^{+1.10}_{-0.34}) \times 10^{-5}$	
Γ_{78}	$J/\psi(1S)\overline{K}^0\pi^+\pi^-$	$< 4.4 \times 10^{-5}$	CL=90%
Γ_{79}	$J/\psi(1S) K^+K^-$	$(7.9 \pm 0.7) \times 10^{-4}$	
Γ_{80}	$J/\psi(1S) K^0 K^-\pi^+ +$ c.c.	$(9.5 \pm 1.3) \times 10^{-4}$	
Γ_{81}	$J/\psi(1S)\overline{K}^0 K^+K^-$	$< 1.2 \times 10^{-5}$	CL=90%
Γ_{82}	$J/\psi K^*(892)^0\overline{K}^*(892)^0$	$(1.10 \pm 0.09) \times 10^{-4}$	
Γ_{83}	$J/\psi(1S) f'_2(1525)$	$(2.6 \pm 0.6) \times 10^{-4}$	
Γ_{84}	$J/\psi(1S) p\overline{p}$	$(3.6 \pm 0.4) \times 10^{-6}$	
Γ_{85}	$J/\psi(1S)\gamma$	$< 7.3 \times 10^{-6}$	CL=90%
Γ_{86}	$J/\psi(1S)\pi^+\pi^-\pi^+\pi^-$	$(7.5 \pm 0.8) \times 10^{-5}$	
Γ_{87}	$J/\psi(1S) f_1(1285)$	$(7.2 \pm 1.4) \times 10^{-5}$	
Γ_{88}	$\psi(2S)\eta$	$(3.3 \pm 0.9) \times 10^{-4}$	
Γ_{89}	$\psi(2S)\eta'$	$(1.29 \pm 0.35) \times 10^{-4}$	
Γ_{90}	$\psi(2S)\pi^+\pi^-$	$(6.9 \pm 1.2) \times 10^{-5}$	
Γ_{91}	$\psi(2S)\phi$	$(5.2 \pm 0.4) \times 10^{-4}$	
Γ_{92}	$\psi(2S) K^-\pi^+$	$(3.1 \pm 0.4) \times 10^{-5}$	
Γ_{93}	$\psi(2S)\overline{K}^*(892)^0$	$(3.3 \pm 0.5) \times 10^{-5}$	
Γ_{94}	$\chi_{c1}\phi$	$(1.97 \pm 0.25) \times 10^{-4}$	
Γ_{95}	$\chi_{c1} K^+K^-$		
Γ_{96}	$\chi_{c2} K^+K^-$		
Γ_{97}	$\chi_{c1}(3872)\phi$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{98}	$\chi_{c1}(3872)(K^+K^-)_{non-\phi}$	$(8.6 \pm 3.5) \times 10^{-5}$	
Γ_{99}	$\pi^+\pi^-$	$(7.0 \pm 1.0) \times 10^{-7}$	
Γ_{100}	$\pi^0\pi^0$	$< 2.1 \times 10^{-4}$	CL=90%
Γ_{101}	$\eta\pi^0$	$< 1.0 \times 10^{-3}$	CL=90%
Γ_{102}	$\eta\eta$	$< 1.43 \times 10^{-4}$	CL=90%
Γ_{103}	$\rho^0\rho^0$	$< 3.20 \times 10^{-4}$	CL=90%

Γ_{104}	$\eta' \eta$		$< 6.5 \times 10^{-5}$	CL=90%
Γ_{105}	$\eta' \eta'$		$(3.3 \pm 0.7) \times 10^{-5}$	
Γ_{106}	$\eta' \phi$		$< 8.2 \times 10^{-7}$	CL=90%
Γ_{107}	$\phi f_0(980)$, $f_0(980) \to \pi^+ \pi^-$		$(1.12 \pm 0.21) \times 10^{-6}$	
Γ_{108}	$\phi f_2(1270)$, $f_2(1270) \to \pi^+ \pi^-$		$(6.1 {}^{+1.8}_{-1.5}) \times 10^{-7}$	
Γ_{109}	$\phi \rho^0$		$(2.7 \pm 0.8) \times 10^{-7}$	
Γ_{110}	$\phi \pi^+ \pi^-$		$(3.5 \pm 0.5) \times 10^{-6}$	
Γ_{111}	$\phi \phi$		$(1.85 \pm 0.14) \times 10^{-5}$	
Γ_{112}	$\phi \phi \phi$		$(2.2 \pm 0.6) \times 10^{-6}$	
Γ_{113}	$\pi^+ K^-$		$(5.8 \pm 0.7) \times 10^{-6}$	
Γ_{114}	$K^+ K^-$		$(2.66 \pm 0.22) \times 10^{-5}$	
Γ_{115}	$K^0 \overline{K}^0$		$(1.76 \pm 0.31) \times 10^{-5}$	
Γ_{116}	$K^0 \pi^+ \pi^-$		$(9.5 \pm 2.1) \times 10^{-6}$	
Γ_{117}	$K^0 K^\pm \pi^\mp$		$(8.4 \pm 0.9) \times 10^{-5}$	
Γ_{118}	$K^*(892)^- \pi^+$		$(2.9 \pm 1.1) \times 10^{-6}$	
Γ_{119}	$K^*(892)^\pm K^\mp$		$(1.9 \pm 0.5) \times 10^{-5}$	
Γ_{120}	$K_0^*(1430)^\pm K^\mp$		$(3.1 \pm 2.5) \times 10^{-5}$	
Γ_{121}	$K_2^*(1430)^\pm K^\mp$		$(1.0 \pm 1.7) \times 10^{-5}$	
Γ_{122}	$K^*(892)^0 \overline{K}^0 +$ c.c.		$(2.0 \pm 0.6) \times 10^{-5}$	
Γ_{123}	$K_0^*(1430) \overline{K}^0 +$ c.c.		$(3.3 \pm 1.0) \times 10^{-5}$	
Γ_{124}	$K_2^*(1430)^0 \overline{K}^0 +$ c.c.		$(1.7 \pm 2.2) \times 10^{-5}$	
Γ_{125}	$K_S^0 \overline{K}^*(892)^0 +$ c.c.		$(1.6 \pm 0.4) \times 10^{-5}$	
Γ_{126}	$K^0 K^+ K^-$		$(1.3 \pm 0.6) \times 10^{-6}$	
Γ_{127}	$\overline{K}^*(892)^0 \rho^0$		$< 7.67 \times 10^{-4}$	CL=90%
Γ_{128}	$\overline{K}^*(892)^0 K^*(892)^0$		$(1.11 \pm 0.27) \times 10^{-5}$	
Γ_{129}	$K^*(892)^0 \overline{K}_2^*(1430)^0$			
Γ_{130}	$K_2^*(1430)^0 \overline{K}^*(892)^0$			
Γ_{131}	$K_2^*(1430)^0 \overline{K}_2^*(1430)^0$			
Γ_{132}	$\phi K^*(892)^0$		$(1.14 \pm 0.30) \times 10^{-6}$	
Γ_{133}	$p \overline{p}$		$< 1.5 \times 10^{-8}$	CL=90%
Γ_{134}	$p \overline{p} K^+ K^-$		$(4.5 \pm 0.5) \times 10^{-6}$	
Γ_{135}	$p \overline{p} K^+ \pi^-$		$(1.39 \pm 0.26) \times 10^{-6}$	
Γ_{136}	$p \overline{p} \pi^+ \pi^-$		$(4.3 \pm 2.0) \times 10^{-7}$	
Γ_{137}	$p \overline{\Lambda} K^- +$ c.c.		$(5.5 \pm 1.0) \times 10^{-6}$	
Γ_{138}	$\Lambda_c^- \Lambda \pi^+$		$(3.6 \pm 1.6) \times 10^{-4}$	
Γ_{139}	$\Lambda_c^- \Lambda_c^+$		$< 8.0 \times 10^{-5}$	CL=95%

Lepton Family number (*LF*) violating modes or $\Delta B = 1$ weak neutral current (*B1*) modes

Γ_{140}	$\gamma \gamma$	*B1*	$< 3.1 \times 10^{-6}$	CL=90%
Γ_{141}	$\phi \gamma$	*B1*	$(3.4 \pm 0.4) \times 10^{-5}$	
Γ_{142}	$\mu^+ \mu^-$	*B1*	$(3.01 \pm 0.35) \times 10^{-9}$	
Γ_{143}	$e^+ e^-$	*B1*	$< 9.4 \times 10^{-9}$	CL=90%

Γ_{144}	$\tau^+\tau^-$	B1		$<$ 6.8	$\times 10^{-3}$	CL=95%
Γ_{145}	$\mu^+\mu^-\mu^+\mu^-$	B1		$<$ 2.5	$\times 10^{-9}$	CL=95%
Γ_{146}	SP, $S \to \mu^+\mu^-$, $P \to \mu^+\mu^-$	B1	[b]	$<$ 2.2	$\times 10^{-9}$	CL=95%
Γ_{147}	$\phi(1020)\mu^+\mu^-$	B1		(8.4 $\pm$ 0.4)	$\times 10^{-7}$	
Γ_{148}	$f_2'(1525)\mu^+\mu^-$			(1.62$\pm$ 0.22)	$\times 10^{-7}$	
Γ_{149}	$\overline{K}^*(892)^0\mu^+\mu^-$	B1		(2.9 $\pm$ 1.1)	$\times 10^{-8}$	
Γ_{150}	$\pi^+\pi^-\mu^+\mu^-$	B1		(8.4 $\pm$ 1.7)	$\times 10^{-8}$	
Γ_{151}	$\phi\nu\overline{\nu}$	B1		$<$ 5.4	$\times 10^{-3}$	CL=90%
Γ_{152}	$e^\pm\mu^\mp$	LF	[c]	$<$ 5.4	$\times 10^{-9}$	CL=90%
Γ_{153}	$\mu^\pm\tau^\mp$	LF		$<$ 4.2	$\times 10^{-5}$	CL=95%

[a] Not a pure measurement. See note at head of B_s^0 Decay Modes.

[b] Here S and P are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/c^2 and 214.3 MeV/c^2, respectively.

[c] The value is for the sum of the charge states or particle/antiparticle states indicated.

CONSTRAINED FIT INFORMATION

An overall fit to 12 branching ratios uses 20 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 26.9$ for 13 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i\delta x_j\right\rangle/(\delta x_i\cdot\delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_{13}	x_{15}	x_{17}	x_{56}	x_{63}	x_{66}
x_{15}	17					
x_{17}	82	14				
x_{56}	0	0	0			
x_{63}	0	0	0	43		
x_{66}	0	0	0	31	52	
x_{111}	0	0	0	15	6	5

B_s^0 BRANCHING RATIOS

$\Gamma(D_s^-\text{ anything})/\Gamma_{total}$ — Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.62 $\pm$0.06 OUR AVERAGE					
0.602$\pm$0.058$\pm$0.023		[1] WANG	22	BELL	$e^+e^- \to \Upsilon(5S)$
0.91 $\pm$0.18 $\pm$0.41		[2] DRUTSKOY	07	BELL	$e^+e^- \to \Upsilon(4S)$
0.81 $\pm$0.24 $\pm$0.22	90	[3] BUSKULIC	96E	ALEP	$e^+e^- \to Z$
1.56 $\pm$0.58 $\pm$0.44	147	[4] ACTON	92N	OPAL	$e^+e^- \to Z$

[1] WANG 22 selects the B_s events by tagging the accompanying B_s via partial reconstruction of the semileptonic decays $B_s \rightarrow D_s X \ell^+ \nu$.

[2] The extraction of this result takes into account the correlation between the measurements of B($\Upsilon(5S) \rightarrow D_s X$) and B($\Upsilon(5S) \rightarrow D^0 X$).

[3] BUSKULIC 96E separate $c\overline{c}$ and $b\overline{b}$ sources of D_s^+ mesons using a lifetime tag, subtract generic $\overline{b} \rightarrow W^+ \rightarrow D_s^+$ events, and obtain B($\overline{b} \rightarrow B_s^0$) × B($B_s^0 \rightarrow D_s^-$ anything) $= 0.088 \pm 0.020 \pm 0.020$ assuming B($D_s \rightarrow \phi\pi$) $= (3.5 \pm 0.4) \times 10^{-2}$ and PDG 1994 values for the relative partial widths to other D_s channels. We evaluate using our current values B($\overline{b} \rightarrow B_s^0$) $= 0.107 \pm 0.014$ and B($D_s \rightarrow \phi\pi$) $= 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to B($\overline{b} \rightarrow B_s^0$) and B($D_s \rightarrow \phi\pi$).

[4] ACTON 92N assume that excess of 147 ± 48 D_s^0 events over that expected from B^0, B^+, and $c\overline{c}$ is all from B_s^0 decay. The product branching fraction is measured to be B($\overline{b} \rightarrow B_s^0$)B($B_s^0 \rightarrow D_s^-$ anything)×B($D_s^- \rightarrow \phi\pi^-$) $= (5.9 \pm 1.9 \pm 1.1) \times 10^{-3}$. We evaluate using our current values B($\overline{b} \rightarrow B_s^0$) $= 0.107 \pm 0.014$ and B($D_s \rightarrow \phi\pi$) $= 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to B($\overline{b} \rightarrow B_s^0$) and B($D_s \rightarrow \phi\pi$).

$\Gamma(\ell \nu_\ell X)/\Gamma_{total}$ — Γ_2/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
9.6±0.8 OUR AVERAGE				
$9.6 \pm 0.4 \pm 0.7$	[1] OSWALD	13	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$
$9.5^{+2.5+1.1}_{-2.0-1.9}$	[2] LEES	12A	BABR	$e^+ e^-$

[1] The measurement corresponds to the average of the electron and muon branching fractions.

[2] The measurement corresponds to a branching fraction where the lepton originates from bottom decay and is the average between the electron and muon branching fractions. LEES 12A uses the correlation of the production of ϕ mesons in association with a lepton in $e^+ e^-$ data taken at center-of-mass energies between 10.54 and 11.2 GeV.

$\Gamma(e^+ \nu X^-)/\Gamma_{total}$ — Γ_3/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
9.1±0.5±0.6	OSWALD	13	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$

$\Gamma(\mu^+ \nu X^-)/\Gamma_{total}$ — Γ_4/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
10.2±0.6±0.8	OSWALD	13	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$

$\Gamma(D_s^- \ell^+ \nu_\ell \text{anything})/\Gamma_{total}$ — Γ_5/Γ

The values and averages in this section serve only to show what values result if one assumes our B($\overline{b} \rightarrow B_s^0$). They cannot be thought of as measurements since the underlying product branching fractions were also used to determine B($\overline{b} \rightarrow B_s^0$) as described in the note on "Production and Decay of b-Flavored Hadrons."

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.1±1.3 OUR AVERAGE					
8.2±0.2±1.5		[1] OSWALD	15	BELL	$e^+e^- \to \Upsilon(5S)$
7.6±1.2±2.1	134	[2] BUSKULIC	95O	ALEP	$e^+e^- \to Z$
10.7±4.3±2.9		[3] ABREU	92M	DLPH	$e^+e^- \to Z$
10.3±3.6±2.8	18	[4] ACTON	92N	OPAL	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
13 ±4 ±4	27	[5] BUSKULIC	92E	ALEP	$e^+e^- \to Z$

[1] Obtains $B_s \to D_s X e\nu$, and $D_s X \mu\nu$ separately, then combines them by assuming systematic uncertainties are fully correlated, except for the one on lepton identification. The third uncertainty adds in quadrature systematic uncertainties from external sources (number of B_s events, and $D_s^{(*)}$ branching fractions). OSWALD 15 also measures the cross-section $\sigma(e^+e^- \to B_s^{(*)}\overline{B}_s^{(*)}) = 53.8 \pm 1.4 \pm 5.3$ pb at $\sqrt{s} = 10.86$ GeV.

[2] BUSKULIC 95O use $D_s\ell$ correlations. The measured product branching ratio is B($\overline{b} \to B_s$) × B($B_s \to D_s^- \ell^+ \nu_\ell$ anything) = $(0.82 \pm 0.09^{+0.13}_{-0.14})$% assuming B($D_s \to \phi\pi$) = $(3.5 \pm 0.4) \times 10^{-2}$ and PDG 1994 values for the relative partial widths to the six other D_s channels used in this analysis. Combined with results from $\Upsilon(4S)$ experiments this can be used to extract B($\overline{b} \to B_s$) = $(11.0 \pm 1.2^{+2.5}_{-2.6})$%. We evaluate using our current values B($\overline{b} \to B_s^0$) = 0.107 ± 0.014 and B($D_s \to \phi\pi$) = 0.036 ± 0.009. Our first error is their experiment's and our second error is that due to B($\overline{b} \to B_s^0$) and B($D_s \to \phi\pi$).

[3] ABREU 92M measured muons only and obtained product branching ratio B($Z \to b$ or $\overline{b}$) × B($\overline{b} \to B_s$) × B($B_s \to D_s \mu^+ \nu_\mu$ anything) × B($D_s \to \phi\pi$) = $(18 \pm 8) \times 10^{-5}$. We evaluate using our current values B($\overline{b} \to B_s^0$) = 0.107 ± 0.014 and B($D_s \to \phi\pi$) = 0.036 ± 0.009. Our first error is their experiment's and our second error is that due to B($\overline{b} \to B_s^0$) and B($D_s \to \phi\pi$). We use B($Z \to b$ or $\overline{b}$) = 2B($Z \to b\overline{b}$) = 2×(0.2212 ± 0.0019).

[4] ACTON 92N is measured using $D_s \to \phi\pi^+$ and $K^*(892)^0 K^+$ events. The product branching fraction measured is measured to be B($\overline{b} \to B_s^0$)B($B_s^0 \to D_s^- \ell^+ \nu_\ell$ anything) ×B($D_s^- \to \phi\pi^-$) = $(3.9 \pm 1.1 \pm 0.8) \times 10^{-4}$. We evaluate using our current values B($\overline{b} \to B_s^0$) = 0.107 ± 0.014 and B($D_s \to \phi\pi$) = 0.036 ± 0.009. Our first error is their experiment's and our second error is that due to B($\overline{b} \to B_s^0$) and B($D_s \to \phi\pi$).

[5] BUSKULIC 92E is measured using $D_s \to \phi\pi^+$ and $K^*(892)^0 K^+$ events. They use 2.7 ± 0.7% for the $\phi\pi^+$ branching fraction. The average product branching fraction is measured to be B($\overline{b} \to B_s^0$)B($B_s^0 \to D_s^- \ell^+ \nu_\ell$ anything) =$0.020 \pm 0.0055^{+0.005}_{-0.006}$. We evaluate using our current values B($\overline{b} \to B_s^0$) = 0.107 ± 0.014 and B($D_s \to \phi\pi$) = 0.036 ± 0.009. Our first error is their experiment's and our second error is that due to B($\overline{b} \to B_s^0$) and B($D_s \to \phi\pi$). Superseded by BUSKULIC 95O.

$\Gamma(D_s^{*-} \ell^+ \nu_\ell \text{anything})/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.4±0.4±1.0	[1] OSWALD	15	BELL	$e^+e^- \to \Upsilon(5S)$

[1] Obtains $B_s \to D_s^* X e\nu$, and $D_s^* X \mu\nu$ separately, then combines them by assuming systematic uncertainties are fully correlated, except for the one on lepton identification. The third uncertainty adds in quadrature systematic uncertainties from external sources (number of B_s events, and $D_s^{(*)}$ branching fractions). OSWALD 15 also measures the cross-section $\sigma(e^+ e^- \to B_s^{(*)} \overline{B}_s^{(*)}) = 53.8 \pm 1.4 \pm 5.3$ pb at $\sqrt{s} = 10.86$ GeV.

$\Gamma(D_s^- \mu^+ \nu_\mu)/\Gamma_{total}$ — Γ_7/Γ

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
2.44±0.21±0.10	[1] AAIJ 20E	LHCB	pp at 7, 8 TeV

[1] AAIJ 20E reports $[\Gamma(B_s^0 \to D_s^- \mu^+ \nu_\mu)/\Gamma_{total}] / [B(B^0 \to D^- \ell^+ \nu_\ell)] = 1.09 \pm 0.05 \pm 0.06 \pm 0.05$ which we multiply by our best value $B(B^0 \to D^- \ell^+ \nu_\ell) = (2.24 \pm 0.09) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{*-} \mu^+ \nu_\mu)/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
5.3±0.5±0.1	[1] AAIJ 20E	LHCB	pp at 7, 8 TeV

[1] AAIJ 20E reports $[\Gamma(B_s^0 \to D_s^{*-} \mu^+ \nu_\mu)/\Gamma_{total}] / [B(B^0 \to D^*(2010)^- \ell^+ \nu_\ell)] = 1.06 \pm 0.05 \pm 0.07 \pm 0.05$ which we multiply by our best value $B(B^0 \to D^*(2010)^- \ell^+ \nu_\ell) = (4.97 \pm 0.12) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^- \mu^+ \nu_\mu)/\Gamma(D_s^{*-} \mu^+ \nu_\mu)$ — Γ_7/Γ_8

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.464±0.013±0.043	[1] AAIJ 20E	LHCB	pp at 7, 8 TeV

[1] AAIJ 20E value is not independent of other reported measurements.

$\Gamma(D_{s1}(2536)^- \mu^+ \nu_\mu,\ D_{s1}^- \to D^{*-} K_S^0)/\Gamma_{total}$ — Γ_9/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.7±0.7±0.2	[1] ABAZOV 09G	D0	$p\overline{p}$ at 1.96 TeV

[1] ABAZOV 09G reports $[\Gamma(B_s^0 \to D_{s1}(2536)^- \mu^+ \nu_\mu,\ D_{s1}^- \to D^{*-} K_S^0)/\Gamma_{total}] \times [B(\overline{b} \to B_s^0)] = (2.66 \pm 0.52 \pm 0.45) \times 10^{-4}$ which we divide by our best value $B(\overline{b} \to B_s^0) = (10.0 \pm 0.8) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s1}(2536)^- X \mu^+ \nu,\ D_{s1}^- \to \overline{D}^0 K^+)/\Gamma(D_s^- \ell^+ \nu_\ell \text{anything})$ — Γ_{10}/Γ_5

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
5.4±1.2±0.5	AAIJ 11A	LHCB	pp at 7 TeV

$\Gamma(D_{s2}(2573)^- X \mu^+ \nu,\ D_{s2}^- \to \overline{D}^0 K^+)/\Gamma(D_s^- \ell^+ \nu_\ell \text{anything})$ — Γ_{11}/Γ_5

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
3.3±1.0±0.4	AAIJ 11A	LHCB	pp at 7 TeV

$\Gamma\big(D_{s1}(2536)^- X \mu^+ \nu,\ D_{s1}^- \to \overline{D}^0 K^+\big)/\Gamma\big(D_{s2}(2573)^- X \mu^+ \nu,\ D_{s2}^- \to \overline{D}^0 K^+\big)$ — Γ_{10}/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.61 \pm 0.14 \pm 0.05$	[1] AAIJ	11A	LHCB	pp at 7 TeV

[1] Not independent of other AAIJ 11A measurements.

$\Gamma(K^- \mu^+ \nu_\mu)/\Gamma(D_s^- \mu^+ \nu_\mu)$ — Γ_{12}/Γ_7

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$4.89 \pm 0.21 \pm 0.25$	[1,2] AAIJ	21G	LHCB	pp at 8 TeV

[1] AAIJ 21G measures $B(B_s^0 \to K^- \mu^+ \nu_\mu)/B(B_s^0 \to D_s^- \mu^+ \nu_\mu) = (4.89 \pm 0.21 {}^{+0.20}_{-0.21} \pm 0.14) \times 10^{-3}$ over the whole q^2 range, where the last uncertainty is due to the $D_s^- \to K^+ K^- \pi^-$ branching fraction.

[2] AAIJ 21G reports this branching ratio for $q^2 < 7$ GeV^2 as $(1.66 \pm 0.08 \pm 0.07 \pm 0.05) \times 10^{-3}$ and for $q^2 > 7$ GeV^2 as $(3.25 \pm 0.21 {}^{+0.16}_{-0.17} \pm 0.09) \times 10^{-3}$.

$\Gamma(K^- \mu^+ \nu_\mu)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.06 \pm 0.05 \pm 0.08$	[1] AAIJ	21G	LHCB	pp at 8 TeV

[1] The total systematic error includes D_s^- branching fractions, B_s^0 lifetime, $|V_{cb}|$, and $B_s^0 \to D_s^-$ form factor integral uncertainties.

$\Gamma(D_s^- \pi^+)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.98 ± 0.14 OUR FIT					
2.97 ± 0.13 OUR AVERAGE					
$2.96 \pm 0.10 \pm 0.09$		[1] AAIJ	21Y	LHCB	pp at 7, 8, 13 TeV
$3.6 \pm 0.5 \pm 0.5$		[2] LOUVOT	09	BELL	$e^+ e^- \to \Upsilon(5S)$
$2.8 \pm 0.6 \pm 0.1$		[3] ABULENCIA	07C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.95 \pm 0.05 {}^{+0.25}_{-0.28}$		[4] AAIJ	12AG	LHCB	Repl. by AAIJ 21Y
$6.8 \pm 2.2 \pm 1.6$		DRUTSKOY	07A	BELL	Repl. by LOUVOT 09
$3.3 \pm 1.1 \pm 0.1$		[5] ABULENCIA	06J	CDF	Repl. by ABULENCIA 07C
<130	6	[6] AKERS	94J	OPAL	$e^+ e^- \to Z$
seen	1	BUSKULIC	93G	ALEP	$e^+ e^- \to Z$

[1] AAIJ 21Y reports $[\Gamma(B_s^0 \to D_s^- \pi^+)/\Gamma_{total}] / [B(B^0 \to D^- \pi^+)] = 1.18 \pm 0.04$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] LOUVOT 09 reports $(3.67 {}^{+0.35}_{-0.33} {}^{+0.65}_{-0.645}) \times 10^{-3}$ from a measurement of $[\Gamma(B_s^0 \to D_s^- \pi^+)/\Gamma_{total}] \times [B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)})]$ assuming $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.5 \pm 2.6) \times 10^{-2}$, which we rescale to our best value $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (20.1 \pm 3.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ABULENCIA 07C reports $[\Gamma(B^0_s \to D^-_s \pi^+)/\Gamma_{total}]$ / $[B(B^0 \to D^- \pi^+)] = 1.13 \pm 0.08 \pm 0.23$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] AAIJ 12AG reports $(2.95 \pm 0.05 \pm 0.17^{+0.18}_{-0.22}) \times 10^{-3}$ where the last uncertainty comes from the semileptonic f_s/f_d measurement. We combined the systematics in quadrature.

[5] ABULENCIA 06J reports $[\Gamma(B^0_s \to D^-_s \pi^+)/\Gamma_{total}]$ / $[B(B^0 \to D^- \pi^+)] = 1.32 \pm 0.18 \pm 0.38$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[6] AKERS 94J sees ≤ 6 events and measures the limit on the product branching fraction $f(\overline{b} \to B^0_s) \cdot B(B^0_s \to D^-_s \pi^+) < 1.3\%$ at CL = 90%. We divide by our current value $B(\overline{b} \to B^0_s) = 0.105$.

$\Gamma(D^-_s \rho^+)/\Gamma(D^-_s \pi^+)$ — Γ_{14}/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
2.3±0.4±0.2	LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

$\Gamma(D^-_s \pi^+ \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{15}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.1±1.0 OUR FIT				
6.3±1.4±0.6	[1] ABULENCIA	07C	CDF	$p\overline{p}$ at 1.96 TeV

[1] ABULENCIA 07C reports $[\Gamma(B^0_s \to D^-_s \pi^+ \pi^+ \pi^-)/\Gamma_{total}]$ / $[B(B^0 \to D^- \pi^+ \pi^+ \pi^-)] = 1.05 \pm 0.10 \pm 0.22$ which we multiply by our best value $B(B^0 \to D^- \pi^+ \pi^+ \pi^-) = (6.0 \pm 0.6) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^-_s \pi^+ \pi^+ \pi^-)/\Gamma(D^-_s \pi^+)$ — Γ_{15}/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
2.05±0.33 OUR FIT				
2.01±0.37±0.20	AAIJ	11E	LHCB	pp at 7 TeV

$\Gamma(D_{s1}(2536)^- \pi^+,\ D^-_{s1} \to D^-_s \pi^+ \pi^-)/\Gamma(D^-_s \pi^+ \pi^+ \pi^-)$ — Γ_{16}/Γ_{15}

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.0±1.0±0.4	AAIJ	12AX	LHCB	pp at 7 TeV

$\Gamma(D^\mp_s K^\pm)/\Gamma_{total}$ — Γ_{17}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.25±0.12 OUR FIT				
$2.3\ ^{+1.2}_{-1.0}\ ^{+0.4}_{-0.3}$	[1] LOUVOT	09	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 09 reports $(2.4^{+1.2}_{-1.0} \pm 0.42) \times 10^{-4}$ from a measurement of $[\Gamma(B^0_s \to D^\mp_s K^\pm)/\Gamma_{total}] \times [B(\Upsilon(10860) \to B^{(*)}_s \overline{B}^{(*)}_s)]$ assuming $B(\Upsilon(10860) \to B^{(*)}_s \overline{B}^{(*)}_s) = (19.5 \pm 2.6) \times 10^{-2}$, which we rescale to our best value $B(\Upsilon(10860) \to B^{(*)}_s \overline{B}^{(*)}_s) = (20.1 \pm 3.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{\mp} K^{\pm})/\Gamma(D_s^- \pi^+)$ — Γ_{17}/Γ_{13}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
7.55±0.24 OUR FIT				
7.55±0.24 OUR AVERAGE				
7.52±0.15±0.19	AAIJ	15AC	LHCB	pp at 7, 8 TeV
9.7 ±1.8 ±0.9	AALTONEN	09AQ	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.46±0.43±0.25	AAIJ	12AG	LHCB	Repl. by AAIJ 15AC

$\Gamma(D_s^- K^+ \pi^+ \pi^-)/\Gamma(D_s^- \pi^+ \pi^+ \pi^-)$ — Γ_{18}/Γ_{15}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.2±0.5±0.3	AAIJ	12AX	LHCB	pp at 7 TeV

$\Gamma(D_s^+ D_s^-)/\Gamma_{total}$ — Γ_{19}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
4.4±0.5 OUR AVERAGE					
4.0±0.2±0.5		[1] AAIJ	13AP	LHCB	pp at 7 TeV
$5.8^{+1.1}_{-0.9}\pm1.3$		[2] ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$
5.4±0.8±0.8		[3] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10.3^{+3.9+2.6}_{-3.2-2.5}$		[4] ESEN	10	BELL	Repl. by ESEN 13
$10.4^{+3.5}_{-3.2}\pm1.1$		[5] AALTONEN	08F	CDF	Repl. by AALTONEN 12C
<67	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] Uses $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$.

[2] Use $\Upsilon(5S) \to B_s^* \overline{B}_s^*$ decays assuming $B(\Upsilon(5S) \to B_s^* \overline{B}_s^*) = (17.1 \pm 3.0)\%$ and $\Gamma(\Upsilon(5S) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%$.

[3] AALTONEN 12C reports (f_s/f_d) $(B(B_s^0 \to D_s^+ D_s^-) / B(B^0 \to D^- D_s^+)) = 0.183 \pm 0.021 \pm 0.017$. We multiply this result by our best value of $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[4] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ assuming $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (90.1^{+3.8}_{-4.0})\%$.

[5] AALTONEN 08F reports $[\Gamma(B_s^0 \to D_s^+ D_s^-)/\Gamma_{total}] / [B(B^0 \to D^- D_s^+)] = 1.44^{+0.48}_{-0.44}$ which we multiply by our best value $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^- D^+)/\Gamma_{total}$ — Γ_{20}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.8±0.4±0.3	[1] AAIJ	14AA	LHCB	pp at 7 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$3.6 \pm 0.6 \pm 0.5$	[2] AAIJ	13AP	LHCB	Repl. by AAIJ 14AA

[1] AAIJ 14AA reports $[\Gamma(B^0_s \to D^-_s D^+)/\Gamma_{total}] / [B(B^0 \to D^- D^+_s)] = 0.038 \pm 0.004 \pm 0.003$ which we multiply by our best value $B(B^0 \to D^- D^+_s) = (7.2 \pm 0.8) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value..

[2] Uses $B(B^0 \to D^- D^+_s) = (7.2 \pm 0.8) \times 10^{-3}$.

$\Gamma(D^+ D^-)/\Gamma_{total}$ — Γ_{21}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$2.2 \pm 0.4 \pm 0.4$	[1] AAIJ	13AP	LHCB	pp at 7 TeV

[1] Uses $B(B^0 \to D^- D^+) = (2.11 \pm 0.31) \times 10^{-4}$ and $B(B^+ \to \overline{D}^0 D^+_s) = (10.1 \pm 1.7) \times 10^{-3}$.

$\Gamma(D^0 \overline{D}^0)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.9 \pm 0.3 \pm 0.4$	[1] AAIJ	13AP	LHCB	pp at 7 TeV

[1] Uses $B(B^0 \to D^- D^+) = (2.11 \pm 0.31) \times 10^{-4}$ and $B(B^+ \to \overline{D}^0 D^+_s) = (10.1 \pm 1.7) \times 10^{-3}$.

$\Gamma(D^{*-}_s \pi^+)/\Gamma(D^-_s \pi^+)$ — Γ_{25}/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
$0.65^{+0.15}_{-0.13} \pm 0.07$	LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

$\Gamma(D^{*\mp}_s K^\pm)/\Gamma(D^{*-}_s \pi^+)$ — Γ_{26}/Γ_{25}

VALUE	DOCUMENT ID		TECN	COMMENT
$0.068 \pm 0.005^{+0.003}_{-0.002}$	AAIJ	15AD	LHCB	pp at 7, 8 TeV

$\Gamma(D^{*-}_s \rho^+)/\Gamma(D^-_s \pi^+)$ — Γ_{27}/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
$3.2 \pm 0.6 \pm 0.3$	LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

$\Gamma(D^{*-}_s \rho^+)/\Gamma(D^-_s \rho^+)$ — Γ_{27}/Γ_{14}

VALUE	DOCUMENT ID		TECN	COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.4 \pm 0.3 \pm 0.1$	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] Not independent of other LOUVOT 10 measurements.

$\left[\Gamma(D_s^{*+} D_s^-) + \Gamma(D_s^{*-} D_s^+)\right]/\Gamma_{total}$ Γ_{28}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
13.9±1.7 OUR AVERAGE					
$13.6\pm1.0\pm1.4$		[1] AAIJ	16P	LHCB	pp at 7 TeV
$17.6^{+2.3}_{-2.2}\pm4.0$		[2] ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$
$12.5\pm1.7\pm1.8$		[3] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$27.5^{+8.3}_{-7.1}\pm6.9$		[4] ESEN	10	BELL	Repl. by ESEN 13
<121	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] AAIJ 16P reports $[\left[\Gamma(B_s^0 \to D_s^{*+} D_s^-) + \Gamma(D_s^{*-} D_s^+)\right]/\Gamma_{total}] / [B(B^0 \to D^- D_s^+)] = 1.88 \pm 0.08 \pm 0.12$ which we multiply by our best value $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Use $\Upsilon(5S) \to B_s^* \overline{B}_s^*$ decays assuming $B(\Upsilon(5S) \to B_s^* \overline{B}_s^*) = (17.1 \pm 3.0)\%$ and $\Gamma(\Upsilon(5S) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%$.

[3] AALTONEN 12C reports (f_s/f_d) $(B(B_s^0 \to D_s^{*+} D_s^- + D_s^{*-} D_s^+) / B(B^0 \to D^- D_s^+)) = 0.424 \pm 0.046 \pm 0.035$. We multiply this result by our best value of $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[4] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ assuming $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (90.1^{+3.8}_{-4.0})\%$.

$\Gamma(D_s^{*+} D_s^{*-})/\Gamma_{total}$ Γ_{29}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
14.4± 2.1 OUR AVERAGE		Error includes scale factor of 1.1.			
$12.7\pm\ 1.3\pm1.4$		[1] AAIJ	16P	LHCB	pp at 7 TeV
$19.8^{+\ 3.3+5.2}_{-\ 3.1-5.0}$		[2] ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$
$19.2\pm\ 2.9\pm2.7$		[3] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$30.8^{+12.2+8.5}_{-10.4-8.6}$		[4] ESEN	10	BELL	Repl. by ESEN 13
<257	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] AAIJ 16P reports $[\Gamma(B_s^0 \to D_s^{*+} D_s^{*-})/\Gamma_{total}] / [B(B^0 \to D^- D_s^+)] = 1.76 \pm 0.11 \pm 0.14$ which we multiply by our best value $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Use $\Upsilon(5S) \to B_s^* \overline{B}_s^*$ decays assuming $B(\Upsilon(5S) \to B_s^* \overline{B}_s^*) = (17.1 \pm 3.0)\%$ and $\Gamma(\Upsilon(5S) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%$.

[3] AALTONEN 12C reports (f_s/f_d) $(B(B_s^0 \to D_s^{*+} D_s^{*-}) / B(B^0 \to D^- D_s^+)) = 0.654 \pm 0.072 \pm 0.065$. We multiply this result by our best value of $B(B^0 \to D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.1230 \pm 0.0115$.

Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[4] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ assuming B($\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}$) = (19.3 ± 2.9)% and Γ($\Upsilon(10860) \to B_s^* \overline{B}_s^*$) / Γ($\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}$) = $(90.1^{+3.8}_{-4.0})$%.

$\Gamma(D_s^{(*)+} D_s^{(*)-})/\Gamma_{total}$ Γ_{30}/Γ

"OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) and are described at https://hflav.web.cern.ch/. The averaging/rescaling procedure takes into account correlations between the measurements.

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
4.5 ±1.4 OUR EVALUATION					
3.4 ±0.4 OUR AVERAGE					
3.07±0.22±0.33		[1] AAIJ	16P	LHCB	pp at 7 TeV
$4.32^{+0.42}_{-0.39}{}^{+1.04}_{-1.03}$		[2] ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$
3.7 ±0.4 ±0.5		[3] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
3.5 ±1.0 ±1.1		[4] ABAZOV	09I	D0	$p\overline{p}$ at 1.96 TeV
14 ±6 ±3		[5,6] BARATE	00K	ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.85^{+1.53}_{-1.30}{}^{+1.79}_{-1.80}$		[7,8] ESEN	10	BELL	Repl. by ESEN 13
$3.9^{+1.9}_{-1.7}{}^{+1.6}_{-1.5}$		[4] ABAZOV	07Y	D0	Repl. by ABAZOV 09I
<0.218	90	BARATE	98Q	ALEP	$e^+e^- \to Z$

[1] AAIJ 16P reports [Γ($B_s^0 \to D_s^{(*)+} D_s^{(*)-}$)/Γ$_{total}$] / [B($B^0 \to D^- D_s^+$)] = 4.24 ± 0.14 ± 0.27 which we multiply by our best value B($B^0 \to D^- D_s^+$) = $(7.2 \pm 0.8) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Use $\Upsilon(5S) \to B_s^* \overline{B}_s^*$ decays assuming B($\Upsilon(5S) \to B_s^* \overline{B}_s^*$) = (17.1 ± 3.0)% and Γ($\Upsilon(5S) \to B_s^* \overline{B}_s^*$) / Γ($\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}$) = (87.0 ± 1.7)%.

[3] AALTONEN 12C reports (f_s/f_d) (B($B_s^0 \to D_s^{(*)+} D_s^{(*)-}$) / B($B^0 \to D^- D_s^+$)) = 1.261 ± 0.095 ± 0.112. We multiply this result by our best value of B($B^0 \to D^- D_s^+$) = $(7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[4] Uses the final states where $D_s^+ \to \phi\pi^+$ and $D_s^- \to \phi\mu^-\overline{\nu}_\mu$.

[5] Reports B(B_s^0(short) $\to D_s^{(*)} D_s^{(*)}$) = (0.23 ± 0.10 ± 0.05) · $[0.17/\text{B}(D_s \to \phi\chi)]^2$ assuming B($B_s^0 \to B_s^0$(short)) = 50%. We use our best value of B($D_s \to \phi\chi$) = 15.7 ± 1.0% to obtain the quoted result.

[6] Uses $\phi\phi$ correlations from B_s^0(short) $\to D_s^{(*)+} D_s^{(*)-}$.

[7] Sum of exclusive $B_s \to D_s^+ D_s^-$, $B_s \to D_s^{*\pm} D_s^{\mp}$ and $B_s \to D_s^{*+} D_s^{*-}$.

[8] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ assuming B($\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}$) = (19.3 ± 2.9)% and Γ($\Upsilon(10860) \to B_s^* \overline{B}_s^*$) / Γ($\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}$) = $(90.1^{+3.8}_{-4.0})$%.

$\Gamma(D^{*-} D_s^+)/\Gamma_{total}$ — Γ_{31}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.9±0.6±0.5	[1] AAIJ	21S	LHCB	pp at 13 TeV

[1] AAIJ 21S reports $[\Gamma(B_s^0 \to D^{*-} D_s^+)/\Gamma_{total}] / [B(B^0 \to D^*(2010)^- D_s^+)] = 0.049 \pm 0.006 \pm 0.0036$ which we multiply by our best value $B(B^0 \to D^*(2010)^- D_s^+) = (8.0 \pm 1.1) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$[\Gamma(D^{*+} D^-) + \Gamma(D^{*-} D^+)]/\Gamma_{total}$ — $(\Gamma_{22}+\Gamma_{23})/\Gamma$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
8.4±1.1±0.8	[1] AAIJ	21N	LHCB	pp at 7, 8, 13 TeV

[1] AAIJ 21N reports $[[\Gamma(B_s^0 \to D^{*+} D^-) + \Gamma(B_s^0 \to D^{*-} D^+)]/\Gamma_{total}] / [B(B^0 \to D^{\pm} D^{*\mp}(CP\text{-averaged}))] = 0.137 \pm 0.017 \pm 0.006$ which we multiply by our best value $B(B^0 \to D^{\pm} D^{*\mp}(CP\text{-averaged})) = (6.1 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^{*0} \overline{K}^0)/\Gamma_{total}$ — Γ_{32}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.8±1.0±0.5	[1] AAIJ	16C	LHCB	pp at 7, 8 TeV

[1] Measured and normalized to the $B_s^0 \to \overline{D}^{*0} K_S^0$ decay with $f_s/f_d = 0.259 \pm 0.015$. Signal significance is 4.4 standard deviations.

$\Gamma(\overline{D}^0 \overline{K}^0)/\Gamma_{total}$ — Γ_{33}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.3±0.5±0.7	[1] AAIJ	16C	LHCB	pp at 7, 8 TeV

[1] Measured and normalized to the $B^0 \to \overline{D}^0 K_S^0$ decay with $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(\overline{D}^0 K^- \pi^+)/\Gamma_{total}$ — Γ_{34}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.4±1.1±0.5	[1] AAIJ	13AQ	LHCB	pp at 7 TeV

[1] AAIJ 13AQ reports $[\Gamma(B_s^0 \to \overline{D}^0 K^- \pi^+)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 \pi^+ \pi^-)] = 1.18 \pm 0.05 \pm 0.12$ which we multiply by our best value $B(B^0 \to \overline{D}^0 \pi^+ \pi^-) = (8.8 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{35}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.4 ±0.6 OUR AVERAGE				
4.29±0.09±0.65	[1] AAIJ	14BH	LHCB	pp at 7, 8 TeV
4.7 ±1.2 ±0.3	[2] AAIJ	11D	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.5 ±0.4 ±0.4	[3] AAIJ	13BX	LHCB	Repl. by AAIJ 14BH

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

[2] AAIJ 11D reports $[\Gamma(B_s^0 \to \overline{D}^0 \overline{K}^*(892)^0)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 \rho^0)] = 1.48 \pm 0.34 \pm 0.19$ which we multiply by our best value $B(B^0 \to \overline{D}^0 \rho^0) = (3.21 \pm 0.21) \times 10^{-4}$.

Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] AAIJ 13BX reports $[\Gamma(B_s^0 \to \overline{D}^0 \overline{K}^*(892)^0)/\Gamma_{total}]$ / $[B(B^0 \to \overline{D}^0 K^*(892)^0)]$ = $7.8 \pm 0.7 \pm 0.3 \pm 0.6$ which we multiply by our best value $B(B^0 \to \overline{D}^0 K^*(892)^0) = (4.5 \pm 0.6) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^0 \overline{K}^*(1410))/\Gamma_{total}$ — Γ_{36}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
38.6±11.4±33.3	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 \overline{K}_0^*(1430))/\Gamma_{total}$ — Γ_{37}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
30.0±2.4±6.8	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays. Corresponds to the resonant $K_0^*(1430)$ part of LASS parametrization.

$\Gamma(\overline{D}^0 \overline{K}_2^*(1430))/\Gamma_{total}$ — Γ_{38}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
11.1±1.8±3.8	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 \overline{K}^*(1680))/\Gamma_{total}$ — Γ_{39}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<7.8	90	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 \overline{K}_0^*(1950))/\Gamma_{total}$ — Γ_{40}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<11	90	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 \overline{K}_3^*(1780))/\Gamma_{total}$ — Γ_{41}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<2.6	90	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 \overline{K}_4^*(2045))/\Gamma_{total}$ — Γ_{42}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<3.1	90	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 K^- \pi^+ \text{(non-resonant)})/\Gamma_{total}$ Γ_{43}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
20.6±3.8±7.3	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays. Corresponds to the non-resonant part of the LASS parametrization.

$\Gamma(D_{s2}^*(2573)^- \pi^+,\ D_{s2}^* \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{44}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
25.7±0.7±4.0	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(D_{s1}^*(2700)^- \pi^+,\ D_{s1}^* \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{45}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.6±0.4±0.7	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(D_{s1}^*(2860)^- \pi^+,\ D_{s1}^* \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{46}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
5.0±1.2±3.4	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(D_{s3}^*(2860)^- \pi^+,\ D_{s3}^* \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{47}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
2.2±0.1±0.6	[1] AAIJ 14BH	LHCB	pp at 7, 8 TeV

[1] Uses Dalitz plot analysis of $B_s^0 \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 K^+ K^-)/\Gamma_{total}$ Γ_{48}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
5.6±0.7±0.5	[1] AAIJ 18AZ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
5.5±2.0±0.5	[2,3] AAIJ 12AM	LHCB	Repl. by AAIJ 18AZ

[1] AAIJ 18AZ reports $[\Gamma(B_s^0 \to \overline{D}^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 K^+ K^-)] = 0.930 \pm 0.089 \pm 0.069$ which we multiply by our best value $B(B^0 \to \overline{D}^0 K^+ K^-) = (6.1 \pm 0.5) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AAIJ 12AM reports $[\Gamma(B_s^0 \to \overline{D}^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 K^+ K^-)] = 0.90 \pm 0.27 \pm 0.20$ which we multiply by our best value $B(B^0 \to \overline{D}^0 K^+ K^-) = (6.1 \pm 0.5) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] Uses $B(b \to B_s^0)/B(b \to B^0) = 0.267^{+0.023}_{-0.020}$ measured by the same authors.

$\Gamma(\overline{D}^0 f_0(980))/\Gamma_{total}$ Γ_{49}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.1 \times 10^{-6}$	90	AAIJ 15AG	LHCB	pp at 7, 8 TeV

$\Gamma(\overline{D}^0 \phi)/\Gamma_{total}$ — Γ_{50}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
3.0±0.4±0.2	[1] AAIJ 18AY	LHCB	pp at 7 and 8 TeV

[1] AAIJ 18AY reports $[\Gamma(B_s^0 \to \overline{D}^0 \phi)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 \pi^+ \pi^-)] = (3.4 \pm 0.4 \pm 0.3) \times 10^{-2}$ which we multiply by our best value $B(B^0 \to \overline{D}^0 \pi^+ \pi^-) = (8.8 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^0 \phi)/\Gamma(\overline{D}^0 \overline{K}^*(892)^0)$ — Γ_{50}/Γ_{35}

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.069±0.013±0.007	AAIJ 13BX	LHCB	Repl. by AAIJ 18AY

$\Gamma(\overline{D}^{*0} \phi)/\Gamma_{total}$ — Γ_{51}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
3.7±0.6±0.2	[1] AAIJ 18AY	LHCB	pp at 7 and 8 TeV

[1] AAIJ 18AY reports $[\Gamma(B_s^0 \to \overline{D}^{*0} \phi)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 \pi^+ \pi^-)] = (4.2 \pm 0.5 \pm 0.4) \times 10^{-2}$ which we multiply by our best value $B(B^0 \to \overline{D}^0 \pi^+ \pi^-) = (8.8 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^{*\mp} \pi^\pm)/\Gamma_{total}$ — Γ_{52}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<6.1 × 10^{-6}	90	[1] AAIJ 13AL	LHCB	pp at 7 TeV

[1] Uses $f_s/f_d = 0.256 \pm 0.020$ and $B(B^0 \to D^{*-} \pi^+) = (2.76 \pm 0.13) \times 10^{-3}$.

$\Gamma(\eta_c \phi)/\Gamma_{total}$ — Γ_{53}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
5.01±0.53±0.68	[1] AAIJ 17U	LHCB	pp at 7, 8 TeV

[1] The last uncertainty includes the limited knowledge of the external branching fractions where the η_c is reconstructed in the $p\overline{p}$,$K^+ K^- \pi^+ \pi^-$, $\pi^+ \pi^- \pi^+ \pi^-$, and $K^+ K^- K^+ K^-$ decays and $\phi(1020) \to K^+ K^-$.

$\Gamma(\eta_c \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{55}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.76±0.59±0.31	[1] AAIJ 17U	LHCB	pp at 7, 8 TeV

[1] The last uncertainty includes the limited knowledge of the external branching fractions where the η_c is reconstructed in the $p\overline{p}$,$K^+ K^- \pi^+ \pi^-$, $\pi^+ \pi^- \pi^+ \pi^-$, and $K^+ K^- K^+ K^-$ decays. The significance of the signal, including systematic uncertainties, is 4.6 standard deviations.

$\Gamma(J/\psi(1S) \phi)/\Gamma_{total}$ — Γ_{56}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.04 ±0.04 OUR FIT				
1.04 ±0.04 OUR AVERAGE				
1.037±0.032±0.022		[1] AAIJ 21Y	LHCB	pp at 7, 8, 13 TeV
1.25 ±0.07 ±0.23		[2] THORNE 13	BELL	$e^+ e^- \to \Upsilon(5S)$
1.5 ±0.5 ±0.1		[3] ABE 96Q	CDF	$p\overline{p}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.050\pm0.013\pm0.104$		[4] AAIJ	13AN	LHCB	Repl. by AAIJ 21Y
<6	1	[5] AKERS	94J	OPAL	$e^+e^- \to Z$
seen	14	[6] ABE	93F	CDF	$p\overline{p}$ at 1.8 TeV
seen	1	[7] ACTON	92N	OPAL	Sup. by AKERS 94J

[1] AAIJ 21Y reports $[\Gamma(B^0_s \to J/\psi(1S)\phi)/\Gamma_{\text{total}}] \times [B(\phi(1020) \to K^+K^-)] = (5.01 \pm 0.16 \pm 0.17) \times 10^{-4}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S)\phi)/\Gamma_{\text{total}}] \times [B(\phi(1020) \to K^+K^-)]$ / $[B(B^+ \to J/\psi(1S)K^+)]$ assuming $B(B^+ \to J/\psi(1S)K^+) = (1.003 \pm 0.035) \times 10^{-3}$, which we rescale to our best values $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$, $B(B^+ \to J/\psi(1S)K^+) = (1.020 \pm 0.019) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] THORNE 13 uses $f_s = (17.2 \pm 3.0)\%$ as the fraction of $\Upsilon(5S)$ decaying to $B^{(*)}_s \overline{B}^{(*)}_s$.

[3] ABE 96Q reports $[\Gamma(B^0_s \to J/\psi(1S)\phi)/\Gamma_{\text{total}}] \times [\Gamma(\overline{b} \to B^0_s)/\left[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^0)\right]] = (0.185 \pm 0.055 \pm 0.020) \times 10^{-3}$ which we divide by our best value $\Gamma(\overline{b} \to B^0_s)/\left[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^0)\right] = 0.1230 \pm 0.0115$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] AAIJ 13AN uses $f_s/f_d = 0.256 \pm 0.020$ and $B(B^+ \to J/\psi K^+) = (10.18 \pm 0.42) \times 10^{-4}$.

[5] AKERS 94J sees one event and measures the limit on the product branching fraction $f(\overline{b} \to B^0_s) \cdot B(B^0_s \to J/\psi(1S)\phi) < 7 \times 10^{-4}$ at CL = 90%. We divide by $B(\overline{b} \to B^0_s) = 0.112$.

[6] ABE 93F measured using $J/\psi(1S) \to \mu^+\mu^-$ and $\phi \to K^+K^-$.

[7] In ACTON 92N a limit on the product branching fraction is measured to be $f(\overline{b} \to B^0_s) \cdot B(B^0_s \to J/\psi(1S)\phi) \le 0.22 \times 10^{-2}$.

$\Gamma(J/\psi(1S)\phi\phi)/\Gamma(J/\psi(1S)\phi)$ — Γ_{57}/Γ_{56}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.15 \pm 0.12^{+0.05}_{-0.09}}$	128	[1] AAIJ	16U	LHCB	pp at 7, 8 TeV

[1] Uses $J/\psi \to \mu^+\mu^-$, $\phi \to K^+K^-$ decays, and observes 128 ± 13 events of $B^0_s \to J/\psi\phi\phi$.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$ — Γ_{58}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$\mathbf{<1.2 \times 10^{-3}}$	90	[1] ACCIARRI	97C	L3

[1] ACCIARRI 97C assumes B^0 production fraction $(39.5 \pm 4.0\%)$ and B_s $(12.0 \pm 3.0\%)$.

$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ — Γ_{59}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
4.0 ±0.7 OUR AVERAGE		Error includes scale factor of 1.4.			
$3.6\ ^{+0.5}_{-0.6}\ ^{+0.3}_{-0.2}$		[1] AAIJ	13A	LHCB	pp at 7 TeV
$5.10 \pm 0.50^{+1.17}_{-0.83}$		[2] LI	12	BELL	$e^+e^- \to \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<38	90	[3] ACCIARRI	97C	L3

[1] AAIJ 13A reports $[\Gamma(B_s^0 \to J/\psi(1S)\eta)/\Gamma_{total}] / [B(B^0 \to J/\psi(1S)\rho^0)] = 14.0 \pm 1.2^{+1.1}_{-1.5}{}^{+1.1}_{-1.0}$ which we multiply by our best value $B(B^0 \to J/\psi(1S)\rho^0) = (2.55^{+0.18}_{-0.16}) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Observed for the first time with significances over 10 σ. The second error are total systematic uncertainties including the error on $N(B_s^{(*)}\overline{B}_s^{(*)})$.

[3] ACCIARRI 97C assumes B^0 production fraction (39.5 ± 4.0%) and B_s (12.0 ± 3.0%).

$\Gamma(J/\psi(1S)K_S^0)/\Gamma_{total}$ Γ_{60}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.92±0.14 OUR AVERAGE				
1.92±0.14±0.05	[1] AAIJ	15AL	LHCB	pp at 7, 8 TeV
2.0 ±0.4 ±0.2	[2] AALTONEN	11A	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.03±0.16±0.20	[3] AAIJ	13AB	LHCB	Repl. by AAIJ 15AL
2.03±0.26±0.20	[4] AAIJ	12O	LHCB	Repl. by AAIJ 13AB

[1] AAIJ 15AL reports $[\Gamma(B_s^0 \to J/\psi(1S)K_S^0)/\Gamma_{total}] / [B(B^0 \to J/\psi(1S)K_S^0)] = (4.31 \pm 0.17 \pm 0.12 \pm 0.25) \times 10^{-2}$ which we multiply by our best value $B(B^0 \to J/\psi(1S)K_S^0) = (4.45 \pm 0.11) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AALTONEN 11A reports $[\Gamma(B_s^0 \to J/\psi(1S)K_S^0)/\Gamma_{total}] \times [B(\overline{b} \to B_s^0)] / [B(\overline{b} \to B^0)] / [B(B^0 \to J/\psi(1S)K_S^0)] = (1.09 \pm 0.19 \pm 0.11) \times 10^{-2}$ which we multiply or divide by our best values $B(\overline{b} \to B_s^0) = (10.0 \pm 0.8) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.8 \pm 0.7) \times 10^{-2}$, $B(B^0 \to J/\psi(1S)K_S^0) = 1/2 \times B(B^0 \to J/\psi(1S)K^0) = 1/2 \times (8.91 \pm 0.21) \times 10^{-4}$. Our firs t error is their experiment's error and our second error is the systematic error from using our best values.

[3] AAIJ 13AB reports $(1.97 \pm 0.14 \pm 0.07 \pm 0.15 \pm 0.08) \times 10^{-5}$ from a measurement of $[\Gamma(B_s^0 \to J/\psi(1S)K_S^0)/\Gamma_{total}] / [B(B^0 \to J/\psi(1S)K^0)] \times [\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0)]$ assuming $B(B^0 \to J/\psi(1S)K^0) = (8.98 \pm 0.35) \times 10^{-4}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.256 \pm 0.020$, which we rescale to our best values $B(B^0 \to J/\psi(1S)K^0) = (8.91 \pm 0.21) \times 10^{-4}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[4] AAIJ 12O reports $(1.83 \pm 0.21 \pm 0.10 \pm 0.14 \pm 0.07) \times 10^{-5}$ from a measurement of $[\Gamma(B_s^0 \to J/\psi(1S)K_S^0)/\Gamma_{total}] / [B(B^0 \to J/\psi(1S)K^0)] \times [\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0)]$ assuming $B(B^0 \to J/\psi(1S)K^0) = (8.71 \pm 0.32) \times 10^{-4}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.267^{+0.021}_{-0.02}$, which we rescale to our best values $B(B^0 \to J/\psi(1S)K^0) = (8.91 \pm 0.21) \times 10^{-4}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi(1S)\overline{K}^*(892)^0)/\Gamma_{total}$ Γ_{61}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.14±0.18±0.35	[1] AAIJ	15AV	LHCB	pp at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$4.4\ ^{+0.5}_{-0.4}\ \pm 0.8$	[2] AAIJ	12AP	LHCB	Repl. by AAIJ 15AV
$9\ \pm 4\ \pm 1$	[3] AALTONEN	11A	CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15AV result combines two measurements with different normalizing modes of $B^0 \to J/\psi K^*(892)^0$ and $B^0_s \to J/\psi\phi$.

[2] AAIJ 12AP reports $B(B^0_s \to J/\psi(1S)\overline{K}^*(892)^0)/B(B^0 \to J/\psi(1S)K^*(892)^0) = (3.43^{+0.34}_{-0.36} \pm 0.50) \times 10^{-2}$ and $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.29 \pm 0.05 \pm 0.13) \times 10^{-3}$ after correcting for the contribution from $K\pi$ S-wave beneath the K^* peak.

[3] AALTONEN 11A reports $[\Gamma(B^0_s \to J/\psi(1S)\overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\overline{b} \to B^0_s)]$ / $[B(\overline{b} \to B^0)]$ / $[B(B^0 \to J/\psi(1S)K^*(892)^0)] = 0.0168 \pm 0.0024 \pm 0.0068$ which we multiply or divide by our best values $B(\overline{b} \to B^0_s) = (10.0 \pm 0.8) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.8 \pm 0.7) \times 10^{-2}$, $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi(1S)\eta')/\Gamma_{total}$ — Γ_{62}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.3 ±0.4 OUR AVERAGE				
$3.2\ ^{+0.4}_{-0.5}\ \pm 0.2$	[1] AAIJ	13A	LHCB	pp at 7 TeV
$3.71 \pm 0.61\ ^{+0.85}_{-0.60}$	[2] LI	12	BELL	$e^+e^- \to \Upsilon(4S)$

[1] AAIJ 13A reports $[\Gamma(B^0_s \to J/\psi(1S)\eta')/\Gamma_{total}]$ / $[B(B^0 \to J/\psi(1S)\rho^0)] = 12.7 \pm 1.1^{+0.5}_{-1.3}{}^{+1.0}_{-0.9}$ which we multiply by our best value $B(B^0 \to J/\psi(1S)\rho^0) = (2.55^{+0.18}_{-0.16}) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Observed for the first time with significances over 10 σ. The second error are total systematic uncertainties including the error on $N(B^{(*)}_s \overline{B}^{(*)}_s)$.

$\Gamma(J/\psi(1S)\eta')/\Gamma(J/\psi(1S)\eta)$ — Γ_{62}/Γ_{59}

VALUE	DOCUMENT ID		TECN	COMMENT
0.87 ±0.06 OUR AVERAGE				
$0.902 \pm 0.072 \pm 0.045$	[1] AAIJ	15D	LHCB	pp at 7, 8 TeV
$0.90\ \pm 0.09\ ^{+0.06}_{-0.02}$	[2] AAIJ	13A	LHCB	pp at 7 TeV
$0.73\ \pm 0.14\ \pm 0.02$	[2] LI	12	BELL	$e^+e^- \to \Upsilon(4S)$

[1] Uses $J/\psi \to \mu^+\mu^-$, $\eta' \to \rho^0\gamma$, and $\eta' \to \eta\pi^+\pi^-$ decays.

[2] Strongly correlated with measurements of $\Gamma(J/\psi(1S)\eta)/\Gamma$ and $\Gamma(J/\psi(1S)\eta')/\Gamma$ reported in the same reference.

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{63}/Γ_{56}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
19.4±1.5 OUR FIT Error includes scale factor of 2.2.				
19.9±0.7±0.2	[1] AAIJ	12AO	LHCB	pp at 7 TeV

[1] AAIJ 12AO reports $(19.79 \pm 0.47 \pm 0.52) \times 10^{-2}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S)\pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)]$ assuming

B($\phi(1020) \to K^+ K^-$) = (48.9 ± 0.5) × 10^{-2}, which we rescale to our best value B($\phi(1020) \to K^+ K^-$) = (49.1 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S) f_0(500),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)$ Γ_{64}/Γ_{66}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.034	90	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S)\rho,\ \rho \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_{65}/Γ_{63}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.017	90	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ Γ_{66}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.24±0.15 OUR FIT Error includes scale factor of 2.1.				
$1.16^{+0.31}_{-0.19}{}^{+0.30}_{-0.25}$	[1] LI	11	BELL	$e^+e^- \to \Upsilon(5S)$

[1] The second error includes both the detector systematic and the uncertainty in the number of produced $Y(5S) \to B_s^{(*)} \overline{B}_s^{(*)}$ pairs.

$\Gamma(J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ Γ_{66}/Γ_{56}

VALUE	DOCUMENT ID		TECN	COMMENT
$0.119^{+0.013}_{-0.014}$ OUR FIT Error includes scale factor of 2.4.				
$0.110^{+0.020}_{-0.018}$ OUR AVERAGE Error includes scale factor of 2.5. See the ideogram below.				
0.069±0.012±0.001	[1] KHACHATRY...	16Q	CMS	pp at 7 TeV
$0.140^{+0.026}_{-0.013}$±0.002	[2,3] AAIJ	12AO	LHCB	pp at 7 TeV
0.135±0.036±0.001	[4] ABAZOV	12C	D0	$p\overline{p}$ at 1.96 TeV
0.126±0.012±0.001	[5] AALTONEN	11AB	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.124^{+0.026}_{-0.023}$±0.001	[6] AAIJ	11	LHCB	Repl. by AAIJ 12AO

[1] KHACHATRYAN 16Q reports [$\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)$] / [B($\phi(1020) \to K^+K^-$)] = 0.140 ± 0.008 ± 0.023 which we multiply by our best value B($\phi(1020) \to K^+K^-$) = (49.1 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AAIJ 12AO reports (13.9 ± $0.6^{+2.5}_{-1.2}$) × 10^{-2} from a measurement of [$\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)$] / [B($\phi(1020) \to K^+K^-$)] assuming B($\phi(1020) \to K^+K^-$) = (48.9 ± 0.5) × 10^{-2}, which we rescale to our best value B($\phi(1020) \to K^+K^-$) = (49.1 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

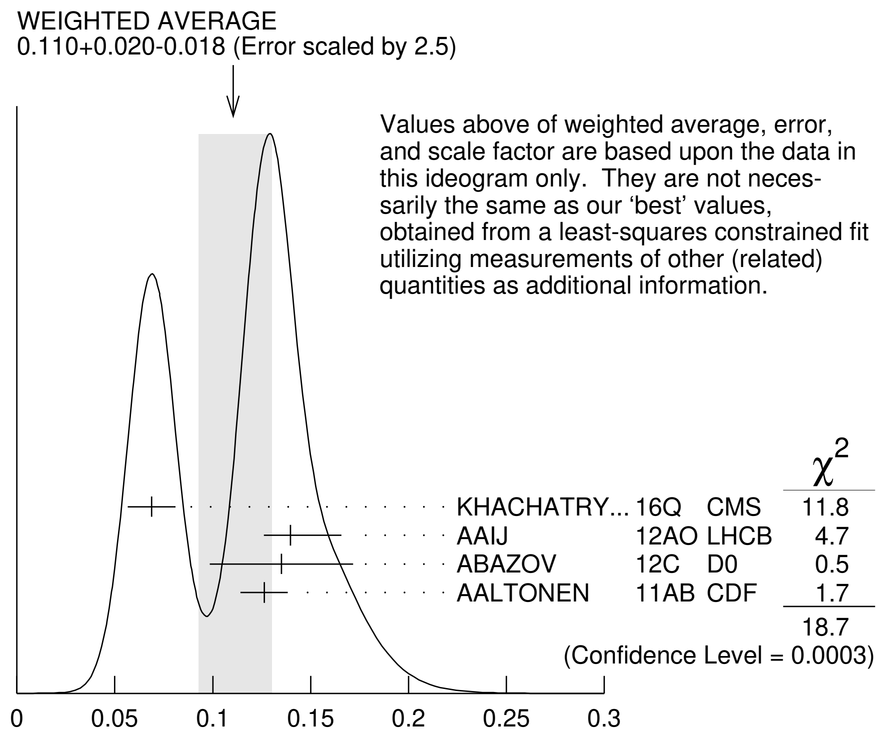
[3] Measured in Dalitz plot like analysis of $B_s \to J/\psi\pi^+\pi^-$ decays.

[4] ABAZOV 12C reports [$\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)$] / [B($\phi(1020) \to K^+K^-$)] = 0.275 ± 0.041 ± 0.061 which we multiply by our best value

B(ϕ(1020) → K^+K^-) = (49.1 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[5] AALTONEN 11AB reports $[\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)]$ / [B(ϕ(1020) → K^+K^-)] = 0.257 ± 0.020 ± 0.014 which we multiply by our best value B(ϕ(1020) → K^+K^-) = (49.1 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[6] AAIJ 11 reports $[\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)]$ / [B(ϕ(1020) → K^+K^-)] = $0.252^{+0.046}_{-0.032}{}^{+0.027}_{-0.033}$ which we multiply by our best value B(ϕ(1020) → K^+K^-) = (49.1 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.



$\Gamma\big(J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-\big)/\Gamma\big(J/\psi(1S)\phi\big)$

$\Gamma\big(J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-\big)/\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)$ Γ_{66}/Γ_{63}

VALUE	DOCUMENT ID	TECN	COMMENT
$0.61^{+0.06}_{-0.07}$ OUR FIT Error includes scale factor of 2.1.			
$0.703 \pm 0.015^{+0.004}_{-0.051}$	[1] AAIJ	14BR LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma\big(J/\psi(1S) f_2(1270),\ f_2 \to \pi^+\pi^-\big)/\Gamma\big(J/\psi(1S)\phi\big)$ Γ_{67}/Γ_{56}

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$9.8^{+3.4}_{-3.6} \pm 0.1$	[1,2] AAIJ	12AO LHCB	pp at 7 TeV

[1] AAIJ 12AO reports $(0.098 \pm 0.033^{+0.006}_{-0.015}) \times 10^{-2}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S) f_2(1270),\ f_2 \to \pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)]$ assuming $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Measured in Dalitz plot like analysis of $B_s \to J/\psi\pi^+\pi^-$ decays for the f_2 helicity state $\lambda = 0$.

$\Gamma(J/\psi(1S) f_2(1270)_0,\ f_2 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{68}/Γ_{63}

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.36±0.07±0.03	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_2(1270)_{\parallel},\ f_2 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{69}/Γ_{63}

VALUE (%)	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.52 \pm 0.15^{+0.05}_{-0.02}}$	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_2(1270)_{\perp},\ f_2 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{70}/Γ_{63}

VALUE (%)	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.63 \pm 0.34^{+0.16}_{-0.08}}$	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{71}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.34^{+0.11}_{-0.14}{}^{+0.085}_{-0.054}$	[1] LI	11	BELL	$e^+e^- \to \Upsilon(5S)$

[1] The second error includes both the detector systematic and the uncertainty in the number of produced $Y(5S) \to B_s^{(*)}\overline{B}_s^{(*)}$ pairs.

$\Gamma(J/\psi(1S) f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{71}/Γ_{56}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{4.21^{+0.54}_{-3.76} \pm 0.05}$	[1,2] AAIJ	12AO	LHCB	pp at 7 TeV

[1] AAIJ 12AO reports $(4.19 \pm 0.53^{+0.12}_{-3.7}) \times 10^{-2}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S) f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)]$ assuming $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Measured in Dalitz plot like analysis of $B_s \to J/\psi\pi^+\pi^-$ decays.

$\Gamma(J/\psi(1S) f_0(1500),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{72}/Γ_{63}

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.101 \pm 0.008^{+0.011}_{-0.003}}$	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_2'(1525)_0,\ f_2' \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{73}/Γ_{63}

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.51 \pm 0.09^{+0.05}_{-0.04}}$	[1] AAIJ 14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_2'(1525)_\parallel,\ f_2' \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{74}/Γ_{63}

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.06^{+0.13}_{-0.04} \pm 0.01}$	[1] AAIJ 14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_2'(1525)_\perp,\ f_2' \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{75}/Γ_{63}

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.26 \pm 0.18^{+0.06}_{-0.04}}$	[1] AAIJ 14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) f_0(1790),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{76}/Γ_{63}

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.024 \pm 0.004^{+0.050}_{-0.002}}$	[1] AAIJ 14BR	LHCB	pp at 7, 8 TeV

[1] Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S)\pi^+\pi^-\,(\text{nonresonant}))/\Gamma(J/\psi(1S)\phi)$ — Γ_{77}/Γ_{56}

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
$\mathbf{1.67^{+1.01}_{-0.32} \pm 0.02}$	[1,2] AAIJ 12AO	LHCB	pp at 7 TeV

[1] AAIJ 12AO reports $(1.66 \pm 0.31^{+0.96}_{-0.08}) \times 10^{-2}$ from a measurement of $[\Gamma(B_s^0 \to J/\psi(1S)\pi^+\pi^-\,(\text{nonresonant}))/\Gamma(B_s^0 \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)]$ assuming $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Measured in Dalitz plot like analysis of $B_s \to J/\psi\pi^+\pi^-$ decays.

$\Gamma(J/\psi(1S)\overline{K}^0\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{78}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\mathbf{<4.4 \times 10^{-5}}$	90	[1] AAIJ 14L	LHCB	pp at 7 TeV

[1] Measured with $B(B_s^0 \to J/\psi K_S^0\pi^+\pi^-)$ / $B(B^0 \to J/\psi K_S^0\pi^+\pi^-)$ using PDG 12 values for the involved branching fractions.

$\Gamma(J/\psi(1S)K^+K^-)/\Gamma_{\text{total}}$ — Γ_{79}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
7.9 ±0.7 OUR AVERAGE			
$7.70 \pm 0.08 \pm 0.72$	[1] AAIJ 13AN	LHCB	pp at 7 TeV
$10.1 \pm 0.9 \pm 2.1$	[2] THORNE 13	BELL	$e^+e^- \to \Upsilon(5S)$

[1] Uses $f_s/f_d = 0.256 \pm 0.020$ and $B(B^+ \to J/\psi K^+) = (10.18 \pm 0.42) \times 10^{-4}$.

[2] Uses $f_s = (17.2 \pm 3.0)\%$ as the fraction of $\Upsilon(5S)$ decaying to $B_s^{(*)}\overline{B}_s^{(*)}$.

$\Gamma(J/\psi(1S)K^0K^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{80}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
9.5±1.0±0.8	[1] AAIJ	14L	LHCB	pp at 7 TeV

[1] AAIJ 14L reports $[\Gamma(B_s^0 \to J/\psi(1S)K^0K^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}]$ / $[B(B^0 \to J/\psi(1S)K^0\pi^+\pi^-)] = 2.12 \pm 0.15 \pm 0.18$ which we multiply by our best value $B(B^0 \to J/\psi(1S)K^0\pi^+\pi^-) = (4.5 \pm 0.4) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. This is an observation of $B_s^0 \to J/\psi K_S^0 K^\pm\pi^\mp$ with more than 10 standard deviations.

$\Gamma(J/\psi(1S)\overline{K}^0K^+K^-)/\Gamma_{\text{total}}$ — Γ_{81}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<12 \times 10^{-6}$	90	[1] AAIJ	14L	LHCB	pp at 7 TeV

[1] Measured with $B(B_s^0 \to J/\psi K_S^0 K^+K^-)/B(B^0 \to J/\psi K_S^0\pi^+\pi^-)$ using PDG 12 values for the involved branching fractions.

$\Gamma(J/\psi(1S)f_2'(1525))/\Gamma_{\text{total}}$ — Γ_{83}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$2.61 \pm 0.20^{+0.56}_{-0.50}$	[1] AAIJ	13AN	LHCB	pp at 7 TeV

[1] Uses $f_s/f_d = 0.256 \pm 0.020$ and $B(B^+ \to J/\psi K^+) = (10.18 \pm 0.42) \times 10^{-4}$.

$\Gamma(J/\psi(1S)f_2'(1525))/\Gamma(J/\psi(1S)\phi)$ — Γ_{83}/Γ_{56}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
21 ±4 OUR AVERAGE				
21.5±4.9±2.6	[1] THORNE	13	BELL	$e^+e^- \to \Upsilon(5S)$
21 ±7 ±1	[2,3] ABAZOV	12AF	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
27 ±4 ±1	[4] AAIJ	12S	LHCB	Repl. by AAIJ 13AN

[1] Uses $B(f_2'(1525) \to K^+K^-) = (44.4 \pm 1.1)\%$.

[2] ABAZOV 12AF reports $[\Gamma(B_s^0 \to J/\psi(1S)f_2'(1525))/\Gamma(B_s^0 \to J/\psi(1S)\phi)] \times B(f_2'(1525) \to K^+K^-)$ / $B(\phi(1020) \to K^+K^-) = 0.19 \pm 0.05 \pm 0.04$ which we divide and multiply by our best values $B(f_2'(1525) \to K^+K^-) = \frac{1}{2}(87.6 \pm 2.2) \times 10^{-2}$, $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[3] ABAZOV 12AF fits the invariant masses of the K^+K^- pair in the range $1.35 < M(K^+K^-) < 2$ GeV.

[4] AAIJ 12S reports $[(26.4 \pm 2.7 \pm 2.4) \times 10^{-2}$ from a measurement of $\Gamma(B_s^0 \to J/\psi(1S)f_2'(1525))/\Gamma(B_s^0 \to J/\psi(1S)\phi)] \times B(f_2'(1525) \to K^+K^-)$ / $B(\phi(1020) \to K^+K^-)$ assuming $B(f_2'(1525) \to K^+K^-) = (44.4 \pm 1.1) \times 10^{-2}$, $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$, which we rescale to our best values $B(f_2'(1525) \to K^+K^-) = \frac{1}{2}(87.6 \pm 2.2) \times 10^{-2}$, $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi(1S)p\bar{p})/\Gamma_{total}$ — Γ_{84}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
3.58±0.19±0.39		[1] AAIJ	19U	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.8	90	[2] AAIJ	13Z	LHCB	Repl. by AAIJ 19U

[1] Measured relative to $B^0_s \to J/\psi\phi$ assuming $B(B^0_s \to J/\psi\phi) = (10.5 \pm 0.13 \pm 0.64) \times 10^{-4}$ and taking into account small K^+K^- S-wave contribution.
[2] Uses $B(B^0_s \to J/\psi(1S)\pi^+\pi^-) = (1.98 \pm 0.20) \times 10^{-4}$.

$\Gamma(J/\psi(1S)\gamma)/\Gamma_{total}$ — Γ_{85}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.3 × 10^{-6}	90	[1] AAIJ	15BB	LHCB	pp at 7, 8 TeV

[1] Branching fractions of normalization modes $B^0_s \to J/\psi\gamma X$ taken from PDG 14. Uses $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{86}/Γ_{63}

VALUE	DOCUMENT ID		TECN	COMMENT
0.371±0.015±0.022	[1] AAIJ	14Y	LHCB	pp at 7,8 TeV

[1] Excludes contributions from $\psi(2S)$ and $\chi_{c1}(3872)$ decaying to $J/\psi(1S)\pi^+\pi^-$.

$\Gamma(J/\psi(1S)f_1(1285))/\Gamma_{total}$ — Γ_{87}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
7.2±1.3±0.4	[1] AAIJ	14Y	LHCB	pp at 7, 8 TeV

[1] AAIJ 14Y reports $(7.14 \pm 0.99^{+0.83}_{-0.91} \pm 0.41) \times 10^{-5}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S)f_1(1285))/\Gamma_{total}] \times [B(f_1(1285) \to 2\pi^+2\pi^-)]$ assuming $B(f_1(1285) \to 2\pi^+2\pi^-) = 0.11^{+0.007}_{-0.006}$, which we rescale to our best value $B(f_1(1285) \to 2\pi^+2\pi^-) = (10.9 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\psi(2S)\eta)/\Gamma(J/\psi(1S)\eta)$ — Γ_{88}/Γ_{59}

VALUE	DOCUMENT ID		TECN	COMMENT
0.83±0.14±0.12	[1] AAIJ	13AA	LHCB	pp at 7 TeV

[1] Assuming lepton universality for dimuon decay modes of J/ψ and $\psi(2S)$ mesons, the ratio $B(J/\psi \to \mu^+\mu^-)/B(\psi(2S) \to \mu^+\mu^-) = B(J/\psi \to e^+e^-)/B(\psi(2S) \to e^+e^-) = 7.69 \pm 0.19$ was used.

$\Gamma(\psi(2S)\eta')/\Gamma(J/\psi(1S)\eta')$ — Γ_{89}/Γ_{62}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
38.7±9.0±1.6	[1] AAIJ	15D	LHCB	pp at 7, 8 TeV

[1] Uses $J/\psi \to \mu^+\mu^-$, $\eta' \to \rho^0\gamma$, and $\eta' \to \eta\pi^+\pi^-$ decays.

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{90}/Γ_{63}

VALUE	DOCUMENT ID		TECN	COMMENT
0.34±0.04±0.03	[1] AAIJ	13AA	LHCB	pp at 7 TeV

[1] Assuming lepton universality for dimuon decay modes of J/ψ and $\psi(2S)$ mesons, the ratio $B(J/\psi \to \mu^+\mu^-)/B(\psi(2S) \to \mu^+\mu^-) = B(J/\psi \to e^+e^-)/B(\psi(2S) \to e^+e^-) = 7.69 \pm 0.19$ was used.

$\Gamma(\psi(2S)\phi)/\Gamma_{total}$ — Γ_{91}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	1	BUSKULIC	93G	ALEP	$e^+e^- \to Z$

$\Gamma(\psi(2S)\phi)/\Gamma(J/\psi(1S)\phi)$ — Γ_{91}/Γ_{56}

VALUE	DOCUMENT ID		TECN	COMMENT
0.503±0.034 OUR AVERAGE				
0.500±0.034±0.011	[1,2] AAIJ	12L	LHCB	pp at 7 TeV
0.53 ±0.10 ±0.09	ABAZOV	09Y	D0	$p\overline{p}$ at 1.96 TeV
0.52 ±0.13 ±0.07	ABULENCIA	06N	CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 12L reports 0.489 ± 0.026 ± 0.021 ± 0.012 from a measurement of $[\Gamma(B_s^0 \to \psi(2S)\phi)/\Gamma(B_s^0 \to J/\psi(1S)\phi)] \times [B(J/\psi(1S) \to e^+e^-)] / [B(\psi(2S) \to e^+e^-)]$ assuming $B(J/\psi(1S) \to e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$, $B(\psi(2S) \to e^+e^-) = (7.72 \pm 0.17) \times 10^{-3}$, which we rescale to our best values $B(J/\psi(1S) \to e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$, $B(\psi(2S) \to e^+e^-) = (7.93 \pm 0.17) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] Assumes $B(J/\psi \to \mu^+\mu^-) / B(\psi(2S) \to \mu^+\mu^-) = B(J/\psi \to e^+e^-) / B(\psi(2S) \to e^+e^-) = 7.69 \pm 0.19$.

$\Gamma(\psi(2S)K^-\pi^+)/\Gamma_{total}$ — Γ_{92}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
3.12±0.30±0.21	[1] AAIJ	15U	LHCB	pp at 7, 8 TeV

[1] AAIJ 15U reports $[\Gamma(B_s^0 \to \psi(2S)K^-\pi^+)/\Gamma_{total}] / [B(B^0 \to \psi(2S)K^+\pi^-)] = (5.38 \pm 0.36 \pm 0.22 \pm 0.31) \times 10^{-2}$ which we multiply by our best value $B(B^0 \to \psi(2S)K^+\pi^-) = (5.8 \pm 0.4) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\psi(2S)\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{93}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$3.3\pm0.5^{+0.2}_{-0.3}$	[1] AAIJ	15U	LHCB	pp at 7, 8 TeV

[1] AAIJ 15U reports $[\Gamma(B_s^0 \to \psi(2S)\overline{K}^*(892)^0)/\Gamma_{total}] / [B(B^0 \to \psi(2S)K^*(892)^0)] = (5.58 \pm 0.57 \pm 0.40 \pm 0.32) \times 10^{-2}$ which we multiply by our best value $B(B^0 \to \psi(2S)K^*(892)^0) = (5.9 \pm 0.4) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\chi_{c1}\phi)/\Gamma(J/\psi(1S)\phi)$ — Γ_{94}/Γ_{56}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
18.9±1.8±1.5	[1] AAIJ	13AC	LHCB	pp at 7 TeV

[1] Uses $B(\chi_{c1} \to J/\psi\gamma) = (34.4 \pm 1.5)\%$.

$\Gamma(\chi_{c2}K^+K^-)/\Gamma(\chi_{c1}K^+K^-)$ — Γ_{96}/Γ_{95}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
17.1±3.1±1.0	[1] AAIJ	18AC	LHCB	pp at 7, 8, 13 TeV

[1] Measures the ratio for ±15 MeV window around ϕ mass.

$\Gamma(\chi_{c1}(3872)\phi)/\Gamma(\psi(2S)\phi)$ — Γ_{97}/Γ_{91}

VALUE	DOCUMENT ID		TECN	COMMENT
0.21±0.07 OUR AVERAGE				
0.22±0.02±0.07	[1] AAIJ	21C	LHCB	pp at 7, 8, 13 TeV
0.20±0.03±0.07	[2] SIRUNYAN	20BB	CMS	pp at 13 TeV

[1] AAIJ 21C reports $[\Gamma(B_s^0 \to \chi_{c1}(3872)\phi)/\Gamma(B_s^0 \to \psi(2S)\phi)] \times [B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))] / [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)] = (2.42 \pm 0.23 \pm 0.07) \times 10^{-2}$ which we multiply or divide by our best values $B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)) = (3.8 \pm 1.2) \times 10^{-2}$, $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] SIRUNYAN 20BB reports $[\Gamma(B_s^0 \to \chi_{c1}(3872)\phi)/\Gamma(B_s^0 \to \psi(2S)\phi)] \times [B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))] / [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)] = (2.21 \pm 0.29 \pm 0.17) \times 10^{-2}$ which we multiply or divide by our best values $B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)) = (3.8 \pm 1.2) \times 10^{-2}$, $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi K^*(892)^0 \overline{K}^*(892)^0)/\Gamma(\psi(2S)\phi)$ — Γ_{82}/Γ_{91}

VALUE	DOCUMENT ID		TECN	COMMENT
0.209±0.006±0.003	[1] AAIJ	21C	LHCB	pp at 7, 8, 13 TeV

[1] AAIJ 21C reports $\Gamma(B_s^0 \to J/\psi K^*(892)^0 \overline{K}^*(892)^0)/\Gamma(B_s^0 \to \psi(2S)\phi)$ $B^2(K^{*0} \to K^+\pi^-)/B(\psi(2S) \to J/\psi\pi^+\pi^-)/B(\phi \to K^+K^-) = 1.22 \pm 0.03 \pm 0.04$ which we adjust with PDG 20 values of $B(K^{*0} \to K^+\pi^-) = (99.902 \pm 0.009) \times 10^{-2}$, $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$, and $B(\phi \to K^+K^-) = (49.2 \pm 0.5) \times 10^{-2}$. The first uncertainty is the total experiment's one and the second is due to the adjustment branching fractions.

$\Gamma(\chi_{c1}(3872)(K^+K^-)_{non-\phi})/\Gamma(\chi_{c1}(3872)\phi)$ — Γ_{98}/Γ_{97}

VALUE	DOCUMENT ID		TECN	COMMENT
0.77±0.17±0.01	[1] AAIJ	21C	LHCB	pp at 7, 8, 13 TeV

[1] AAIJ 21C reports $[\Gamma(B_s^0 \to \chi_{c1}(3872)(K^+K^-)_{non-\phi})/\Gamma(B_s^0 \to \chi_{c1}(3872)\phi)] / [B(\phi(1020) \to K^+K^-)] = 1.57 \pm 0.32 \pm 0.12$ which we multiply by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{99}/Γ

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
7.0±1.0 OUR AVERAGE					
7.3±0.9±0.7		[1] AAIJ	17G	LHCB	pp at 7 and 8 TeV
6.4±1.8±0.6		[2] AALTONEN	12L	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10.4^{+2.4}_{-2.1}\pm1.0$		[3] AAIJ	12AR	LHCB	Repl. by AAIJ 17G
< 120	90	[4] PENG	10	BELL	$e^+e^- \to \Upsilon(5S)$
< 12	90	[5] AALTONEN	09C	CDF	Repl. by AALTONEN 12L
< 17	90	[6] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 09C
<2320	90	[7] ABE	00C	SLD	$e^+e^- \to Z$
<1700	90	[8] BUSKULIC	96V	ALEP	$e^+e^- \to Z$

[1] AAIJ 17G reports $[\Gamma(B_s^0 \to \pi^+\pi^-)/\Gamma_{\rm total}]$ / $[B(B^0 \to K^+\pi^-)] \times [\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0)] = (9.15 \pm 0.71 \pm 0.83) \times 10^{-3}$ which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] AALTONEN 12L reports $[\Gamma(B_s^0 \to \pi^+\pi^-)/\Gamma_{\rm total}]$ / $[B(B^0 \to K^+\pi^-)] \times [\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0)] = 0.008 \pm 0.002 \pm 0.001$ which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[3] AAIJ 12AR reports $[\Gamma(B_s^0 \to \pi^+\pi^-)/\Gamma_{\rm total}]$ / $[B(B^0 \to \pi^+\pi^-)] \times [\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0)] = 0.050^{+0.011}_{-0.009} \pm 0.004$ which we multiply or divide by our best values $B(B^0 \to \pi^+\pi^-) = (5.12 \pm 0.19) \times 10^{-6}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[4] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ and assumes $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \to B_s^* \overline{B}_s^*)$ / $\Gamma(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (90.1^{+3.8}_{-4.0})\%$.

[5] Obtains this result from $(f_s/f_d) \cdot B(B_s \to \pi^+\pi^-)/B(B^0 \to K^+\pi^-) = 0.007 \pm 0.004 \pm 0.005$, assuming $f_s/f_d = 0.276 \pm 0.034$ and $B(B^0 \to K^+\pi^-) = (19.4 \pm 0.6) \times 10^{-6}$.

[6] ABULENCIA,A 06D obtains this from $B(B_s \to \pi^+\pi^-)$ / $B(B_s \to K^+K^-) < 0.05$ at 90% CL, assuming $B(B_s \to K^+K^-) = (33 \pm 6 \pm 7) \times 10^{-6}$.

[7] ABE 00C assumes $B(Z \to b\overline{b})$=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.

[8] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.

$\Gamma(\pi^0\pi^0)/\Gamma_{\rm total}$ — Γ_{100}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.1 × 10⁻⁴	90	[1] ACCIARRI	95H	L3	$e^+e^- \to Z$

[1] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.

$\Gamma(\eta\pi^0)/\Gamma_{\rm total}$ — Γ_{101}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-3}$	90	[1] ACCIARRI	95H	L3	$e^+e^- \to Z$

[1] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.

$\Gamma(\eta\eta)/\Gamma_{\rm total}$ — Γ_{102}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.43 \times 10^{-4}$	90	BHUYAN	22	BELL	$e^+e^- \to \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.5 \times 10^{-3}$	90	[1] ACCIARRI	95H	L3	$e^+e^- \to Z$

[1] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.

$\Gamma(\rho^0\rho^0)/\Gamma_{total}$ — Γ_{103}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.20 × 10⁻⁴	90	[1] ABE	00C	SLD	$e^+e^- \to Z$

[1] ABE 00C assumes B($Z \to b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\eta'\eta)/\Gamma_{total}$ — Γ_{104}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.5 \times 10^{-5}$	90	[1] NISAR	21	BELL	$e^+e^- \to \Upsilon(5S)$

[1] Uses $\Upsilon(10860) \to B_s^*\overline{B}_s^*$ decays and assumes B($\Upsilon(10860) \to B_s^{(*)}\overline{B}_s^{(*)}$) = (20.1 ± 3.1)%.

$\Gamma(\eta'\eta')/\Gamma_{total}$ — Γ_{105}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
3.3±0.7±0.1	[1] AAIJ	15O	LHCB	pp at 7, 8 TeV

[1] AAIJ 15O reports [$\Gamma(B_s^0 \to \eta'\eta')/\Gamma_{total}$] / [B($B^+ \to \eta' K^+$)] = 0.47 ± 0.09 ± 0.04 which we multiply by our best value B($B^+ \to \eta' K^+$) = (7.04 ± 0.25) × 10^{-5}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta'\phi)/\Gamma_{total}$ — Γ_{106}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.82 \times 10^{-6}$	90	[1] AAIJ	17BA	LHCB	pp at 7, 8 TeV

[1] Corresponds to the 95% CL upper limit 1.01 × 10^{-6}. Uses the normalization mode $B^+ \to \eta' K^+$ with branching fraction (70.6 ± 2.5) × 10^{-6} and the ratio of hadronisation fractions f_s/f_d =0.259 ± 0.015, which is assumed equal to f_s/f_u.

$\Gamma(\eta' X_{s\overline{s}})/\Gamma_{total}$ — Γ_{54}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[1] DUBEY	21	BELL	$e^+e^- \to \Upsilon(4S)$

[1] DUBEY 21 result is for m($X_{s\overline{s}}$) < 2.85 GeV/c².

$\Gamma(\phi f_0(980),\ f_0(980) \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{107}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
1.12±0.16±0.14	[1] AAIJ	17A	LHCB	pp at 7, 8 TeV

[1] Signal is observed with 8 standard deviations significance.

$\Gamma(\phi f_2(1270),\ f_2(1270) \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{108}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$0.61\pm0.13^{+0.13}_{-0.08}$	[1] AAIJ	17A	LHCB	pp at 7, 8 TeV

[1] Signal is observed with 5 standard deviations significance.

$\Gamma(\phi\rho^0)/\Gamma_{total}$ — Γ_{109}/Γ

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
2.7±0.7±0.3		[1] AAIJ	17A	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6170	90	[2] ABE	00C	SLD	$e^+e^- \to Z$

[1] Signal evidence is 4 standard deviations.
[2] ABE 00C assumes B($Z \to b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{110}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
3.48±0.23±0.39	[1] AAIJ	17A	LHCB	pp at 7, 8 TeV

[1] Inclusive decays in mass range 400 < m($\pi^+\pi^-$) < 1600 MeV/c^2.

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_{111}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
18.5±1.4 OUR FIT					
18.5±1.4±1.0		[1] AAIJ	15AS	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$14\ ^{+6}_{-5}\ \pm 6$		[2] ACOSTA	05J	CDF	Repl. by AALTONEN 11AN
<1183	90	[3] ABE	00C	SLD	$e^+e^- \to Z$

[1] AAIJ 15AS reports [$\Gamma(B^0_s \to \phi\phi)/\Gamma_{total}$] / [B($B^0 \to K^*(892)^0\phi$)] = 1.84 ± 0.05 ± 0.13 which we multiply by our best value B($B^0 \to K^*(892)^0\phi$) = (1.00 ± 0.05) × 10^{-5}. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] Uses B($B^0 \to J/\psi\phi$) = (1.38 ± 0.49) × 10^{-3} and production cross-section ratio of $\sigma(B_s)/\sigma(B^0)$ = 0.26 ± 0.04.
[3] ABE 00C assumes B($Z \to b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\phi\phi)/\Gamma(J/\psi(1S)\phi)$ — Γ_{111}/Γ_{56}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.77±0.14 OUR FIT				
1.78±0.14±0.20	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV

$\Gamma(\phi\phi\phi)/\Gamma(\phi\phi)$ — $\Gamma_{112}/\Gamma_{111}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.117±0.030±0.015	AAIJ	17BB	LHCB	pp at 7, 8 TeV

$\Gamma(\pi^+K^-)/\Gamma_{total}$ — Γ_{113}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
5.8±0.7 OUR AVERAGE					
5.9±0.7±0.6		[1] AAIJ	12AR	LHCB	pp at 7 TeV
5.7±1.0±0.5		[2] AALTONEN	09C	CDF	$p\overline{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<$ 26	90	[3] PENG	10	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$
$<$ 5.6	90	[4] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 09C
$<$261	90	[5] ABE	00C	SLD	$e^+ e^- \rightarrow Z$
$<$210	90	[6] BUSKULIC	96V	ALEP	$e^+ e^- \rightarrow Z$
$<$260	90	[7] AKERS	94L	OPAL	$e^+ e^- \rightarrow Z$

[1] AAIJ 12AR reports $[\Gamma(B^0_s \rightarrow \pi^+ K^-)/\Gamma_{total}]$ / $[B(B^0 \rightarrow K^+\pi^-)] \times [\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0)] = 0.074 \pm 0.006 \pm 0.006$ which we multiply or divide by our best values $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] AALTONEN 09C reports $[\Gamma(B^0_s \rightarrow \pi^+ K^-)/\Gamma_{total}]$ / $[B(B^0 \rightarrow K^+\pi^-)] \times [B(\overline{b} \rightarrow B^0_s)]$ / $[B(\overline{b} \rightarrow B^0)] = 0.071 \pm 0.010 \pm 0.007$ which we multiply or divide by our best values $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $B(\overline{b} \rightarrow B^0_s) = (10.0 \pm 0.8) \times 10^{-2}$, $B(\overline{b} \rightarrow B^0) = (40.8 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[3] Uses $\Upsilon(10860) \rightarrow B^*_s \overline{B}^*_s$ and assumes $B(\Upsilon(10860) \rightarrow B^{(*)}_s \overline{B}^{(*)}_s) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \rightarrow B^*_s \overline{B}^*_s)$ / $\Gamma(\Upsilon(10860) \rightarrow B^{(*)}_s \overline{B}^{(*)}_s) = (90.1^{+3.8}_{-4.0})\%$.

[4] ABULENCIA,A 06D obtains this from (f_s/f_d) $(B(B_s \rightarrow \pi^+ K^-)$ / $B(B^0 \rightarrow K^+\pi^-))$ < 0.08 at 90% CL, assuming $f_s/f_d = 0.260 \pm 0.039$ and $B(B^0 \rightarrow K^+\pi^-) = (18.9 \pm 0.7) \times 10^{-6}$.

[5] ABE 00C assumes $B(Z \rightarrow b\overline{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.

[6] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.

[7] Assumes $B(Z \rightarrow b\overline{b}) = 0.217$ and B^0_d (B^0_s) fraction 39.5% (12%).

$\Gamma(K^+ K^-)/\Gamma_{total}$ Γ_{114}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
26.6± 2.2 OUR AVERAGE					
25.2± 1.7±2.4		[1] AAIJ	12AR	LHCB	pp at 7 TeV
27.6± 2.3±2.7		[2] AALTONEN	11N	CDF	$p\overline{p}$ at 1.96 TeV
38 $^{+10}_{-9}$ ±7		[3] PENG	10	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<$310	90	DRUTSKOY	07A	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$
33 ± 6 ±7		[4] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 11N
$<$283	90	[5] ABE	00C	SLD	$e^+ e^- \rightarrow Z$
$<$ 59	90	[6] BUSKULIC	96V	ALEP	$e^+ e^- \rightarrow Z$
$<$140	90	[7] AKERS	94L	OPAL	$e^+ e^- \rightarrow Z$

[1] AAIJ 12AR reports $[\Gamma(B^0_s \rightarrow K^+ K^-)/\Gamma_{total}]$ / $[B(B^0 \rightarrow K^+\pi^-)] \times [\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0)] = 0.316 \pm 0.009 \pm 0.019$ which we multiply or divide by our best values $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] AALTONEN 11N reports (f_s/f_d) $(B(B^0_s \rightarrow K^+ K^-)$ / $B(B^0 \rightarrow K^+\pi^-)) = 0.347 \pm 0.020 \pm 0.021$. We multiply this result by our best value of $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm$

$0.05) \times 10^{-5}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[3] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ and assumes $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (90.1^{+3.8}_{-4.0})\%$.

[4] ABULENCIA,A 06D obtains this from (f_s/f_d) $(B(B_s \to K^+ K^-) / B(B^0 \to K^+ \pi^-))$ $= 0.46 \pm 0.08 \pm 0.07$, assuming $f_s/f_d = 0.260 \pm 0.039$ and $B(B^0 \to K^+ \pi^-) = (18.9 \pm 0.7) \times 10^{-6}$.

[5] ABE 00C assumes $B(Z \to b\overline{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.

[6] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.

[7] Assumes $B(Z \to b\overline{b}) = 0.217$ and B_d^0 (B_s^0) fraction 39.5% (12%).

$\Gamma(K^0\overline{K}^0)/\Gamma_{total}$ Γ_{115}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.76±0.31 OUR AVERAGE					
$1.68 \pm 0.34^{+0.16}_{-0.15}$		[1] AAIJ	20F	LHCB	pp at 7, 8, 13 TeV
$1.96^{+0.58}_{-0.51} \pm 0.10 \pm 0.20$		[2] PAL	16	BELL	$e^+ e^- \to \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.6	90	[3] PENG	10	BELL	Repl. by PAL 16

[1] AAIJ 20F reports $[\Gamma(B_s^0 \to K^0 \overline{K}^0)/\Gamma_{total}] / [B(B^0 \to K^0 \phi)] = 2.3 \pm 0.4 \pm 0.2 \pm 0.1$ which we multiply by our best value $B(B^0 \to K^0 \phi) = (7.3 \pm 0.7) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Observed in $B_s^0 \to K_S^0 K_S^0$ with significance of 5.1 σ. The last uncertainty is due to the uncertainty of the total number of $B_s^0 \overline{B}_s^0$ pairs.

[3] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ and assumes $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (90.1^{+3.8}_{-4.0})\%$.

$\Gamma(K^0\pi^+\pi^-)/\Gamma_{total}$ Γ_{116}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
9.5±2.1±0.3	[1,2] AAIJ	17BP	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
14 ±4 ±1	[3] AAIJ	13BP	LHCB	Repl. by AAIJ 17BP

[1] AAIJ 17BP reports $[\Gamma(B_s^0 \to K^0 \pi^+ \pi^-)/\Gamma_{total}] / [B(B^0 \to K^0 \pi^+ \pi^-)] = 0.191 \pm 0.027 \pm 0.033$ which we multiply by our best value $B(B^0 \to K^0 \pi^+ \pi^-) = (4.97 \pm 0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Used $f_s/f_d = 0.259 \pm 0.015$.

[3] AAIJ 13BP reports $[\Gamma(B_s^0 \to K^0 \pi^+ \pi^-)/\Gamma_{total}] / [B(B^0 \to K^0 \pi^+ \pi^-)] = 0.29 \pm 0.06 \pm 0.04$ which we multiply by our best value $B(B^0 \to K^0 \pi^+ \pi^-) = (4.97 \pm 0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^0 K^\pm \pi^\mp)/\Gamma_{total}$ — Γ_{117}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
8.4±0.8±0.3	[1,2] AAIJ 17BP	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
7.4±0.9±0.3	[3] AAIJ 13BP	LHCB	Repl. by AAIJ 17BP

[1] AAIJ 17BP reports $[\Gamma(B_s^0 \to K^0 K^\pm \pi^\mp)/\Gamma_{total}] / [B(B^0 \to K^0 \pi^+ \pi^-)] = 1.70 \pm 0.07 \pm 0.15$ which we multiply by our best value $B(B^0 \to K^0 \pi^+ \pi^-) = (4.97 \pm 0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Used $f_s/f_d = 0.259 \pm 0.015$.

[3] AAIJ 13BP reports $[\Gamma(B_s^0 \to K^0 K^\pm \pi^\mp)/\Gamma_{total}] / [B(B^0 \to K^0 \pi^+ \pi^-)] = 1.48 \pm 0.12 \pm 0.14$ which we multiply by our best value $B(B^0 \to K^0 \pi^+ \pi^-) = (4.97 \pm 0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^- \pi^+)/\Gamma_{total}$ — Γ_{118}/Γ

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
2.9±1.0±0.2	[1,2] AAIJ 14BM	LHCB	pp at 7 TeV

[1] AAIJ 14BM reports $[\Gamma(B_s^0 \to K^*(892)^- \pi^+)/\Gamma_{total}] / [B(B^0 \to K^*(892)^+ \pi^-)] = 0.39 \pm 0.13 \pm 0.05$ which we multiply by our best value $B(B^0 \to K^*(892)^+ \pi^-) = (7.5 \pm 0.4) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Uses $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{total}$ — Γ_{119}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.86±0.12±0.45	[1,2] AAIJ 19K	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.12 \pm 0.21^{+0.07}_{-0.06}$	[3,4] AAIJ 14BM	LHCB	Repl. by AAIJ 19K

[1] AAIJ 19K reports $(18.6 \pm 1.2 \pm 0.8 \pm 4.0 \pm 2.0) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one.

[2] Measured in Dalitz plot analysis of $B_s^0 \to K_S^0 K^\pm \pi^\mp$ decays.

[3] AAIJ 14BM reports $[\Gamma(B_s^0 \to K^*(892)^\pm K^\mp)/\Gamma_{total}] / [B(B^0 \to K^*(892)^+ \pi^-)] = 1.49 \pm 0.22 \pm 0.18$ which we multiply by our best value $B(B^0 \to K^*(892)^+ \pi^-) = (7.5 \pm 0.4) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] Uses $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(K_0^*(1430)^\pm K^\mp)/\Gamma_{total}$ — Γ_{120}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
3.13±0.23±2.53	[1,2] AAIJ 19K	LHCB	pp at 7, 8 TeV

[1] AAIJ 19K reports $(31.3 \pm 2.3 \pm 0.7 \pm 25.1 \pm 3.3) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one.

[2] Measured in Dalitz plot analysis of $B_s^0 \to K_S^0 K^\pm \pi^\mp$ decays.

$\Gamma\left(K_2^*(1430)^{\pm} K^{\mp}\right)/\Gamma_{total}$ — Γ_{121}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.03±0.25±1.64	[1,2] AAIJ	19K	LHCB	pp at 7, 8 TeV

[1] AAIJ 19K reports $(10.3 \pm 2.5 \pm 1.1 \pm 16.3 \pm 1.1) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one.
[2] Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_S^0 K^{\pm} \pi^{\mp}$ decays.

$\Gamma\left(K^*(892)^0 \overline{K}^0 + \text{c.c.}\right)/\Gamma_{total}$ — Γ_{122}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.98±0.28±0.50	[1,2] AAIJ	19K	LHCB	pp at 7, 8 TeV

[1] AAIJ 19K reports $(19.8 \pm 2.8 \pm 1.2 \pm 4.4 \pm 2.1) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one.
[2] Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_S^0 K^{\pm} \pi^{\mp}$ decays.

$\Gamma\left(K_0^*(1430) \overline{K}^0 + \text{c.c.}\right)/\Gamma_{total}$ — Γ_{123}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
3.30±0.25±0.98	[1,2] AAIJ	19K	LHCB	pp at 7, 8 TeV

[1] AAIJ 19K reports $(33.0 \pm 2.5 \pm 0.9 \pm 9.1 \pm 3.5) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one.
[2] Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_S^0 K^{\pm} \pi^{\mp}$ decays.

$\Gamma\left(K_2^*(1430)^0 \overline{K}^0 + \text{c.c.}\right)/\Gamma_{total}$ — Γ_{124}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.68±0.45±2.13	[1,2] AAIJ	19K	LHCB	pp at 7, 8 TeV

[1] AAIJ 19K reports $(16.8 \pm 4.5 \pm 1.7 \pm 21.2 \pm 1.8) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one.
[2] Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_S^0 K^{\pm} \pi^{\mp}$ decays.

$\Gamma\left(K_S^0 \overline{K}^*(892)^0 + \text{c.c.}\right)/\Gamma_{total}$ — Γ_{125}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
16.4±3.4±2.3	[1] AAIJ	16	LHCB	pp at 7 TeV

[1] Measured relative to $B^0 \rightarrow K_S^0 \pi^+ \pi^-$ using the value of $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = (4.96 \pm 0.2) \times 10^{-5}$.

$\Gamma\left(K^0 K^+ K^-\right)/\Gamma_{total}$ — Γ_{126}/Γ

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
12.9±6.5±0.5		[1,2,3] AAIJ	17BP	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<34	90	[4] AAIJ	13BP	LHCB	Repl. by AAIJ 17BP

[1] AAIJ 17BP reports $[\Gamma(B_s^0 \rightarrow K^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \rightarrow K^0 \pi^+ \pi^-)] = 0.026 \pm 0.011 \pm 0.007$ which we multiply by our best value $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = (4.97 \pm 0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] AAIJ 17BP also set the limit range 4–25 $\times 10^{-7}$ at 90% CL using the world average value $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$.
[3] Used $f_s/f_d = 0.259 \pm 0.015$.
[4] AAIJ 13BP reports $[\Gamma(B_s^0 \rightarrow K^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \rightarrow K^0 \pi^+ \pi^-)] < 0.068$ which we multiply by our best value $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = 4.97 \times 10^{-5}$.

$\Gamma(\overline{K}^*(892)^0 \rho^0)/\Gamma_{total}$ — Γ_{127}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.67 × 10⁻⁴	90	[1] ABE	00C	SLD	$e^+ e^- \to Z$

[1] ABE 00C assumes B($Z \to b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{total}$ — Γ_{128}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.11±0.26±0.06		[1] AAIJ	15AF	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.81±0.46±0.56		[2] AAIJ	12F	LHCB	Repl. by AAIJ 15AF
<168.1	90	[3] ABE	00C	SLD	$e^+ e^- \to Z$

[1] AAIJ 15AF reports $[\Gamma(B_s^0 \to \overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{total}]$ / $[B(B^0 \to K^*(892)^0 \phi)]$ $= 1.11 \pm 0.22 \pm 0.12 \pm 0.06$ which we multiply by our best value $B(B^0 \to K^*(892)^0 \phi)$ $= (1.00 \pm 0.05) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Uses $B^0 \to J/\psi K^{*0}$ for normalization and assumes $B(B^0 \to J/\psi K^{*0})$ $B(J/\psi \to \mu^+\mu^-)$ $B(K^{*0} \to K^+\pi^-) = (1.33 \pm 0.06) \times 10^{-3}$ and $f_s/f_d = 0.253 \pm 0.031$. The second quoted error is total uncertainty including the error of 0.34 on f_s/f_d.

[3] ABE 00C assumes B($Z \to b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\phi K^*(892)^0)/\Gamma_{total}$ — Γ_{132}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
1.14±0.29±0.06		[1] AAIJ	13BW	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1013	90	[2] ABE	00C	SLD	$e^+ e^- \to Z$

[1] AAIJ 13BW reports $[\Gamma(B_s^0 \to \phi K^*(892)^0)/\Gamma_{total}]$ / $[B(B^0 \to K^*(892)^0 \phi)] = 0.113 \pm 0.024 \pm 0.016$ which we multiply by our best value $B(B^0 \to K^*(892)^0 \phi) = (1.00 \pm 0.05) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABE 00C assumes B($Z \to b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{133}/Γ

Test for ΔB=1 weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units 10^{-8})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.5	90	[1] AAIJ	17BJ	LHCB	pp at 7 and 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.84^{+2.03+0.85}_{-1.68-0.18}$		[2] AAIJ	13BQ	LHCB	Repl. by AAIJ 17BJ
<5900	90	[3] BUSKULIC	96V	ALEP	$e^+ e^- \to Z$

[1] Uses normalization mode $B(B^0 \to K^+\pi^-) = (19.6 \pm 0.5) \times 10^{-6}$ and B production ratio $f(\overline{b} \to B_s^0)/f(\overline{b} \to B_d^0) = 0.259 \pm 0.015$.

[2] Uses normalization mode $B(B^0 \to K^+\pi^-) = (19.55 \pm 0.54) \times 10^{-6}$ and B production ratio $f(\overline{b} \to B_s^0)/f(\overline{b} \to B_d^0) = 0.256 \pm 0.020$.

[3] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$ Γ_{134}/Γ

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
4.5±0.4±0.2	[1,2] AAIJ 17BD	LHCB	pp at 7, 8 TeV

[1] AAIJ 17BD reports $[\Gamma(B_s^0 \to p\overline{p}K^+K^-)/\Gamma_{total}]$ / $[B(B^0 \to J/\psi(1S)K^*(892)^0)]$ / $[B(J/\psi(1S) \to p\overline{p})]$ / $[B(K^*(892) \to (K\pi)^{\pm})] = 1.67 \pm 0.12 \pm 0.11$ which we multiply by our best values $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$, $B(J/\psi(1S) \to p\overline{p}) = (2.120 \pm 0.029) \times 10^{-3}$, $B(K^*(892) \to (K\pi)^{\pm}) = (99.902 \pm 0.009) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. Reported value assumes $f_s/f_d = 0.259 \pm 0.015$.

[2] The branching ratio is given for $m_{p\overline{p}} < 2.85$ GeV.

$\Gamma(p\overline{p}K^+\pi^-)/\Gamma_{total}$ Γ_{135}/Γ

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
13.9±2.5±0.5	[1,2] AAIJ 17BD	LHCB	pp at 7, 8 TeV

[1] AAIJ 17BD reports $[\Gamma(B_s^0 \to p\overline{p}K^+\pi^-)/\Gamma_{total}]$ / $[B(B^0 \to J/\psi(1S)K^*(892)^0)]$ / $[B(J/\psi(1S) \to p\overline{p})]$ / $[B(K^*(892) \to (K\pi)^{\pm})] = 0.52 \pm 0.08 \pm 0.05$ which we multiply by our best values $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$, $B(J/\psi(1S) \to p\overline{p}) = (2.120 \pm 0.029) \times 10^{-3}$, $B(K^*(892) \to (K\pi)^{\pm}) = (99.902 \pm 0.009) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. Reported value assumes $f_s/f_d = 0.259 \pm 0.015$.

[2] The branching ratio is given for $m_{p\overline{p}} < 2.85$ GeV.

$\Gamma(p\overline{p}K^+\pi^-)/\Gamma(p\overline{p}K^+K^-)$ $\Gamma_{135}/\Gamma_{134}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.31±0.05±0.02	[1,2] AAIJ 17BD	LHCB	pp at 7, 8 TeV

[1] Reports $B(B_s^0 \to p\overline{p}K^+\pi^-)$ / $B(B^0 \to p\overline{p}K^+\pi^-) = 0.22 \pm 0.04 \pm 0.02 \pm 0.01$, where the third error is due to f_s/f_d.

[2] The ratio is given for $m_{p\overline{p}} < 2.85$ GeV and assuming $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{136}/Γ

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
4.3±2.0±0.2	[1,2] AAIJ 17BD	LHCB	pp at 7, 8 TeV

[1] AAIJ 17BD reports $[\Gamma(B_s^0 \to p\overline{p}\pi^+\pi^-)/\Gamma_{total}]$ / $[B(B^0 \to J/\psi(1S)K^*(892)^0)]$ / $[B(J/\psi(1S) \to p\overline{p})]$ / $[B(K^*(892) \to (K\pi)^{\pm})] = 0.16 \pm 0.07 \pm 0.02$ which we multiply by our best values $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$, $B(J/\psi(1S) \to p\overline{p}) = (2.120 \pm 0.029) \times 10^{-3}$, $B(K^*(892) \to (K\pi)^{\pm}) = (99.902 \pm 0.009) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. Reported value assumes $f_s/f_d = 0.259 \pm 0.015$.

[2] The branching ratio is given for $m_{p\overline{p}} < 2.85$ GeV.

$\Gamma(p\overline{\Lambda}K^- + c.c.)/\Gamma_{total}$ Γ_{137}/Γ

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
5.5±0.6±0.8	[1,2] AAIJ 17AL	LHCB	pp at 7, 8 TeV

[1] AAIJ 17AL reports $(5.46 \pm 0.61 \pm 0.82) \times 10^{-6}$ from a measurement of $[\Gamma(B_s^0 \to p\overline{\Lambda}K^- + c.c.)/\Gamma_{total}]$ / $[B(B^0 \to p\overline{\Lambda}\pi^-)]$ assuming $B(B^0 \to p\overline{\Lambda}\pi^-) = (3.14 \pm 0.29) \times 10^{-6}$.

[2] AAIJ 17AL value represents the sum of $B_s^0 \to p\overline{\Lambda}K^-$ and $B_s^0 \to \overline{p}\Lambda K^+$ and assumes the fraction $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(\Lambda_c^- \Lambda \pi^+)/\Gamma_{total}$ — Γ_{138}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.6±1.1±1.2	[1] SOLOVIEVA	13	BELL	$e^+e^- \to \Upsilon(4S)$

[1] The second error is the total systematic uncertainty including the Λ_c absolute branching fractions and the normalizion number of B_s events.

$\Gamma(\Lambda_c^- \Lambda_c^+)/\Gamma_{total}$ — Γ_{139}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8.0 \times 10^{-5}$	95	[1] AAIJ	14AA	LHCB	pp at 7 TeV

[1] Uses $B(\overline{B}^0 \to D^+ D_s^-) = (7.2 \pm 0.8) \times 10^{-3}$.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{140}/Γ

Test for ΔB=1 weak neutral current.

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.1	90	[1] DUTTA	15	BELL	$e^+e^- \to \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8.7	90	[2] WICHT	08A	BELL	Repl. by DUTTA 15
< 53	90	DRUTSKOY	07A	BELL	Repl. by WICHT 08A
<148	90	[3] ACCIARRI	95I	L3	$e^+e^- \to Z$

[1] Assumes the fraction of $B_s^{(*)}\overline{B}_s^{(*)}$ in $b\overline{b}$ events is $f_s = (17.2 \pm 3.0)\%$.
[2] Assumes $\Upsilon(5S) \to B_s^*\overline{B}_s^* = (19.5^{+3.0}_{-2.3})\%$.
[3] ACCIARRI 95I assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = (12.0 \pm 3.0)\%$.

$\Gamma(\phi\gamma)/\Gamma_{total}$ — Γ_{141}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
34 ± 4 OUR AVERAGE					
36 ± 5 ± 7		[1] DUTTA	15	BELL	$e^+e^- \to \Upsilon(5S)$
33.8± 3.4± 2.0		[2] AAIJ	13	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
39 ± 5		[3] AAIJ	12AE	LHCB	Repl. by AAIJ 13
$57\ ^{+18}_{-15}\ ^{+12}_{-11}$		[4] WICHT	08A	BELL	Repl. by DUTTA 15
<390	90	DRUTSKOY	07A	BELL	$e^+e^- \to \Upsilon(5S)$
<120	90	ACOSTA	02G	CDF	$p\overline{p}$ at 1.8 TeV
<700	90	[5] ADAM	96D	DLPH	$e^+e^- \to Z$

[1] Assumes the fraction of $B_s^{(*)}\overline{B}_s^{(*)}$ in $b\overline{b}$ events is $f_s = (17.2 \pm 3.0)\%$. The systematic uncertainty from f_s is 0.6×10^{-5}.
[2] AAIJ 13 reports $[\Gamma(B_s^0 \to \phi\gamma)/\Gamma_{total}]$ / $[B(B^0 \to K^*(892)^0\gamma)] = 0.81 \pm 0.04 \pm 0.07$ which we multiply by our best value $B(B^0 \to K^*(892)^0\gamma) = (4.18 \pm 0.25) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[3] Measures $B(B^0 \to K^{*0}\gamma)/B(B_s \to \phi\gamma) = 1.12 \pm 0.08(\text{stat})^{+0.06}_{-0.04}(\text{sys})^{+0.09}_{-0.08}(f_s/f_d)$ and uses current world-average value of $B(B^0 \to K^{*0}\gamma) = (4.33 \pm 0.15) \times 10^{-5}$.
[4] Assumes $\Upsilon(5S) \to B_s^*\overline{B}_s^* = (19.5^{+3.0}_{-2.3})\%$.
[5] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_{142}/Γ

Test for $\Delta B = 1$ weak neutral current.

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
3.01±0.35 OUR AVERAGE					
$3.09^{+0.46}_{-0.43}{}^{+0.15}_{-0.11}$		AAIJ	22	LHCB	pp at 7, 8, 13 TeV
$2.9 \pm 0.6 \pm 0.4$		[1] SIRUNYAN	20AG	CMS	pp at 7, 8, 13 TeV
$2.8^{+0.8}_{-0.7}$		[2] AABOUD	19L	ATLS	pp at 7, 8, 13 TeV
13^{+9}_{-7}		[3] AALTONEN	13F	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.0 \pm 0.6 {}^{+0.3}_{-0.2}$		AAIJ	17AI	LHCB	Repl. by AAIJ 22
$0.9^{+1.1}_{-0.8}$		[4] AABOUD	16L	ATLS	Repl. by AABOUD 19L
$2.8^{+0.7}_{-0.6}$		[5] KHACHATRY...	15BE	LHC	pp at 7, 8 TeV
$3.2^{+1.4}_{-1.2}{}^{+0.5}_{-0.3}$		[6] AAIJ	13B	LHCB	Repl. by AAIJ 13BA
$2.9^{+1.1}_{-1.0}{}^{+0.3}_{-0.1}$		[7] AAIJ	13BA	LHCB	Repl. by KHACHATRYAN 15BE
<12	90	[8] ABAZOV	13C	D0	$p\overline{p}$ at 1.96 TeV
$3.0^{+1.0}_{-0.9}$		[9] CHATRCHYAN	13AW	CMS	Repl. by SIRUNYAN 20AG
<19	90	[10] AAD	12AE	ATLS	pp at 7 TeV
<12	90	[11] AAIJ	12A	LHCB	Repl. by AAIJ 12W
< 3.8	90	[12] AAIJ	12W	LHCB	Repl. by AAIJ 13B
< 6.4	90	[13] CHATRCHYAN	12A	CMS	pp at 7 TeV
<43	90	[14] AAIJ	11B	LHCB	Repl. by AAIJ 12A
<35	90	[15] AALTONEN	11AG	CDF	$p\overline{p}$ at 1.96 TeV
<16	90	[16] CHATRCHYAN	11T	CMS	Repl. by CHATRCHYAN 12A
<42	90	[17] ABAZOV	10S	D0	$p\overline{p}$ at 1.96 TeV

[1] Uses normalization mode $B(B^+ \to J/\psi K^+) = (1.01 \pm 0.03) \times 10^{-3}$ and B production ratio $f(b \to B^0_s)/f(b \to B^+) = 0.252 \pm 0.012 \pm 0.015$.

[2] Uses normalization mode $B(B^+ \to J/\psi K^+) = (1.010 \pm 0.029) \times 10^{-3}$ and B production ratio $f(b \to B^0_s)/f(b \to B^0) = 0.256 \pm 0.013$.

[3] Uses normalization mode $B(B^+ \to J/\psi K^+) = (10.22 \pm 0.35) \times 10^{-4}$ and B production ratio $f(\overline{b} \to B^0_s)/f(\overline{b} \to B^0_d) = 0.28 \pm 0.04$.

[4] This value corresponds to an upper limit of $< 3.0 \times 10^{-9}$ at 95% C.L. It uses $f_s/f_d = 0.24 \pm 0.02$.

[5] Determined from the joint fit to CMS and LHCb data. Uncertainty includes both statistical and systematic component.

[6] Uses B production ratio $f(\overline{b} \to B^0_s)/f(\overline{b} \to B^0_d) = 0.256 \pm 0.020$ and two normalization modes: $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$ and $B(B^0 \to K^+\pi^-) = (1.94 \pm 0.06) \times 10^{-5}$.

[7] Uses B production ratio $f(\overline{b} \to B^0_s)/f(\overline{b} \to B^0_d) = 0.259 \pm 0.015$ and normalization modes $B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$ and $B^0 \to K^+\pi^-$.

[8] Uses normalization mode $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$ and B production ratio $f(\overline{b} \to B^0_s)/f(\overline{b} \to B^0_d) = 0.263 \pm 0.017$.

[9] Uses B production ratio $f(\overline{b} \to B^0_s)/f(\overline{b} \to B^0_d) = 0.256 \pm 0.020$ and $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$ for normalization.

[10] Uses B production ratio f($\overline{b} \to B^+$)/f($\overline{b} \to B^0_s$) = 3.75 ± 0.29 and B($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = (6.0 ± 0.2) × 10^{-5}.

[11] Uses B production ratio f($\overline{b} \to B^0_s$)/f($\overline{b} \to B^0_d$) = $0.267^{+0.021}_{-0.020}$ and three normalization modes B($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = (6.01 ± 0.21) × 10^{-5}, B($B^0 \to K^+\pi^-$) = (1.94 ± 0.06) × 10^{-5}, and B($B^0_s \to J/\psi\phi \to \mu^+\mu^- K^+ K^-$) = (3.4 ± 0.9) × 10^{-5}.

[12] Uses B production ratio f($\overline{b} \to B^0_s$)/f($\overline{b} \to B^0_d$) = $0.267^{+0.021}_{-0.020}$ and three normalization modes of $B^+ \to J/\psi K^+$, $B^0 \to K^+\pi^-$, and $B^0_s \to J/\psi\phi$.

[13] Uses f_s/f_u = 0.267 ± 0.021 and B($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = (6.0 ± 0.2) × 10^{-5}.

[14] Uses B production ratio f($\overline{b} \to B^+$)/f($\overline{b} \to B^0_s$) = 3.71 ± 0.47 and three normalization modes.

[15] Uses B production ratio f($\overline{b} \to B^+$)/f($\overline{b} \to B^0_s$) = 3.55 ± 0.47 and B($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = (6.01 ± 0.21) × 10^{-5}.

[16] Uses B production ratio f($\overline{b} \to B^+$)/f($\overline{b} \to B^0_s$) = 3.55 ± 0.42 and B($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = (6.0 ± 0.2) × 10^{-5}.

[17] Uses B production ratio f($\overline{b} \to B^+$)/f($\overline{b} \to B^0_s$) = 3.86 ± 0.59, and the number of $B^+ \to J/\psi K^+$ decays.

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_{143}/Γ

Test for $\Delta B = 1$ weak neutral current.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9.4 × 10^{-9}	90	[1] AAIJ	20W	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.8 × 10^{-7}	90	AALTONEN	09P	CDF	$p\overline{p}$ at 1.96 TeV
<5.4 × 10^{-5}	90	[2] ACCIARRI	97B	L3	$e^+e^- \to Z$

[1] Assumes no contribution from $B^0 \to e^+e^-$ decays.

[2] ACCIARRI 97B assume PDG 96 production fractions for B^+, B^0, B_s, and Λ_b.

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ — Γ_{144}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.8 × 10^{-3}	95	[1] AAIJ	17AJ	LHCB	pp at 7, 8 TeV

[1] Assuming no contribution from $B^0 \to \tau^+\tau^-$.

$\Gamma(\mu^+\mu^-\mu^+\mu^-)/\Gamma_{total}$ — Γ_{145}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.5 × 10^{-9}	95	AAIJ	17N	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.2 × 10^{-8}	90	[1] AAIJ	13AW	LHCB	Repl. by AAIJ 17N

[1] Also reports a limit of < 1.6 × 10^{-8} at 95% CL.

$\Gamma(SP,\ S \to \mu^+\mu^-,\ P \to \mu^+\mu^-)/\Gamma_{total}$ — Γ_{146}/Γ

Here S and P are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/c^2 and 214.3 MeV/c^2, respectively.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.2 × 10^{-9}	95	AAIJ	17N	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.2 × 10^{-8}	90	[1] AAIJ	13AW	LHCB	Repl. by AAIJ 17N

[1] Also reports a limit of < 1.6 × 10^{-8} at 95% CL.

$\Gamma(\phi(1020)\mu^+\mu^-)/\Gamma_{total}$ — Γ_{147}/Γ

Test for $\Delta B = 1$ weak neutral current.

VALUE (units 10^{-7})	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<32	90	[1] ABAZOV 06G	D0	$p\overline{p}$ at 1.96 TeV
$< 4.7 \times 10^2$	90	ACOSTA 02D	CDF	$p\overline{p}$ at 1.8 TeV

[1] Uses $B(B_s^0 \to J/\psi\phi) = 9.3 \times 10^{-4}$.

$\Gamma(\phi(1020)\mu^+\mu^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{147}/Γ_{56}

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
0.806±0.026 OUR AVERAGE				
$0.800 \pm 0.021 \pm 0.016$		AAIJ 21AG	LHCB	pp at 7, 8, 13 TeV
$1.13 \pm 0.19 \pm 0.07$		AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.741^{+0.042}_{-0.040} \pm 0.029$		AAIJ 15AQ	LHCB	Repl. by AAIJ 21AG
$0.674^{+0.061}_{-0.056} \pm 0.016$		AAIJ 13X	LHCB	Repl. by AAIJ 15AQ
$1.11 \pm 0.25 \pm 0.09$		AALTONEN 11L	CDF	Repl. by AALTONEN 11AI
< 2.3	90	AALTONEN 09B	CDF	Repl. by AALTONEN 11L

$\Gamma(\overline{K}^*(892)^0\mu^+\mu^-)/\Gamma_{total}$ — Γ_{149}/Γ

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
2.9±1.0±0.4	[1] AAIJ 18AB	LHCB	pp at 7, 8, 13 TeV

[1] Normalizes to $B(B^0 \to J/\psi K^{*0}) = 1.19 \pm 0.01 \pm 0.08\%$ and $B(J/\psi \to \mu^+\mu^-) = 5.96 \pm 0.03\%$, and uses $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(f_2'(1525)\mu^+\mu^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{148}/Γ_{56}

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.55±0.19±0.08	[1] AAIJ 21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured by combining the q^2 regions [0.1, 0.98], [1.1, 8.0], and [11.0, 12.5] GeV^2/c^4.

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}$ — Γ_{150}/Γ

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
8.4±1.6±0.3	[1] AAIJ 15S	LHCB	pp at 7, 8 TeV

[1] AAIJ 15S reports $(8.6 \pm 1.5 \pm 0.7 \pm 0.7) \times 10^{-8}$ from a measurement of $[\Gamma(B_s^0 \to \pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}]$ / $[B(B^0 \to J/\psi(1S)K^*(892)^0)]$ assuming $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.3 \pm 0.1) \times 10^{-3}$, which we rescale to our best value $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi\nu\overline{\nu})/\Gamma_{total}$ — Γ_{151}/Γ

Test for $\Delta B = 1$ weak neutral current.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.4 \times 10^{-3}$	90	[1] ADAM 96D	DLPH	$e^+e^- \to Z$

[1] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.

$\Gamma(e^{\pm}\mu^{\mp})/\Gamma_{total}$ — Γ_{152}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.4 × 10^{-9}	90	[1] AAIJ	18T	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.1 \times 10^{-8}$	90	[2] AAIJ	13BM	LHCB	Repl. by AAIJ 18T
$<2.0 \times 10^{-7}$	90	AALTONEN	09P	CDF	$p\overline{p}$ at 1.96 TeV
$<6.1 \times 10^{-6}$	90	ABE	98V	CDF	Repl. by AALTONEN 09P
$<4.1 \times 10^{-5}$	90	[3] ACCIARRI	97B	L3	$e^+e^- \to Z$

[1] AAIJ 18T uses normalization modes B($B^0 \to K^+\pi^-$) = (19.6 ± 0.5) × 10^{-6} and B($B^+ \to J/\psi K^+$) = (1.026 ± 0.031) × 10^{-3} with B production ratio f($\overline{b} \to B^0_s$)/f($\overline{b} \to B^0_d$) = 0.259 ± 0.015. The upper limit increases to 6 × 10^{-9} with the assumption of B_L-dominated decay amplitude.

[2] Uses normalization mode B($B^0 \to K^+\pi^-$) = (19.4 ± 0.6) × 10^{-6} and B production ratio f($\overline{b} \to B^0_s$)/f($\overline{b} \to B^0_d$) = 0.256 ± 0.020.

[3] ACCIARRI 97B assume PDG 96 production fractions for B^+, B^0, B_s, and Λ_b.

$\Gamma(\mu^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{153}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.2 × 10^{-5}	95	[1] AAIJ	19AK	LHCB	pp at 7, 8 TeV

[1] Assuming no contribution from $B^0 \to \mu^{\pm}\tau^{\mp}$.

POLARIZATION IN B^0_s DECAY

In decays involving two vector mesons, one can distinguish among the states in which meson polarizations are both longitudinal (L), or both are transverse and parallel ($\parallel$), or perpendicular ($\perp$) to each other with the parameters Γ_L/Γ, $\Gamma_\perp/\Gamma$, and the relative phases $\phi_\parallel$ and $\phi_\perp$. In decays involving two tensor mesons, the transverse polarization states are described by parameters $\Gamma_{\parallel 1}$, $\Gamma_{\parallel 2}$, $\Gamma_{\perp 1}$, $\Gamma_{\perp 2}$ and their relative phases $\phi_{\parallel 1}$, $\phi_{\parallel 2}$, $\phi_{\perp 1}$, $\phi_{\perp 2}$. See also the review on "Polarization in B Decays."

Γ_L/Γ in $B^0_s \to D^*_s \rho^+$

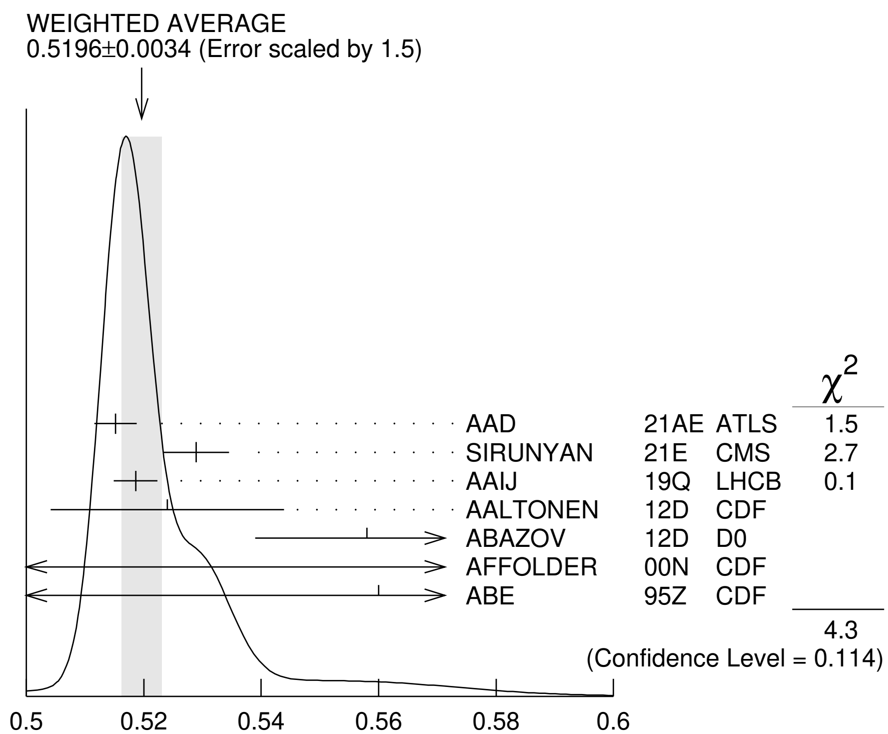
VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.05^{+0.08}_{-0.10}{}^{+0.03}_{-0.04}}$	LOUVOT	10	BELL	$e^+e^- \to \Upsilon(5S)$

Γ_L/Γ in $B^0_s \to J/\psi(1S)\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.5196±0.0034 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.				
0.5152±0.0012±0.0034	[1] AAD	21AE	ATLS	pp at 7, 8, 13 TeV
0.5289±0.0038±0.0041	[2] SIRUNYAN	21E	CMS	pp at 8, 13 TeV
0.5186±0.0029±0.0023	AAIJ	19Q	LHCB	pp at 13 TeV
0.524 ±0.013 ±0.015	[2] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$0.558^{+0.017}_{-0.019}$	[2,3] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
0.61 ±0.14 ±0.02	[4] AFFOLDER	00N	CDF	$p\overline{p}$ at 1.8 TeV
$0.56 \pm 0.21{}^{+0.02}_{-0.04}$	ABE	95Z	CDF	$p\overline{p}$ at 1.8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.5350 ± 0.0047 ± 0.0049	[2] SIRUNYAN	21E	CMS	pp at 13 TeV
0.522 ± 0.003 ± 0.007	[1] AAD	16AP	ATLS	Repl. by AAD 21AE
0.510 ± 0.005 ± 0.011	[2] KHACHATRY...	16S	CMS	pp at 8 TeV
0.5241 ± 0.0034 ± 0.0067	AAIJ	15I	LHCB	Repl. by AAIJ 19Q
0.529 ± 0.006 ± 0.012	[1] AAD	14U	ATLS	Repl. by AAD 16AP
0.539 ± 0.014 ± 0.016	[2] AAD	12CV	ATLS	Repl. by AAD 14U
0.555 ± 0.027 ± 0.006	[5] ABAZOV	09E	D0	Repl. by ABAZOV 12D
0.531 ± 0.020 ± 0.007	[2] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
0.62 ± 0.06 ± 0.01	ACOSTA	05	CDF	Repl. by AALTONEN 08J



Γ_L/Γ in $B_s^0 \to J/\psi(1S)\phi$

[1] Measured using the flavor tagged, time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

[2] Measured using the time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

[3] The error includes both statistical and systematic uncertainties.

[4] AFFOLDER 00N measurements are based on 40 B_s^0 candidates obtained from a data sample of 89 pb^{-1}. The P-wave fraction is found to be 0.23 ± 0.19 ± 0.04.

[5] Measured the angular and lifetime parameters for the time-dependent angular untagged decays $B_d^0 \to J/\psi K^{*0}$ and $B_s^0 \to J/\psi\phi$.

Γ_L/Γ in $B_s^0 \to D_s^{*+} D_s^{*-}$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.06^{+0.18}_{-0.17} \pm 0.03$	ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$

$\Gamma_{\parallel}/\Gamma$ in $B_s^0 \rightarrow J/\psi(1S)\phi$

VALUE		DOCUMENT ID		TECN	COMMENT
0.2222±0.0027 OUR AVERAGE					
0.2220±0.0017±0.0021	1	AAD	21AE	ATLS	pp at 7, 8, 13 TeV
0.231 ±0.014 ±0.015	2	AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
0.231 $^{+0.024}_{-0.030}$	2,3	ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.227 ±0.004 ±0.006	1	AAD	16AP	ATLS	Repl. by AAD 21AE
0.220 ±0.008 ±0.009	1	AAD	14U	ATLS	Repl. by AAD 16AP
0.224 ±0.010 ±0.009	2	AAD	12CV	ATLS	Repl. by AAD 14U
0.244 ±0.032 ±0.014	4	ABAZOV	09E	D0	Repl. by ABAZOV 12D
0.230 ±0.029 ±0.011	2	AALTONEN	08J	CDF	Repl. by AALTONEN 12D
0.260 ±0.084 ±0.013		ACOSTA	05	CDF	Repl. by AALTONEN 08J

[1] Measured using a tagged, time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays.

[2] Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays.

[3] The error includes both statistical and systematic uncertainties.

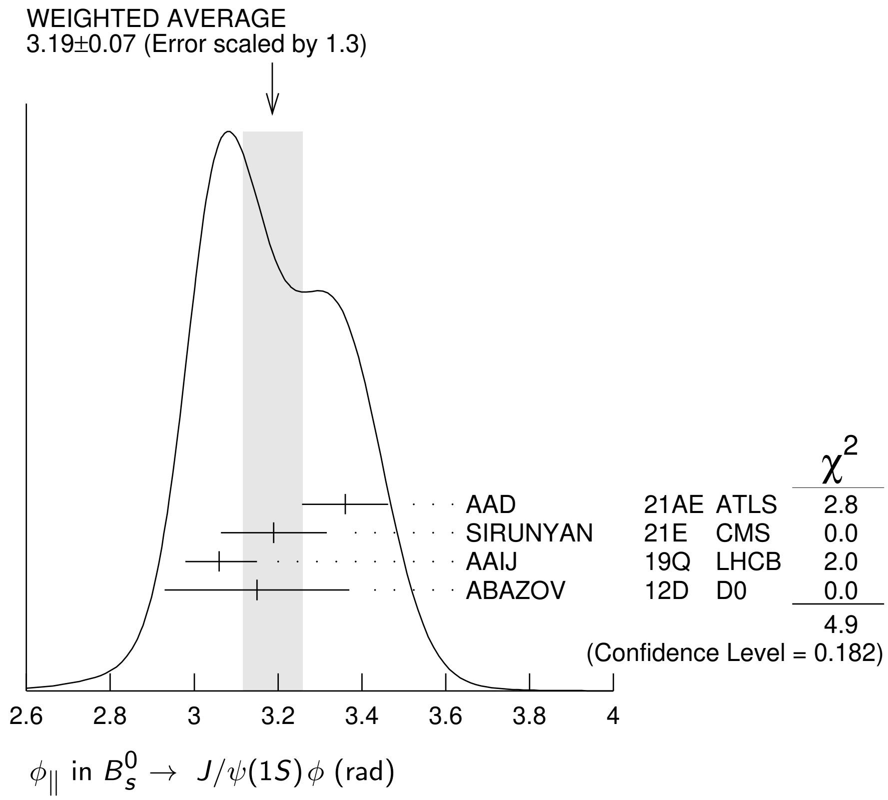
[4] Measured the angular and lifetime parameters for the time-dependent angular untagged decays $B_d^0 \rightarrow J/\psi K^{*0}$ and $B_s^0 \rightarrow J/\psi\phi$.

$\Gamma_{\perp}/\Gamma$ in $B_s^0 \rightarrow J/\psi(1S)\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.243 ±0.004 OUR AVERAGE				
0.2393±0.0050±0.0037	SIRUNYAN	21E	CMS	pp at 8, 13 TeV
0.2456±0.0040±0.0019	AAIJ	19Q	LHCB	pp at 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.2337±0.0063±0.0045	SIRUNYAN	21E	CMS	pp at 13 TeV
0.243 ±0.008 ±0.012	KHACHATRY...	16S	CMS	pp at 8 TeV
0.2504±0.0049±0.0036	AAIJ	15I	LHCB	Repl. by AAIJ 19Q

$\phi_{\parallel}$ in $B_s^0 \rightarrow J/\psi(1S)\phi$

VALUE (rad)		DOCUMENT ID		TECN	COMMENT
3.19±0.07 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
3.36±0.05±0.09	1	AAD	21AE	ATLS	pp at 7, 8, 13 TeV
3.19±0.12±0.04		SIRUNYAN	21E	CMS	pp at 8, 13 TeV
3.06 $^{+0.08}_{-0.07}$ ±0.04		AAIJ	19Q	LHCB	pp at 13 TeV
3.15±0.22	2	ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.18±0.12±0.003		SIRUNYAN	21E	CMS	pp at 13 TeV
3.15±0.10±0.05		AAD	16AP	ATLS	Repl. by AAD 21AE
3.48 $^{+0.07}_{-0.09}$ ±0.68		KHACHATRY...	16S	CMS	pp at 8 TeV
3.26 $^{+0.10}_{-0.17}$ $^{+0.06}_{-0.07}$		AAIJ	15I	LHCB	Repl. by AAIJ 19Q
2.72 $^{+1.12}_{-0.27}$ ±0.26		ABAZOV	09E	D0	Repl. by ABAZOV 12D



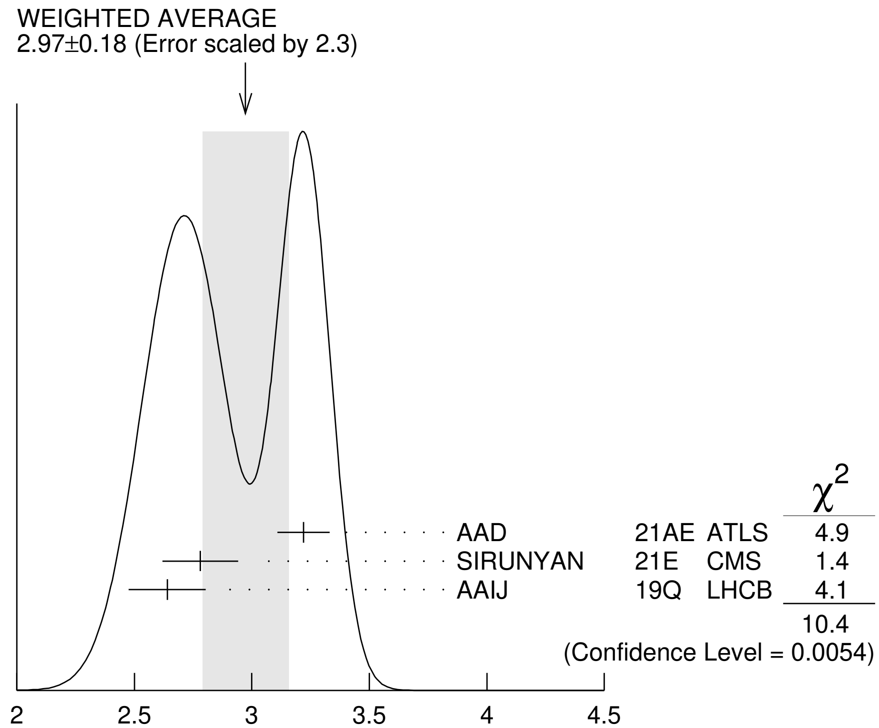
[1] The fit found another solution with $\phi_{\|} = 2.95 \pm 0.05 \pm 0.09$ rad.

[2] The error includes both statistical and systematic uncertainties.

$\phi_{\perp}$ in $B_s^0 \to J/\psi(1S)\phi$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.97±0.18 OUR AVERAGE	Error includes scale factor of 2.3. See the ideogram below.			
$3.22 \pm 0.10 \pm 0.05$	[1] AAD	21AE	ATLS	pp at 7, 8, 13 TeV
$2.78 \pm 0.15 \pm 0.06$	[2] SIRUNYAN	21E	CMS	pp at 8, 13 TeV
$2.64 \pm 0.13 \pm 0.10$	AAIJ	19Q	LHCB	pp at 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.77 \pm 0.16 \pm 0.05$	[2] SIRUNYAN	21E	CMS	pp at 13 TeV
$4.15 \pm 0.32 \pm 0.16$	[2] AAD	16AP	ATLS	Repl. by AAD 21AE
$2.98 \pm 0.36 \pm 0.66$	[2] KHACHATRY...	16S	CMS	pp at 8 TeV
$3.08^{+0.14}_{-0.15} \pm 0.06$	AAIJ	15I	LHCB	Repl. by AAIJ 19Q
$3.89 \pm 0.47 \pm 0.11$	[2] AAD	14U	ATLS	Repl. by AAD 16AP

[1] The fit found another solution with $\phi_{\perp} = 3.03 \pm 0.05 \pm 0.09$ rad.
[2] Measured using a tagged, time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.



$\phi_{\perp}$ in $B_s^0 \to J/\psi(1S)\phi$ (rad)

$\Gamma_{\perp}/\Gamma$ in $B_s^0 \to \psi(2S)\phi$

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.264^{+0.024}_{-0.023}\pm0.002}$	[1] AAIJ 16AK	LHCB	pp at 7, 8 TeV

[1] Measured using time-dependent angular analysis of $B_s^0 \to \psi(2S)\phi$ decays.

$\phi_{\parallel}$ in $B_s^0 \to \psi(2S)\phi$

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
$\mathbf{3.67^{+0.13}_{-0.18}\pm0.03}$	[1] AAIJ 16AK	LHCB	pp at 7, 8 TeV

[1] Measured using time-dependent angular analysis of $B_s^0 \to \psi(2S)\phi$ decays.

$\phi_{\perp}$ in $B_s^0 \to \psi(2S)\phi$

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
$\mathbf{3.29^{+0.43}_{-0.39}\pm0.04}$	[1] AAIJ 16AK	LHCB	pp at 7, 8 TeV

[1] Measured using time-dependent angular analysis of $B_s^0 \to \psi(2S)\phi$ decays.

Γ_L/Γ for $B_s^0 \to J/\psi(1S)\overline{K}^*(892)^0$

Longitudinal polarization fraction, equals to f_L using notation of "Polarization in B decays" review.

VALUE	DOCUMENT ID	TECN	COMMENT
0.497±0.025±0.025	AAIJ 15AV	LHCB	pp at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.50 \pm 0.08 \pm 0.02$	[1] AAIJ	12AP	LHCB	Repl. by AAIJ 15AV

[1] The non-resonant $K\pi$ background contributions are subtracted. Also reports an S-wave amplitude $|A_S|^2 = 0.07^{+0.15}_{-0.07}$.

$\Gamma_{\parallel}/\Gamma$ for $B_s^0 \to J/\psi(1S)\overline{K}^*(892)^0$

Parallel polarization fraction, equals to $1 - f_L - f_\perp$ using notation of "Polarization in B decays" review.

VALUE	DOCUMENT ID		TECN	COMMENT
$0.179 \pm 0.027 \pm 0.013$	AAIJ	15AV	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.19\ ^{+0.10}_{-0.08} \pm 0.02$	[1] AAIJ	12AP	LHCB	Repl. by AAIJ 15AV

[1] The non-resonant $K\pi$ background contributions are subtracted. Also reports an S-wave amplitude $|A_S|^2 = 0.07^{+0.15}_{-0.07}$.

$\Gamma_{\parallel}/\Gamma$ of $K^*(892)^0$ in $B_s^0 \to \psi(2S)\overline{K}^*(892)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.524 \pm 0.056 \pm 0.029$	AAIJ	15U	LHCB	pp at 7, 8 TeV

Γ_L/Γ in $B_s^0 \to \phi\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.378 ± 0.013 OUR AVERAGE				
$0.381 \pm 0.007 \pm 0.012$	AAIJ	19AP	LHCB	pp at 7, 8 and 13 TeV
$0.348 \pm 0.041 \pm 0.021$	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.364 \pm 0.012 \pm 0.009$	AAIJ	14AE	LHCB	Repl. by AAIJ 19AP
$0.365 \pm 0.022 \pm 0.012$	AAIJ	12P	LHCB	Repl. by AAIJ 14AE

$\Gamma_\perp/\Gamma$ in $B_s^0 \to \phi\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.292 ± 0.009 OUR AVERAGE				
$0.290 \pm 0.008 \pm 0.005$	[1] AAIJ	19AP	LHCB	pp at 7, 8 and 13 TeV
$0.365 \pm 0.044 \pm 0.027$	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.305 \pm 0.013 \pm 0.005$	AAIJ	14AE	LHCB	Repl. by AAIJ 19AP
$0.291 \pm 0.024 \pm 0.010$	AAIJ	12P	LHCB	Repl. by AAIJ 14AE

[1] Note: in the summary of AAIJ 19AP the systematic uncertainty is 0.007. We take the systematic uncertainty as given in Table 5 in the paper.

$\phi_{\parallel}$ in $B_s^0 \to \phi\phi$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.56 ± 0.06 OUR AVERAGE				
$2.559 \pm 0.045 \pm 0.033$	AAIJ	19AP	LHCB	pp at 7, 8 and 13 TeV
$2.71\ ^{+0.31}_{-0.36} \pm 0.22$	[1] AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.54 ±0.07 ±0.09	[2] AAIJ	14AE	LHCB	Repl. by AAIJ 19AP
2.57 ±0.15 ±0.06	[3] AAIJ	12P	LHCB	Repl. by AAIJ 14AE

[1] AALTONEN 11AN quotes $\cos\phi_{\parallel} = -0.91^{+0.15}_{-0.13} \pm 0.09$ which we convert to $\phi_{\parallel}$ taking the smaller solution.
[2] AAIJ 14AE reports measurement of $\phi_{\perp}$ and $\phi_{\perp} - \phi_{\parallel}$, which we convert into $\phi_{\parallel}$. Statistical uncertainty includes correlation between measured parameters, while systematic uncertainties are assumed uncorrelated.
[3] AAIJ 12P quotes $\cos\phi_{\parallel} = -0.844 \pm 0.068 \pm 0.029$ which we convert to $\phi_{\parallel}$, taking the smaller solution.

$\phi_{\perp}$ in $B_s^0 \to \phi\phi$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.818±0.178±0.073	AAIJ	19AP	LHCB	pp at 7, 8 and 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.67 ±0.23 ±0.07	AAIJ	14AE	LHCB	Repl. by AAIJ 19AP

Γ_L/Γ in $B_s^0 \to K^{*0}\overline{K}^{*0}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.240±0.031±0.025	[1] AAIJ	19L	LHCB	pp at 7 and 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.208±0.032±0.046	[2] AAIJ	18S	LHCB	Repl. by AAIJ 19L
0.201±0.057±0.040	[3] AAIJ	15AF	LHCB	Repl. by AAIJ 18S
0.31 ±0.12 ±0.04	AAIJ	12F	LHCB	Repl. by AAIJ 15AF

[1] Untagged and time-integrated analysis within 150 MeV of the K^{*0} mass.
[2] Measured in angular analysis, which takes into account *S*-, *P*- and *D*-wave. contributions.
[3] Measured in angular analysis, which takes into account *S*-wave contributions.

$\Gamma_{\perp}/\Gamma$ in $B_s^0 \to K^{*0}\overline{K}^{*0}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.38±0.11±0.04	AAIJ	12F	LHCB	pp at 7 TeV

$\Gamma_{\parallel}/\Gamma$ in $B_s^0 \to K^*(892)^0\overline{K}^*(892)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.297±0.029±0.042	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.215±0.046±0.015	AAIJ	15AF	LHCB	Repl. by AAIJ 18S

[1] Measured in angular analysis, which takes into account *S*-, *P*- and *D*-wave. contributions.

$\Phi_{\parallel}$ in $B_s^0 \to K^*(892)^0\overline{K}^*(892)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
2.40±0.11±0.33	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

5.31±0.24±0.14	AAIJ	15AF	LHCB	Repl. by AAIJ 18S

[1] Measured in angular analysis, which takes into account *S*-, *P*- and *D*-wave. contributions.

$\Phi_\perp$ in $B_s^0 \to K^*(892)^0 \overline{K}^*(892)^0$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.62±0.26±0.64	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

Γ_L/Γ in $B_s^0 \to \phi \overline{K}^{*0}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.51±0.15±0.07	AAIJ	13BW	LHCB	pp at 7 TeV

$\Gamma_\parallel/\Gamma$ in $B_s^0 \to \phi \overline{K}^{*0}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.21±0.11±0.02	AAIJ	13BW	LHCB	pp at 7 TeV

$\phi_\parallel$ in $B_s^0 \to \phi \overline{K}^{*0}$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
1.75±0.53±0.29	[1] AAIJ	13BW	LHCB	pp at 7 TeV

[1] Measures $\cos(\phi_\parallel) = -0.18 \pm 0.52 \pm 0.29$, which we convert to $\phi_\parallel$ by taking the smaller solution.

Γ_L/Γ in $B_s^0 \to \overline{D}^{*0} \phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.73±0.15±0.04	AAIJ	18AY	LHCB	pp at 7 and 8 TeV

Γ_L/Γ in $B_s^0 \to K^*(892)^0 \overline{K}_2^*(1430)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.911±0.020±0.165	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

$\Gamma_\parallel/\Gamma$ in $B_s^0 \to K^*(892)^0 \overline{K}_2^*(1430)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.012±0.008±0.053	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

Γ_L/Γ in $B_s^0 \to K_2^*(1430)^0 \overline{K}^*(892)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.62±0.16±0.25	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

$\Gamma_\parallel/\Gamma$ in $B_s^0 \to K_2^*(1430)^0 \overline{K}^*(892)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.24±0.10±0.14	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

Γ_L/Γ in $B_s^0 \to K_2^*(1430)^0 \overline{K}_2^*(1430)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.25±0.14±0.18	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

$\Gamma_{\parallel 1}/\Gamma$ in $B_s^0 \to K_2^*(1430)^0 \overline{K}_2^*(1430)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.11±0.14	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

$\Gamma_{\perp 1}/\Gamma$ in $B_s^0 \to K_2^*(1430)^0 \overline{K}_2^*(1430)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.30±0.18±0.21	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

$\Gamma_{\parallel 2}/\Gamma$ in $B_s^0 \to K_2^*(1430)^0 \overline{K}_2^*(1430)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.015±0.033±0.107	[1] AAIJ	18S	LHCB	pp at 7, 8 TeV

[1] Measured in angular analysis, which takes into account S-, P- and D-wave . contributions.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($0.10 < q^2 < 2.00$ GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.20^{+0.08}_{-0.09}\pm0.02}$	AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.37^{+0.19}_{-0.17}\pm0.07$	AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($2.00 < q^2 < 5.0$ GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.68^{+0.16}_{-0.13}\pm0.03}$	AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.53^{+0.25}_{-0.23}\pm0.10$	[1] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in $2.0 < q^2 < 4.3$ GeV^2/c^4.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($5.0 < q^2 < 8.0$ GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.54^{+0.10}_{-0.09}\pm0.02}$	AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.81^{+0.11}_{-0.13}\pm0.05$	[1] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in $4.3 < q^2 < 8.68$ GeV^2/c^4.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($11.0 < q^2 < 12.5$ GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
0.29±0.11±0.04	AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.33^{+0.14}_{-0.12}\pm0.06$	[1] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in $10.09 < q^2 < 12.90$ GeV^2/c^4.

$F_L(B^0_s \to \phi\mu^+\mu^-)$ (15.0< q^2 < 17.0 GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
$0.23^{+0.09}_{-0.08}\pm0.02$	AAIJ 15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.34^{+0.18}_{-0.17}\pm0.07$	[1] AAIJ 13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in 14.18 < q^2 < 16 GeV^2/c^4.

$F_L(B^0_s \to \phi\mu^+\mu^-)$ (17.0 < q^2 < 19.0 GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
$0.40^{+0.13}_{-0.15}\pm0.02$	AAIJ 15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.16^{+0.17}_{-0.10}\pm0.07$	[1] AAIJ 13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in 16.0 < q^2 < 19.0 GeV^2/c^4.

$F_L(B^0_s \to \phi\mu^+\mu^-)$ (15.0 < q^2 < 18.9 GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
0.359±0.031±0.019	AAIJ 21AK	LHCB	pp at 7, 8, 13 TeV

$F_L(B^0_s \to \phi\mu^+\mu^-)$ (1.00 < q^2 < 6.00 GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
0.715±0.036±0.013	AAIJ 21AK	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.63^{+0.09}_{-0.09}\pm0.03$	AAIJ 15AQ	LHCB	Repl. by AAIJ 21AK
$0.56^{+0.17}_{-0.16}\pm0.09$	AAIJ 13X	LHCB	Repl. by AAIJ 15AQ

B^0_s-$\overline{B}^0_s$ MIXING

For a discussion of B^0_s-$\overline{B}^0_s$ mixing see the note on "B^0-$\overline{B}^0$ Mixing" in the B^0 Particle Listings above.

χ_s is a measure of the time-integrated B^0_s-$\overline{B}^0_s$ mixing probability that produced $B^0_s(\overline{B}^0_s)$ decays as a $\overline{B}^0_s(B^0_s)$. Mixing violates $\Delta B \neq 2$ rule.

$$\chi_s = \frac{x_s^2}{2(1+x_s^2)}$$

$$x_s = \frac{\Delta m_{B^0_s}}{\Gamma_{B^0_s}} = (m_{B^0_{sH}} - m_{B^0_{sL}})\,\tau_{B^0_s}\ ,$$

where H, L stand for heavy and light states of two B^0_s CP eigenstates and $\tau_{B^0_s} = \frac{1}{0.5(\Gamma_{B^0_{sH}}+\Gamma_{B^0_{sL}})}$.

$\Delta m_{B^0_s} = m_{B^0_{sH}} - m_{B^0_{sL}}$

$\Delta m_{B^0_s}$ is a measure of 2π times the B^0_s-$\overline{B}^0_s$ oscillation frequency in time-dependent mixing experiments.

"OUR EVALUATION" is provided by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) by taking into account correlations between measurements.

VALUE (10^{12} $\hbar$ s^{-1})	CL%	DOCUMENT ID		TECN	COMMENT
17.765 ±0.006 OUR EVALUATION					
17.765 ±0.005 OUR AVERAGE					
17.7683±0.0051±0.0032		[1] AAIJ	22B	LHCB	pp at 13 TeV
17.757 ±0.007 ±0.008		[2] AAIJ	21M	LHCB	pp at 7, 8, 13 TeV
17.51 $^{+0.10}_{-0.09}$ ±0.03		[3] SIRUNYAN	21E	CMS	pp at 13 TeV
17.703 ±0.059 ±0.018		[4] AAIJ	19Q	LHCB	pp at 13 TeV
17.768 ±0.023 ±0.006		[1] AAIJ	13BI	LHCB	pp at 7 TeV
17.93 ±0.22 ±0.15		[5] AAIJ	13CF	LHCB	pp at 7 TeV
17.77 ±0.10 ±0.07		[6] ABULENCIA,A	06G	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
17.711 $^{+0.055}_{-0.057}$ ±0.011		[4] AAIJ	15I	LHCB	Repl. by AAIJ 19Q
17.63 ±0.11 ±0.02		[7] AAIJ	12I	LHCB	Repl. by AAIJ 21M
17–21	90	[8] ABAZOV	06B	D0	$p\overline{p}$ at 1.96 TeV
17.31 $^{+0.33}_{-0.18}$ ±0.07		[9] ABULENCIA	06Q	CDF	Repl. by ABULENCIA,A 06G
> 8.0	95	[10] ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
> 4.9	95	[11] ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
> 8.5	95	[12] ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
> 5.0	95	[13] ABDALLAH	03B	DLPH	$e^+e^- \rightarrow Z$
>10.3	95	[14] ABE	03	SLD	$e^+e^- \rightarrow Z$
>10.9	95	[15] HEISTER	03E	ALEP	$e^+e^- \rightarrow Z$
> 5.3	95	[16] ABE	02V	SLD	$e^+e^- \rightarrow Z$
> 1.0	95	[17] ABBIENDI	01D	OPAL	$e^+e^- \rightarrow Z$
> 7.4	95	[18] ABREU	00Y	DLPH	Repl. by ABDALLAH 04J
> 4.0	95	[19] ABREU,P	00G	DLPH	$e^+e^- \rightarrow Z$
> 5.2	95	[20] ABBIENDI	99S	OPAL	$e^+e^- \rightarrow Z$
<96	95	[21] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
> 5.8	95	[22] ABE	99J	CDF	$p\overline{p}$ at 1.8 TeV
> 9.6	95	[23] BARATE	99J	ALEP	$e^+e^- \rightarrow Z$
> 7.9	95	[24] BARATE	98C	ALEP	Repl. by BARATE 99J
> 3.1	95	[25] ACKERSTAFF	97U	OPAL	Repl. by ABBIENDI 99S
> 2.2	95	[26] ACKERSTAFF	97V	OPAL	Repl. by ABBIENDI 99S
> 6.5	95	[27] ADAM	97	DLPH	Repl. by ABREU 00Y
> 6.6	95	[28] BUSKULIC	96M	ALEP	Repl. by BARATE 98C
> 2.2	95	[26] AKERS	95J	OPAL	Sup. by ACKERSTAFF 97V
> 5.7	95	[29] BUSKULIC	95J	ALEP	$e^+e^- \rightarrow Z$
> 1.8	95	[26] BUSKULIC	94B	ALEP	$e^+e^- \rightarrow Z$

[1] Measured using $B^0_s \rightarrow D^-_s \pi^+$ decays.

[2] Measured using $B^0_s \rightarrow D^-_s \pi^+ \pi^- \pi^+$ decays.

[3] Measured using time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[4] Measured using time-dependent angular analysis of $B^0_s \to J/\psi K^+ K^-$ decays.

[5] Measured using $B^0_s \to D^-_s \mu^+ \nu_\mu X$ decays.

[6] Significance of oscillation signal is 5.4 σ. Also reports $|V_{td} / V_{ts}| = 0.2060 \pm 0.0007^{+0.0081}_{-0.0060}$.

[7] Measured using $B^0_s \to D^-_s \pi^+$ and $D^-_s \pi^+\pi^-\pi^+$ decays.

[8] A likelihood scan over the oscillation frequency, Δm_s, gives a most probable value of 19 ps^{-1} and a range of 17< Δm_s <21 (ps^{-1}) at 90% C.L. assuming Gaussian uncertainties. Also excludes Δm_s <14.8 ps^{-1} at 95% C.L

[9] Significance of oscillation signal is 0.2%. Also reported the value $|V_{td} / V_{ts}| = 0.208^{+0.001+0.008}_{-0.002-0.006}$.

[10] Uses leptons emitted with large momentum transverse to a jet and improved techniques for vertexing and flavor-tagging.

[11] Updates of D_s-lepton analysis.

[12] Combined results from all Delphi analyses.

[13] Events with a high transverse momentum lepton were removed and an inclusively reconstructed vertex was required.

[14] ABE 03 uses the novel "charge dipole" technique to reconstruct separate secondary and tertiary vertices originating from the $B \to D$ decay chain. The analysis excludes Δm_s <4.9 ps^{-1} and 7.9< Δm_s <10.3 ps^{-1}.

[15] Three analyses based on complementary event selections: (1) fully-reconstructed hadronic decays; (2) semileptonic decays with D_s exclusively reconstructed; (3) inclusive semileptonic decays.

[16] ABE 02V uses exclusively reconstructed D^-_s mesons and excludes Δm_s <1.4 ps^{-1} and 2.4< Δm_s <5.3 ps^{-1} at 95%CL.

[17] Uses fully or partially reconstructed $D_s \ell$ vertices and a mixing tag as a flavor tagging.

[18] Replaced by ABDALLAH 04A. Uses $D^-_s \ell^+$, and $\phi\ell^+$ vertices, and a multi-variable discriminant as a flavor tagging.

[19] Uses inclusive D_s vertices and fully reconstructed B_s decays and a multi-variable discriminant as a flavor tagging.

[20] Uses ℓ-Q_{hem} and ℓ-ℓ.

[21] ABE 99D assumes $\tau_{B^0_s}$= 1.55 $\pm$ 0.05 ps and $\Delta\Gamma/\Delta m$= (5.6 $\pm$ 2.6) $\times 10^{-3}$.

[22] ABE 99J uses ϕ ℓ-ℓ correlation.

[23] BARATE 99J uses combination of an inclusive lepton and D^-_s-based analyses.

[24] BARATE 98C combines results from $D_s h$-ℓ/Q_{hem}, $D_s h$-K in the same side, $D_s \ell$-ℓ/Q_{hem} and $D_s \ell$-K in the same side.

[25] Uses ℓ-Q_{hem}.

[26] Uses ℓ-ℓ.

[27] ADAM 97 combines results from $D_s \ell$-Q_{hem}, ℓ-Q_{hem}, and ℓ-ℓ.

[28] BUSKULIC 96M uses D_s lepton correlations and lepton, kaon, and jet charge tags.

[29] BUSKULIC 95J uses ℓ-Q_{hem}. They find Δm_s > 5.6 [> 6.1] for f_s=10% [12%]. We interpolate to our central value f_s=10.5%.

$x_s = \Delta m_{B^0_s}/\Gamma_{B^0_s}$

This is derived by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) from the results on $\Delta m_{B^0_s}$ and "OUR EVALUATION" of the B^0_s mean lifetime.

VALUE	DOCUMENT ID
27.01±0.10 OUR EVALUATION	

χ_s

This is a B^0_s-$\overline{B}^0_s$ integrated mixing parameter derived from x_s above and OUR EVALUATION of $\Delta\Gamma_{B^0_s}/\Gamma_{B^0_s}$.

VALUE	DOCUMENT ID
0.499318±0.000005 OUR EVALUATION	

CP VIOLATION PARAMETERS in B^0_s

$\mathrm{Re}(\epsilon_{B^0_s}) / (1 + |\epsilon_{B^0_s}|^2)$

CP impurity in B^0_s system.

"OUR EVALUATION" is an average obtained by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) and described at https://hflav.web.cern.ch/. It is the result of a fit to B_d and B_s *CP* asymmetries, which includes the B_s measurements listed below and the B_d measurements listed in the B_d section, and takes into account correlations between those measurements.

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
−0.15±0.70 OUR EVALUATION				
0.0 ±1.1 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.			
0.98±0.65±0.5	[1] AAIJ	16G	LHCB	pp at 7, 8 TeV
−2.15±1.85	[2] ABAZOV	14	D0	$p\overline{p}$ at 1.96 TeV
−2.8 ±1.9 ±0.4	[3] ABAZOV	13	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.15±1.25±0.90	[4] AAIJ	14D	LHCB	Repl. by AAIJ 16G
−4.5 ±2.7	[5] ABAZOV	11U	D0	Repl. by ABAZOV 14
−0.4 ±2.3 ±0.4	[6] ABAZOV	10E	D0	Repl. by ABAZOV 13
−3.6 ±1.9	[7] ABAZOV	10H	D0	Repl. by ABAZOV 11U
6.1 ±4.8 ±0.9	[8] ABAZOV	07A	D0	Repl. by ABAZOV 10E

[1] AAIJ 16G reports a measurement of time-integrated flavor-specific asymmetry in $B^0_s \to \mu^+ D^-_s X$ decays, $A^s_{SL} = (0.39 \pm 0.26 \pm 0.20)\%$, which is approximately equal to $4 \times \mathrm{Re}(\epsilon_{B^0_s}) / (1 + |\epsilon_{B^0_s}|^2)$.

[2] ABAZOV 14 uses the dimuon charge asymmetry with different impact parameters from which it reports $A^s_{SL} = (-0.86 \pm 0.74) \times 10^{-2}$.

[3] ABAZOV 13 reports a measurement of time-integrated flavor-specific asymmetry in mixed semileptonic $B^0_s \to \mu^+ D^-_s X$ decays $A^s_{SL} = (-1.12 \pm 0.74 \pm 0.17)\%$ which is approximately equal to $4 \times \mathrm{Re}(\epsilon_{B^0_s}) / (1 + |\epsilon_{B^0_s}|^2)$.

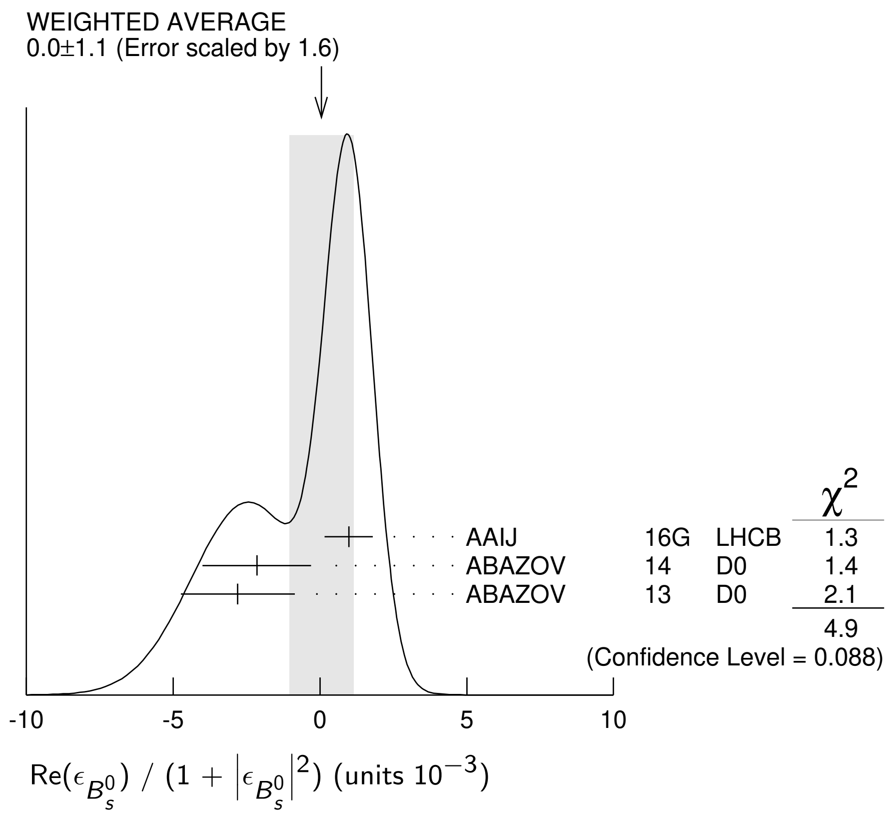
[4] AAIJ 14D reports a measurement of time-integrated flavor-specific asymmetry in $B_s^0 \to \mu^+ D_s^- X$ decays, $A^s_{SL} = (-0.06 \pm 0.50 \pm 0.36)\%$, which is approximately equal to4 $\times$ Re($\epsilon_{B_s^0}$) / (1 + $|\epsilon_{B_s^0}|^2$).

[5] ABAZOV 11U uses the dimuon charge asymmetry with different impact parameters from which it reports $A^s_{SL} = (-18.1 \pm 10.6) \times 10^{-3}$.

[6] ABAZOV 10E reports a measurement of flavor-specific asymmetry in $B^0_{(s)} \to \mu^+ D^{*-}_{(s)} X$ decays with a decay-time analysis including initial-state flavor tagging, $A^s_{SL} = (-1.7 \pm 9.1^{+1.4}_{-1.5}) \times 10^{-3}$ which is approximately equal to 4 $\times$ Re($\epsilon_{B_s^0}$) / (1 + $|\epsilon_{B_s^0}|^2$).

[7] ABAZOV 10H reports a measurement of like-sign dimuon charge asymmetry of $A^s_{SL} = (-9.57 \pm 2.51 \pm 1.46) \times 10^{-3}$ in semileptonic b-hadron decays. Using the measured production ratio of B_d^0 and B_s^0, and the asymmetry of B_d^0 $A^s_{SL} = (-4.7 \pm 4.6) \times 10^{-3}$ measured from B-factories, they obtain the asymmetry for B_s^0.

[8] The first direct measurement of the time integrated flavor untagged charge asymmetry in semileptonic B_s^0 decays is reported as $2 \times A^s_{SL}(\text{untagged}) = A^s_{SL} = (2.45 \pm 1.93 \pm 0.35) \times 10^{-2}$.



$C_{KK}(B_s^0 \to K^+ K^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.162±0.035 OUR AVERAGE				
0.164±0.034±0.014	AAIJ	21O	LHCB	pp at 13 TeV
0.14 ±0.11 ±0.03	AAIJ	13BO	LHCB	pp at 7 TeV

$S_{KK}(B^0_s \to K^+ K^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
0.14 ±0.05 OUR AVERAGE	Error includes scale factor of 1.3.		
0.123±0.034±0.015	AAIJ 21O	LHCB	pp at 13 TeV
0.30 ±0.12 ±0.04	AAIJ 13BO	LHCB	pp at 7 TeV

$r_B(B^0_s \to D^{\mp}_s K^{\pm})$

r_B and δ_B are the amplitude ratio and relative strong phase between the amplitudes of $A(B^0_s \to D^+_s K^-)$ and $A(B^0_s \to D^-_s K^+)$,

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.37^{+0.10}_{-0.09}}$	[1] AAIJ 18U	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.53^{+0.17}_{-0.16}$	[2] AAIJ 14BF	LHCB	Repl. by AAIJ 18U

[1] Measured in $B^0_s \to D^{\mp}_s K^{\pm}$ decays, constraining $-2\beta_s$ by the measurement of $\phi_s = -0.030 \pm 0.033$ from HFLAV.

[2] Measured in $B^0_s \to D^{\mp}_s K^{\pm}$ decays, constraining $-2\beta_s$ by the measurement of $\phi_s = 0.01 \pm 0.07 \pm 0.0$ from AAIJ 13AR. At 68% CL.

$r_B(B^0_s \to D^{\mp}_s K^{\pm} \pi^{\pm} \pi^{\mp})$

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.47 \pm 0.08^{+0.02}_{-0.03}}$	[1,2] AAIJ 21M	LHCB	pp at 7, 8, 13 TeV

[1] Measured in restricted phase space with m($K^+ \pi^+ \pi^-$) $<$ 1950 MeV, m($K^+ \pi^-$) $<$ 1200 MeV and m($\pi^+ \pi^-$) $<$ 1200 MeV.

[2] A model-independent coherence factor for the decay $B_s \to D_s K \pi \pi$ (in the restricted phase space region) is also reported.

$\delta_B(B^0_s \to D^{\pm}_s K^{\mp})$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
$\mathbf{358^{+13}_{-14}}$	[1] AAIJ 18U	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
3^{+19}_{-20}	[2] AAIJ 14BF	LHCB	Repl. by AAIJ 18U

[1] Measured in $B^0_s \to D^{\mp}_s K^{\pm}$ decays, constraining $-2\beta_s$ by the measurement of $\phi_s = 0.030 \pm 0.033$ from HFLAV. The value is modulo 180°.

[2] Measured in $B^0_s \to D^{\mp}_s K^{\pm}$ decays, constraining $-2\beta_s$ by the measurement of $\phi_s = 0.01 \pm 0.07 \pm 0.0$ from AAIJ 13AR. The value is modulo 180° at 68% CL.

$\delta_B(B^0_s \to D^{\pm}_s K^{\mp} \pi^{\pm} \pi^{\mp})$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
$\mathbf{-6^{+10}_{-12}{}^{+2}_{-4}}$	[1,2] AAIJ 21M	LHCB	pp at 7, 8, 13 TeV

[1] Measured in restricted phase space with m($K^+ \pi^+ \pi^-$) $<$ 1950 MeV, m($K^+ \pi^-$) $<$ 1200 MeV and m($\pi^+ \pi^-$) $<$ 1200 MeV. The value is modulo 180°.

[2] A model-independent coherence factor for the decay $B_s \to D_s K \pi \pi$ (in the restricted phase space region) is also reported.

CP Violation phase β_s

$-2\beta_s$ is the weak phase difference between B_s^0 mixing amplitude and the $B_s^0 \rightarrow J/\psi\phi$ decay amplitude driven by the $b \rightarrow c\overline{c}s$ transition (such as $B_s \rightarrow J/\psi\phi$, $J/\psi K^+ K^-$, $J/\psi\pi^+\pi^-$, and $D_s^+ D_s^-$). The Standard Model value of β_s is arg$(-\frac{V_{ts}V_{tb}^*}{V_{cs}V_{cb}^*})$ if penguin contributions are neglected.

"OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFLAV, https://hflav.web.cern.ch/) and are described at https://hflav.web.cern.ch/. The averaging/scaling procedure takes into account correlation between the measurements.

VALUE (10^{-2} rad)	*DOCUMENT ID*		*TECN*	*COMMENT*
2.5 ± 1.0 OUR EVALUATION				
2.3 ± 1.0 OUR AVERAGE				
4.35 ± 1.80 ± 1.05	[1] AAD	21AE	ATLS	pp at 7, 8, 13 TeV
0 ± 14 ± 4	[2] AAIJ	21AN	LHCB	pp at 7, 8 TeV
1.05 ± 2.20 ± 0.50	[3] SIRUNYAN	21E	CMS	pp at 8, 13 TeV
− 0.1 ± 2.2 ± 0.6	[4] AAIJ	19AF	LHCB	pp at 7, 8, 13 TeV
4.15 ± 2.05 ± 0.30	[5] AAIJ	19Q	LHCB	pp at 13 TeV
− 5.95 ± 5.35 ± 1.70	[6] AAIJ	17V	LHCB	pp at 7, 8 TeV
$-11.5\ ^{+14}_{-14.5} \pm 1$	[7] AAIJ	16AK	LHCB	pp at 7, 8 TeV
2.9 ± 2.5 ± 0.3	[8] AAIJ	15I	LHCB	pp at 7, 8 TeV
− 1 ± 9 ± 1	[9] AAIJ	14AY	LHCB	pp at 7, 8 TeV
	[10] AALTONEN	12AJ	CDF	$p\overline{p}$ at 1.96 TeV
$28\ ^{+18}_{-19}$	[11] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.7 ± 5.8 ± 1.4	[12,13] AAIJ	19AP	LHCB	pp at 7, 8, 13 TeV
5.0 ± 6.5 ± 7.0	[14] AAIJ	18S	LHCB	pp at 7, 8 TeV
4.5 ± 3.9 ± 2.1	[15] AAD	16AP	ATLS	Repl. by AAD 21AE
3.75 ± 4.85 ± 1.55	[16] KHACHATRY...	16S	CMS	Repl. by SIRUNYAN 21E
$6\ ^{+8}_{-7}$	[17,18] AAIJ	15K	LHCB	pp at 7, 8 TeV
− 6 ± 13 ± 3	[19] AAD	14U	ATLS	Repl. by AAD 21AE
8.5 ± 7.5 ± 1.5	[20] AAIJ	14AE	LHCB	Repl. by AAIJ 19AP
− 3.5 ± 3.4 ± 0.4	[21] AAIJ	14S	LHCB	Repl. by AAIJ 19AF
− 0.5 ± 3.5 ± 0.5	[22] AAIJ	13AR	LHCB	Repl. by AAIJ 15I
	[23] AAIJ	13AY	LHCB	pp at 7 TeV
− 11.0 ± 20.5 ± 5.0	[24] AAD	12CV	ATLS	Repl. by AAD 14U
22 ± 22 ± 1	[25] AAIJ	12B	LHCB	Repl. by AAIJ 12Q
− 8 ± 9 ± 3	[26] AAIJ	12D	LHCB	Repl. by AAIJ 13AR
$0.95\ ^{+8.70}_{-8.65}\ ^{+0.15}_{-0.20}$	[27] AAIJ	12Q	LHCB	Repl. by AAIJ 13AR
	[28] AALTONEN	12D	CDF	Repl. by AALTONEN 12AJ
	[29] AALTONEN	08G	CDF	Repl. by AALTONEN 12D
$28\ ^{+12}_{-15}\ ^{+4}_{-1}$	[11,30] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
$39.5 \pm 28.0\ ^{+0.5}_{-7.0}$	[31,32] ABAZOV	07	D0	Repl. by ABAZOV 07N
$35\ ^{+20}_{-24}$	[32,33] ABAZOV	07N	D0	Repl. by ABAZOV 08AM

[1] AAD 21AE measured $\phi_s = -2\,\beta_s = -0.087 \pm 0.036 \pm 0.021$ rad. using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[2] AAIJ 21AN measured $\phi_s = -2\beta_s = 0.00 \pm 0.28 \pm 0.07$ rad, using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays with $J/\psi \to e^+e^-$.

[3] SIRUNYAN 21E measured $\phi_s = -2\,\beta_s = -0.021 \pm 0.044 \pm 0.010$ rad. using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[4] AAIJ 19AF reports $\phi_s = -2\,\beta_s = 0.002 \pm 0.044 \pm 0.012$ rad. and $|\lambda| = 0.949 \pm 0.036 \pm 0.019$, when direct CP violation is allowed. Measured using a time-dependent fit to $B^0_s \to J/\psi\pi^+\pi^-$ decays, which is sensitive to $\phi_s(s\overline{s}s)$, not $\phi_s(c\overline{c}s)$.

[5] AAIJ 19Q reports $\phi_s = -2\,\beta_s = -0.083 \pm 0.041 \pm 0.006$ rad. that was measured using a time-dependent angular analysis of $B^0_s \to J/\psi K^+K^-$ decays.

[6] Measured $\phi_s = -2\,\beta_s = 0.119 \pm 0.107 \pm 0.034$ rad using time-dependent angular analysis of $B^0_s \to J/\psi K^+K^-$ in the region m$(KK) > 1.05$ GeV.

[7] AAIJ 16AK reports $\phi_s = -2\,\beta_s = 0.23^{+0.29}_{-0.28} \pm 0.02$ rad. that was measured using a time-dependent angular analysis of $B^0_s \to \psi(2S)\phi$ decays.

[8] AAIJ 15I reports $\phi_s = -2\,\beta_s = -0.058 \pm 0.049 \pm 0.006$ rad. that was measured using a time-dependent angular analysis of $B^0_s \to J/\psi K^+K^-$ decays. It also combines this result with that of AAIJ 14S and quotes $\phi_s = -2\,\beta_s = -0.010 \pm 0.039$ rad.

[9] AAIJ 14AY reports $\phi_s = -2\,\beta_s = 0.02 \pm 0.17 \pm 0.02$ rad. in a time-dependent fit to $B^0_s \to D^+_s D^-_s$, while allowing CP violation in decay.

[10] AALTONEN 12AJ reports $-\pi/2 < \beta_s < -1.51$ or $-0.06 < \beta_s < 0.30$, or $1.26 < \beta_s < \pi/2$ rad. at 68% CL. Measured using the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[11] ABAZOV 12D reports $\phi_s = -2\,\beta_s = -0.55^{+0.38}_{-0.36}$ rad. that was measured using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays. A single error includes both statistical and systematic uncertainties.

[12] AAIJ 19AP reports $\phi_s^{s\overline{s}s} = -0.073 \pm 0.115 \pm 0.027$ rad and $|\lambda| = 0.99 \pm 0.05 \pm 0.01$. Measured using a time-dependent fit to $B^0_s \to \phi\phi$ decays, assuming independence of the helicity of the $\phi\phi$ decay.

[13] AAIJ 19AP reports also polarisation-dependent results assuming that the longitudinal weak phase is CP-conserving and that there is no direct CP violation, giving $\phi_{s,\parallel} = 0.014 \pm 0.055 \pm 0.011$ rad and $\phi_{s,\perp} = 0.044 \pm 0.059 \pm 0.019$ rad.

[14] AAIJ 18S reports $\phi_s = -2\,\beta_s = -0.10 \pm 0.13 \pm 0.14$ rad measured in $B^0_s \to (K^+\pi^-)(K^-\pi^+)$ in the region $0.75 <$ m$(K^\pm\pi^\mp) < 1.6$ GeV. This is a $b \to d\overline{d}s$ transition with a decay amplitude phase different from that of $b \to c\overline{c}s$ transition.

[15] AAD 16AP reports $\phi_s = -2\,\beta_s = -0.090 \pm 0.078 \pm 0.041$ rad. that was measured using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[16] KHACHATRYAN 16S reports $\phi_s = -2\,\beta_s = -0.075 \pm 0.097 \pm 0.031$ rad. that was measured using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[17] AAIJ 15K reports $-2\beta_s = -0.12^{+0.14}_{-0.16}$ rad. The value was obtained by measuring time-dependent CP asymmetry in $B^0_s \to K^+K^-$ and using a U-spin relation between $B^0_s \to K^+K^-$ and $B^0 \to \pi^+\pi^-$.

[18] Results are also presented using additional inputs on $B^0 \to \pi^0\pi^0$ and $B^+ \to \pi^+\pi^0$ decays from other experiments and isospin symmetry assumptions. The dependence of the results on the maximum allowed amount of U-spin breaking up to 50% is also included.

[19] AAD 14U reports $\phi_s = -2\,\beta_s = 0.12 \pm 0.25 \pm 0.05$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

[20] AAIJ 14AE value measured in $B_s^0 \to \phi\phi$ decays.This is a $b \to s\overline{s}s$ transition with a decay amplitude phase different from that of $b \to c\overline{c}s$ transition. Also reports $\phi_s = -0.17 \pm 0.15 \pm 0.03$ rad.

[21] AAIJ 14S reports $\phi_s = -2\,\beta_s = 0.070 \pm 0.068 \pm 0.008$ rad. and $|\lambda| = 0.89 \pm 0.05 \pm 0.01$, when direct CP violation is allowed. Measured using a time-dependent fit to $B_s^0 \to J/\psi\pi^+\pi^-$ decays.

[22] AAIJ 13AR reports $\phi_s = -2\beta_s = 0.01 \pm 0.07 \pm 0.01$ rad. obtained from combined fit to $B_s^0 \to J/\psi K^+ K^-$ and $B_s^0 \to J/\psi\pi^+\pi^-$ data sets. Also reports separate results of $\phi_s = 0.07 \pm 0.09 \pm 0.01$ rad. from $B_s^0 \to J/\psi K^+ K^-$ decays and $\phi_s = -0.14^{+0.17}_{-0.16} \pm 0.01$ rad. from $B_s^0 \to J/\psi\pi^+\pi^-$ decays.

[23] AAIJ 13AY uses $B_s^0 \to \phi\phi$ mode, and reports the 68% CL interval of $\phi_s = -2\,\beta_s$ as $[-2.46, -0.76]$ rad.

[24] AAD 12CV reports $\phi_s = -2\,\beta_s = 0.22 \pm 0.41 \pm 0.10$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

[25] Reports $\phi_s = -2\,\beta_s = -0.44 \pm 0.44 \pm 0.02$ rad. that was measured using a time-dependent fit to $B_s^0 \to J/\psi f_0(980)$ decays.

[26] Reports $\phi_s = -2\,\beta_s = 0.15 \pm 0.18 \pm 0.06$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

[27] Reports $\phi_s = -2\,\beta_s = -0.019^{+0.173}_{-0.174}{}^{+0.004}_{-0.003}$ rad. which was measured using a time-dependent fit to $B_s^0 \to J/\psi\pi^+\pi^-$ decays, with the $\pi^+\pi^-$ mass within 775–1550 MeV. Searches for, but finds no evidence, for direct CP violation in $B_s^0 \to J/\psi\pi\pi$ decays.

[28] Reports $0.02 < \phi_s < 0.52$ or $1.08 < \phi_s < 1.55$ rad. at 68% C.L. confidence regions in the two-dimensional space of ϕ_s and $\Delta\Gamma_{B_s^0}$ from $B_s^0 \to J/\psi\phi$ decays.

[29] Reports $0.32 < 2\beta_s < 2.82$ rad. at 68% C.L. and confidence regions in the two-dimensional space of $2\beta_s$ and $\Delta\Gamma$ from the first measurement of $B_s^0 \to J/\psi\phi$ decays using flavor tagging. The probability of a deviation from SM prediction as large as the level of observed data is 15%.

[30] Reports $\phi_s = -2\,\beta_s$ and obtains 90% CL interval $-0.03 < \beta_s < 0.60$ rad.

[31] The first direct measurement of the CP-violating mixing phase is reported from the time-dependent analysis of flavor untagged $B_s^0 \to J/\psi\phi$ decays.

[32] Reports ϕ_s which equals to $-2\beta_s$.

[33] Combines D0 collaboration measurements of time-dependent angular distributions in $B_s^0 \to J/\psi\phi$ and charge asymmetry in semileptonic decays. There is a 4-fold ambiguity in the solution.

$|\lambda|$ ($B_s^0 \to J/\psi(1S)\phi$)

VALUE	DOCUMENT ID		TECN	COMMENT
1.001±0.018 OUR AVERAGE	Error includes scale factor of 1.2.			
0.972±0.026±0.008	[1] SIRUNYAN	21E	CMS	pp at 13 TeV
1.012±0.016±0.006	AAIJ	19Q	LHCB	pp at 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.964±0.019±0.007	AAIJ	15I	LHCB	Repl. by AAIJ 19Q

[1] Measured using time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

$|\lambda|$

VALUE	DOCUMENT ID		TECN	COMMENT
0.999±0.017 OUR AVERAGE				
0.99 ±0.05 ±0.01	[1] AAIJ	19AP	LHCB	pp at 7, 8, 13 TeV
1.035±0.034±0.089	[2] AAIJ	18S	LHCB	pp at 7, 8 TeV
0.994±0.018±0.006	[3] AAIJ	17V	LHCB	pp at 7, 8 TeV
$1.045^{+0.069}_{-0.050}\pm0.007$	[4] AAIJ	16AK	LHCB	pp at 7, 8 TeV
$0.91^{+0.18}_{-0.15}\pm0.02$	[5] AAIJ	14AY	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.949±0.036±0.019	[6] AAIJ	19AF	LHCB	pp at 7, 8, 13 TeV
1.04 ±0.07 ±0.03	[7] AAIJ	14AE	LHCB	Repl. by AAIJ 19AP

[1] Measured in $B_s^0 \to \phi\phi$ decays.
[2] Measured in $B_s^0 \to (K^+\pi^-)(K^-\pi^+)$ in the region $0.75 < m(K^\pm\pi^\mp) < 1.6$ GeV.
[3] Measured using time-dependent angular analysis of $B_s^0 \to J/\psi K^+ K^-$ in the region $m(KK) > 1.05$ GeV.
[4] Measured using time-dependent angular analysis of $B_s^0 \to \psi(2S)\phi$ decays.
[5] Measured in $B_s^0 \to D_s^+ D_s^-$ decays.
[6] Measured using time-dependent analysis of $B_s^0 \to J/\psi\pi^+\pi^-$ decays.
[7] Measured in $B_s^0 \to \phi\phi$ decays.

A, *CP* violation parameter

$A = -2\ \mathrm{Re}(\lambda) / (1 + |\lambda|^2)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.79±0.08 OUR AVERAGE				
−0.83±0.05±0.09	[1] AAIJ	21O	LHCB	pp at 13 TeV
−0.79±0.07±0.10	[1] AAIJ	18O	LHCB	pp at 7, 8 TeV
$0.49^{+0.77}_{-0.65}\pm0.06$	[2] AAIJ	15AL	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \to K^+K^-$ decays.
[2] Measured in $B_s^0 \to J/\psi K_S^0$ decays.

C, *CP* violation parameter

$C = (1 - |\lambda|^2) / (1 + |\lambda|^2)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.19±0.06 OUR AVERAGE				
0.20±0.06±0.02	[1] AAIJ	18O	LHCB	pp at 7, 8 TeV
−0.28±0.41±0.08	[2] AAIJ	15AL	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \to K^+K^-$ decays.
[2] Measured in $B_s^0 \to J/\psi K_S^0$ decays.

S, *CP* violation parameter

$S = -2\ \mathrm{Im}(\lambda) / (1 + |\lambda|^2)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.06 OUR AVERAGE				
0.18±0.06±0.02	[1] AAIJ	18O	LHCB	pp at 7, 8 TeV
−0.08±0.40±0.08	[2] AAIJ	15AL	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \to K^+K^-$ decays.
[2] Measured in $B_s^0 \to J/\psi K_S^0$ decays.

$A^{L}_{CP}(B_s \to J/\psi \overline{K}^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.048±0.057±0.020	AAIJ	15AV	LHCB	pp at 7, 8 TeV

$A^{\parallel}_{CP}(B_s \to J/\psi \overline{K}^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.171±0.152±0.028	AAIJ	15AV	LHCB	pp at 7, 8 TeV

$A^{\perp}_{CP}(B_s \to J/\psi \overline{K}^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.049±0.096±0.025	AAIJ	15AV	LHCB	pp at 7, 8 TeV

$A_{CP}(B_s \to \pi^+ K^-)$

A_{CP} is defined as

$$\frac{B(\overline{B}^0_s \to f) - B(B^0_s \to \overline{f})}{B(\overline{B}^0_s \to f) + B(B^0_s \to \overline{f})},$$

the *CP*-violation asymmetry of exclusive B^0_s and $\overline{B}^0_s$ decay.

VALUE	DOCUMENT ID		TECN	COMMENT
0.224±0.012 OUR AVERAGE				
0.236±0.013±0.011	AAIJ	21O	LHCB	pp at 13 TeV
0.213±0.015±0.007	AAIJ	18O	LHCB	pp at 7, 8 TeV
0.22 ±0.07 ±0.02	AALTONEN	14P	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27 ±0.04 ±0.01	AAIJ	13AX	LHCB	Repl. by AAIJ 18O
0.27 ±0.08 ±0.02	AAIJ	12V	LHCB	Repl. by AAIJ 13AX
0.39 ±0.15 ±0.08	AALTONEN	11N	CDF	Repl. by AALTONEN 14P

$A_{CP}(B^0_s \to [K^+ K^-]_D \overline{K}^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.04±0.07±0.02	AAIJ	14BN	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.04±0.16±0.01	AAIJ	13L	LHCB	Repl. by AAIJ 14BN

$A_{CP}(B^0_s \to [\pi^+ K^-]_D K^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.01±0.03±0.02	AAIJ	14BN	LHCB	pp at 7, 8 TeV

$A_{CP}(B^0_s \to [\pi^+ \pi^-]_D K^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.06±0.13±0.02	AAIJ	14BN	LHCB	pp at 7, 8 TeV

$S(B^0_s \to \phi\gamma)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.43±0.30±0.11	[1] AAIJ	19AE	LHCB	pp at 7, 8 TeV

[1] Measured in flavor tagged time dependent analysis.

$C(B_s^0 \to \phi\gamma)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.11±0.29±0.11	[1] AAIJ	19AE	LHCB	pp at 7, 8 TeV

[1] Measured in flavor tagged time dependent analysis.

$A^{\Delta}(B_s^0 \to \phi\gamma)$

$A^{\Delta}(B_s \to \phi\gamma)$ is the multiplicative coefficient of the sinh($\Delta\Gamma$t/2) term in the $B_s \to \phi\gamma$ decay rate time dependence.

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{-0.67^{+0.37}_{-0.41}\pm0.17}$	[1] AAIJ	19AE	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.98^{+0.46}_{-0.52}{}^{+0.23}_{-0.20}$	[2] AAIJ	17B	LHCB	Repl. by AAIJ 19AE

[1] Measured in flavor tagged time dependent analysis, using tagged and un-tagged events. This result updates AAIJ 17B with better selection efficiency and other analysis improvements.

[2] Measured in time dependent analysis without initial flavor tagging.

CPT VIOLATION PARAMETERS

In the B_s^0 mixing, propagating mass eigenstates can be written as

$$|B_{sL}\rangle \propto \text{p}\sqrt{1-\xi}\,|B_s^0\rangle + \text{q}\sqrt{1+\xi}\,|\overline{B}_s^0\rangle$$
$$|B_{sH}\rangle \propto \text{p}\sqrt{1+\xi}\,|B_s^0\rangle - \text{q}\sqrt{1-\xi}\,|\overline{B}_s^0\rangle$$

where parameter ξ controls CPT violation. If ξ is zero, then CPT is conserved. The parameter ξ can be written as

$$\xi = \frac{2(M_{11}-M_{22})-i(\Gamma_{11}-\Gamma_{22})}{-2\Delta m_s+i\Delta\Gamma_s} \approx \frac{-2\beta^{\mu}\Delta a_{\mu}}{2\Delta m_s-i\Delta\Gamma_s},$$

where M_{ii}, Γ_{ii}, Δm_s, and $\Delta\Gamma_s$ are parameters of Hamiltonian governing B_s oscillations, β^{μ} is the B_s^0 meson velocity and Δa_{μ} characterizes Lorentz-invariance violation.

$\Delta a_{\perp}$

VALUE (10^{-12} GeV)	CL%	DOCUMENT ID		TECN	COMMENT
−0.47±0.39±0.08		[1] AAIJ	16E	LHCB	pp at 7, 8 TeV
< 1.2	95	[2] ABAZOV	15L	D0	$p\overline{p}$ at 1.96 TeV

[1] Uses $B_s^0 \to J/\psi K^+ K^-$ decays.

[2] Measured in semileptonic $B_s^0 \to D_s^- \mu^+ X$ decays. Also extracts limit on time and longitudinal components ($-0.8 < \Delta a_T - 0.396\,\Delta a_Z < 3.9$) 10^{-13} GeV.

$\Delta a_{\parallel}$

VALUE (10^{-14} GeV)	DOCUMENT ID		TECN	COMMENT
−0.89±1.41±0.36	[1] AAIJ	16E	LHCB	pp at 7, 8 TeV

[1] Uses $B_s^0 \to J/\psi K^+ K^-$ decays.

Δa_X

VALUE (10^{-14} GeV)	DOCUMENT ID		TECN	COMMENT
$+1.01 \pm 2.08 \pm 0.71$	[1] AAIJ	16E	LHCB	pp at 7, 8 TeV

[1] Uses $B_s^0 \to J/\psi K^+ K^-$ decays.

Δa_Y

VALUE (10^{-14} GeV)	DOCUMENT ID		TECN	COMMENT
$-3.83 \pm 2.09 \pm 0.71$	[1] AAIJ	16E	LHCB	pp at 7, 8 TeV

[1] Uses $B_s^0 \to J/\psi K^+ K^-$ decays.

Re(ξ)

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.022 \pm 0.033 \pm 0.003$	[1] AAIJ	16E	LHCB	pp at 7, 8 TeV

[1] Uses $B_s^0 \to J/\psi K^+ K^-$ decays.

Im(ξ)

VALUE	DOCUMENT ID		TECN	COMMENT
$0.004 \pm 0.011 \pm 0.002$	[1] AAIJ	16E	LHCB	pp at 7, 8 TeV

[1] Uses $B_s^0 \to J/\psi K^+ K^-$ decays.

PARTIAL BRANCHING FRACTIONS IN $B_s \to \phi \ell^+ \ell^-$

B($B_s \to \phi \ell^+ \ell^-$) ($0.1 < q^2 < 2.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
1.14 ±0.16 OUR AVERAGE				
$1.11 \ ^{+0.14}_{-0.13} \pm 0.09$	[1] AAIJ	15AQ	LHCB	pp at 7, 8 TeV
$2.78 \pm 0.95 \pm 0.89$	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.897 \ ^{+0.207}_{-0.186} \pm 0.097$	[1] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in $B_s^0 \to \phi \mu^+ \mu^-$ decays.

B($B_s^0 \to \phi \ell^+ \ell^-$) ($0.1 < q^2 < 0.98$ GeV^2/c^4)

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
$6.81 \pm 0.47 \pm 0.34$	[1] AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B_s^0 \to \phi \mu^+ \mu^-$ decays

B($B_s^0 \to \phi \ell^+ \ell^-$) ($1.1 < q^2 < 2.5$ GeV^2/c^4)

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
$4.41 \pm 0.41 \pm 0.24$	[1] AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B_s^0 \to \phi \mu^+ \mu^-$ decays

B($B_s \to \phi \ell^+ \ell^-$) ($2.0 < q^2 < 5.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.77 ±0.12 ±0.06	[1] AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.529^{+0.182}_{-0.159} \pm 0.057$	[1,2] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
0.58 ±0.55 ±0.19	[2] AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays.
[2] Measured in $2 < q^2 < 4.3$ GeV^2/c^4.

B($B^0_s \to \phi \ell^+ \ell^-$) ($2.5 < q^2 < 4.0$ GeV^2/c^4)

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
3.51±0.39±0.18	[1] AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays

B($B^0_s \to \phi \ell^+ \ell^-$) ($4.0 < q^2 < 6.0$ GeV^2/c^4)

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
6.22±0.48±0.32	[1] AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays

B($B_s \to \phi \ell^+ \ell^-$) ($5.0 < q^2 < 8.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.96±0.13±0.08	[1] AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.38^{+0.25}_{-0.23} \pm 0.14$	[1,2] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
1.34±0.83±0.43	[2] AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays.
[2] Measured in $4.3 < q^2 < 8.68$ GeV^2/c^4.

B($B^0_s \to \phi \ell^+ \ell^-$) ($6.0 < q^2 < 8.0$ GeV^2/c^4)

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
6.30±0.48±0.32	[1] AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays

B($B_s \to \phi \ell^+ \ell^-$) ($11.0 < q^2 < 12.5$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.717±0.045±0.036	[1] AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.71 ±0.10 ±0.06	[1] AAIJ	15AQ	LHCB	Repl. by AAIJ 21AG
$1.18^{+0.22}_{-0.21} \pm 0.14$	[1,2] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
2.98 ±0.95 ±0.95	[2] AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays.
[2] Measured in $10.9 < q^2 < 12.86$ GeV^2/c^4.

$B(B^0_s \to \phi\ell^+\ell^-)$ $(15.0 < q^2 < 19.0\ \mathrm{GeV}^2/c^4)$

VALUE (units 10^{-8})		DOCUMENT ID		TECN	COMMENT
18.52±0.80±1.00	[1]	AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV

[1] Measured in $B^0_s \to \phi\mu^+\mu^-$ decays

$B(B_s \to \phi\ell^+\ell^-)$ $(15.0 < q^2 < 17.0\ \mathrm{GeV}^2/c^4)$

VALUE (units 10^{-7})		DOCUMENT ID		TECN	COMMENT
1.050±0.058±0.054	[1]	AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.90 ±0.11 ±0.07	[1]	AAIJ	15AQ	LHCB	Repl. by AAIJ 21AG
$0.760^{+0.189}_{-0.169}\pm0.087$	[1,2]	AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
1.86 ±0.66 ±0.59	[2]	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B^0_s \to \phi\mu^+\mu^-$ decays.

[2] Measured in $14.18 < q^2 < 16\ \mathrm{GeV}^2/c^4$.

$B(B_s \to \phi\ell^+\ell^-)$ $(17.0 < q^2 < 19.0\ \mathrm{GeV}^2/c^4)$

VALUE (units 10^{-7})		DOCUMENT ID		TECN	COMMENT
0.838±0.058±0.046	[1]	AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.79 ±0.11 ±0.07	[1]	AAIJ	15AQ	LHCB	Repl. by AAIJ 21AG
$1.06\ ^{+0.23}_{-0.21}\pm0.12$	[1,2]	AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
2.32 ±0.76 ±0.74	[2]	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B^0_s \to \phi\mu^+\mu^-$ decays.

[2] Measured in $16 < q^2 < 19\ \mathrm{GeV}^2/c^4$.

$B(B_s \to \phi\ell^+\ell^-)$ $(1.0 < q^2 < 6.0\ \mathrm{GeV}^2/c^4)$

VALUE (units 10^{-7})		DOCUMENT ID		TECN	COMMENT
1.44 ±0.11 OUR AVERAGE					
1.440±0.075±0.075	[1]	AAIJ	21AG	LHCB	pp at 7, 8, 13 TeV
1.14 ±0.79 ±0.36		AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.29 ±0.16 ±0.10	[1]	AAIJ	15AQ	LHCB	Repl. by AAIJ 21AG
$1.14\ ^{+0.25}_{-0.23}\pm0.13$	[1]	AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in $B^0_s \to \phi\mu^+\mu^-$ decays.

$B(B_s \to \phi\ell^+\ell^-)$ $(0.0 < q^2 < 4.3\ \mathrm{GeV}^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
3.30±1.09±1.05	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

PRODUCTION ASYMMETRIES

$A_P(B_s^0)$

$A_P(B_s^0) = [\sigma(\overline{B}_s^0) - \sigma(B_s^0)] / [\sigma(\overline{B}_s^0) + \sigma(B_s^0)]$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.2 ±1.6 OUR AVERAGE				
$-0.65 \pm 2.88 \pm 0.59$	[1] AAIJ	17BF	LHCB	pp at 7 TeV
$1.98 \pm 1.90 \pm 0.59$	[1] AAIJ	17BF	LHCB	pp at 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.09 \pm 2.61 \pm 0.66$	[2] AAIJ	14BP	LHCB	Repl. by AAIJ 17BF, pp at 7 TeV

[1] Based on time-dependent analysis of $B_s^0 \to D_s^- \pi^+$ in kinematic range $2 < p_T < 30$ GeV/c and $2.1 < \eta < 4.5$.

[2] Based on time-dependent analysis of $B_s^0 \to D_s^- \pi^+$ in kinematic range $4 < p_T < 30$ GeV/c and $2.5 < \eta < 4.5$.

$B_s^0 \to D_s^{*-} \ell^+ \nu_\ell$ FORM FACTORS

ρ^2 (form factor slope)

VALUE	DOCUMENT ID		TECN	COMMENT
1.17±0.08 OUR AVERAGE				
$1.16 \pm 0.05 \pm 0.07$	[1] AAIJ	20AW	LHCB	pp at 13 TeV
$1.23 \pm 0.17 \pm 0.05$	[2] AAIJ	20E	LHCB	pp at 7,8 TeV

[1] The $B_s^0 \to D_s^{*-} \mu^+ \nu_\mu$ decay is reconstructed through the decays of $D_s^{*-} \to D_s^- \gamma$, $D_s^- \to K^- K^+ \pi^-$.

[2] The $B_s^0 \to D_s^{*-} \mu^+ \nu_\mu$ decay is reconstructed inclusively without γ from the decays of $D_s^{*-} \to D_s^- \gamma$, $D_s^- \to K^- K^+ \pi^-$.

B_s^0 REFERENCES

AAIJ	22	PRL 128 041801	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D105 012010	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	22B	NATP 18 1	R. Aaij *et al.*	(LHCb Collab.)
BHUYAN	22	PR D105 012007	B. Bhuyan *et al.*	(Belle Collab.)
WANG	22	PR D105 012004	B. Wang *et al.*	(BELLE Collab.)
AAD	21AE	EPJ C81 342	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	21AG	PRL 127 151801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21AK	JHEP 2111 043	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21AN	EPJ C81 1026	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21C	JHEP 2102 024	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21G	PRL 126 081804	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21M	JHEP 2103 137	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21N	JHEP 2103 099	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21O	JHEP 2103 075	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21S	JHEP 2106 177	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21Y	PR D104 032005	R. Aaij *et al.*	(LHCb Collab.)
DUBEY	21	PR D104 012007	S. Dubey *et al.*	(Belle Collab.)
NISAR	21	PR D104 L031101	N. K. Nisar *et al.*	(BELLE Collab.)
SIRUNYAN	21E	PL B816 136188	A.M. Sirunyan *et al.*	(CMS Collab.)
AAIJ	20AW	JHEP 2012 144	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	20E	PR D101 072004	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	20F	PR D102 012011	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	20W	PRL 124 211802	R. Aaij *et al.*	(LHCb Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)

SIRUNYAN	20AG	JHEP 2004 188	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	20BB	PRL 125 152001	A.M. Sirunyan *et al.*	(CMS Collab.)
AABOUD	19L	JHEP 1904 098	M. Aaboud *et al.*	(ATLAS Collab.)
AAIJ	19AE	PRL 123 081802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19AF	PL B797 134789	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19AK	PRL 123 211801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19AP	JHEP 1912 155	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19K	JHEP 1906 114	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19L	JHEP 1907 032	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19Q	EPJ C79 706	R. Aaij *et al.*	(LHCb Collab.)
Also		EPJ C80 601 (errat.)	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19U	PRL 122 191804	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18AB	JHEP 1807 020	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18AC	JHEP 1808 191	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18AY	PR D98 071103	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18AZ	PR D98 072006	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18O	PR D98 032004	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18S	JHEP 1803 140	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18T	JHEP 1803 078	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18U	JHEP 1803 059	R. Aaij *et al.*	(LHCb Collab.)
SIRUNYAN	18BY	EPJ C78 457	A.M. Sirunyan *et al.*	(CMS Collab.)
AAIJ	17A	PR D95 012006	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17AI	PRL 118 191801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17AJ	PRL 118 251802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17AL	PRL 119 041802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17AN	PRL 119 101801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17B	PRL 118 021801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BA	JHEP 1705 158	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BD	PR D96 051103	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BF	PL B774 139	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BJ	PRL 119 232001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BP	JHEP 1711 027	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17G	PRL 118 081801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17N	JHEP 1703 001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17U	JHEP 1707 021	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17V	JHEP 1708 037	R. Aaij *et al.*	(LHCb Collab.)
AABOUD	16L	EPJ C76 513	M. Aaboud *et al.*	(ATLAS Collab.)
AAD	16AP	JHEP 1608 147	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	16	JHEP 1601 012	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16AK	PL B762 253	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16AL	PL B762 484	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16C	PRL 116 161802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16E	PRL 116 241601	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16G	PRL 117 061803	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16P	PR D93 092008	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16U	JHEP 1603 040	R. Aaij *et al.*	(LHCb Collab.)
ABAZOV	16C	PR D94 012001	V.M. Abazov *et al.*	(D0 Collab.)
KHACHATRY...	16Q	PL B756 84	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16S	PL B757 97	V. Khachatryan *et al.*	(CMS Collab.)
PAL	16	PRL 116 161801	B. Pal *et al.*	(BELLE Collab.)
AAIJ	15AC	JHEP 1505 019	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15AD	JHEP 1506 130	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15AF	JHEP 1507 166	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15AG	JHEP 1508 005	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15AL	JHEP 1506 131	R. Aaji *et al.*	(LHCb Collab.)
AAIJ	15AQ	JHEP 1509 179	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15AS	JHEP 1510 053	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15AV	JHEP 1511 082	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15BB	PR D92 112002	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15D	JHEP 1501 024	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15I	PRL 114 041801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15K	PL B741 1	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15O	PRL 115 051801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15S	PL B743 46	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15U	PL B747 484	R. Aaij *et al.*	(LHCb Collab.)
ABAZOV	15A	PRL 114 062001	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	15L	PRL 115 161601	V.M. Abazov *et al.*	(D0 Collab.)
DUTTA	15	PR D91 011101	D. Dutta *et al.*	(BELLE Collab.)
KHACHATRY...	15BE	NAT 522 68	V. Khachatryan *et al.*	(CMS and LHCb Collab.)
OSWALD	15	PR D92 072013	C. Oswald *et al.*	(BELLE Collab.)

AAD	14U	PR D90 052007	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	14AA	PRL 112 202001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14AE	PR D90 052011	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14AX	PRL 113 172001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14AY	PRL 113 211801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BF	JHEP 1411 060	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BH	PR D90 072003	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BM	NJP 16 123001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BN	PR D90 112002	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BP	PL B739 218	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BR	PR D89 092006	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14D	PL B728 607	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14E	JHEP 1404 114	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14F	PRL 112 111802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14L	JHEP 1407 140	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14R	PL B736 446	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14S	PL B736 186	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14Y	PRL 112 091802	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14P	PRL 113 242001	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	14	PR D89 012002	V.M. Abazov *et al.*	(D0 Collab.)
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)
AAIJ	13	NP B867 1	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13A	NP B867 547	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AA	NP B871 403	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AB	NP B873 275	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AC	NP B874 663	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AL	PR D87 071101	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AN	PR D87 072004	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AP	PR D87 092007	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AQ	PR D87 112009	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AR	PR D87 112010	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AW	PRL 110 211801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AX	PRL 110 221601	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AY	PRL 110 241802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13B	PRL 110 021801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BA	PRL 111 101805	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BI	NJP 15 053021	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BM	PRL 111 141801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BO	JHEP 1310 183	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BP	JHEP 1310 143	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BQ	JHEP 1310 005	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BW	JHEP 1311 092	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13BX	PL B727 403	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13CF	EPJ C73 2655	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13L	JHEP 1303 067	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13X	JHEP 1307 084	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13Z	JHEP 1309 006	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	13F	PR D87 072003	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	13	PRL 110 011801	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	13C	PR D87 072006	V.M. Abazov *et al.*	(D0 Collab.)
CHATRCHYAN	13AW	PRL 111 101804	S. Chatrchyan *et al.*	(CMS Collab.)
ESEN	13	PR D87 031101	S. Esen *et al.*	(BELLE Collab.)
OSWALD	13	PR D87 072008	C. Oswald *et al.*	(BELLE Collab.)
Also		PR D90 119901 (errat.)	C. Oswald *et al.*	(BELLE Collab.)
SOLOVIEVA	13	PL B726 206	E. Solovieva *et al.*	(BELLE Collab.)
THORNE	13	PR D88 114006	F. Thorne *et al.*	(BELLE Collab.)
AAD	12AE	PL B713 387	G. Aad *et al.*	(ATLAS Collab.)
AAD	12CV	JHEP 1212 072	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	12	PL B707 349	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12A	PL B708 55	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AE	PR D85 112013	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AG	JHEP 1206 115	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AM	PRL 109 131801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AN	PRL 109 152002	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AO	PR D86 052006	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AP	PR D86 071102	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AR	JHEP 1210 037	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12AX	PR D86 112005	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12B	PL B707 497	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12D	PRL 108 101803	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12E	PL B708 241	R. Aaij *et al.*	(LHCb Collab.)

AAIJ	12F	PL B709 50	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12I	PL B709 177	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12L	EPJ C72 2118	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12O	PL B713 172	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12P	PL B713 369	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12Q	PL B713 378	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12R	PL B716 393	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12S	PRL 108 151801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12V	PRL 108 201601	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	12W	PRL 108 231801	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	12AJ	PRL 109 171802	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	12C	PRL 108 201801	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	12D	PR D85 072002	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	12L	PRL 108 211803	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	12AF	PR D86 092011	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	12C	PR D85 011103	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	12D	PR D85 032006	V.M. Abazov *et al.*	(D0 Collab.)
CHATRCHYAN	12A	JHEP 1204 033	S. Chatrchyan *et al.*	(CMS Collab.)
LEES	12A	PR D85 011101	J.P. Lees *et al.*	(BABAR Collab.)
LI	12	PRL 108 181808	J. Li *et al.*	(BELLE Collab.)
PDG	12	PR D86 010001	J. Beringer *et al.*	(PDG Collab.)
AAIJ	11	PL B698 115	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	11A	PL B698 14	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	11B	PL B699 330	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	11D	PL B706 32	R. Aaij	(LHCb Collab.)
AAIJ	11E	PR D84 092001	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D85 039904 (errat.)	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	11A	PR D83 052012	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11AB	PR D84 052012	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11AG	PRL 107 191801	T. Aaltonen *et al.*	(CDF Collab.)
Also		PRL 107 239903 (errat.)	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11AI	PRL 107 201802	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11AN	PRL 107 261802	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11AP	PRL 107 272001	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11L	PRL 106 161801	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11N	PRL 106 181802	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	11U	PR D84 052007	V.M. Abazov *et al.*	(D0 Collab.)
CHATRCHYAN	11T	PRL 107 191802	S. Chatrchyan *et al.*	(CMS Collab.)
LI	11	PRL 106 121802	J. Li *et al.*	(BELLE Collab.)
ABAZOV	10E	PR D82 012003	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	10H	PRL 105 081801	V.M. Abazov *et al.*	(D0 Collab.)
Also		PR D82 032001	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	10S	PL B693 539	V.M. Abazov *et al.*	(D0 Collab.)
ESEN	10	PRL 105 201802	S. Esen *et al.*	(BELLE Collab.)
LOUVOT	10	PRL 104 231801	R. LOUVOT *et al.*	(BELLE Collab.)
PENG	10	PR D82 072007	C.-C. Peng *et al.*	(BELLE Collab.)
AALTONEN	09AQ	PRL 103 191802	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	09B	PR D79 011104	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	09C	PRL 103 031801	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	09P	PRL 102 201801	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	09E	PRL 102 032001	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	09G	PRL 102 051801	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	09I	PRL 102 091801	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	09Y	PR D79 111102	V.M. Abazov *et al.*	(D0 Collab.)
LOUVOT	09	PRL 102 021801	R. Louvot *et al.*	(BELLE Collab.)
AALTONEN	08F	PRL 100 021803	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	08G	PRL 100 161802	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	08J	PRL 100 121803	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	08AM	PRL 101 241801	V.M. Abazov *et al.*	(D0 Collab.)
WICHT	08A	PRL 100 121801	J. Wicht *et al.*	(BELLE Collab.)
ABAZOV	07	PRL 98 121801	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	07A	PRL 98 151801	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	07N	PR D76 057101	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	07Y	PRL 99 241801	V.M. Abazov *et al.*	(D0 Collab.)
ABULENCIA	07C	PRL 98 061802	A. Abulencia *et al.*	(CDF Collab.)
DRUTSKOY	07	PRL 98 052001	A. Drutskoy *et al.*	(BELLE Collab.)
DRUTSKOY	07A	PR D76 012002	A. Drutskoy *et al.*	(BELLE Collab.)
ABAZOV	06B	PRL 97 021802	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	06G	PR D74 031107	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	06V	PRL 97 241801	V.M. Abazov *et al.*	(D0 Collab.)
ABULENCIA	06J	PRL 96 191801	A. Abulencia *et al.*	(CDF Collab.)

ABULENCIA	06N	PRL 96 231801	A. Abulencia *et al.*	(CDF Collab.)
ABULENCIA	06Q	PRL 97 062003	A. Abulencia *et al.*	(CDF Collab.)
ABULENCIA,A	06D	PRL 97 211802	A. Abulencia *et al.*	(CDF Collab.)
ABULENCIA,A	06G	PRL 97 242003	A. Abulencia *et al.*	(CDF Collab.)
ACOSTA	06	PRL 96 202001	D. Acosta *et al.*	(CDF Collab.)
ABAZOV	05B	PRL 94 042001	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	05W	PRL 95 171801	V.M. Abazov *et al.*	(D0 Collab.)
ACOSTA	05	PRL 94 101803	D. Acosta *et al.*	(CDF Collab.)
ACOSTA	05J	PRL 95 031801	D. Acosta *et al.*	(CDF Collab.)
ABDALLAH	04A	PL B585 63	J. Abdallah *et al.*	(DELPHI Collab.)
ABDALLAH	04J	EPJ C35 35	J. Abdallah *et al.*	(DELPHI Collab.)
ABDALLAH	03B	EPJ C28 155	J. Abdallah *et al.*	(DELPHI Collab.)
ABE	03	PR D67 012006	K. Abe *et al.*	(SLD Collab.)
HEISTER	03E	EPJ C29 143	A. Heister *et al.*	(ALEPH Collab.)
ABE	02V	PR D66 032009	K. Abe *et al.*	(SLD Collab.)
ACOSTA	02D	PR D65 111101	D. Acosta *et al.*	(CDF Collab.)
ACOSTA	02G	PR D66 112002	D. Acosta *et al.*	(CDF Collab.)
ABBIENDI	01D	EPJ C19 241	G. Abbiendi *et al.*	(OPAL Collab.)
ABE	00C	PR D62 071101	K. Abe *et al.*	(SLD Collab.)
ABREU	00Y	EPJ C16 555	P. Abreu *et al.*	(DELPHI Collab.)
ABREU,P	00G	EPJ C18 229	P. Abreu *et al.*	(DELPHI Collab.)
AFFOLDER	00N	PRL 85 4668	T. Affolder *et al.*	(CDF Collab.)
BARATE	00K	PL B486 286	R. Barate *et al.*	(ALEPH Collab.)
ABBIENDI	99S	EPJ C11 587	G. Abbiendi *et al.*	(OPAL Collab.)
ABE	99D	PR D59 032004	F. Abe *et al.*	(CDF Collab.)
ABE	99J	PRL 82 3576	F. Abe *et al.*	(CDF Collab.)
BARATE	99J	EPJ C7 553	R. Barate *et al.*	(ALEPH Collab.)
Also		EPJ C12 181 (errat.)	R. Barate *et al.*	(ALEPH Collab.)
ABE	98B	PR D57 5382	F. Abe *et al.*	(CDF Collab.)
ABE	98V	PRL 81 5742	F. Abe *et al.*	(CDF Collab.)
ACCIARRI	98S	PL B438 417	M. Acciarri *et al.*	(L3 Collab.)
ACKERSTAFF	98F	EPJ C2 407	K. Ackerstaff *et al.*	(OPAL Collab.)
ACKERSTAFF	98G	PL B426 161	K. Ackerstaff *et al.*	(OPAL Collab.)
BARATE	98C	EPJ C4 367	R. Barate *et al.*	(ALEPH Collab.)
BARATE	98Q	EPJ C4 387	R. Barate *et al.*	(ALEPH Collab.)
PDG	98	EPJ C3 1	C. Caso *et al.*	(PDG Collab.)
ACCIARRI	97B	PL B391 474	M. Acciarri *et al.*	(L3 Collab.)
ACCIARRI	97C	PL B391 481	M. Acciarri *et al.*	(L3 Collab.)
ACKERSTAFF	97U	ZPHY C76 401	K. Ackerstaff *et al.*	(OPAL Collab.)
ACKERSTAFF	97V	ZPHY C76 417	K. Ackerstaff *et al.*	(OPAL Collab.)
ADAM	97	PL B414 382	W. Adam *et al.*	(DELPHI Collab.)
ABE	96B	PR D53 3496	F. Abe *et al.*	(CDF Collab.)
ABE	96N	PRL 77 1945	F. Abe *et al.*	(CDF Collab.)
ABE	96Q	PR D54 6596	F. Abe *et al.*	(CDF Collab.)
ABREU	96F	ZPHY C71 11	P. Abreu *et al.*	(DELPHI Collab.)
ADAM	96D	ZPHY C72 207	W. Adam *et al.*	(DELPHI Collab.)
BUSKULIC	96E	ZPHY C69 585	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	96M	PL B377 205	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	96V	PL B384 471	D. Buskulic *et al.*	(ALEPH Collab.)
PDG	96	PR D54 1	R. M. Barnett *et al.*	(PDG Collab.)
ABE	95R	PRL 74 4988	F. Abe *et al.*	(CDF Collab.)
ABE	95Z	PRL 75 3068	F. Abe *et al.*	(CDF Collab.)
ACCIARRI	95H	PL B363 127	M. Acciarri *et al.*	(L3 Collab.)
ACCIARRI	95I	PL B363 137	M. Acciarri *et al.*	(L3 Collab.)
AKERS	95G	PL B350 273	R. Akers *et al.*	(OPAL Collab.)
AKERS	95J	ZPHY C66 555	R. Akers *et al.*	(OPAL Collab.)
BUSKULIC	95J	PL B356 409	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	95O	PL B361 221	D. Buskulic *et al.*	(ALEPH Collab.)
ABREU	94D	PL B324 500	P. Abreu *et al.*	(DELPHI Collab.)
ABREU	94E	ZPHY C61 407	P. Abreu *et al.*	(DELPHI Collab.)
Also		PL B289 199	P. Abreu *et al.*	(DELPHI Collab.)
AKERS	94J	PL B337 196	R. Akers *et al.*	(OPAL Collab.)
AKERS	94L	PL B337 393	R. Akers *et al.*	(OPAL Collab.)
BUSKULIC	94B	PL B322 441	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	94C	PL B322 275	D. Buskulic *et al.*	(ALEPH Collab.)
ABE	93F	PRL 71 1685	F. Abe *et al.*	(CDF Collab.)
ACTON	93H	PL B312 501	P.D. Acton *et al.*	(OPAL Collab.)
BUSKULIC	93G	PL B311 425	D. Buskulic *et al.*	(ALEPH Collab.)
ABREU	92M	PL B289 199	P. Abreu *et al.*	(DELPHI Collab.)
ACTON	92N	PL B295 357	P.D. Acton *et al.*	(OPAL Collab.)

BUSKULIC	92E	PL B294 145	D. Buskulic *et al.*	(ALEPH Collab.)
LEE-FRANZINI	90	PRL 65 2947	J. Lee-Franzini *et al.*	(CUSB II Collab.)