B^0_s

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

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

B^0_s MASS

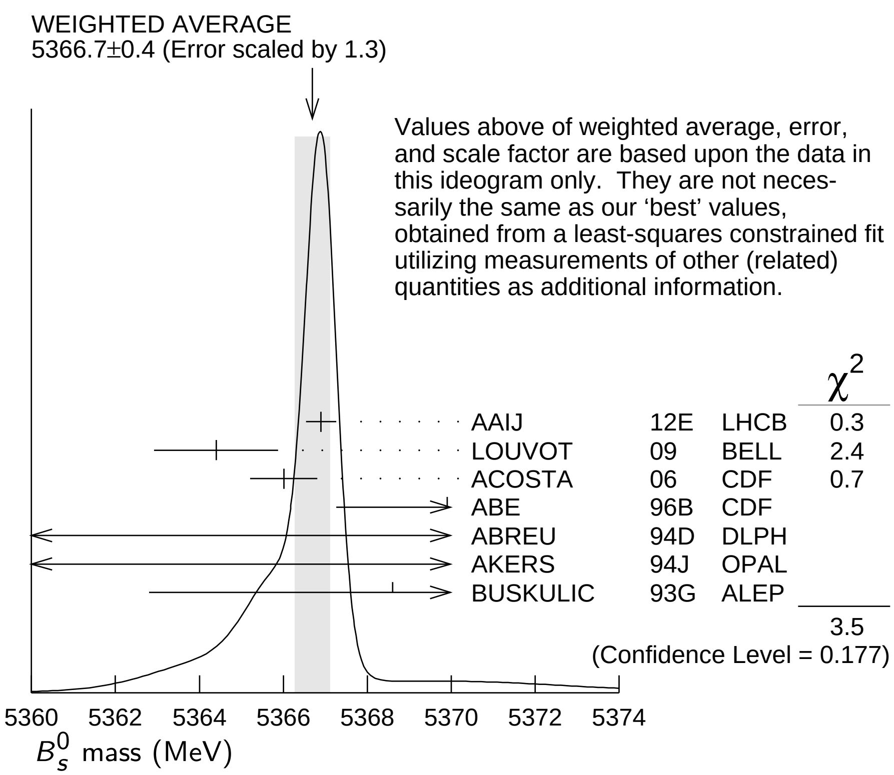
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5366.82± 0.22 OUR FIT					
5366.7 ± 0.4 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
5366.90± 0.28±0.23		[1] AAIJ	12E	LHCB	pp at 7 TeV
5364.4 ± 1.3 ±0.7		LOUVOT	09	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
5366.01± 0.73±0.33		[2] ACOSTA	06	CDF	$p\overline{p}$ at 1.96 TeV
5369.9 ± 2.3 ±1.3	32	[3] ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV
5374 ±16 ±2	3	ABREU	94D	DLPH	$e^+e^- \rightarrow Z$
5359 ±19 ±7	1	[3] AKERS	94J	OPAL	$e^+e^- \rightarrow Z$
5368.6 ± 5.6 ±1.5	2	BUSKULIC	93G	ALEP	$e^+e^- \rightarrow Z$
• • • 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	[4] AKERS	94J	OPAL	$e^+e^- \rightarrow Z$
5383.3 ± 4.5 ±5.0	14	ABE	93F	CDF	Repl. by ABE 96B

[1] Uses $B^0_s \rightarrow J/\psi\phi$ fully reconstructed decays.

[2] Uses exclusively reconstructed final states containing a $J/\psi \rightarrow \mu^+\mu^-$ decays.

[3] From the decay $B_s \rightarrow J/\psi(1S)\phi$.

[4] From the decay $B_s \rightarrow D^-_s\pi^+$.



$m_{B^0_s} - m_B$

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

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
87.35±0.20 OUR FIT					
87.37±0.24 OUR AVERAGE					
87.45±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	$e^+e^- \rightarrow \Upsilon(5S)$

[1] Uses the mode $B^0_s \rightarrow \psi(2S)K^-\pi^+$.

[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 an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account correlations between the measurements and asymmetric lifetime errors.

"OUR EVALUATION" is an average of 1 / [0.5 ($\Gamma_{B^0_{sL}} + \Gamma_{B^0_{sH}}$)].

VALUE (10^{-12} s)	EVTS	DOCUMENT ID		TECN	COMMENT
1.510±0.005 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.518±0.041±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	$e^+e^- \rightarrow Z$
$1.53 ^{+0.16}_{-0.15} \pm 0.07$		[4] ABREU,P	00G	DLPH	$e^+e^- \rightarrow Z$
$1.36 \pm 0.09 ^{+0.06}_{-0.05}$		[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	$e^+e^- \rightarrow Z$

$1.50^{+0.16}_{-0.15}\pm0.04$		[5] ACKERSTAFF	98G OPAL	$e^+e^- \to Z$
$1.47\pm0.14\pm0.08$		[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
$1.65^{+0.34}_{-0.31}\pm0.12$		[4] ABREU	96F DLPH	Repl. by ABREU 00Y
$1.76\pm0.20^{+0.15}_{-0.10}$		[8] ABREU	96F DLPH	Repl. by ABREU 00Y
$1.60\pm0.26^{+0.13}_{-0.15}$		[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
$1.54^{+0.14}_{-0.13}\pm0.04$		[5] BUSKULIC	96M ALEP	$e^+e^- \to Z$
$1.42^{+0.27}_{-0.23}\pm0.11$	76	[5] ABE	95R CDF	Repl. by ABE 99D
$1.74^{+1.08}_{-0.69}\pm0.07$	8	[11] ABE	95R CDF	Sup. by ABE 96N
$1.54^{+0.25}_{-0.21}\pm0.06$	79	[5] AKERS	95G OPAL	Repl. by ACKERSTAFF 98G
$1.59^{+0.17}_{-0.15}\pm0.03$	134	[5] BUSKULIC	95O ALEP	Sup. by BUSKULIC 96M
0.96 ± 0.37	41	[12] ABREU	94E DLPH	Sup. by ABREU 96F
$1.92^{+0.45}_{-0.35}\pm0.04$	31	[5] BUSKULIC	94C ALEP	Sup. by BUSKULIC 95O
$1.13^{+0.35}_{-0.26}\pm0.09$	22	[5] ACTON	93H OPAL	Sup. by AKERS 95G

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

B_s^0 MEAN LIFE (Flavor specific)

VALUE (10^{-12} s)	*DOCUMENT ID*	*TECN*	*COMMENT*
1.511±0.014 OUR EVALUATION			
1.508±0.019 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.		
$1.479\pm0.010\pm0.021$	[1] ABAZOV	15A D0	$p\overline{p}$ at 1.96 TeV

$1.535 \pm 0.015 \pm 0.014$	[2] AAIJ	14AX	LHCB	pp at 7 TeV
$1.52 \pm 0.15 \pm 0.01$	[3] AAIJ	14F	LHCB	pp at 7, 8 TeV
$1.518 \pm 0.041 \pm 0.027$	[4] AALTONEN	11AP	CDF	$p\overline{p}$ at 1.96 TeV
$1.42\ ^{+0.14}_{-0.13} \pm 0.03$	[5] ABREU	00Y	DLPH	$e^+e^- \rightarrow Z$
$1.36 \pm 0.09\ ^{+0.06}_{-0.05}$	[6] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
$1.50\ ^{+0.16}_{-0.15} \pm 0.04$	[6] ACKERSTAFF	98G	OPAL	$e^+e^- \rightarrow Z$
$1.54\ ^{+0.14}_{-0.13} \pm 0.04$	[6] BUSKULIC	96M	ALEP	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.60 \pm 0.06 \pm 0.01$	[7] AAIJ	14R	LHCB	pp at 7 TeV
$1.398 \pm 0.044\ ^{+0.028}_{-0.025}$	[8] ABAZOV	06V	D0	Repl. by ABAZOV 15A

[1] Measured using $B_s^0 \rightarrow D_s^- \mu^+ \nu X$ decays.

[2] Measured using the $B_s^0 \rightarrow D_s^- \pi^+$ decays.

[3] Measured using $B_s^0 \rightarrow D^+ D_s^-$.

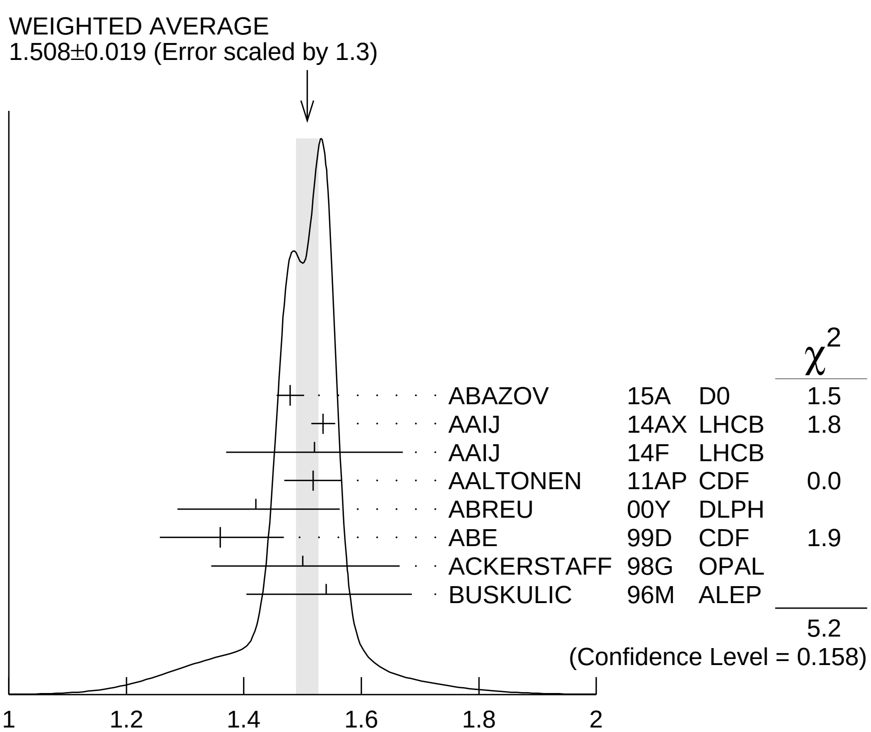
[4] AALTONEN 11AP combines the fully reconstrcuted $B_s^0 \rightarrow D_s^- \pi^+$ decays and partially reconstructed $B_s^0 \rightarrow D_s X$ decays.

[5] Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices.

[6] Measured using $D_s^- \ell^+$ vertices.

[7] Measured using $B_s^0 \rightarrow \pi^+ K^-$ decays. May not be flavor specific.

[8] Measured using $D_s^- \mu^+$ vertices.



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

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

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.479±0.012 OUR EVALUATION				
1.479±0.012 OUR AVERAGE				
$1.480 \pm 0.011 \pm 0.005$	[1] AAIJ	14E	LHCB	pp at 7 TeV
$1.444^{+0.098}_{-0.090} \pm 0.020$	[1] ABAZOV	05B	D0	$p\overline{p}$ at 1.96 TeV
$1.34^{+0.23}_{-0.19} \pm 0.05$	[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
$1.34^{+0.23}_{-0.19} \pm 0.05$	[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.

B_{sH}^0 MEAN LIFE

B_{sH}^0 is the heavy mass state of two B_s^0 *CP* eigenstates.

"OUR EVALUATION" has been obtained by the Heavy Flavor Averaging Group (HFAG) using the constraint of the flavor-specific lifetime average in a way similar to $\Delta\Gamma_{B_s^0}/\Gamma_{B_s^0}$.

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.610±0.012 OUR EVALUATION				
1.70 ±0.04 OUR AVERAGE				
$1.75 \pm 0.12 \pm 0.07$	[1] AAIJ	13AB	LHCB	pp at 7 TeV
$1.700 \pm 0.040 \pm 0.026$	[2] AAIJ	12AN	LHCB	pp at 7 TeV
$1.70^{+0.12}_{-0.11} \pm 0.03$	[2] AALTONEN	11AB	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
	[3] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$1.613^{+0.123}_{-0.113}$	[4,5] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$1.58^{+0.39}_{-0.42}{}^{+0.01}_{-0.02}$	[5] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$2.07^{+0.58}_{-0.46} \pm 0.03$	[5] ACOSTA	05	CDF	Repl. by AALTONEN 08J

[1] Measured using a pure *CP*-odd final state $J/\psi K_S^0$ with the assumption that contributions from penguin diagrams are small.
[2] Measured using a pure *CP*-odd final state $J/\psi f_0(980)$.
[3] Uses the time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays assuming *CP*-violating angle $\beta_s(B^0 \to J/\psi\phi) = 0.02$.
[4] Obtained from $\Delta\Gamma_s$ and Γ_s fit with a correlation of 0.6.
[5] Measured using the time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

B^0_{sL} MEAN LIFE

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

"OUR EVALUATION" has been obtained by the Heavy Flavor Averaging Group (HFAG) using the constraint of the flavor-specific lifetime average in a way similar to $\Delta\Gamma_{B^0_s}/\Gamma_{B^0_s}$.

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.422±0.008 OUR EVALUATION				
1.379±0.026±0.017	[1] AAIJ	14F	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.407±0.016±0.007	[2] AAIJ	14R	LHCB	pp at 7 TeV
1.440±0.096±0.009	[2] AAIJ	12	LHCB	Repl. by AAIJ 14R
1.455±0.046±0.006	[2] AAIJ	12R	LHCB	Repl. by AAIJ 14R
	[3] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$1.437^{+0.054}_{-0.047}$	[4,5] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$1.24\ ^{+0.14}_{-0.11}\ ^{+0.01}_{-0.02}$	[5] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$1.05\ ^{+0.16}_{-0.13}\ \pm0.02$	[5] ACOSTA	05	CDF	Repl. by AALTONEN 08J
1.27 ±0.33 ±0.08	[6] BARATE	00K	ALEP	$e^+e^- \rightarrow Z$

[1] Measured using $B^0_s \rightarrow D^-_s D^+_s$. The effective lifetime is translated into a decay width of $\Gamma_L = 0.725 \pm 0.014 \pm 0.009$ ps^{-1}.
[2] Measured using $B^0_s \rightarrow K^+K^-$ decays. There may still be CPV in the decay.
[3] Uses the time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays and assuming *CP*-violating angle $\beta_s(B^0 \rightarrow J/\psi\phi) = 0.02$.
[4] Obtained from $\Delta\Gamma_s$ and Γ_s fit with a correlation of 0.6.
[5] Measured using the time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays.
[6] Uses $\phi\phi$ correlations from $B^0_s \rightarrow D^{(*)+}_s D^{(*)-}_s$.

$\Delta\Gamma_{B^0_s}/\Gamma_{B^0_s}$

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

"OUR EVALUATION" is an average of all available B_s flavor-specific lifetime measurements with the $\Delta\Gamma_{B^0_s}/\Gamma_s$ analyses performed by the Heavy Flavor Averaging Group (HFAG) as described in our "Review on B-$\overline{B}$ Mixing" in the B^0 Section of these Listings.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.124±0.011 OUR EVALUATION					
		[1] AAIJ	12D	LHCB	pp at 7 TeV
		[2] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$0.090 \pm 0.009 \pm 0.023$		[3] ESEN	13	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$
		[4] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$0.147^{+0.036}_{-0.030}{}^{+0.042}_{-0.041}$		[3] ESEN	10	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$
$0.116^{+0.09}_{-0.10} \pm 0.010$		[5] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$0.24\ ^{+0.28}_{-0.38}\ ^{+0.03}_{-0.04}$		[5,6] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$0.65\ ^{+0.25}_{-0.33} \pm 0.01$		[5] ACOSTA	05	CDF	Repl. by AALTONEN 08J
<0.46	95	[7] ABREU	00Y	DLPH	$e^+ e^- \rightarrow Z$
<0.69	95	[8] ABREU,P	00G	DLPH	$e^+ e^- \rightarrow Z$
<0.83	95	[9] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
<0.67	95	[10] ACCIARRI	98S	L3	$e^+ e^- \rightarrow Z$

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

[2] Measured using fully reconstructed $B_s \rightarrow J/\psi\phi$ decays.

[3] Assumes CP violation is negligible.

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

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

[6] Uses $|A_0|^2 - |A_{\|}|^2$=0.355 ± 0.066 from ACOSTA 05.

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

[8] Measured using D_s hadron vertices.

[9] ABE 99D assumes $\tau_{B_s^0} = 1.55 \pm 0.05$ ps.

[10] ACCIARRI 98S assumes $\tau_{B_s^0} = 1.49 \pm 0.06$ ps and PDG 98 values of b production fraction.

$\Delta\Gamma_{B_s^0}$

"OUR EVALUATION" has been obtained by the Heavy Flavor Averaging Group (HFAG) using the constraint of the flavor-specific lifetime average in a way similar to $\Delta\Gamma_{B_s^0}/\Gamma_{B_s^0}$.

VALUE (10^{12} s^{-1})	DOCUMENT ID		TECN	COMMENT
0.082 ±0.007 OUR EVALUATION				
0.077 ±0.008 OUR AVERAGE				
$0.0805 \pm 0.0091 \pm 0.0032$	[1] AAIJ	15I	LHCB	pp at 7, 8 TeV
$0.053 \pm 0.021 \pm 0.010$	[2] AAD	14U	ATLS	pp at 7 TeV
$0.068 \pm 0.026 \pm 0.007$	[3] AALTONEN	12AJ	CDF	$p\overline{p}$ at 1.96 TeV
$0.163\ ^{+0.065}_{-0.064}$	[4,5] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.106 \pm 0.011 \pm 0.007$	[6] AAIJ	13AR	LHCB	Repl. by AAIJ 15I
$0.053 \pm 0.021 \pm 0.010$	[3] AAD	12CV	ATLS	Repl. by AAD 14U
$0.123 \pm 0.029 \pm 0.011$	[3] AAIJ	12D	LHCB	Repl. by AAIJ 13AR
$0.075 \pm 0.035 \pm 0.006$	[7] AALTONEN	12D	CDF	Repl. by AALTONEN 12AJ
$0.085\ ^{+0.072}_{-0.078} \pm 0.001$	[8] ABAZOV	09E	D0	Repl. by ABAZOV 08AM

0.076	$^{+0.059}_{-0.063}$	± 0.006	[9] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
0.19	± 0.07	$^{+0.02}_{-0.01}$	[5,10] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
0.12	$^{+0.08}_{-0.10}$	± 0.02	[9,11] ABAZOV	07	D0	Repl. by ABAZOV 07N
0.13	± 0.09		[12] ABAZOV	07N	D0	Repl. by ABAZOV 09E
0.47	$^{+0.19}_{-0.24}$	± 0.01	[9] ACOSTA	05	CDF	Repl. by AALTONEN 08J

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

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

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

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

[5] Measured using fully reconstructed $B_s \to J/\psi \phi$ decays.

[6] 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.

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

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

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

[10] Obtaines 90% CL interval $-0.06 < \Delta\Gamma_s < 0.30$.

[11] ABAZOV 07 reports $0.17 \pm 0.09 \pm 0.02$ with CP-violating phase ϕ_s as a free parameter.

[12] Combines D^0 measurements of time-dependent angular distributions in $B^0_s \to J/\psi \phi$ and charge asymmetry in semileptonic decays. There is a 4-fold ambiguity in the solution.

$\Delta\Gamma^{CP}_s$ / Γ_s

Γ_s and $\Delta\Gamma^{CP}_s$ are the decay rate average and difference between even, $\Gamma^{CP-even}_s$, and odd, Γ^{CP-odd}_s, CP eigenstates.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.072 \pm 0.021 \pm 0.022$		[1] ABAZOV	09I	D0	$p\overline{p}$ at 1.96 TeV
>0.012	95	[1] AALTONEN	08F	CDF	$p\overline{p}$ at 1.96 TeV
$0.079^{+0.038}_{-0.035}{}^{+0.031}_{-0.030}$		[1] ABAZOV	07Y	D0	Repl. by ABAZOV 09I
$0.25\ ^{+0.21}_{-0.14}$		[2] BARATE	00K	ALEP	$e^+ e^- \to Z$

[1] Assumes 2 B($B^0_s \to D^{(*)}_s D^{(*)}_s$) $\simeq \Delta\Gamma^{CP}_s / \Gamma_s$.

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

$1 / \Gamma_{B^0_s}$

"OUR EVALUATION" has been obtained by the Heavy Flavor Averaging Group (HFAG) using the constraint of the flavor-specific lifetime average in a way similar to $\Delta\Gamma_{B^0_s}/\Gamma_{B^0_s}$.

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.510 ±0.005 OUR EVALUATION				
1.509 ±0.010 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.				
1.5145±0.0062±0.0034	[1] AAIJ	15I	LHCB	pp at 7, 8 TeV
1.477 ±0.015 ±0.009	[2] AAD	14U	ATLS	pp at 7 TeV
1.528 ±0.019 ±0.009	[3] AALTONEN	12AJ	CDF	$p\overline{p}$ at 1.96 TeV
1.443 $^{+0.038}_{-0.035}$	[3,4] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.513 ±0.009 ±0.014	[5] AAIJ	13AR	LHCB	Repl. by AAIJ 15I
1.477 ±0.015 ±0.009	[6] AAD	12CV	ATLS	Repl. by AAD 14U
1.522 ±0.021 ±0.019	[7] AAIJ	12D	LHCB	Repl. by AAIJ 13AR
1.529 ±0.025 ±0.012	[3] AALTONEN	12D	CDF	Repl. by AALTONEN 12AJ
1.487 ±0.060 ±0.028	[3] ABAZOV	09E	D0	Repl. by ABAZOV 08AM
1.52 ±0.04 ±0.02	[3] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
1.52 ±0.05 ±0.01	[3] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
1.40 $^{+0.15}_{-0.13}$ ±0.02	[3] ACOSTA	05	CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15I reports $\Gamma_{B^0_s} = 0.6603 \pm 0.0027 \pm 0.0015$ ps^{-1} obtained from time-dependent angular analysis of $B^0_s \rightarrow J/\psi K^+ K^-$ decays.

[2] AAD 14U reports $\Gamma_{B^0_s} = 0.677 \pm 0.007 \pm 0.004$ ps^{-1} measured using a tagged, time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays.

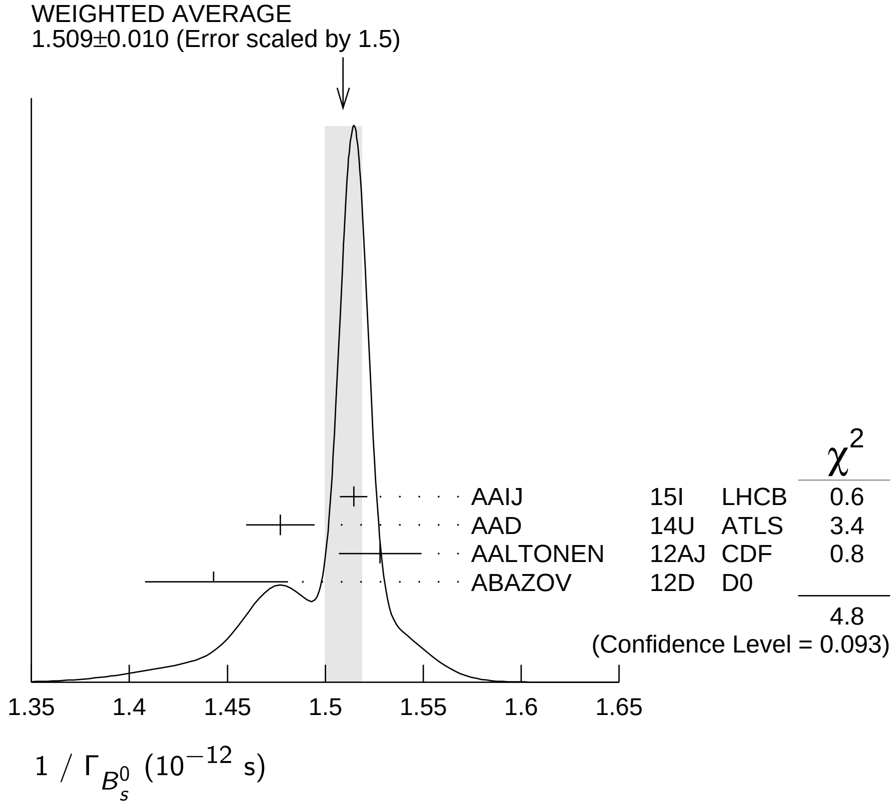
[3] Measured using the time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays.

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

[5] AAIJ 13AR reports $\Gamma_s = 0.661 \pm 0.004 \pm 0.006$ ps^{-1} obtained from combined fit to $B^0_s \rightarrow J/\psi K^+ K^-$ and $B^0_s \rightarrow J/\psi \pi^+ \pi^-$ data sets. Also reports a separate measurement of $\Gamma_s = 0.663 \pm 0.005 \pm 0.006$ ps^{-1} from $B^0_s \rightarrow J/\psi K^+ K^-$ decays.

[6] AAD 12CV reports $\Gamma_{B^0_s} = 0.677 \pm 0.007 \pm 0.004$ ps^{-1} measured using a time-dependent angular analysis of $B^0_s \rightarrow J/\psi\phi$ decays.

[7] AAIJ 12D reports average deacy width of B^0_s, $\Gamma_{B^0_s} = 0.657 \pm 0.009 \pm 0.008$ ps^{-1} that we converted to $1/\Gamma_{B^0_s}$.



B_s^0 DECAY MODES

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

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

For inclusive branching fractions, *e.g.*, $B \rightarrow D^\pm$ 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		(93 ±25) %	
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	$D_{s1}(2536)^- \mu^+ \nu_\mu$, $D_{s1}^- \rightarrow D^{*-} K_S^0$		(2.6 ± 0.7) $\times 10^{-3}$	

Γ_8	$D_{s1}(2536)^- X \mu^+ \nu$, $D_{s1}^- \to \overline{D}^0 K^+$	$(4.4 \pm 1.3) \times 10^{-3}$	
Γ_9	$D_{s2}(2573)^- X \mu^+ \nu$, $D_{s2}^- \to \overline{D}^0 K^+$	$(2.7 \pm 1.0) \times 10^{-3}$	
Γ_{10}	$D_s^- \pi^+$	$(3.00 \pm 0.23) \times 10^{-3}$	
Γ_{11}	$D_s^- \rho^+$	$(6.9 \pm 1.4) \times 10^{-3}$	
Γ_{12}	$D_s^- \pi^+ \pi^+ \pi^-$	$(6.1 \pm 1.0) \times 10^{-3}$	
Γ_{13}	$D_{s1}(2536)^- \pi^+$, $D_{s1}^- \to D_s^- \pi^+ \pi^-$	$(2.5 \pm 0.8) \times 10^{-5}$	
Γ_{14}	$D_s^{\mp} K^{\pm}$	$(2.27 \pm 0.19) \times 10^{-4}$	
Γ_{15}	$D_s^- K^+ \pi^+ \pi^-$	$(3.2 \pm 0.6) \times 10^{-4}$	
Γ_{16}	$D_s^+ D_s^-$	$(4.4 \pm 0.5) \times 10^{-3}$	
Γ_{17}	$D_s^- D^+$	$(2.8 \pm 0.5) \times 10^{-4}$	
Γ_{18}	$D^+ D^-$	$(2.2 \pm 0.6) \times 10^{-4}$	
Γ_{19}	$D^0 \overline{D}^0$	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{20}	$D_s^{*-} \pi^+$	$(2.0 \pm 0.5) \times 10^{-3}$	
Γ_{21}	$D_s^{*\mp} K^{\pm}$	$(1.33 \pm 0.35) \times 10^{-4}$	
Γ_{22}	$D_s^{*-} \rho^+$	$(9.6 \pm 2.1) \times 10^{-3}$	
Γ_{23}	$D_s^{*+} D_s^- + D_s^{*-} D_s^+$	(1.29 ± 0.22) %	S=1.1
Γ_{24}	$D_s^{*+} D_s^{*-}$	(1.86 ± 0.30) %	
Γ_{25}	$D_s^{(*)+} D_s^{(*)-}$	(4.5 ± 1.4) %	
Γ_{26}	$\overline{D}^0 K^- \pi^+$	$(1.04 \pm 0.13) \times 10^{-3}$	
Γ_{27}	$\overline{D}^0 \overline{K}^*(892)^0$	$(4.4 \pm 0.6) \times 10^{-4}$	
Γ_{28}	$\overline{D}^0 \overline{K}^*(1410)$	$(3.9 \pm 3.5) \times 10^{-4}$	
Γ_{29}	$\overline{D}^0 \overline{K}_0^*(1430)$	$(3.0 \pm 0.7) \times 10^{-4}$	
Γ_{30}	$\overline{D}^0 \overline{K}_2^*(1430)$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{31}	$\overline{D}^0 \overline{K}^*(1680)$	$< 7.8 \times 10^{-5}$	CL=90%
Γ_{32}	$\overline{D}^0 \overline{K}_0^*(1950)$	$< 1.1 \times 10^{-4}$	CL=90%
Γ_{33}	$\overline{D}^0 \overline{K}_3^*(1780)$	$< 2.6 \times 10^{-5}$	CL=90%
Γ_{34}	$\overline{D}^0 \overline{K}_4^*(2045)$	$< 3.1 \times 10^{-5}$	CL=90%
Γ_{35}	$\overline{D}^0 K^- \pi^+$(non-resonant)	$(2.1 \pm 0.8) \times 10^{-4}$	
Γ_{36}	$D_{s2}^*(2573)^- \pi^+$, $D_{s2}^* \to \overline{D}^0 K^-$	$(2.6 \pm 0.4) \times 10^{-4}$	
Γ_{37}	$D_{s1}^*(2700)^- \pi^+$, $D_{s1}^* \to \overline{D}^0 K^-$	$(1.6 \pm 0.8) \times 10^{-5}$	
Γ_{38}	$D_{s1}^*(2860)^- \pi^+$, $D_{s1}^* \to \overline{D}^0 K^-$	$(5 \pm 4) \times 10^{-5}$	
Γ_{39}	$D_{s3}^*(2860)^- \pi^+$, $D_{s3}^* \to \overline{D}^0 K^-$	$(2.2 \pm 0.6) \times 10^{-5}$	

Γ_{40}	$\overline{D}^0 K^+ K^-$	$(4.4 \pm 2.0) \times 10^{-5}$		
Γ_{41}	$\overline{D}^0 f_0(980)$	< 3.1	$\times 10^{-6}$	CL=90%
Γ_{42}	$\overline{D}^0 \phi$	$(3.0 \pm 0.8) \times 10^{-5}$		
Γ_{43}	$D^{*\mp} \pi^\pm$	< 6.1	$\times 10^{-6}$	CL=90%
Γ_{44}	$J/\psi(1S)\phi$	$(1.07 \pm 0.08) \times 10^{-3}$		
Γ_{45}	$J/\psi(1S)\pi^0$	< 1.2	$\times 10^{-3}$	CL=90%
Γ_{46}	$J/\psi(1S)\eta$	$(3.9 \pm 0.7) \times 10^{-4}$		S=1.4
Γ_{47}	$J/\psi(1S) K^0_S$	$(1.89 \pm 0.12) \times 10^{-5}$		
Γ_{48}	$J/\psi(1S) \overline{K}^*(892)^0$	$(4.1 \pm 0.4) \times 10^{-5}$		
Γ_{49}	$J/\psi(1S)\eta'$	$(3.3 \pm 0.4) \times 10^{-4}$		
Γ_{50}	$J/\psi(1S)\pi^+\pi^-$	$(2.13 \pm 0.18) \times 10^{-4}$		
Γ_{51}	$J/\psi(1S) f_0(500)$, $f_0 \to \pi^+\pi^-$	< 1.7	$\times 10^{-6}$	CL=90%
Γ_{52}	$J/\psi(1S)\rho$, $\rho \to \pi^+\pi^-$	< 1.2	$\times 10^{-6}$	CL=90%
Γ_{53}	$J/\psi(1S) f_0(980)$, $f_0 \to \pi^+\pi^-$	$(1.34 \pm 0.15) \times 10^{-4}$		
Γ_{54}	$J/\psi(1S) f_0(980)_0$, $f_0 \to \pi^+\pi^-$	$(5.1 \pm 0.9) \times 10^{-5}$		
Γ_{55}	$J/\psi(1S) f_2(1270)$, $f_2 \to \pi^+\pi^-$			
Γ_{56}	$J/\psi(1S) f_2(1270)_0$, $f_2 \to \pi^+\pi^-$	$(2.6 \pm 0.7) \times 10^{-7}$		
Γ_{57}	$J/\psi(1S) f_2(1270)_\parallel$, $f_2 \to \pi^+\pi^-$	$(3.8 \pm 1.3) \times 10^{-7}$		
Γ_{58}	$J/\psi(1S) f_2(1270)_\perp$, $f_2 \to \pi^+\pi^-$	$(4.6 \pm 2.7) \times 10^{-7}$		
Γ_{59}	$J/\psi(1S) f_0(1370)$, $f_0 \to \pi^+\pi^-$			
Γ_{60}	$J/\psi(1S) f_0(1500)$, $f_0 \to \pi^+\pi^-$	$(7.3 {}^{+1.6}_{-1.4}) \times 10^{-6}$		
Γ_{61}	$J/\psi(1S) f'_2(1525)_0$, $f'_2 \to \pi^+\pi^-$	$(3.7 \pm 1.0) \times 10^{-7}$		
Γ_{62}	$J/\psi(1S) f'_2(1525)_\parallel$, $f'_2 \to \pi^+\pi^-$	$(4.3 {}^{+9.0}_{-3.1}) \times 10^{-8}$		
Γ_{63}	$J/\psi(1S) f'_2(1525)_\perp$, $f'_2 \to \pi^+\pi^-$	$(1.9 \pm 1.4) \times 10^{-7}$		
Γ_{64}	$J/\psi(1S) f_0(1790)$, $f_0 \to \pi^+\pi^-$	$(1.7 {}^{+4.0}_{-0.4}) \times 10^{-6}$		
Γ_{65}	$J/\psi(1S)\pi^+\pi^-$ (nonresonant)			
Γ_{66}	$J/\psi(1S)\overline{K}^0\pi^+\pi^-$	< 4.4	$\times 10^{-5}$	CL=90%
Γ_{67}	$J/\psi(1S) K^+ K^-$	$(7.9 \pm 0.7) \times 10^{-4}$		

Γ_{68}	$J/\psi(1S) K^0 K^- \pi^+ +$ c.c.		$(9.3 \pm 1.3) \times 10^{-4}$	
Γ_{69}	$J/\psi(1S) \overline{K}^0 K^+ K^-$		$< 1.2 \times 10^{-5}$	CL=90%
Γ_{70}	$J/\psi(1S) f'_2(1525)$		$(2.6 \pm 0.6) \times 10^{-4}$	
Γ_{71}	$J/\psi(1S) p \overline{p}$		$< 4.8 \times 10^{-6}$	CL=90%
Γ_{72}	$J/\psi(1S) \gamma$		$< 7.3 \times 10^{-6}$	CL=90%
Γ_{73}	$J/\psi(1S) \pi^+ \pi^- \pi^+ \pi^-$		$(7.9 \pm 0.9) \times 10^{-5}$	
Γ_{74}	$J/\psi(1S) f_1(1285)$		$(7.1 \pm 1.4) \times 10^{-5}$	
Γ_{75}	$\psi(2S) \eta$		$(3.3 \pm 0.9) \times 10^{-4}$	
Γ_{76}	$\psi(2S) \eta'$		$(1.29 \pm 0.35) \times 10^{-4}$	
Γ_{77}	$\psi(2S) \pi^+ \pi^-$		$(7.2 \pm 1.2) \times 10^{-5}$	
Γ_{78}	$\psi(2S) \phi$		$(5.4 \pm 0.5) \times 10^{-4}$	
Γ_{79}	$\psi(2S) K^- \pi^+$		$(3.12 \pm 0.30) \times 10^{-5}$	
Γ_{80}	$\psi(2S) \overline{K}^*(892)^0$		$(3.3 \pm 0.5) \times 10^{-5}$	
Γ_{81}	$\chi_{c1} \phi$		$(2.03 \pm 0.29) \times 10^{-4}$	
Γ_{82}	$\pi^+ \pi^-$		$(7.7 \pm 2.0) \times 10^{-7}$	S=1.4
Γ_{83}	$\pi^0 \pi^0$		$< 2.1 \times 10^{-4}$	CL=90%
Γ_{84}	$\eta \pi^0$		$< 1.0 \times 10^{-3}$	CL=90%
Γ_{85}	$\eta \eta$		$< 1.5 \times 10^{-3}$	CL=90%
Γ_{86}	$\rho^0 \rho^0$		$< 3.20 \times 10^{-4}$	CL=90%
Γ_{87}	$\eta' \eta'$		$(3.3 \pm 0.7) \times 10^{-5}$	
Γ_{88}	$\phi \rho^0$		$< 6.17 \times 10^{-4}$	CL=90%
Γ_{89}	$\phi \phi$		$(1.87 \pm 0.15) \times 10^{-5}$	
Γ_{90}	$\pi^+ K^-$		$(5.6 \pm 0.6) \times 10^{-6}$	
Γ_{91}	$K^+ K^-$		$(2.52 \pm 0.17) \times 10^{-5}$	
Γ_{92}	$K^0 \overline{K}^0$		$< 6.6 \times 10^{-5}$	CL=90%
Γ_{93}	$K^0 \pi^+ \pi^-$		$(1.5 \pm 0.4) \times 10^{-5}$	
Γ_{94}	$K^0 K^\pm \pi^\mp$		$(7.7 \pm 1.0) \times 10^{-5}$	
Γ_{95}	$K^*(892)^- \pi^+$		$(3.3 \pm 1.2) \times 10^{-6}$	
Γ_{96}	$K^*(892)^\pm K^\mp$		$(1.25 \pm 0.26) \times 10^{-5}$	
Γ_{97}	$K^0_S \overline{K}^*(892)^0 +$ c.c.		$(1.6 \pm 0.4) \times 10^{-5}$	
Γ_{98}	$K^0 K^+ K^-$		$< 3.5 \times 10^{-6}$	CL=90%
Γ_{99}	$\overline{K}^*(892)^0 \rho^0$		$< 7.67 \times 10^{-4}$	CL=90%
Γ_{100}	$\overline{K}^*(892)^0 K^*(892)^0$		$(1.11 \pm 0.27) \times 10^{-5}$	
Γ_{101}	$\phi K^*(892)^0$		$(1.14 \pm 0.30) \times 10^{-6}$	
Γ_{102}	$p \overline{p}$		$(2.8 {}^{+2.2}_{-1.7}) \times 10^{-8}$	
Γ_{103}	$\Lambda_c^- \Lambda \pi^+$		$(3.6 \pm 1.6) \times 10^{-4}$	
Γ_{104}	$\Lambda_c^- \Lambda_c^+$		$< 8.0 \times 10^{-5}$	CL=95%
Γ_{105}	$\gamma \gamma$	B1	$< 3.1 \times 10^{-6}$	CL=90%
Γ_{106}	$\phi \gamma$		$(3.52 \pm 0.34) \times 10^{-5}$	

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

Γ_{107}	$\mu^+\mu^-$	*B1*		$(\ 2.9\ ^{+\ 0.7}_{-\ 0.6}\ ) \times 10^{-9}$	
Γ_{108}	e^+e^-	*B1*		$< 2.8 \times 10^{-7}$	CL=90%
Γ_{109}	$\mu^+\mu^-\mu^+\mu^-$	*B1*		$< 1.2 \times 10^{-8}$	CL=90%
Γ_{110}	SP, $S \to \mu^+\mu^-$, $P \to \mu^+\mu^-$	*B1*	[b]	$< 1.2 \times 10^{-8}$	CL=90%
Γ_{111}	$\phi(1020)\mu^+\mu^-$	*B1*		$(\ 8.2 \pm 1.2\ ) \times 10^{-7}$	
Γ_{112}	$\pi^+\pi^-\mu^+\mu^-$	*B1*		$(\ 8.4 \pm 1.7\ ) \times 10^{-8}$	
Γ_{113}	$\phi\nu\overline{\nu}$	*B1*		$< 5.4 \times 10^{-3}$	CL=90%
Γ_{114}	$e^\pm\mu^\mp$	*LF*	[c]	$< 1.1 \times 10^{-8}$	CL=90%

[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 10 branching ratios uses 16 measurements and one constraint to determine 7 parameters. The overall fit has a $\chi^2 = 3.3$ for 10 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_{12}	28				
x_{14}	92	25			
x_{44}	0	0	0		
x_{53}	0	0	0	62	
x_{89}	0	0	0	28	17
	x_{10}	x_{12}	x_{14}	x_{44}	x_{53}

B_s^0 BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.25 OUR AVERAGE					
0.91±0.18±0.41		[1] DRUTSKOY	07	BELL	$e^+e^- \to \Upsilon(4S)$
0.81±0.24±0.22	90	[2] BUSKULIC	96E	ALEP	$e^+e^- \to Z$
1.56±0.58±0.44	147	[3] ACTON	92N	OPAL	$e^+e^- \to Z$

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

[2] 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($D_s \rightarrow \phi\pi$).

[3] 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($D_s \rightarrow \phi\pi$).

$\Gamma(\ell\nu_\ell X)/\Gamma_{total}$ $\qquad\qquad$ 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	$e^+e^- \rightarrow \Upsilon(5S)$
$9.5^{+2.5}_{-2.0}{}^{+1.1}_{-1.9}$	[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.

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

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

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

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

$\Gamma(D_s^-\ell^+\nu_\ell\,\text{anything})/\Gamma_{total}$ $\qquad\qquad$ 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					
$8.2 \pm 0.2 \pm 1.5$		[1] OSWALD	15	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
$7.6 \pm 1.2 \pm 2.1$	134	[2] BUSKULIC	95O	ALEP	$e^+e^- \rightarrow Z$
$10.7 \pm 4.3 \pm 2.9$		[3] ABREU	92M	DLPH	$e^+e^- \rightarrow Z$
$10.3 \pm 3.6 \pm 2.8$	18	[4] ACTON	92N	OPAL	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$13 \pm 4 \pm 4$	27	[5] BUSKULIC	92E	ALEP	$e^+e^- \rightarrow Z$

[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.

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

$\Gamma(D_{s1}(2536)^- \mu^+ \nu_\mu,\ D_{s1}^- \to D^{*-} K_S^0)/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.6±0.7±0.1	[1] ABAZOV	09G	D0	$p\overline{p}$ at 1.96 TeV

[1] ABAZOV 09G reports $[\Gamma(B^0_s \to D_{s1}(2536)^- \mu^+ \nu_\mu,\ D^-_{s1} \to D^{*-} K^0_S)/\Gamma_{\text{total}}] \times [B(\overline{b} \to B^0_s)] = (2.66 \pm 0.52 \pm 0.45) \times 10^{-4}$ which we divide by our best value $B(\overline{b} \to B^0_s) = (10.3 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s1}(2536)^- X \mu^+ \nu,\ D^-_{s1} \to \overline{D}^0 K^+)/\Gamma(D^-_s \ell^+ \nu_\ell \text{anything})$ Γ_8/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_9/Γ_5

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

$\Gamma(D_{s1}(2536)^- X \mu^+ \nu,\ D^-_{s1} \to \overline{D}^0 K^+)/\Gamma(D_{s2}(2573)^- X \mu^+ \nu,\ D^-_{s2} \to \overline{D}^0 K^+)$ Γ_8/Γ_9

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

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

$\Gamma(D^-_s \pi^+)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.00±0.23 OUR FIT					
2.99±0.24 OUR AVERAGE					
$2.95 \pm 0.05 {}^{+0.25}_{-0.28}$		[1] AAIJ	12AG	LHCB	pp at 7 TeV
3.6 ±0.5 ±0.5		[2] LOUVOT	09	BELL	$e^+ e^- \to \Upsilon(5S)$
2.8 ±0.6 ±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. • • •					
6.8 ±2.2 ±1.6		DRUTSKOY	07A	BELL	Repl. by LOUVOT 09
3.3 ±1.1 ±0.2		[4] ABULENCIA	06J	CDF	Repl. by ABULENCIA 07C
<130	6	[5] AKERS	94J	OPAL	$e^+ e^- \to Z$
seen	1	BUSKULIC	93G	ALEP	$e^+ e^- \to Z$

[1] 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.

[2] LOUVOT 09 reports $(3.67 {}^{+0.35}_{-0.33} {}^{+0.65}_{-0.645}) \times 10^{-3}$ from a measurement of $[\Gamma(B^0_s \to D^-_s \pi^+)/\Gamma_{\text{total}}] \times [B(\Upsilon(10860) \to B^{(*)}_s \overline{B}^{(*)}_s)]$ 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 $[\Gamma(B^0_s \to D^-_s \pi^+)/\Gamma_{\text{total}}] / [B(B^0 \to D^- \pi^+)] = 1.13 \pm 0.08 \pm 0.23$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.52 \pm 0.13) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] ABULENCIA 06J reports $[\Gamma(B^0_s \to D^-_s \pi^+)/\Gamma_{\text{total}}] / [B(B^0 \to D^- \pi^+)] = 1.32 \pm 0.18 \pm 0.38$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.52 \pm 0.13) \times$

10^{-3}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(D_s^- \rho^+)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.9±1.3±0.5	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 10 reports $[\Gamma(B_s^0 \to D_s^- \rho^+)/\Gamma_{total}] / [B(B_s^0 \to D_s^- \pi^+)] = 2.3 \pm 0.4 \pm 0.2$ which we multiply by our best value $B(B_s^0 \to D_s^- \pi^+) = (3.00 \pm 0.23) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.1±1.0 OUR FIT				
6.3±1.5±0.7	[1] ABULENCIA	07C	CDF	$p\overline{p}$ at 1.96 TeV

[1] ABULENCIA 07C reports $[\Gamma(B_s^0 \to D_s^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}] / [B(B^0 \to D^- \pi^+ \pi^+ \pi^-)] = 1.05 \pm 0.10 \pm 0.22$ which we multiply by our best value $B(B^0 \to D^- \pi^+ \pi^+ \pi^-) = (6.0 \pm 0.7) \times 10^{-3}$. 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_{12}/Γ_{10}

VALUE	DOCUMENT ID		TECN	COMMENT
2.05±0.34 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_{13}/Γ_{12}

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

$\Gamma(D_s^{\mp} K^{\pm})/\Gamma_{total}$ — Γ_{14}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.27±0.19 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 $[\Gamma(B_s^0 \to D_s^{\mp} K^{\pm})/\Gamma_{total}] \times [B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)})]$ 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_{14}/Γ_{10}

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_{15}/Γ_{12}

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_{16}/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	$e^+e^- \to \Upsilon(5S)$
5.1±0.8±0.6		[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 ± 0.8) × 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 ± 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($B^0 \to D^- D_s^+$)) = 0.183 ± 0.021 ± 0.017. We multiply this result by our best value of B($B^0 \to D^- D_s^+$) = (7.2±0.8)×10^{-3} and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.130\pm0.008$. 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($\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}$) = $(90.1^{+3.8}_{-4.0})$%.

[5] AALTONEN 08F reports [Γ($B_s^0 \to D_s^+ D_s^-$)/Γ_{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±0.8)×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_{17}/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±0.6±0.5	[2] AAIJ 13AP	LHCB	Repl. by AAIJ 14AA

[1] AAIJ 14AA reports $[\Gamma(B_s^0 \to D_s^- D^+)/\Gamma_{total}] / [B(B^0 \to D^- D_s^+)] = 0.038 \pm 0.004 \pm 0.003$ 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_{18}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.2±0.4±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_{19}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.9±0.3±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 $B(B^+ \to \overline{D}^0 D_s^+) = (10.1 \pm 1.7) \times 10^{-3}$.

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.0^{+0.5}_{-0.4}{}^{+0.1}_{-0.2}}$	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 10 reports $[\Gamma(B_s^0 \to D_s^{*-} \pi^+)/\Gamma_{total}] / [B(B_s^0 \to D_s^- \pi^+)] = 0.65^{+0.15}_{-0.13} \pm 0.07$ which we multiply by our best value $B(B_s^0 \to D_s^- \pi^+) = (3.00 \pm 0.23) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{*\mp} K^\pm)/\Gamma(D_s^{*-} \pi^+)$ — Γ_{21}/Γ_{20}

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

$\Gamma(D_s^{*-} \rho^+)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
9.6±2.0±0.7	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 10 reports $[\Gamma(B_s^0 \to D_s^{*-} \rho^+)/\Gamma_{total}] / [B(B_s^0 \to D_s^- \pi^+)] = 3.2 \pm 0.6 \pm 0.3$ which we multiply by our best value $B(B_s^0 \to D_s^- \pi^+) = (3.00 \pm 0.23) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{*-} \rho^+)/\Gamma(D_s^- \rho^+)$ — Γ_{22}/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4±0.3±0.1	LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

$\left[\Gamma(D_s^{*+} D_s^-) + \Gamma(D_s^{*-} D_s^+)\right]/\Gamma_{total}$ — Γ_{23}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
12.9±2.2 OUR AVERAGE		Error includes scale factor of 1.1.			
$17.6^{+2.3}_{-2.2}\pm4.0$		[1] ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$
$11.8\pm1.6\pm1.4$		[2] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$27.5^{+8.3}_{-7.1}\pm6.9$		[3] ESEN	10	BELL	Repl. by ESEN 13
<121	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] 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 $\Gamma(\Upsilon(5S) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%$.

[2] 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 $1/2\ f_s/f_d = 0.130 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[3] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ 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_{24}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
18.6± 3.0 OUR AVERAGE					
$19.8^{+\ 3.3}_{-\ 3.1}{}^{+5.2}_{-5.0}$		[1] ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$
$18.2\pm\ 2.7\pm2.2$		[2] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$30.8^{+12.2}_{-10.4}{}^{+8.5}_{-8.6}$		[3] ESEN	10	BELL	Repl. by ESEN 13
<257	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] 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 $\Gamma(\Upsilon(5S) \to B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%$.

[2] 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 $B(B^0 \to D^- D_s^+) = (7.2\pm0.8)\times10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.130\pm0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[3] Uses $\Upsilon(10860) \to B_s^* \overline{B}_s^*$ 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_{25}/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 (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account correlations between the measurements.

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

[1] 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 $\Gamma(\Upsilon(5S) \to B_s^* \overline{B}_s^*)$ / $\Gamma(\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)})$ = (87.0 ± 1.7)%.

[2] 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 $1/2\ f_s/f_d = 0.130 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

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

[4] 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.

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

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

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

$\Gamma(\overline{D}^0 K^- \pi^+)/\Gamma_{total}$ Γ_{26}/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 $[\Gamma(B_s^0 \to \overline{D}^0 K^- \pi^+)/\Gamma_{total}]$ / $[\text{B}(B^0 \to \overline{D}^0 \pi^+ \pi^-)]$ = 1.18 ± 0.05 ± 0.12 which we multiply by our best value B($B^0 \to \overline{D}^0 \pi^+ \pi^-$) = (8.8 ± 0.5) × 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_{27}/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_{28}/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_{29}/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 parametrisation.

$\Gamma(\overline{D}^0 \overline{K}_2^*(1430))/\Gamma_{total}$ — Γ_{30}/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_{31}/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_{32}/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_{33}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 \overline{K}^*_4(2045))/\Gamma_{total}$ Γ_{34}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 K^- \pi^+ \text{(non-resonant)})/\Gamma_{total}$ Γ_{35}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays. Corresponds to the non-resonant part of the LASS parametrisation.

$\Gamma(D^*_{s2}(2573)^- \pi^+,\ D^*_{s2} \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{36}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(D^*_{s1}(2700)^- \pi^+,\ D^*_{s1} \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{37}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(D^*_{s1}(2860)^- \pi^+,\ D^*_{s1} \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{38}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(D^*_{s3}(2860)^- \pi^+,\ D^*_{s3} \to \overline{D}^0 K^-)/\Gamma_{total}$ Γ_{39}/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 $B^0_s \to \overline{D}^0 K^- \pi^+$ decays.

$\Gamma(\overline{D}^0 K^+ K^-)/\Gamma_{total}$ Γ_{40}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.4±1.7±1.1	[1,2] AAIJ	12AM	LHCB	pp at 7 TeV

[1] AAIJ 12AM reports $[\Gamma(B^0_s \to \overline{D}^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 K^+ K^-)] = 0.90 \pm 0.27 \pm 0.20$ which we multiply by our best value $B(B^0 \to \overline{D}^0 K^+ K^-) = (4.9 \pm 1.2) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(\overline{D}^0 f_0(980))/\Gamma_{total}$ — Γ_{41}/Γ

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

$\Gamma(\overline{D}^0 \phi)/\Gamma(\overline{D}^0 \overline{K}^*(892)^0)$ — Γ_{42}/Γ_{27}

VALUE	DOCUMENT ID		TECN	COMMENT
0.069±0.013±0.007	AAIJ	13BX	LHCB	pp at 7 TeV

$\Gamma(D^{*\mp}\pi^{\pm})/\Gamma_{total}$ — Γ_{43}/Γ

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

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

$\Gamma(J/\psi(1S)\phi)/\Gamma_{total}$ — Γ_{44}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.07 ±0.08 OUR FIT					
1.10 ±0.09 OUR AVERAGE					
1.050±0.013±0.104		[1] AAIJ	13AN	LHCB	pp at 7 TeV
1.25 ±0.07 ±0.23		[2] THORNE	13	BELL	$e^+e^- \to \Upsilon(5S)$
1.4 ±0.5 ±0.1		[3] ABE	96Q	CDF	$p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	1	[4] AKERS	94J	OPAL	$e^+e^- \to Z$
seen	14	[5] ABE	93F	CDF	$p\overline{p}$ at 1.8 TeV
seen	1	[6] ACTON	92N	OPAL	Sup. by AKERS 94J

[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 $B_s^{(*)}\overline{B}_s^{(*)}$.

[3] ABE 96Q reports $[\Gamma(B_s^0 \to J/\psi(1S)\phi)/\Gamma_{total}] \times [\Gamma(\overline{b} \to B_s^0)/[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^0)]] = (0.185 \pm 0.055 \pm 0.020) \times 10^{-3}$ which we divide by our best value $\Gamma(\overline{b} \to B_s^0)/[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^0)] = 0.130 \pm 0.008$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

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

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{total}$ — Γ_{45}/Γ

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

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

$\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$ Γ_{46}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
3.9 ±0.7 OUR AVERAGE		Error includes scale factor of 1.4.			
3.6 ±0.5 ±0.2		[1] AAIJ	13A	LHCB	pp at 7 TeV
$5.10 \pm 0.50 ^{+1.17}_{-0.83}$		[2] LI	12	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<38	90	[3] ACCIARRI	97C	L3	

[1] AAIJ 13A reports $[\Gamma(B^0_s \rightarrow J/\psi(1S)\eta)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)\rho^0)] = 14.0 \pm 1.2^{+1.1}_{-1.5}{}^{+1.1}_{-1.0}$ which we multiply by our best value $B(B^0 \rightarrow J/\psi(1S)\rho^0) = (2.54 \pm 0.14) \times 10^{-5}$. 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%).

$\Gamma(J/\psi(1S)K^0_S)/\Gamma_{total}$ Γ_{47}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.89±0.12 OUR AVERAGE				
1.88±0.14±0.07	[1] AAIJ	15AL	LHCB	pp at 7, 8 TeV
1.91±0.15±0.13	[2] AAIJ	13AB	LHCB	pp at 7 TeV
1.9 ±0.4 ±0.1	[3] AALTONEN	11A	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.91^{+0.25}_{-0.24} \pm 0.13$	[4] AAIJ	12O	LHCB	Repl. by AAIJ 13AB

[1] AAIJ 15AL reports $[\Gamma(B^0_s \rightarrow J/\psi(1S)K^0_S)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)K^0_S)] = (4.31 \pm 0.17 \pm 0.12 \pm 0.25) \times 10^{-2}$ which we multiply by our best value $B(B^0 \rightarrow J/\psi(1S)K^0_S) = (4.36 \pm 0.16) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AAIJ 13AB reports $(1.97 \pm 0.14 \pm 0.07 \pm 0.15 \pm 0.08) \times 10^{-5}$ from a measurement of $[\Gamma(B^0_s \rightarrow J/\psi(1S)K^0_S)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)K^0)] \times [\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0)]$ assuming $B(B^0 \rightarrow J/\psi(1S)K^0) = (8.98 \pm 0.35) \times 10^{-4}$,$\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.256 \pm 0.020$, which we rescale to our best values $B(B^0 \rightarrow J/\psi(1S)K^0) = (8.73 \pm 0.32) \times 10^{-4}$, $\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.256 \pm 0.014$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[3] AALTONEN 11A reports $[\Gamma(B^0_s \rightarrow J/\psi(1S)K^0_S)/\Gamma_{total}] \times [B(\overline{b} \rightarrow B^0_s)] / [B(\overline{b} \rightarrow B^0)] / [B(B^0 \rightarrow J/\psi(1S)K^0_S)] = (1.09 \pm 0.19 \pm 0.11) \times 10^{-2}$ which we multiply or divide by our best values $B(\overline{b} \rightarrow B^0_s) = (10.3 \pm 0.5) \times 10^{-2}$, $B(\overline{b} \rightarrow B^0) = (40.4 \pm 0.6) \times 10^{-2}$, $B(B^0 \rightarrow J/\psi(1S)K^0_S) = 1/2 \times B(B^0 \rightarrow J/\psi(1S)K^0) = 1/2 \times (8.73 \pm 0.32) \times 10^{-4}$. Our firs t error is their experiment's error and our second error is the systematic error from using our best values.

[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 $[\Gamma(B^0_s \rightarrow J/\psi(1S)K^0_S)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)K^0)] \times [\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0)]$ assuming $B(B^0 \rightarrow J/\psi(1S)K^0) = (8.71 \pm 0.32) \times 10^{-4}$,$\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.267^{+0.021}_{-0.02}$, which we rescale to our best values $B(B^0 \rightarrow J/\psi(1S)K^0) =$

$(8.73 \pm 0.32) \times 10^{-4}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.256 \pm 0.014$. 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_{48}/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. • • •				
$4.4\ ^{+0.5}_{-0.4}\ \pm0.8$	[2] AAIJ	12AP	LHCB	Repl. by AAIJ 15AV
$8\ \pm4\ \pm1$	[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 $B_s^0 \to J/\psi \phi$.

[2] AAIJ 12AP reports $B(B_s^0 \to J/\psi(1S)\overline{K}^*(892)^0)/B(B^0 \to J/\psi(1S)K^*(892)^0) = (3.43^{+0.34}_{-0.36} \pm 0.50) \times 10^{-2}$ 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 $[\Gamma(B_s^0 \to J/\psi(1S)\overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\overline{b} \to B_s^0)] / [B(\overline{b} \to B^0)] / [B(B^0 \to J/\psi(1S)K^*(892)^0)] = 0.0168 \pm 0.0024 \pm 0.0068$ which we multiply or divide by our best values $B(\overline{b} \to B_s^0) = (10.3 \pm 0.5) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.4 \pm 0.6) \times 10^{-2}$, $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.28 \pm 0.05) \times 10^{-3}$. 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_{49}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.3 ±0.4 OUR AVERAGE				
$3.2\ ^{+0.4}_{-0.5}\ \pm0.2$	[1] AAIJ	13A	LHCB	pp at 7 TeV
$3.71\pm0.61^{+0.85}_{-0.60}$	[2] LI	12	BELL	$e^+e^- \to \Upsilon(4S)$

[1] AAIJ 13A reports $[\Gamma(B_s^0 \to J/\psi(1S)\eta')/\Gamma_{total}] / [B(B^0 \to J/\psi(1S)\rho^0)] = 12.7 \pm 1.1^{+0.5}_{-1.3}{}^{+1.0}_{-0.9}$ which we multiply by our best value $B(B^0 \to J/\psi(1S)\rho^0) = (2.54 \pm 0.14) \times 10^{-5}$. 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_{49}/Γ_{46}

VALUE	DOCUMENT ID		TECN	COMMENT
0.87 ±0.06 OUR AVERAGE				
0.902±0.072±0.045	[1] AAIJ	15D	LHCB	pp at 7, 8 TeV
$0.90\ \pm0.09\ ^{+0.06}_{-0.02}$	[2] AAIJ	13A	LHCB	pp at 7 TeV
0.73 ±0.14 ±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_{50}/Γ_{44}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
19.8±0.5±0.5	[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 $[\Gamma(B_s^0 \rightarrow J/\psi(1S)\pi^+\pi^-)/\Gamma(B_s^0 \rightarrow J/\psi(1S)\phi)]$ / $[B(\phi(1020) \rightarrow K^+K^-)]$ assuming $B(\phi(1020) \rightarrow K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$.

$\Gamma(J/\psi(1S)f_0(980),\ f_0 \rightarrow \pi^+\pi^-)/\Gamma_{total}$ Γ_{53}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.34±0.15 OUR FIT				
$\mathbf{1.16^{+0.31}_{-0.19}{}^{+0.30}_{-0.25}}$	[1] LI	11	BELL	$e^+e^- \rightarrow \Upsilon(5S)$

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

$\Gamma(J/\psi(1S)f_0(500),\ f_0 \rightarrow \pi^+\pi^-)/\Gamma(J/\psi(1S)f_0(980)_0,\ f_0 \rightarrow \pi^+\pi^-)$ Γ_{51}/Γ_{54}

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.

$\Gamma(J/\psi(1S)\rho,\ \rho \rightarrow \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ Γ_{52}/Γ_{77}

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.

$\Gamma(J/\psi(1S)f_0(980)_0,\ f_0 \rightarrow \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ Γ_{54}/Γ_{77}

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.703 \pm 0.015^{+0.004}_{-0.051}}$	[1] AAIJ	14BR	LHCB	pp at 7, 8 TeV

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

$\Gamma(J/\psi(1S)f_2(1270)_0,\ f_2 \rightarrow \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ Γ_{56}/Γ_{77}

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.

$\Gamma(J/\psi(1S)f_2(1270)_\parallel,\ f_2 \rightarrow \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ Γ_{57}/Γ_{77}

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.

$\Gamma(J/\psi(1S)f_2(1270)_\perp,\ f_2 \rightarrow \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ Γ_{58}/Γ_{77}

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.

$\Gamma(J/\psi(1S) f_0(1500),\ f_0 \to \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_{60}/Γ_{77}

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.

$\Gamma(J/\psi(1S) f'_2(1525)_0,\ f'_2 \to \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_{61}/Γ_{77}

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.

$\Gamma(J/\psi(1S) f'_2(1525)_\parallel,\ f'_2 \to \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_{62}/Γ_{77}

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.

$\Gamma(J/\psi(1S) f'_2(1525)_\perp,\ f'_2 \to \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_{63}/Γ_{77}

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.

$\Gamma(J/\psi(1S) f_0(1790),\ f_0 \to \pi^+\pi^-)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_{64}/Γ_{77}

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.

$\Gamma(J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{53}/Γ_{44}

VALUE	DOCUMENT ID		TECN	COMMENT
0.125±0.011 OUR FIT				
0.127±0.011 OUR AVERAGE				
$0.135 \pm 0.036 \pm 0.001$	[1] ABAZOV	12C	D0	$p\overline{p}$ at 1.96 TeV
$0.126 \pm 0.012 \pm 0.001$	[2] AALTONEN	11AB	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.139 \pm 0.006 {}^{+0.025}_{-0.012}$	[3,4] AAIJ	12AO	LHCB	Repl. by AAIJ 14
$0.123 {}^{+0.026}_{-0.022} \pm 0.001$	[5] AAIJ	11	LHCB	Repl. by AAIJ 12AO

[1] ABAZOV 12C reports $[\Gamma(B^0_s \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)] = 0.275 \pm 0.041 \pm 0.061$ which we multiply by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AALTONEN 11AB reports $[\Gamma(B^0_s \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)] = 0.257 \pm 0.020 \pm 0.014$ which we multiply by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is

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

[3] AAIJ 12AO reports $(13.9 \pm 0.6^{+2.5}_{-1.2}) \times 10^{-2}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)]$ assuming $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$.

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

[5] AAIJ 11 reports $[\Gamma(B^0_s \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)] = 0.252^{+0.046}_{-0.032}{}^{+0.027}_{-0.033}$ which we multiply by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S) f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{59}/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_{59}/Γ_{44}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4.2 \pm 0.5^{+0.1}_{-3.7}$	[1,2] AAIJ	12AO	LHCB	Repl. by AAIJ 14

[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 $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$.

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

$\Gamma(J/\psi(1S) f_2(1270),\ f_2 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{55}/Γ_{44}

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$9.8 \pm 3.3^{+0.6}_{-1.5}$	[1,2] AAIJ	12AO	LHCB	Repl. by AAIJ 14

[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 $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$.

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

$\Gamma(J/\psi(1S)\pi^+\pi^-\text{(nonresonant)})/\Gamma(J/\psi(1S)\phi)$ — Γ_{65}/Γ_{44}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.66 \pm 0.31^{+0.96}_{-0.08}$	[1,2] AAIJ	12AO	LHCB	Repl. by AAIJ 14

[1] AAIJ 12AO reports $(1.66 \pm 0.31^{+0.96}_{-0.08}) \times 10^{-2}$ from a measurement of $[\Gamma(B^0_s \to J/\psi(1S)\pi^+\pi^-\text{(nonresonant)})/\Gamma(B^0_s \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)]$ assuming $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$.
[2] Measured in Dalitz plot like analysis of $B_s \to J/\psi\pi^+\pi^-$ decays.

$\Gamma(J/\psi(1S)\overline{K}^0\pi^+\pi^-)/\Gamma_{total}$ Γ_{66}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.4 × 10⁻⁵	90	[1] AAIJ	14L	LHCB	pp at 7 TeV

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

$\Gamma(J/\psi(1S)K^+K^-)/\Gamma_{total}$ Γ_{67}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
7.9 ±0.7 OUR AVERAGE				
7.70±0.08±0.72	[1] AAIJ	13AN	LHCB	pp at 7 TeV
10.1 ±0.9 ±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 $B^{(*)}_s \overline{B}^{(*)}_s$.

$\Gamma(J/\psi(1S)K^0K^-\pi^+ + \text{c.c.})/\Gamma_{total}$ Γ_{68}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
9.3±1.0±0.9	[1] AAIJ	14L	LHCB	pp at 7 TeV

[1] AAIJ 14L reports $[\Gamma(B^0_s \to J/\psi(1S)K^0K^-\pi^+ + \text{c.c.})/\Gamma_{total}]$ / $[B(B^0 \to J/\psi(1S)K^0\pi^+\pi^-)] = 2.12 \pm 0.15 \pm 0.18$ which we multiply by our best value $B(B^0 \to J/\psi(1S)K^0\pi^+\pi^-) = (4.4 \pm 0.4) \times 10^{-4}$. 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 $B^0_s \to J/\psi K^0_S K^\pm\pi^\mp$ with more than 10 standard deviations.

$\Gamma(J/\psi(1S)\overline{K}^0K^+K^-)/\Gamma_{total}$ Γ_{69}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<12 × 10⁻⁶	90	[1] AAIJ	14L	LHCB	pp at 7 TeV

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

$\Gamma(J/\psi(1S)f'_2(1525))/\Gamma(J/\psi(1S)\phi)$ Γ_{70}/Γ_{44}

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. • • •				
26.4±3.5±0.7	[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 $[\Gamma(B^0_s \to J/\psi(1S)f'_2(1525))/\Gamma(B^0_s \to J/\psi(1S)\phi)] \times B(f'_2(1525) \to K^+K^-)$ / $B(\phi(1020) \to K^+K^-) = 0.19 \pm 0.05 \pm 0.04$ which we divide and multiply by our best values $B(f'_2(1525) \to K^+K^-) = \frac{1}{2}(88.7 \pm 2.2) \times 10^{-2}$,

B(ϕ(1020) → K^+K^-) = (48.9 ± 0.5) × 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 ± 2.7 ± 2.4) × 10^{-2} from a measurement of Γ(B^0_s → $J/\psi(1S) f'_2(1525)$)/Γ(B^0_s → $J/\psi(1S)\phi$)] × B($f'_2(1525)$ → K^+K^-) / B(ϕ(1020) → K^+K^-) assuming B($f'_2(1525)$ → K^+K^-) = (44.4 ± 1.1) × 10^{-2}, B(ϕ(1020) → K^+K^-) = (48.9 ± 0.5) × 10^{-2}, which we rescale to our best values B($f'_2(1525)$ → K^+K^-) = $\frac{1}{2}$ (88.7 ± 2.2) × 10^{-2}, B(ϕ(1020) → K^+K^-) = (48.9 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi(1S) f'_2(1525))/\Gamma_{total}$ — Γ_{70}/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 ± 0.020 and B(B^+ → $J/\psi K^+$) = (10.18 ± 0.42) × 10^{-4}.

$\Gamma(\psi(2S)\eta)/\Gamma(J/\psi(1S)\eta)$ — Γ_{75}/Γ_{46}

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/ψ → $\mu^+\mu^-$)/B($\psi(2S)$ → $\mu^+\mu^-$) = B(J/ψ → e^+e^-)/B($\psi(2S)$ → e^+e^-) = 7.69 ± 0.19 was used.

$\Gamma(\psi(2S)\eta')/\Gamma(J/\psi(1S)\eta')$ — Γ_{76}/Γ_{49}

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/ψ → $\mu^+\mu^-$, η' → $\rho^0\gamma$, and η' → $\eta\pi^+\pi^-$ decays.

$\Gamma(J/\psi(1S) p\bar{p})/\Gamma_{total}$ — Γ_{71}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.8 × 10^{-6}	90	[1] AAIJ	13Z	LHCB	pp at 7 TeV

[1] Uses B(B^0_s → $J/\psi(1S)\pi^+\pi^-$) = (1.98 ± 0.20) × 10^{-4}.

$\Gamma(J/\psi(1S)\gamma)/\Gamma_{total}$ — Γ_{72}/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 → $J/\psi\gamma X$ taken from PDG 14. Uses f_s/f_d = 0.259 ± 0.015.

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{73}/Γ_{50}

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 $X(3872)$ decaying to $J/\psi(1S)\pi^+\pi^-$.

$\Gamma(J/\psi(1S) f_1(1285))/\Gamma_{total}$ — Γ_{74}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$7.1\pm1.0^{+0.9}_{-1.0}$	[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 $B(f_1(1285) \to 2\pi^+ 2\pi^-) = 0.11^{+0.007}_{-0.006}$.

$\Gamma(\psi(2S)\phi)/\Gamma_{total}$ — Γ_{78}/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_{78}/Γ_{44}

VALUE	DOCUMENT ID		TECN	COMMENT
0.501±0.034 OUR AVERAGE				
0.497±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 $0.489 \pm 0.026 \pm 0.021 \pm 0.012$ from a measurement of $[\Gamma(B^0_s \to \psi(2S)\phi)/\Gamma(B^0_s \to J/\psi(1S)\phi)] \times [B(J/\psi(1S) \to e^+e^-)] / [B(\psi(2S) \to e^+e^-)]$ 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 $B(J/\psi(1S) \to e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$, $B(\psi(2S) \to e^+e^-) = (7.89 \pm 0.17) \times 10^{-3}$. 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_{79}/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 $[\Gamma(B^0_s \to \psi(2S) K^-\pi^+)/\Gamma_{total}] / [B(B^0 \to \psi(2S) K^+\pi^-)] = (5.38 \pm 0.36 \pm 0.22 \pm 0.31) \times 10^{-2}$ 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_{80}/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 $[\Gamma(B^0_s \to \psi(2S)\overline{K}^*(892)^0)/\Gamma_{total}] / [B(B^0 \to \psi(2S) K^*(892)^0)] = (5.58 \pm 0.57 \pm 0.40 \pm 0.32) \times 10^{-2}$ 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_{81}/Γ_{44}

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($\chi_{c1} \rightarrow J/\psi\gamma$) = (34.4 ± 1.5)%.

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{77}/Γ_{50}

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($J/\psi \rightarrow \mu^+\mu^-$)/B($\psi(2S) \rightarrow \mu^+\mu^-$) = B($J/\psi \rightarrow e^+e^-$)/B($\psi(2S) \rightarrow e^+e^-$) = 7.69 ± 0.19 was used.

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{82}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
0.77±0.20 OUR AVERAGE		Error includes scale factor of 1.4.			
$1.00^{+0.23}_{-0.20}\pm0.07$		[1] AAIJ	12AR	LHCB	pp at 7 TeV
$0.61\pm0.17\pm0.04$		[2] AALTONEN	12L	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 12	90	[3] PENG	10	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
$<$ 1.2	90	[4] AALTONEN	09C	CDF	Repl. by AALTONEN 12L
$<$ 1.7	90	[5] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 09C
$<$232	90	[6] ABE	00C	SLD	$e^+e^- \rightarrow Z$
$<$170	90	[7] BUSKULIC	96V	ALEP	$e^+e^- \rightarrow Z$

[1] AAIJ 12AR reports $[\Gamma(B^0_s \rightarrow \pi^+\pi^-)/\Gamma_{total}]$ / $[B(B^0 \rightarrow \pi^+\pi^-)] \times [\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0)] = 0.050^{+0.011}_{-0.009} \pm 0.004$ which we multiply or divide by our best values B($B^0 \rightarrow \pi^+\pi^-$) = $(5.12 \pm 0.19) \times 10^{-6}$, $\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.256 \pm 0.014$. 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 $[\Gamma(B^0_s \rightarrow \pi^+\pi^-)/\Gamma_{total}]$ / $[B(B^0 \rightarrow K^+\pi^-)] \times [\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0)] = 0.008 \pm 0.002 \pm 0.001$ which we multiply or divide by our best values B($B^0 \rightarrow K^+\pi^-$) = $(1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.256 \pm 0.014$. 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 ± 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] Obtains this result from $(f_s/f_d) \cdot$ B($B_s \rightarrow \pi^+\pi^-$)/B($B^0 \rightarrow K^+\pi^-$) = 0.007 ± 0.004 ± 0.005, assuming $f_s/f_d = 0.276 \pm 0.034$ and B($B^0 \rightarrow K^+\pi^-$) = $(19.4 \pm 0.6) \times 10^{-6}$.

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

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

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

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ — Γ_{83}/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 ± 4.0 and f_{B_s} = 12.0 ± 3.0%.

$\Gamma(\eta\pi^0)/\Gamma_{total}$ — Γ_{84}/Γ

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

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

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_{85}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.5 × 10^{-3}	90	[1] ACCIARRI	95H	L3	$e^+e^- \to Z$

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

$\Gamma(\rho^0\rho^0)/\Gamma_{total}$ — Γ_{86}/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_{87}/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 [$\Gamma(B^0_s \to \eta'\eta')/\Gamma_{total}$] / [B($B^+ \to \eta' K^+$)] = 0.47 ± 0.09 ± 0.04 which we multiply by our best value B($B^+ \to \eta' K^+$) = (7.06 ± 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.

$\Gamma(\phi\rho^0)/\Gamma_{total}$ — Γ_{88}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.17 × 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}=$(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_{89}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
18.7±1.5 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 $[\Gamma(B_s^0 \to \phi\phi)/\Gamma_{total}] / [B(B^0 \to K^*(892)^0\phi)] = 1.84 \pm 0.05 \pm 0.13$ 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 $B(B^0 \to J/\psi\phi) = (1.38 \pm 0.49) \times 10^{-3}$ and production cross-section ratio of $\sigma(B_s)/\sigma(B^0) = 0.26 \pm 0.04$.

[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_{89}/Γ_{44}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.74±0.16 OUR FIT				
1.78±0.14±0.20	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV

$\Gamma(\pi^+K^-)/\Gamma_{total}$ Γ_{90}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
5.6±0.6 OUR AVERAGE					
5.7±0.6±0.3		[1] AAIJ	12AR	LHCB	pp at 7 TeV
5.5±0.9±0.3		[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	$e^+e^- \to \Upsilon(5S)$
< 5.6	90	[4] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 09C
<261	90	[5] ABE	00C	SLD	$e^+e^- \to Z$
<210	90	[6] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
<260	90	[7] AKERS	94L	OPAL	$e^+e^- \to Z$

[1] AAIJ 12AR reports $[\Gamma(B_s^0 \to \pi^+K^-)/\Gamma_{total}] / [B(B^0 \to K^+\pi^-)] \times [\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0)] = 0.074 \pm 0.006 \pm 0.006$ which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \to B_s^0)/\Gamma(\overline{b} \to B^0) = 0.256 \pm 0.014$. 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 $[\Gamma(B_s^0 \to \pi^+K^-)/\Gamma_{total}] / [B(B^0 \to K^+\pi^-)] \times [B(\overline{b} \to B_s^0)] / [B(\overline{b} \to B^0)] = 0.071 \pm 0.010 \pm 0.007$ which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $B(\overline{b} \to B_s^0) = (10.3 \pm 0.5) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best 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) $(B(B_s \to \pi^+K^-) / B(B^0 \to K^+\pi^-)) < 0.08$ at 90% CL, 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 ± 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%).

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{91}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
25.2± 1.7 OUR AVERAGE					
24.2± 1.6±1.5		[1] AAIJ	12AR	LHCB	pp at 7 TeV
26.1± 2.2±1.7		[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 $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $\Gamma(\overline{b} \rightarrow B^0_s)/\Gamma(\overline{b} \rightarrow B^0) = 0.256 \pm 0.014$. 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 $f_s/f_d = 0.130 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[3] Uses $\Upsilon(10860) \rightarrow B^*_s \overline{B}^*_s$ 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) $(B(B_s \rightarrow K^+K^-) / B(B^0 \rightarrow K^+\pi^-)) = 0.46 \pm 0.08 \pm 0.07$, 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%).

$\Gamma(K^0\overline{K}^0)/\Gamma_{total}$ Γ_{92}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<6.6	90	[1] PENG	10	BELL	$e^+e^- \rightarrow \Upsilon(5S)$

[1] 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 $\Gamma(\Upsilon(10860) \rightarrow B^*_s \overline{B}^*_s) / \Gamma(\Upsilon(10860) \rightarrow B^{(*)}_s \overline{B}^{(*)}_s) = (90.1^{+3.8}_{-4.0})\%$.

$\Gamma(K^0\pi^+\pi^-)/\Gamma_{total}$ Γ_{93}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
15±4±1	[1] AAIJ	13BP	LHCB	pp at 7 TeV

[1] AAIJ 13BP reports $[\Gamma(B^0_s \rightarrow K^0\pi^+\pi^-)/\Gamma_{total}] / [B(B^0 \rightarrow K^0\pi^+\pi^-)] = 0.29 \pm 0.06 \pm 0.04$ which we multiply by our best value $B(B^0 \rightarrow K^0\pi^+\pi^-) = (5.20 \pm 0.24) \times 10^{-5}$. 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_{95}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
3.3±1.2±0.3	[1,2] AAIJ	14BM	LHCB	pp at 7 TeV

[1] AAIJ 14BM reports $[\Gamma(B^0_s \to K^*(892)^-\pi^+)/\Gamma_{total}] / [B(B^0 \to K^*(892)^+\pi^-)] = 0.39 \pm 0.13 \pm 0.05$ which we multiply by our best value $B(B^0 \to K^*(892)^+\pi^-) = (8.4 \pm 0.8) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(K^0 K^\pm \pi^\mp)/\Gamma_{total}$ Γ_{94}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
7.7±1.0±0.4	[1] AAIJ	13BP	LHCB	pp at 7 TeV

[1] AAIJ 13BP reports $[\Gamma(B^0_s \to K^0 K^\pm \pi^\mp)/\Gamma_{total}] / [B(B^0 \to K^0\pi^+\pi^-)] = 1.48 \pm 0.12 \pm 0.14$ which we multiply by our best value $B(B^0 \to K^0\pi^+\pi^-) = (5.20 \pm 0.24) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{total}$ Γ_{96}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.25±0.24±0.11	[1,2] AAIJ	14BM	LHCB	pp at 7 TeV

[1] AAIJ 14BM reports $[\Gamma(B^0_s \to K^*(892)^\pm K^\mp)/\Gamma_{total}] / [B(B^0 \to K^*(892)^+\pi^-)] = 1.49 \pm 0.22 \pm 0.18$ which we multiply by our best value $B(B^0 \to K^*(892)^+\pi^-) = (8.4 \pm 0.8) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(K^0_S \overline{K}^*(892)^0 + \text{c.c.})/\Gamma_{total}$ Γ_{97}/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 $B^0 \to K^0_S\pi^+\pi^-$ using the value of $B(B^0 \to K^0\pi^+\pi^-) = (4.96 \pm 0.2) \times 10^{-5}$.

$\Gamma(K^0 K^+ K^-)/\Gamma_{total}$ Γ_{98}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.5 × 10⁻⁶	90	[1] AAIJ	13BP	LHCB	pp at 7 TeV

[1] AAIJ 13BP reports $[\Gamma(B^0_s \to K^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \to K^0\pi^+\pi^-)] < 0.068$ which we multiply by our best value $B(B^0 \to K^0\pi^+\pi^-) = 5.20 \times 10^{-5}$.

$\Gamma(\overline{K}^*(892)^0\rho^0)/\Gamma_{total}$ Γ_{99}/Γ

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

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

$\Gamma(\overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{total}$ — Γ_{100}/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 $[\Gamma(B^0_s \to \overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{total}] / [B(B^0 \to K^*(892)^0 \phi)] = 1.11 \pm 0.22 \pm 0.12 \pm 0.06$ 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_{101}/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 $[\Gamma(B^0_s \to \phi K^*(892)^0)/\Gamma_{total}] / [B(B^0 \to K^*(892)^0 \phi)] = 0.113 \pm 0.024 \pm 0.016$ 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_{102}/Γ

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

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

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

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

$\Gamma(\Lambda_c^- \Lambda \pi^+)/\Gamma_{total}$ — Γ_{103}/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_{104}/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_{105}/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_{106}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
35.2± 3.4 OUR AVERAGE					
36 ± 5 ± 7		[1] DUTTA	15	BELL	$e^+ e^- \to \Upsilon(5S)$
35.1± 3.5± 1.2		[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 $B(B^0 \to K^*(892)^0 \gamma) = (4.33 \pm 0.15) \times 10^{-5}$. 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_{107}/Γ

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

VALUE (units 10^{-9})	CL%	DOCUMENT ID	TECN	COMMENT
$\mathbf{2.9^{+0.7}_{-0.6}}$ **OUR AVERAGE**				
$2.8^{+0.7}_{-0.6}$		[1] KHACHATRY...15BE	LHC	pp at 7, 8 TeV
$13\ ^{+9}_{-7}$		[2] AALTONEN 13F	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.2^{+1.4}_{-1.2}{}^{+0.5}_{-0.3}$		[3] AAIJ 13B	LHCB	Repl. by AAIJ 13BA
$2.9^{+1.1}_{-1.0}{}^{+0.3}_{-0.1}$		[4] AAIJ 13BA	LHCB	Repl. by KHACHATRYAN 15BE
$<$ 12	90	[5] ABAZOV 13C	D0	$p\overline{p}$ at 1.96 TeV
$3.0^{+1.0}_{-0.9}$		[6] CHATRCHYAN 13AW	CMS	Repl. by KHACHATRYAN 15BE
$<$ 19	90	[7] AAD 12AE	ATLS	pp at 7 TeV
$<$ 12	90	[8] AAIJ 12A	LHCB	Repl. by AAIJ 12W
$<$ 3.8	90	[9] AAIJ 12W	LHCB	Repl. by AAIJ 13B
$<$ 6.4	90	[10] CHATRCHYAN 12A	CMS	pp at 7 TeV
$<$ 43	90	[11] AAIJ 11B	LHCB	Repl. by AAIJ 12A
$<$ 35	90	[12] AALTONEN 11AG	CDF	$p\overline{p}$ at 1.96 TeV
$<$ 16	90	[13] CHATRCHYAN 11T	CMS	Repl. by CHATRCHYAN 12A
$<$ 42	90	[14] ABAZOV 10S	D0	$p\overline{p}$ at 1.96 TeV
$<$ 47	90	[14] AALTONEN 08I	CDF	Repl. by AALTONEN 11AG
$<$ 94	90	[15] ABAZOV 07Q	D0	Repl. by ABAZOV 10S
$<$ 410	90	[16] ABAZOV 05E	D0	$p\overline{p}$ at 1.96 TeV
$<$ 150	90	[17] ABULENCIA 05	CDF	$p\overline{p}$ at 1.96 TeV
$<$ 580	90	[18] ACOSTA 04D	CDF	$p\overline{p}$ at 1.96 TeV
$<$ 2000	90	[19] ABE 98	CDF	$p\overline{p}$ at 1.8 TeV
$<$38000	90	[20] ACCIARRI 97B	L3	$e^+e^- \rightarrow Z$
$<$ 8400	90	[21] ABE 96L	CDF	Repl. by ABE 98

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

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

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

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

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

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

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

[8] 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($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = $(6.01 \pm 0.21) \times 10^{-5}$, B($B^0 \to K^+\pi^-$) = $(1.94 \pm 0.06) \times 10^{-5}$, and B($B^0_s \to J/\psi\phi \to \mu^+\mu^- K^+ K^-$) = $(3.4 \pm 0.9) \times 10^{-5}$.

[9] 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 $B^0_s \to J/\psi\phi$.

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

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

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

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

[14] 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.

[15] Uses B production ratio f($\overline{b} \to B^+$)/f($\overline{b} \to B^0_s$) = 3.86 ± 0.54 and the number of $B^+ \to J/\psi K^+$ decays.

[16] Assumes production cross-section $\sigma(B_s)/\sigma(B^+) = 0.270 \pm 0.034$.

[17] Assumes production cross section $\sigma(B^+)/\sigma(B_s) = 3.71 \pm 0.41$ and B($B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+$) = $(5.88 \pm 0.26) \times 10^{-5}$.

[18] Assumes production cross-section $\sigma(B_s)/\sigma(B^+) = 0.100/0.391$ and the CDF measured value of $\sigma(B^+) = 3.6 \pm 0.6\ \mu$b.

[19] ABE 98 assumes production of $\sigma(B^0) = \sigma(B^+)$ and $\sigma(B_s)/\sigma(B^0) = 1/3$. They normalize to their measured $\sigma(B^0, p_T(B) > 6, |y| < 1.0) = 2.39 \pm 0.32 \pm 0.44\ \mu$b.

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

[21] ABE 96L assumes B^+/B_s production ratio 3/1. They normalize to their measured $\sigma(B^+, p_T(B) > 6$ GeV/c, $|y| < 1) = 2.39 \pm 0.54\ \mu$b.

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_{108}/Γ

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

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

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

$\Gamma(\mu^+\mu^-\mu^+\mu^-)/\Gamma_{total}$ — Γ_{109}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-8}$	90	[1] AAIJ	13AW	LHCB	pp at 7 TeV

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

$\Gamma(SP,\ S \to \mu^+\mu^-,\ P \to \mu^+\mu^-)/\Gamma_{total}$ — Γ_{110}/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
$<1.2 \times 10^{-8}$	90	[1] AAIJ	13AW	LHCB	pp at 7 TeV

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

$\Gamma(\phi(1020)\mu^+\mu^-)/\Gamma_{total}$ — Γ_{111}/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_{111}/Γ_{44}

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
0.76 ±0.09 OUR AVERAGE		Error includes scale factor of 1.9.		
$0.741^{+0.042}_{-0.040}\pm0.029$		AAIJ 15AQ	LHCB	pp at 7, 8 TeV
$1.13 \pm0.19 \pm0.07$		AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.674^{+0.061}_{-0.056}\pm0.016$		[1] AAIJ 13X	LHCB	Repl. by AAIJ 15AQ
$1.11 \pm0.25 \pm0.09$		AALTONEN 11L	CDF	Repl. by AALTONEN 11AI
< 2.3	90	AALTONEN 09B	CDF	Repl. by AALTONEN 11L

[1] Replaced by AAIJ 15AQ.

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}$ — Γ_{112}/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 $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.28 \pm 0.05) \times 10^{-3}$. 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_{113}/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_{114}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.1 \times 10^{-8}$	90	[1] AAIJ 13BM	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<2.0 \times 10^{-7}$	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	[2] ACCIARRI 97B	L3	$e^+e^- \to Z$

[1] Uses normalization mode $B(B^0 \to K^+\pi^-) = (19.4 \pm 0.6) \times 10^{-6}$ and B production ratio $f(\overline{b} \to B_s^0)/f(\overline{b} \to B_d^0) = 0.256 \pm 0.020$.

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

POLARIZATION IN B_s^0 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 ($\|$), or perpendicular ($\perp$) to each other with the parameters Γ_L/Γ, $\Gamma_\perp/\Gamma$, and the relative phases $\phi_\|$ and $\phi_\perp$. See the definitions in the note on "Polarization in B Decays" review in the B^0 Particle Listings.

Γ_L/Γ in $B_s^0 \to D_s^* \rho^+$

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 $B_s^0 \to J/\psi(1S)\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.528 ±0.006 OUR AVERAGE				
0.5241±0.0034±0.0067	AAIJ	15I	LHCB	pp at 7, 8 TeV
0.529 ±0.006 ±0.012	[1] AAD	14U	ATLS	pp at 7 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
$0.56 \pm0.21 {}^{+0.02}_{-0.04}$	ABE	95Z	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.539 ±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

[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 $0.23 \pm 0.19 \pm 0.04$.

[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
$\mathbf{0.06^{+0.18}_{-0.17}\pm0.03}$	ESEN	13	BELL	$e^+e^- \to \Upsilon(5S)$

$\Gamma_\|/\Gamma$ in $B_s^0 \to J/\psi(1S)\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.224±0.010 OUR AVERAGE				
0.220±0.008±0.009	[1] AAD	14U	ATLS	pp at 7 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. • • •

$0.224 \pm 0.010 \pm 0.009$	[2] AAD	12CV	ATLS	Repl. by AAD 14U
$0.244 \pm 0.032 \pm 0.014$	[4] ABAZOV	09E	D0	Repl. by ABAZOV 12D
$0.230 \pm 0.029 \pm 0.011$	[2] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$0.260 \pm 0.084 \pm 0.013$	ACOSTA	05	CDF	Repl. by AALTONEN 08J

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
$0.2504 \pm 0.0049 \pm 0.0036$	AAIJ	15I	LHCB	pp at 7, 8 TeV

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

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
$3.23^{+0.10}_{-0.14}$ OUR AVERAGE				
$3.26^{+0.10}_{-0.17}{}^{+0.06}_{-0.07}$	AAIJ	15I	LHCB	pp at 7, 8 TeV
3.15 ± 0.22	[1] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.72^{+1.12}_{-0.27} \pm 0.26$	ABAZOV	09E	D0	Repl. by ABAZOV 12D

[1] 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
3.16 ± 0.24 OUR AVERAGE Error includes scale factor of 1.6.				
$3.08^{+0.14}_{-0.15} \pm 0.06$	AAIJ	15I	LHCB	pp at 7, 8 TeV
$3.89 \pm 0.47 \pm 0.11$	[1] AAD	14U	ATLS	pp at 7 TeV

[1] Measured using a tagged, time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ 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
$0.497 \pm 0.025 \pm 0.025$	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 $B_s^0 \rightarrow J/\psi(1S)\overline{K}^*(892)^0$

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±0.027±0.013	AAIJ	15AV	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.19\ ^{+0.10}_{-0.08}\ \pm0.02$	[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 $B_s^0 \rightarrow \psi(2S)\overline{K}^*(892)^0$

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

Γ_L/Γ in $B_s^0 \rightarrow \phi\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.362±0.014 OUR AVERAGE				
0.364±0.012±0.009	AAIJ	14AE	LHCB	pp at 7, 8 TeV
0.348±0.041±0.021	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.365±0.022±0.012	AAIJ	12P	LHCB	Repl. by AAIJ 14AE

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.309±0.015 OUR AVERAGE	Error includes scale factor of 1.1.			
0.305±0.013±0.005	AAIJ	14AE	LHCB	pp at 7, 8 TeV
0.365±0.044±0.027	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.291±0.024±0.010	AAIJ	12P	LHCB	Repl. by AAIJ 14AE

$\phi_\parallel$ in $B_s^0 \rightarrow \phi\phi$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.55±0.11 OUR AVERAGE				
2.54±0.07±0.09	[1] AAIJ	14AE	LHCB	pp at 7, 8 TeV
$2.71^{+0.31}_{-0.36}\pm0.22$	[2] AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.57±0.15±0.06	[3] AAIJ	12P	LHCB	Repl. by AAIJ 14AE

[1] 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.

[2] 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.

[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 $B_s^0 \rightarrow \phi\phi$

VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.67±0.23±0.07	AAIJ	14AE	LHCB	pp at 7, 8 TeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.201±0.057±0.040	[1] AAIJ	15AF	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.31 ±0.12 ±0.04	AAIJ	12F	LHCB	Repl. by AAIJ 15AF

[1] 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
0.215±0.046±0.015	AAIJ	15AF	LHCB	pp at 7 TeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
5.31±0.24±0.14	AAIJ	15AF	LHCB	pp at 7 TeV

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

$\Gamma_\parallel$ /Γ 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.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($0.10 < q^2 < 2.00$ GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
$0.20^{+0.08}_{-0.09}\pm0.02$	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
$0.68^{+0.16}_{-0.13}\pm0.03$	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
$\mathbf{0.29\pm0.11\pm0.04}$	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.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($15.0< q^2 < 17.0$ GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.23^{+0.09}_{-0.08}\pm0.02}$	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.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($17.0 < q^2 < 19.0$ GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.40^{+0.13}_{-0.15}\pm0.02}$	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.

$F_L(B_s^0 \to \phi\mu^+\mu^-)$ ($1.00 < q^2 < 6.00$ GeV^2/c^4)

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.63^{+0.09}_{-0.09}\pm0.03}$	AAIJ 15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.56^{+0.17}_{-0.16}\pm0.09$	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 (HFAG) by taking into account correlations between measurements.

VALUE (10^{12} $\hbar$ s^{-1})	CL%	DOCUMENT ID		TECN	COMMENT
17.757±0.021 OUR EVALUATION					
17.756±0.021 OUR AVERAGE					
$17.711^{+0.055}_{-0.057}\pm0.011$		[1] AAIJ	15I	LHCB	pp at 7, 8 TeV
17.768±0.023±0.006		[2] AAIJ	13BI	LHCB	pp at 7 TeV
17.93 ±0.22 ±0.15		[3] AAIJ	13CF	LHCB	pp at 7 TeV
17.63 ±0.11 ±0.02		[4] AAIJ	12I	LHCB	pp at 7 TeV
17.77 ±0.10 ±0.07		[5] ABULENCIA,A	06G	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
17–21	90	[6] ABAZOV	06B	D0	$p\overline{p}$ at 1.96 TeV
$17.31^{+0.33}_{-0.18}\pm0.07$		[7] ABULENCIA	06Q	CDF	Repl. by ABULENCIA,A 06G
>8.0	95	[8] ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
>4.9	95	[9] ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
>8.5	95	[10] ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
>5.0	95	[11] ABDALLAH	03B	DLPH	$e^+e^- \rightarrow Z$
>10.3	95	[12] ABE	03	SLD	$e^+e^- \rightarrow Z$
>10.9	95	[13] HEISTER	03E	ALEP	$e^+e^- \rightarrow Z$
>5.3	95	[14] ABE	02V	SLD	$e^+e^- \rightarrow Z$
>1.0	95	[15] ABBIENDI	01D	OPAL	$e^+e^- \rightarrow Z$
>7.4	95	[16] ABREU	00Y	DLPH	Repl. by ABDALLAH 04J
>4.0	95	[17] ABREU,P	00G	DLPH	$e^+e^- \rightarrow Z$

$>$ 5.2	95	[18] ABBIENDI	99S	OPAL	$e^+ e^- \rightarrow Z$
$<$96	95	[19] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
$>$ 5.8	95	[20] ABE	99J	CDF	$p\overline{p}$ at 1.8 TeV
$>$ 9.6	95	[21] BARATE	99J	ALEP	$e^+ e^- \rightarrow Z$
$>$ 7.9	95	[22] BARATE	98C	ALEP	Repl. by BARATE 99J
$>$ 3.1	95	[23] ACKERSTAFF	97U	OPAL	Repl. by ABBIENDI 99S
$>$ 2.2	95	[24] ACKERSTAFF	97V	OPAL	Repl. by ABBIENDI 99S
$>$ 6.5	95	[25] ADAM	97	DLPH	Repl. by ABREU 00Y
$>$ 6.6	95	[26] BUSKULIC	96M	ALEP	Repl. by BARATE 98C
$>$ 2.2	95	[24] AKERS	95J	OPAL	Sup. by ACKERSTAFF 97V
$>$ 5.7	95	[27] BUSKULIC	95J	ALEP	$e^+ e^- \rightarrow Z$
$>$ 1.8	95	[24] BUSKULIC	94B	ALEP	$e^+ e^- \rightarrow Z$

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

[2] Measured using $B_s^0 \rightarrow D_s^- \pi^+$ decays.

[3] Measured using $B_s^0 \rightarrow D_s^- \mu^+ \nu_\mu X$ decays.

[4] Measured using $B_s^0 \rightarrow D_s^- \pi^+$ and $D_s^- \pi^+ \pi^- \pi^+$ decays.

[5] Significance of oscillation signal is 5.4 σ. Also reports $|V_{td} / V_{ts}| = 0.2060 \pm 0.0007^{+0.0081}_{-0.0060}$.

[6] 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

[7] Significance of oscillation signal is 0.2%. Also reported the value $|V_{td} / V_{ts}| = 0.208^{+0.001}_{-0.002}{}^{+0.008}_{-0.006}$.

[8] Uses leptons emitted with large momentum transverse to a jet and improved techniques for vertexing and flavor-tagging.

[9] Updates of D_s-lepton analysis.

[10] Combined results from all Delphi analyses.

[11] Events with a high transverse momentum lepton were removed and an inclusively reconstructed vertex was required.

[12] ABE 03 uses the novel "charge dipole" technique to reconstruct separate secondary and tertiary vertices originating from the $B \rightarrow D$ decay chain. The analysis excludes Δm_s $<$4.9 ps^{-1} and 7.9$<$ Δm_s $<$10.3 ps^{-1}.

[13] Three analyses based on complementary event selections: (1) fully-reconstructed hadronic decays; (2) semileptonic decays with D_s exclusively reconstructed; (3) inclusive semileptonic decays.

[14] 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.

[15] Uses fully or partially reconstructed $D_s \ell$ vertices and a mixing tag as a flavor tagging.

[16] Replaced by ABDALLAH 04A. Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices, and a multi-variable discriminant as a flavor tagging.

[17] Uses inclusive D_s vertices and fully reconstructed B_s decays and a multi-variable discriminant as a flavor tagging.

[18] Uses ℓ-$Q_{\rm hem}$ and ℓ-ℓ.

[19] ABE 99D assumes $\tau_{B_s^0}$= 1.55 $\pm$ 0.05 ps and $\Delta\Gamma/\Delta m$= (5.6 $\pm$ 2.6) $\times$ 10^{-3}.

[20] ABE 99J uses ϕ ℓ-ℓ correlation.

[21] BARATE 99J uses combination of an inclusive lepton and D_s^--based analyses.

[22] BARATE 98C combines results from $D_s\,h$-$\ell/Q_{\rm hem}$, $D_s\,h$-K in the same side, $D_s\,\ell$-$\ell/Q_{\rm hem}$ and $D_s\,\ell$-K in the same side.
[23] Uses ℓ-$Q_{\rm hem}$.
[24] Uses ℓ-ℓ.
[25] ADAM 97 combines results from $D_s\,\ell$-$Q_{\rm hem}$, ℓ-$Q_{\rm hem}$, and ℓ-ℓ.
[26] BUSKULIC 96M uses D_s lepton correlations and lepton, kaon, and jet charge tags.
[27] BUSKULIC 95J uses ℓ-$Q_{\rm hem}$. They find $\Delta m_s > 5.6$ [> 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 (HFAG) from the results on $\Delta m_{B^0_s}$ and "OUR EVALUATION" of the B^0_s mean lifetime.

VALUE	*DOCUMENT ID*
26.81±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*
0.499308±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 using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/scaling procedure takes into account correlation between the measurements. The value has been obtained from a 2D fit of the B_d and B_s asymmetries, which includes the B_s measurements listed below and the B factory average for the B_d.

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*COMMENT*
−1.9 ±1.0 OUR EVALUATION				
−1.5 ±1.0 OUR AVERAGE				
−0.15±1.25±0.90	[1] AAIJ	14D	LHCB	pp at 7 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. • • •				
−4.5 ±2.7	[4] ABAZOV	11U	D0	Repl. by ABAZOV 14
−0.4 ±2.3 ±0.4	[5] ABAZOV	10E	D0	Repl. by ABAZOV 13
−3.6 ±1.9	[6] ABAZOV	10H	D0	Repl. by ABAZOV 11U
6.1 ±4.8 ±0.9	[7] ABAZOV	07A	D0	Repl. by ABAZOV 10E

[1] AAIJ 14D reports a measurement of time-integrated flavor-specific asymmetry in $B_s^0 \to \mu^+ D_s^- X$ decays $a_{sl}^s = (-0.06 \pm 0.50 \pm 0.36)\%$ which is approximately equal to 4 × Re($\epsilon_{B_s^0}$) / (1 + $|\epsilon_{B_s^0}|^2$).

[2] ABAZOV 14 uses the dimuon charge asymmetry with different impact parameters from which it reports $A_{SL}^s = (-0.86 \pm 0.74) \times 10^{-2}$.

[3] ABAZOV 13 reports a measurement of time-integrated flavor-specific asymmetry in mixed semileptonic $B_s^0 \to \mu^+ D_s^- X$ decays $A_s^{SL} = (-1.12 \pm 0.74 \pm 0.17)\%$ which is approximately equal to 4 × Re($\epsilon_{B_s^0}$) / (1 + $|\epsilon_{B_s^0}|^2$).

[4] ABAZOV 11U uses the dimuon charge asymmetry with different impact parameters from which it reports $A_{SL}^s = (-18.1 \pm 10.6) \times 10^{-3}$.

[5] ABAZOV 10E reports a measurement of flavor-specific asymmetry in $B_{(s)}^0 \to \mu^+ D_{(s)}^{*-} X$ decays with a decay-time analysis including initial-state flavor tagging, $A_{SL}^s = (-1.7 \pm 9.1^{+1.4}_{-1.5}) \times 10^{-3}$ which is approximately equal to 4 × Re($\epsilon_{B_s^0}$) / (1 + $|\epsilon_{B_s^0}|^2$).

[6] ABAZOV 10H reports a measurement of like-sign dimuon charge asymmetry of $A_{SL}^b = (-9.57 \pm 2.51 \pm 1.46) \times 10^{-3}$ 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 $A_{SL}^d = (-4.7 \pm 4.6) \times 10^{-3}$ measured from B-factories, they obtain the asymmetry for B_s^0.

[7] The first direct measurement of the time integrated flavor untagged charge asymmetry in semileptonic B_s^0 decays is reported as 2xA_{SL}^s(untagged) = A_{SL}^s = $(2.45 \pm 1.93 \pm 0.35) \times 10^{-2}$.

$C_{KK}(B_s^0 \to K^+ K^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.14±0.11±0.03	AAIJ	13BO	LHCB	pp at 7 TeV

$S_{KK}(B_s^0 \to K^+ K^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.30±0.12±0.04	AAIJ	13BO	LHCB	pp at 7 TeV

γ

For angle $\gamma(\phi_3)$ of the CKM unitarity triangle, see the review on "CP Violation" in the Reviews section.

VALUE (°)	DOCUMENT ID		TECN	COMMENT
65 ± 7 OUR AVERAGE				
$63.5^{+7.2}_{-6.7}$	[1,2] AAIJ	15K	LHCB	pp at 7, 8 TeV
115^{+28}_{-43}	[3] AAIJ	14BF	LHCB	pp at 7 TeV

[1] Obtained by measuring time-dependent CP asymmetry in $B_s^0 \to K^+ K^-$ and using a U-spin relation between $B_s^0 \to K^+ K^-$ and $B^0 \to \pi^+ \pi^-$.

[2] 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.

[3] Measured in $B_s^0 \to D_s^{\mp} K^{\pm}$ 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.

$\delta_B(B_s^0 \to D_s^\pm K^\mp)$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
3^{+19}_{-20}	[1] AAIJ 14BF	LHCB	pp at 7 TeV

[1] Measured in $B_s^0 \to D_s^\mp K^\pm$ 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.

$r_B(B_s^0 \to D_s^\mp K^\pm)$

r_B and δ_B are the amplitude ratio and relative strong phase between the amplitudes of $A(B_s^0 \to D_s^+ K^-)$ and $A(B_s^0 \to D_s^- K^+)$,

VALUE	DOCUMENT ID	TECN	COMMENT
$0.53^{+0.17}_{-0.16}$	[1] AAIJ 14BF	LHCB	pp at 7 TeV

[1] Measured in $B_s^0 \to D_s^\mp K^\pm$ 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.

CP Violation phase β_s

$-2\beta_s$ is the weak phase difference between B_s^0 mixing amplitude and the $B_s^0 \to J/\psi\phi$ decay amplitude driven by the $b \to c\overline{c}s$ transition (such as $B_s \to J/\psi\phi$, $J/\psi K^+ K^-$, $J/\psi\pi^+\pi^-$, 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 (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/scaling procedure takes into account correlation between the measurements.

VALUE (10^{-2} rad)	DOCUMENT ID	TECN	COMMENT
0.6 ± 1.9 OUR EVALUATION			
1.1 ± 1.9 OUR AVERAGE			
2.9 ± 2.5 ±0.3	[1] AAIJ 15I	LHCB	pp at 7, 8 TeV
6^{+8}_{-7}	[2,3] AAIJ 15K	LHCB	pp at 7, 8 TeV
−6 ±13 ±3	[4] AAD 14U	ATLS	pp at 7 TeV
−1 ± 9 ±1	[5] AAIJ 14AY	LHCB	pp at 7, 8 TeV
−3.5 ± 3.4 ±0.4	[6] AAIJ 14S	LHCB	pp at 7, 8 TeV
	[7] AALTONEN 12AJ	CDF	$p\overline{p}$ at 1.96 TeV
28^{+18}_{-19}	[8,9] ABAZOV 12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
−17 ±15 ±3	[10] AAIJ 14AE	LHCB	pp at 7, 8 TeV
−0.5 ± 3.5 ±0.5	[11] AAIJ 13AR	LHCB	Repl. by AAIJ 15I
	[12] AAIJ 13AY	LHCB	pp at 7 TeV
−11.0 ±20.5 ±5.0	[13] AAD 12CV	ATLS	Repl. by AAD 14U
22 ±22 ±1	[14] AAIJ 12B	LHCB	Repl. by AAIJ 12Q
−8 ± 9 ±3	[15] AAIJ 12D	LHCB	Repl. by AAIJ 13AR

$0.95^{+\ 8.70+0.15}_{-\ 8.65-0.20}$	[16] AAIJ	12Q	LHCB	Repl. by AAIJ 13AR
	[17] AALTONEN	12D	CDF	Repl. by AALTONEN 12AJ
	[18] AALTONEN	08G	CDF	Repl. by AALTONEN 12D
$28\ {}^{+12}_{-15}\ {}^{+4}_{-1}$	[8,19] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
$39.5\ \pm 28.0\ {}^{+0.5}_{-7.0}$	[9,20] ABAZOV	07	D0	Repl. by ABAZOV 07N
$35\ {}^{+20}_{-24}$	[9,21] ABAZOV	07N	D0	Repl. by ABAZOV 08AM

[1] AAIJ 15I reports $\phi_s = -2\,\beta_s = -0.058 \pm 0.049 \pm 0.006$ rad. that was measured using a tagged, time-dependent angular analysis of $B^0_s \rightarrow J/\psi K^+ K^-$ decays. It also combines this result with that of AAIJ 14S and quotes $\phi_s = -2\,\beta_s = -0.010 \pm 0.039$ rad.

[2] AAIJ 15K reports $-2\beta_s = -0.12^{+0.14}_{-0.16}$ rad. The value was obtained by measuring time-dependent CP asymmetry in $B^0_s \rightarrow K^+ K^-$ and using a U-spin relation between $B^0_s \rightarrow K^+ K^-$ and $B^0 \rightarrow \pi^+ \pi^-$.

[3] Results are also presented using additional inputs on $B^0 \rightarrow \pi^0 \pi^0$ and $B^+ \rightarrow \pi^+ \pi^0$ 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.

[4] AAD 14U reports $\phi_s = -2\,\beta_s = 0.12 \pm 0.25 \pm 0.05$ rad. that was measured using a tagged, time-dependent angular analysis of $B^0_s \rightarrow J/\psi \phi$ decays.

[5] AAIJ 14AY reports $\phi_s = -2\,\beta_s = 0.02 \pm 0.17 \pm 0.02$ rad. in tagged, time-dependent fit to $B^0_s \rightarrow D^+_s D^-_s$, while allowing CP violation in decay.

[6] 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 tagged, time-dependent fit to $B^0_s \rightarrow J/\psi \pi^+ \pi^-$ decays.

[7] 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 $B^0_s \rightarrow J/\psi \phi$ decays.

[8] Measured using fully reconstructed $B_s \rightarrow J/\psi \phi$ decays. A single error includes both statistical and systematic uncertainties.

[9] Reports ϕ_s which equals to $-2\beta_s$.

[10] Measured in $B^0_s \rightarrow \phi \phi$ decays. This is a $b \rightarrow s\overline{s}s$ transition with a decay amplitude phase different from that of $b \rightarrow c\overline{c}s$ transition.

[11] AAIJ 13AR reports $\phi_s = -2\beta_s = 0.01 \pm 0.07 \pm 0.01$ rad. obtained from combined fit to $B^0_s \rightarrow J/\psi K^+ K^-$ and $B^0_s \rightarrow J/\psi \pi^+ \pi^-$ data sets. Also reports separate results of $\phi_s = 0.07 \pm 0.09 \pm 0.01$ rad. from $B^0_s \rightarrow J/\psi K^+ K^-$ decays and $\phi_s = -0.14^{+0.17}_{-0.16} \pm 0.01$ rad. from $B^0_s \rightarrow J/\psi \pi^+ \pi^-$ decays.

[12] AAIJ 13AY uses $B^0_s \rightarrow \phi \phi$ mode, and reports the 68% CL interval of $\phi_s = -2\,\beta_s$ as $[-2.46, -0.76]$ rad.

[13] 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 $B^0_s \rightarrow J/\psi \phi$ decays.

[14] Reports $\phi_s = -2\,\beta_s = -0.44 \pm 0.44 \pm 0.02$ rad. that was measured using a time-dependent fit to $B^0_s \rightarrow J/\psi f_0(980)$ decays.

[15] 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 $B^0_s \rightarrow J/\psi \phi$ decays.

[16] 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 $B_s^0 \rightarrow J/\psi\pi^+\pi^-$ decays, with the $\pi^+\pi^-$ mass within 775–1550 MeV. Searches for, but finds no evidence, for direct *CP* violation in $B_s^0 \rightarrow J/\psi\pi\pi$ decays.

[17] 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 $B_s^0 \rightarrow J/\psi\phi$ decays.

[18] 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 $B_s^0 \rightarrow J/\psi\phi$ decays using flavor tagging. The probability of a deviation from SM prediction as large as the level of observed data is 15%.

[19] Reports $\phi_s = -2\,\beta_s$ and obtains 90% CL interval $-0.03 < \beta_s < 0.60$ rad.

[20] The first direct measurement of the *CP*-violating mixing phase is reported from the time-dependent analysis of flavor untagged $B_s^0 \rightarrow J/\psi\phi$ decays.

[21] Combines D0 collaboration 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.

$|\lambda|$ ($B_s^0 \rightarrow J/\psi(1S)\phi$)

VALUE	DOCUMENT ID		TECN	COMMENT
0.964±0.019±0.007	AAIJ	15I	LHCB	pp at 7, 8 TeV

$|\lambda|$

VALUE	DOCUMENT ID		TECN	COMMENT
1.02±0.07 OUR AVERAGE				
1.04±0.07±0.03	[1] AAIJ	14AE	LHCB	pp at 7, 8 TeV
$0.91^{+0.18}_{-0.15}\pm0.02$	[2] AAIJ	14AY	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \rightarrow \phi\phi$ decays.

[2] Measured in $B_s^0 \rightarrow D_s^+ D_s^-$ decays.

A, *CP* violation parameter

$A = -2\,\mathrm{Re}(\lambda)\,/\,(1 + |\lambda|^2)$

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.49^{+0.77}_{-0.65}\pm0.06}$	[1] AAIJ	15AL	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \rightarrow J/\psi K_S^0$ decays.

C, *CP* violation parameter

$C = (1 - |\lambda|^2)\,/\,(1 + |\lambda|^2)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.28±0.41±0.08	[1] AAIJ	15AL	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \rightarrow J/\psi K_S^0$ decays.

S, *CP* violation parameter

$S = -2\,\mathrm{Im}(\lambda)\,/\,(1 + |\lambda|^2)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.08±0.40±0.08	[1] AAIJ	15AL	LHCB	pp at 7, 8 TeV

[1] Measured in $B_s^0 \rightarrow J/\psi K_S^0$ 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
0.263±0.035 OUR AVERAGE				
0.22 ±0.07 ±0.02	AALTONEN	14P	CDF	$p\overline{p}$ at 1.96 TeV
0.27 ±0.04 ±0.01	AAIJ	13AX	LHCB	pp at 7 TeV
0.39 ±0.15 ±0.08	AALTONEN	11N	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27 ±0.08 ±0.02	AAIJ	12V	LHCB	Repl. by AAIJ 13AX

$A_{CP}(B^0_s \to [K^+ K^-]_D \overline{K}^*(892)^0)$

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

CPT VIOLATION PARAMETERS

In the B^0_s mixing, propagating mass eigenstates can be written as

$$|B_{sL}\rangle \propto \text{ p } \sqrt{1-\xi}\; |B^0_s\rangle + \text{ q } \sqrt{1+\xi}\; |\overline{B}^0_s\rangle$$
$$|B_{sH}\rangle \propto \text{ p } \sqrt{1+\xi}\; |B^0_s\rangle - \text{ q } \sqrt{1-\xi}\; |\overline{B}^0_s\rangle$$

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 (GeV)	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-12}$	95	[1] ABAZOV	15L	D0	$p\overline{p}$ at 1.96 TeV

[1] 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.

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($B_s \to \phi \ell^+ \ell^-$) ($2.0 < q^2 < 5.0$ 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
$0.58\ \pm 0.55\ \pm 0.19$	[2] AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B_s^0 \to \phi \mu^+ \mu^-$ decays.
[2] Measured in $2<q^2<4.3$ GeV^2/c^4.

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
$1.34 \pm 0.83 \pm 0.43$	[2] AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Measured in $B_s^0 \to \phi \mu^+ \mu^-$ decays.
[2] Measured in $4.3<q^2<8.68$ GeV^2/c^4.

$B(B_s \to \phi \ell^+ \ell^-)$ ($11.0 < q^2 < 12.5$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.71±0.10±0.06	[1] AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.18^{+0.22}_{-0.21}\pm0.14$	[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.

$B(B_s \to \phi \ell^+ \ell^-)$ ($15.0 < q^2 < 17.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.90 ±0.11 ±0.07	[1] AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.760^{+0.189}_{-0.169}\pm0.087$	[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 $14.18<q^2<16$ GeV^2/c^4.

$B(B_s \to \phi \ell^+ \ell^-)$ ($17.0 < q^2 < 19.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.79±0.11±0.07	[1] AAIJ	15AQ	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.06^{+0.23}_{-0.21}\pm0.12$	[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 $16<q^2<19$ GeV^2/c^4.

$B(B_s \to \phi \ell^+ \ell^-)$ ($1.0 < q^2 < 6.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
1.28±0.18 OUR AVERAGE				
1.29±0.16±0.10	[1] AAIJ	15AQ	LHCB	pp at 7, 8 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. • • •				
$1.14^{+0.25}_{-0.23}\pm0.13$	[1] AAIJ	13X	LHCB	Repl. by AAIJ 15AQ

[1] Measured in $B^0_s \to \phi \mu^+ \mu^-$ decays.

$B(B_s \to \phi \ell^+ \ell^-)$ ($0.0 < q^2 < 4.3$ 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
1.09±2.61±0.66	[1] AAIJ	14BP	LHCB	pp at 7 TeV

[1] Based on time-dependent analysis of $B_s^0 \rightarrow D_s^- \pi^+$ in kinematic range $4 < p_T < 30$ GeV/c and $2.5 < \eta < 4.5$.

B_s^0 REFERENCES

AAIJ	16	JHEP 1601 012	R. Aaij et al.	(LHCb 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.	(LHCb Collab., CMS Collab.)
OSWALD	15	PR D92 072013	C. Oswald et al.	(BELLE Collab.)
AAD	14U	PR D90 052007	G. Aad et al.	(ATLAS Collab.)
AAIJ	14	PRL 112 011801	R. Aaij et al.	(LHCb 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	CPC 38 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, et al	(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	08I	PRL 100 101802	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	07Q	PR D76 092001	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	05E	PRL 94 071802	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV	05W	PRL 95 171801	V.M. Abazov *et al.*	(D0 Collab.)
ABULENCIA	05	PRL 95 221805	A. Abulencia *et al.*	(CDF Collab.)
Also		PRL 95 249905 (errat.)	A. Abulencia *et al.*	(CDF 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.)
ACOSTA	04D	PRL 93 032001	D. Acosta *et al.*	(CDF 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	98	PR D57 R3811	F. Abe *et al.*	(CDF 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	96L	PRL 76 4675	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.)