B_s^0

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

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

B_s^0 MASS

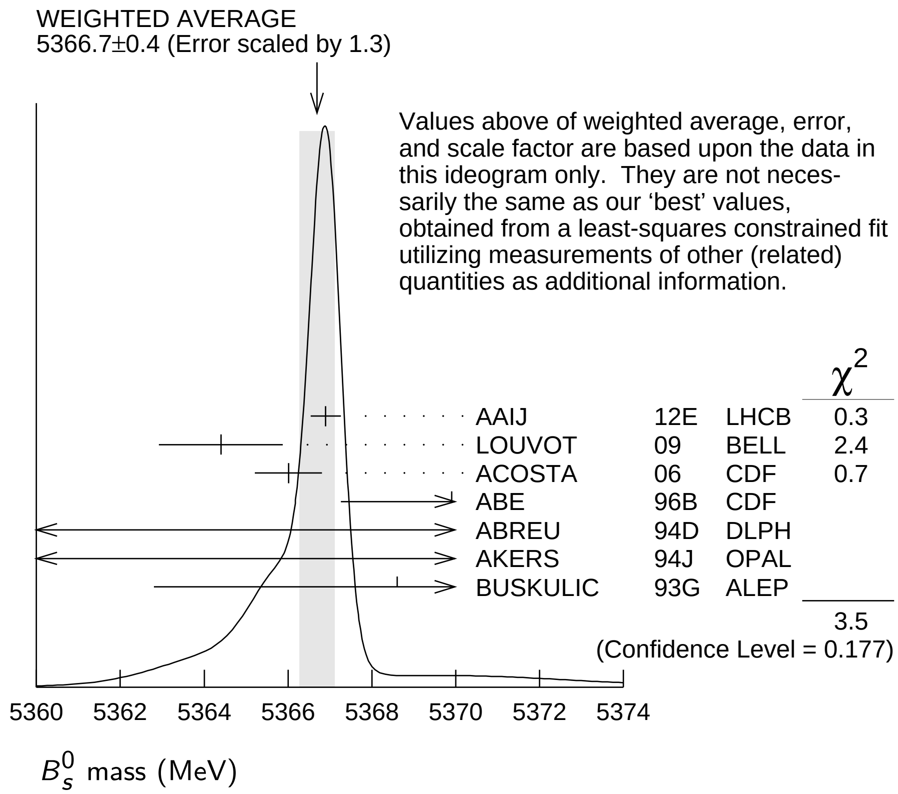
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5366.77± 0.24 OUR FIT					
5366.7 ± 0.4 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
5366.90± 0.28±0.23		[1] AAIJ	12E	LHCB	pp at 7 TeV
5364.4 ± 1.3 ±0.7		LOUVOT	09	BELL	$e^+e^- \to \Upsilon(5S)$
5366.01± 0.73±0.33		[2] 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	$e^+e^- \to Z$
5359 ±19 ±7	1	[3] AKERS	94J	OPAL	$e^+e^- \to Z$
5368.6 ± 5.6 ±1.5	2	BUSKULIC	93G	ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5370 ± 1 ±3		DRUTSKOY	07A	BELL	Repl. by LOUVOT 09
5370 ±40	6	[4] AKERS	94J	OPAL	$e^+e^- \to Z$
5383.3 ± 4.5 ±5.0	14	ABE	93F	CDF	Repl. by ABE 96B

[1] Uses $B_s^0 \to J/\psi\phi$ fully reconstructed decays.

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

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

[4] From the decay $B_s \to D_s^-\pi^+$.



$m_{B_s^0} - m_B$

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±0.23 OUR FIT					
87.34±0.29 OUR AVERAGE					
87.42±0.30±0.09		[1] AAIJ	12E	LHCB	pp at 7 TeV
86.64±0.80±0.08		[2] ACOSTA	06	CDF	$p\overline{p}$ at 1.96 TeV
• • • We use the following data for averages but not for fits. • • •					
89.7 ±2.7 ±1.2		ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
80 to 130	68	LEE-FRANZINI	90	CSB2	$e^+e^- \to \Upsilon(5S)$

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

[2] The reported result is $m_{B_s^0} - m_{B^0} = 86.38 \pm 0.90 \pm 0.06$ 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.

The
First "OUR EVALUATION" is an average of 1 / [0.5 ($\Gamma_{B^0_{sL}} + \Gamma_{B^0_{sH}}$)].
The Second "OUR EVALUATION" is the average of $B_s \to D_s X$ data listed below.

VALUE (10^{-12} s)	EVTS	DOCUMENT ID		TECN	COMMENT
1.497±0.015 OUR EVALUATION		First			
1.466±0.031 OUR EVALUATION		Second			
$1.518 \pm 0.041 \pm 0.027$		[1] AALTONEN	11AP	CDF	$p\overline{p}$ at 1.96 TeV
$1.398 \pm 0.044 {}^{+0.028}_{-0.025}$		[2] ABAZOV	06V	D0	$p\overline{p}$ at 1.96 TeV
$1.42 {}^{+0.14}_{-0.13} \pm 0.03$		[3] ABREU	00Y	DLPH	$e^+e^- \to Z$
$1.53 {}^{+0.16}_{-0.15} \pm 0.07$		[4] ABREU,P	00G	DLPH	$e^+e^- \to Z$
$1.36 \pm 0.09 {}^{+0.06}_{-0.05}$		[5] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
$1.72 {}^{+0.20}_{-0.19} {}^{+0.18}_{-0.17}$		[6] ACKERSTAFF	98F	OPAL	$e^+e^- \to Z$
$1.50 {}^{+0.16}_{-0.15} \pm 0.04$		[5] ACKERSTAFF	98G	OPAL	$e^+e^- \to Z$
$1.47 \pm 0.14 \pm 0.08$		[4] BARATE	98C	ALEP	$e^+e^- \to Z$
$1.54 {}^{+0.14}_{-0.13} \pm 0.04$		[5] BUSKULIC	96M	ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.51 ± 0.11		[7] BARATE	98C	ALEP	$e^+e^- \to Z$
$1.56 {}^{+0.29}_{-0.26} {}^{+0.08}_{-0.07}$		[5] ABREU	96F	DLPH	Repl. by ABREU 00Y
$1.65 {}^{+0.34}_{-0.31} \pm 0.12$		[4] ABREU	96F	DLPH	Repl. by ABREU 00Y
$1.76 \pm 0.20 {}^{+0.15}_{-0.10}$		[8] ABREU	96F	DLPH	Repl. by ABREU 00Y
$1.60 \pm 0.26 {}^{+0.13}_{-0.15}$		[9] ABREU	96F	DLPH	Repl. by ABREU,P 00G
1.67 ± 0.14		[10] ABREU	96F	DLPH	$e^+e^- \to Z$
$1.61 {}^{+0.30}_{-0.29} {}^{+0.18}_{-0.16}$	90	[4] BUSKULIC	96E	ALEP	Repl. by BARATE 98C
$1.42 {}^{+0.27}_{-0.23} \pm 0.11$	76	[5] ABE	95R	CDF	Repl. by ABE 99D

1.74	$^{+1.08}_{-0.69}$	± 0.07	8	[11] ABE	95R	CDF	Sup. by ABE 96N
1.54	$^{+0.25}_{-0.21}$	± 0.06	79	[5] AKERS	95G	OPAL	Repl. by ACKERSTAFF 98G
1.59	$^{+0.17}_{-0.15}$	± 0.03	134	[5] BUSKULIC	95O	ALEP	Sup. by BUSKULIC 96M
0.96	± 0.37		41	[12] ABREU	94E	DLPH	Sup. by ABREU 96F
1.92	$^{+0.45}_{-0.35}$	± 0.04	31	[5] BUSKULIC	94C	ALEP	Sup. by BUSKULIC 95O
1.13	$^{+0.35}_{-0.26}$	± 0.09	22	[5] ACTON	93H	OPAL	Sup. by AKERS 95G

[1] AALTONEN 11AP combines the fully reconstrcuted $B_s^0 \rightarrow D_s^- \pi^+$ decays and partially reconstructed $B_s^0 \rightarrow D_s X$ 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 $D_s^- \rightarrow \phi \pi^-$ and $D_s^- \rightarrow K^{*0} K^-$ 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 $B_s \rightarrow \psi \phi$.
[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*
1.463±0.032 OUR EVALUATION				
1.456±0.031 OUR AVERAGE				
$1.518 \pm 0.041 \pm 0.027$	[1] AALTONEN	11AP	CDF	$p\overline{p}$ at 1.96 TeV
$1.398 \pm 0.044 ^{+0.028}_{-0.025}$	[2] ABAZOV	06V	D0	$p\overline{p}$ at 1.96 TeV
$1.42 \ ^{+0.14}_{-0.13} \pm 0.03$	[3] ABREU	00Y	DLPH	$e^+ e^- \rightarrow Z$
$1.36 \ \pm 0.09 \ ^{+0.06}_{-0.05}$	[4] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
$1.50 \ ^{+0.16}_{-0.15} \pm 0.04$	[4] ACKERSTAFF	98G	OPAL	$e^+ e^- \rightarrow Z$
$1.54 \ ^{+0.14}_{-0.13} \pm 0.04$	[4] BUSKULIC	96M	ALEP	$e^+ e^- \rightarrow Z$

[1] 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.
[2] Measured using $D_s^- \mu^+$ vertices.
[3] Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices.
[4] Measured using $D_s^- \ell^+$ vertices.

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

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.429±0.088 OUR EVALUATION				
$1.42\ ^{+0.08}_{-0.07}$ OUR AVERAGE				
$1.444^{+0.098}_{-0.090}\pm0.020$	[1] ABAZOV	05B	D0	$p\overline{p}$ at 1.96 TeV
$1.40\ ^{+0.15}_{-0.13}\pm0.02$	[2] ACOSTA	05	CDF	$p\overline{p}$ at 1.96 TeV
$1.34\ ^{+0.23}_{-0.19}\pm0.05$	[2] ABE	98B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.39\ ^{+0.13}_{-0.16}\ ^{+0.01}_{-0.02}$	[2] ABAZOV	05W	D0	$p\overline{p}$ at 1.96 TeV
$1.34\ ^{+0.23}_{-0.19}\pm0.05$	[3] ABE	96N	CDF	Repl. by ABE 98B

[1] Measured using fully reconstructed $B_s \to J/\psi(1S)\phi$ 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 $B_s \to J/\psi(1S)\phi$ events.

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
1.052±0.061±0.015	[1] ABAZOV	09E	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.980^{+0.076}_{-0.071}\pm0.003$	[2] ABAZOV	05B	D0	Repl. by ABAZOV 05W
$0.91\ \pm0.09\ \pm0.003$	[3] ABAZOV	05W	D0	Repl. by ABAZOV 09E

[1] Measured the angular and lifetime parameters for the time-dependent angular untagged decays $B_d^0 \to J/\psi K^{*0}$ and $B_s^0 \to J/\psi\phi$.
[2] Measured mean life ratio using fully reconstructed decays.
[3] Measured using the time-dependent angular analysis of $B_s^0 \to J/\psi\phi$ decays.

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
1.618±0.024 OUR EVALUATION				
	[1] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$1.70\ ^{+0.12}_{-0.11}\pm0.03$	[2] AALTONEN	11AB	CDF	$p\overline{p}$ at 1.96 TeV

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

$1.613^{+0.123}_{-0.113}$	[3,4] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$1.58\ ^{+0.39}_{-0.42}\ ^{+0.01}_{-0.02}$	[4] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$2.07\ ^{+0.58}_{-0.46}\ \pm0.03$	[4] ACOSTA	05	CDF	Repl. by AALTONEN 08J

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

[2] Measured using $J/\psi f_0(980)$, a pure *CP* odd final state.

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

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

B^0_{sL} MEAN LIFE

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

"OUR EVALUATION" 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*
1.393±0.019 OUR EVALUATION				
1.440±0.096±0.009	[1] AAIJ	12	LHCB	pp at 7 TeV
	[2] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.437^{+0.054}_{-0.047}$	[3,4] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$1.24\ ^{+0.14}_{-0.11}\ ^{+0.01}_{-0.02}$	[4] ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$1.05\ ^{+0.16}_{-0.13}\ \pm0.02$	[4] ACOSTA	05	CDF	Repl. by AALTONEN 08J
$1.27\ \pm0.33\ \pm0.08$	[5] BARATE	00K	ALEP	$e^+e^- \to Z$

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

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

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

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

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

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

$\Gamma_{B^0_s}$ 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
0.150±0.020 OUR EVALUATION					
		[1] AAIJ	12D	LHCB	pp at 7 TeV
		[2] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
		[3] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.147^{+0.036}_{-0.030}{}^{+0.042}_{-0.041}$		[4] ESEN	10	BELL	$e^+e^- \to \Upsilon(5S)$
$0.116^{+0.09}_{-0.10} \pm 0.010$		[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	$e^+e^- \to Z$
<0.69	95	[8] ABREU,P	00G	DLPH	$e^+e^- \to Z$
<0.83	95	[9] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
<0.67	95	[10] ACCIARRI	98S	L3	$e^+e^- \to Z$

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

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

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

[4] Assumes CP violation is negligible.

[5] Measured using the time-dependent angular analysis of $B^0_s \to J/\psi\phi$ 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 $\tau_{B^0_s} = 1.55 \pm 0.05$ ps.

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

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

"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^{-1})	DOCUMENT ID		TECN	COMMENT
0.100±0.013 OUR EVALUATION				
0.109±0.022 OUR AVERAGE				
0.123±0.029±0.011	[1] AAIJ	12D	LHCB	pp at 7 TeV
0.075±0.035±0.006	[2] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$0.163^{+0.065}_{-0.064}$	[3,4] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV

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

$0.085^{+0.072}_{-0.078}\pm0.001$	[5] ABAZOV	09E	D0	Repl. by ABAZOV 08AM
$0.076^{+0.059}_{-0.063}\pm0.006$	[6] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
$0.19\pm0.07\ ^{+0.02}_{-0.01}$	[4,7] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
$0.12\ ^{+0.08}_{-0.10}\pm0.02$	[6,8] ABAZOV	07	D0	Repl. by ABAZOV 07N
0.13 ± 0.09	[9] ABAZOV	07N	D0	Repl. by ABAZOV 09E
$0.47\ ^{+0.19}_{-0.24}\pm0.01$	[6] ACOSTA	05	CDF	Repl. by AALTONEN 08J

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

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

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

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

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

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

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

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

[9] 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. • • •					
$0.072\pm0.021\pm0.022$		[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 / $\Gamma_{B^0_s}$

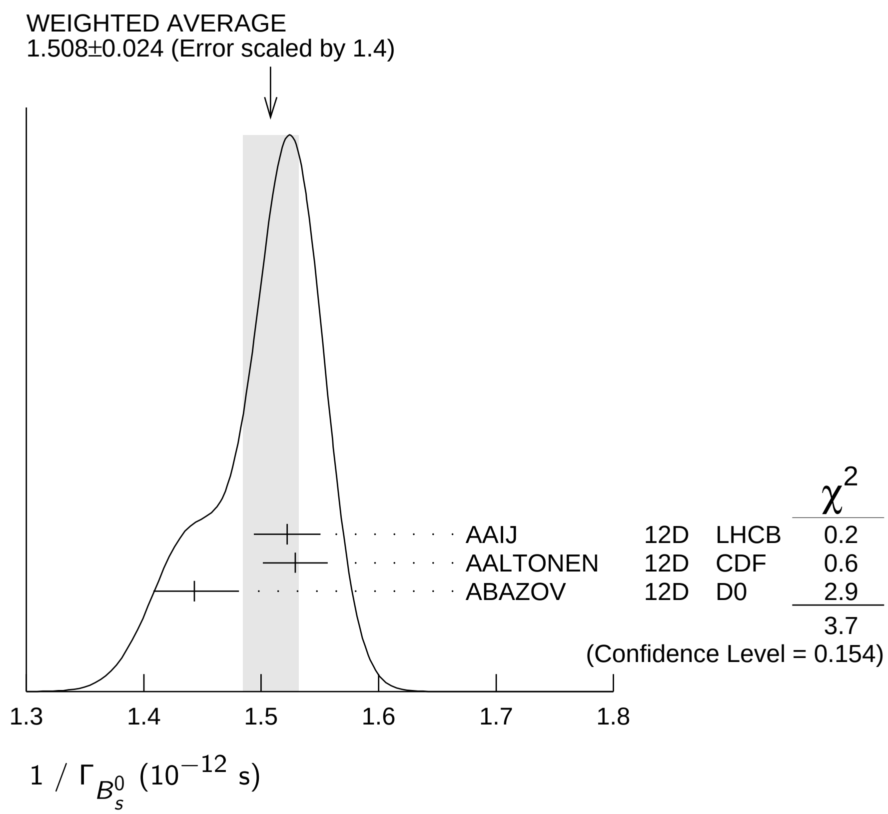
"OUR EVALUATION" has been obtained by the Heavy Flavor Averaging Group (HFAG) using the constraint of the flavor-specific lifetime average in a way similar to $\Delta\Gamma_{B^0_s}/\Gamma_{B^0_s}$.

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.497±0.015 OUR EVALUATION				
1.508±0.024 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.			
1.522±0.021±0.019	[1] AAIJ	12D	LHCB	pp at 7 TeV
1.529±0.025±0.012	[2] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$1.443^{+0.038}_{-0.035}$	[2,3] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.487±0.060±0.028	[2] ABAZOV	09E	D0	Repl. by ABAZOV 08AM
1.52 ±0.04 ±0.02	[2] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
1.52 ±0.05 ±0.01	[2] ABAZOV	08AM	D0	Repl. by ABAZOV 12D

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

[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.



B_s^0 DECAY MODES

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

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

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

	Mode		Fraction (Γ_i/Γ)	Confidence level
Γ_1	D_s^- anything		(93 ± 25) %	
Γ_2	$\ell \nu_\ell X$		(9.5 ± 2.7) %	
Γ_3	$D_s^- \ell^+ \nu_\ell$ anything	[a]	(7.9 ± 2.4) %	
Γ_4	$D_{s1}(2536)^- \mu^+ \nu_\mu$, $D_{s1}^- \to D^{*-} K_S^0$		$(2.5 \pm 0.7) \times 10^{-3}$	
Γ_5	$D_{s1}(2536)^- X \mu^+ \nu$, $D_{s1}^- \to \overline{D}^0 K^+$		$(4.3 \pm 1.7) \times 10^{-3}$	
Γ_6	$D_{s2}(2573)^- X \mu^+ \nu$, $D_{s2}^- \to \overline{D}^0 K^+$		$(2.6 \pm 1.2) \times 10^{-3}$	
Γ_7	$D_s^- \pi^+$		$(3.2 \pm 0.4) \times 10^{-3}$	
Γ_8	$D_s^- \rho^+$		$(7.4 \pm 1.7) \times 10^{-3}$	
Γ_9	$D_s^- \pi^+ \pi^+ \pi^-$		$(6.5 \pm 1.2) \times 10^{-3}$	
Γ_{10}	$D_s^\mp K^\pm$		$(2.9 \pm 0.6) \times 10^{-4}$	
Γ_{11}	$D_s^+ D_s^-$		$(5.3 \pm 0.9) \times 10^{-3}$	
Γ_{12}	$D_s^{*-} \pi^+$		$(2.1 \pm 0.6) \times 10^{-3}$	
Γ_{13}	$D_s^{*-} \rho^+$		(1.03 ± 0.26) %	
Γ_{14}	$D_s^{*+} D_s^- + D_s^{*-} D_s^+$		(1.24 ± 0.21) %	
Γ_{15}	$D_s^{*+} D_s^{*-}$		(1.88 ± 0.34) %	
Γ_{16}	$D_s^{(*)+} D_s^{(*)-}$		(4.5 ± 1.4) %	
Γ_{17}	$\overline{D}^0 \overline{K}^*(892)^0$		$(4.7 \pm 1.4) \times 10^{-4}$	
Γ_{18}	$J/\psi(1S) \phi$		$(1.09 {}^{+0.28}_{-0.23}) \times 10^{-3}$	
Γ_{19}	$J/\psi(1S) \pi^0$		$< 1.2 \times 10^{-3}$	90%
Γ_{20}	$J/\psi(1S) \eta$		$(5.1 {}^{+1.3}_{-1.0}) \times 10^{-4}$	
Γ_{21}	$J/\psi(1S) K^0$		$(3.6 \pm 0.8) \times 10^{-5}$	
Γ_{22}	$J/\psi(1S) K^{*0}$		$(9 \pm 4) \times 10^{-5}$	
Γ_{23}	$J/\psi(1S) \eta'$		$(3.7 {}^{+1.0}_{-0.9}) \times 10^{-4}$	

Γ_{24}	$J/\psi(1S) f_0(980)$, $f_0 \to \pi^+\pi^-$			$(1.36 \, {}^{+0.35}_{-0.28}) \times 10^{-4}$	
Γ_{25}	$J/\psi(1S) f_0(1370)$, $f_0 \to \pi^+\pi^-$			$(3.4 \pm 1.4) \times 10^{-5}$	
Γ_{26}	$\psi(2S)\phi$			$(5.7 \, {}^{+1.8}_{-1.6}) \times 10^{-4}$	
Γ_{27}	$\pi^+\pi^-$			$< 1.2 \times 10^{-6}$	90%
Γ_{28}	$\pi^0\pi^0$			$< 2.1 \times 10^{-4}$	90%
Γ_{29}	$\eta\pi^0$			$< 1.0 \times 10^{-3}$	90%
Γ_{30}	$\eta\eta$			$< 1.5 \times 10^{-3}$	90%
Γ_{31}	$\rho^0\rho^0$			$< 3.20 \times 10^{-4}$	90%
Γ_{32}	$\phi\rho^0$			$< 6.17 \times 10^{-4}$	90%
Γ_{33}	$\phi\phi$			$(1.9 \, {}^{+0.6}_{-0.5}) \times 10^{-5}$	
Γ_{34}	$\pi^+ K^-$			$(5.3 \pm 1.0) \times 10^{-6}$	
Γ_{35}	$K^+ K^-$			$(2.64 \pm 0.28) \times 10^{-5}$	
Γ_{36}	$K^0 \overline{K}^0$			$< 6.6 \times 10^{-5}$	90%
Γ_{37}	$\overline{K}^*(892)^0 \rho^0$			$< 7.67 \times 10^{-4}$	90%
Γ_{38}	$\overline{K}^*(892)^0 K^*(892)^0$			$(2.8 \pm 0.7) \times 10^{-5}$	
Γ_{39}	$\phi K^*(892)^0$			$< 1.013 \times 10^{-3}$	90%
Γ_{40}	$p\overline{p}$			$< 5.9 \times 10^{-5}$	90%
Γ_{41}	$\gamma\gamma$	*B1*		$< 8.7 \times 10^{-6}$	90%
Γ_{42}	$\phi\gamma$			$(5.7 \, {}^{+2.2}_{-1.9}) \times 10^{-5}$	

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

Γ_{43}	$\mu^+\mu^-$	*B1*		$< 6.4 \times 10^{-9}$	90%
Γ_{44}	$e^+ e^-$	*B1*		$< 2.8 \times 10^{-7}$	90%
Γ_{45}	$e^\pm \mu^\mp$	*LF*	[b]	$< 2.0 \times 10^{-7}$	90%
Γ_{46}	$\phi(1020)\mu^+\mu^-$	*B1*		$(1.23 \, {}^{+0.40}_{-0.34}) \times 10^{-6}$	
Γ_{47}	$\phi\nu\overline{\nu}$	*B1*		$< 5.4 \times 10^{-3}$	90%

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

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

CONSTRAINED FIT INFORMATION

An overall fit to 8 branching ratios uses 11 measurements and one constraint to determine 6 parameters. The overall fit has a $\chi^2 =$ 1.5 for 6 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_9	46			
x_{10}	48	22		
x_{18}	0	0	0	
x_{24}	0	0	0	94
	x_7	x_9	x_{10}	x_{18}

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 $\overline{b} \to W^+ \to D_s^+$ events, and obtain B($\overline{b} \to B_s^0$) × B($B_s^0 \to D_s^-$ anything) = 0.088 ± 0.020 ± 0.020 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 other D_s channels. 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] 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($\overline{b} \to B_s^0$)B($B_s^0 \to D_s^-$ anything)×B($D_s^- \to \phi\pi^-$) = $(5.9 \pm 1.9 \pm 1.1) \times 10^{-3}$. 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($D_s \to \phi\pi$).

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

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{9.5^{+2.5+1.1}_{-2.0-1.9}}$	[1] LEES	12A	BABR	e^+e^-

[1] 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.

$\Gamma(D_s^- \ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ Γ_3/Γ

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.079±0.024 OUR AVERAGE					
0.076±0.012±0.021	134	[1] BUSKULIC	95O	ALEP	$e^+e^- \rightarrow Z$
0.107±0.043±0.029		[2] ABREU	92M	DLPH	$e^+e^- \rightarrow Z$
0.103±0.036±0.028	18	[3] ACTON	92N	OPAL	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.13 ±0.04 ±0.04	27	[4] BUSKULIC	92E	ALEP	$e^+e^- \rightarrow Z$

[1] BUSKULIC 95O use $D_s \ell$ correlations. The measured product branching ratio is B($\overline{b} \rightarrow B_s$) × B($B_s \rightarrow D_s^- \ell^+ \nu_\ell$anything) = $(0.82 \pm 0.09^{+0.13}_{-0.14})$% 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 the six other D_s channels used in this analysis. Combined with results from $\Upsilon(4S)$ experiments this can be used to extract B($\overline{b} \rightarrow B_s$) = $(11.0 \pm 1.2^{+2.5}_{-2.6})$%. We evaluate using our current values B($\overline{b} \rightarrow B_s^0$) = 0.107 ± 0.014 and B($D_s \rightarrow \phi\pi$) = 0.036 ± 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($D_s \rightarrow \phi\pi$).

[2] ABREU 92M measured muons only and obtained product branching ratio B($Z \rightarrow b$or $\overline{b}$) × B($\overline{b} \rightarrow B_s$) × B($B_s \rightarrow D_s \mu^+ \nu_\mu$anything) × B($D_s \rightarrow \phi\pi$) = $(18 \pm 8) \times 10^{-5}$. We evaluate using our current values B($\overline{b} \rightarrow B_s^0$) = 0.107 ± 0.014 and B($D_s \rightarrow \phi\pi$) = 0.036 ± 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($D_s \rightarrow \phi\pi$). We use B($Z \rightarrow b$or $\overline{b}$) = 2B($Z \rightarrow b\overline{b}$) = 2×(0.2212 ± 0.0019).

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

[4] BUSKULIC 92E is measured using $D_s \rightarrow \phi\pi^+$ 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($\overline{b} \rightarrow B_s^0$)B($B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell$anything) =$0.020 \pm 0.0055^{+0.005}_{-0.006}$. We evaluate using our current values B($\overline{b} \rightarrow B_s^0$) = 0.107 ± 0.014 and B($D_s \rightarrow \phi\pi$) = 0.036 ± 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($D_s \rightarrow \phi\pi$). Superseded by BUSKULIC 95O.

$\Gamma(D_{s1}(2536)^- \mu^+ \nu_\mu,\ D_{s1}^- \rightarrow D^{*-} K_S^0)/\Gamma_{\text{total}}$ — Γ_4/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.5±0.7±0.1	[1] ABAZOV	09G	D0	$p\overline{p}$ at 1.96 TeV

[1] ABAZOV 09G reports [$\Gamma(B_s^0 \rightarrow D_{s1}(2536)^- \mu^+ \nu_\mu,\ D_{s1}^- \rightarrow D^{*-} K_S^0)/\Gamma_{\text{total}}$] × [B($\overline{b} \rightarrow B_s^0$)] = $(2.66 \pm 0.52 \pm 0.45) \times 10^{-4}$ which we divide by our best value B($\overline{b} \rightarrow B_s^0$) = $(10.5 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s1}(2536)^- X \mu^+ \nu,\ D_{s1}^- \rightarrow \overline{D}^0 K^+)/\Gamma(D_s^- \ell^+ \nu_\ell \text{anything})$ — Γ_5/Γ_3

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_6/Γ_3

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_5/Γ_6

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

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

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.2±0.4 OUR FIT					
3.3±0.5 OUR AVERAGE					
$3.6 \pm 0.5 \pm 0.5$		[1] LOUVOT	09	BELL	$e^+ e^- \to \Upsilon(5S)$
$3.0 \pm 0.7 \pm 0.1$		[2] ABULENCIA	07C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.8 \pm 2.2 \pm 1.6$		DRUTSKOY	07A	BELL	Repl. by LOUVOT 09
$3.5 \pm 1.1 \pm 0.2$		[3] ABULENCIA	06J	CDF	Repl. by ABULENCIA 07C
<130	6	[4] AKERS	94J	OPAL	$e^+ e^- \to Z$
seen	1	BUSKULIC	93G	ALEP	$e^+ e^- \to Z$

[1] LOUVOT 09 reports $(3.67^{+0.35}_{-0.33}{}^{+0.65}_{-0.645}) \times 10^{-3}$ from a measurement of $[\Gamma(B_s^0 \to D_s^- \pi^+)/\Gamma_{\text{total}}] \times [B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)})]$ 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 $B(\Upsilon(10860) \to B_s^{(*)} \overline{B}_s^{(*)}) = (19.9 \pm 3.0) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABULENCIA 07C reports $[\Gamma(B_s^0 \to D_s^- \pi^+)/\Gamma_{\text{total}}] / [B(B^0 \to D^- \pi^+)] = 1.13 \pm 0.08 \pm 0.23$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.68 \pm 0.13) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ABULENCIA 06J reports $[\Gamma(B_s^0 \to D_s^- \pi^+)/\Gamma_{\text{total}}] / [B(B^0 \to D^- \pi^+)] = 1.32 \pm 0.18 \pm 0.38$ which we multiply by our best value $B(B^0 \to D^- \pi^+) = (2.68 \pm 0.13) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] 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 $B(\overline{b} \to B_s^0) = 0.105$.

$\Gamma(D_s^- \rho^+)/\Gamma_{\text{total}}$ — Γ_8/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
7.4±1.4±1.0	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 10 reports $[\Gamma(B_s^0 \to D_s^- \rho^+)/\Gamma_{\text{total}}] / [B(B_s^0 \to D_s^- \pi^+)] = 2.3 \pm 0.4 \pm 0.2$ which we multiply by our best value $B(B_s^0 \to D_s^- \pi^+) = (3.2 \pm 0.4) \times 10^{-3}$. 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_9/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
6.5±1.2 OUR FIT			
6.7±1.5±0.7	[1] ABULENCIA 07C	CDF	$p\overline{p}$ at 1.96 TeV

[1] ABULENCIA 07C reports $[\Gamma(B_s^0 \rightarrow D_s^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}] / [B(B^0 \rightarrow D^- \pi^+ \pi^+ \pi^-)] = 1.05 \pm 0.10 \pm 0.22$ which we multiply by our best value $B(B^0 \rightarrow D^- \pi^+ \pi^+ \pi^-) = (6.4 \pm 0.7) \times 10^{-3}$. 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_9/Γ_7

VALUE	DOCUMENT ID	TECN	COMMENT
2.04±0.35 OUR FIT			
2.01±0.37±0.20	AAIJ 11E	LHCB	pp at 7 TeV

$\Gamma(D_s^{\mp} K^{\pm})/\Gamma_{total}$ — Γ_{10}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
2.9±0.6 OUR FIT			
$\mathbf{2.4^{+1.2}_{-1.0}\pm0.4}$	[1] LOUVOT 09	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$

[1] LOUVOT 09 reports $(2.4^{+1.2}_{-1.0} \pm 0.42) \times 10^{-4}$ from a measurement of $[\Gamma(B_s^0 \rightarrow D_s^{\mp} K^{\pm})/\Gamma_{total}] \times [B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)})]$ assuming $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.5 \pm 2.6) \times 10^{-2}$, which we rescale to our best value $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.9 \pm 3.0) \times 10^{-2}$. 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_{10}/Γ_7

VALUE	DOCUMENT ID	TECN	COMMENT
0.092±0.018 OUR FIT			
0.097±0.018±0.009	AALTONEN 09AQ	CDF	$p\overline{p}$ at 1.96 TeV

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

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
5.3±0.9 OUR AVERAGE				
5.1±0.7±0.6		[1] AALTONEN 12C	CDF	$p\overline{p}$ at 1.96 TeV
$10.3^{+3.9+2.6}_{-3.2-2.5}$		[2] ESEN 10	BELL	$e^+ e^- \rightarrow \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$10.4^{+3.5}_{-3.2}\pm1.1$		[3] AALTONEN 08F	CDF	Repl. by AALTONEN 12C
<67	90	DRUTSKOY 07A	BELL	Repl. by ESEN 10

[1] AALTONEN 12C reports (f_s/f_d) $(B(B_s^0 \rightarrow D_s^+ D_s^-) / B(B^0 \rightarrow D^- D_s^+)) = 0.183 \pm 0.021 \pm 0.017$. We multiply this result by our best value of $B(B^0 \rightarrow D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.131 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

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

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

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.1±0.5±0.3	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 10 reports $[\Gamma(B^0_s \to D^{*-}_s \pi^+)/\Gamma_{total}]$ / $[B(B^0_s \to D^-_s \pi^+)] = 0.65^{+0.15}_{-0.13} \pm 0.07$ which we multiply by our best value $B(B^0_s \to D^-_s \pi^+) = (3.2 \pm 0.4) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^{*-}_s \rho^+)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
10.3±2.2±1.4	[1] LOUVOT	10	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] LOUVOT 10 reports $[\Gamma(B^0_s \to D^{*-}_s \rho^+)/\Gamma_{total}]$ / $[B(B^0_s \to D^-_s \pi^+)] = 3.2 \pm 0.6 \pm 0.3$ which we multiply by our best value $B(B^0_s \to D^-_s \pi^+) = (3.2 \pm 0.4) \times 10^{-3}$. 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_{13}/Γ_8

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	$e^+ e^- \to \Upsilon(5S)$

$[\Gamma(D^{*+}_s D^-_s) + \Gamma(D^{*-}_s D^+_s)]/\Gamma_{total}$ — Γ_{14}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
12.4±2.1 OUR AVERAGE					
11.7±1.6±1.4		[1] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
$27.5^{+8.3}_{-7.1}\pm6.9$		[2] ESEN	10	BELL	$e^+ e^- \to \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<121	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] AALTONEN 12C reports (f_s/f_d) $(B(B^0_s \to D^{*+}_s D^-_s + D^{*-}_s D^+_s)$ / $B(B^0 \to D^- D^+_s)) = 0.424 \pm 0.046 \pm 0.035$. 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 $1/2\ f_s/f_d = 0.131 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

[2] 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_{15}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
18.8± 3.4 OUR AVERAGE					
$18.1 \pm 2.7 \pm 2.2$		[1] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
$30.8^{+12.2+8.5}_{-10.4-8.6}$		[2] ESEN	10	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<257	90	DRUTSKOY	07A	BELL	Repl. by ESEN 10

[1] AALTONEN 12C reports (f_s/f_d) $(B(B_s^0 \rightarrow D_s^{*+} D_s^{*-})$ / $B(B^0 \rightarrow D^- D_s^+)) = 0.654 \pm 0.072 \pm 0.065$. We multiply this result by our best value of $B(B^0 \rightarrow D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.131 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

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

$\Gamma(D_s^{(*)+} D_s^{(*)-})/\Gamma_{total}$ — Γ_{16}/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 ±0.6 OUR AVERAGE					
$3.5 \pm 0.4 \pm 0.4$		[1] AALTONEN	12C	CDF	$p\overline{p}$ at 1.96 TeV
$6.85^{+1.53+1.79}_{-1.30-1.80}$		[2,3] ESEN	10	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
$3.5 \pm 1.0 \pm 1.1$		[4] ABAZOV	09I	D0	$p\overline{p}$ at 1.96 TeV
$14 \pm 6 \pm 3$		[5,6] BARATE	00K	ALEP	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.9^{+1.9}_{-1.7}{}^{+1.6}_{-1.5}$		[4] ABAZOV	07Y	D0	Repl. by ABAZOV 09I
<0.218	90	BARATE	98Q	ALEP	$e^+e^- \rightarrow Z$

[1] AALTONEN 12C reports (f_s/f_d) $(B(B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-})$ / $B(B^0 \rightarrow D^- D_s^+)) = 1.261 \pm 0.095 \pm 0.112$. We multiply this result by our best value of $B(B^0 \rightarrow D^- D_s^+) = (7.2 \pm 0.8) \times 10^{-3}$ and divide by our best value of f_s/f_d, where $1/2\ f_s/f_d = 0.131 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

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

[3] Uses $\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*$ assuming $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ 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] Uses the final states where $D_s^+ \rightarrow \phi\pi^+$ and $D_s^- \rightarrow \phi\mu^-\overline{\nu}_\mu$.

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

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

$\Gamma(\overline{D}^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{17}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.7±1.2±0.7	[1] AAIJ	11D	LHCB	pp at 7 TeV

[1] AAIJ 11D reports $[\Gamma(B^0_s \to \overline{D}^0 \overline{K}^*(892)^0)/\Gamma_{total}] / [B(B^0 \to \overline{D}^0 \rho^0)] = 1.48 \pm 0.34 \pm 0.19$ which we multiply by our best value $B(B^0 \to \overline{D}^0 \rho^0) = (3.2 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S)\phi)/\Gamma_{total}$ — Γ_{18}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.09^{+0.28}_{-0.23}$ OUR FIT					
1.4 ±0.4 ±0.1		[1] ABE	96Q	CDF	$p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	1	[2] AKERS	94J	OPAL	$e^+e^- \to Z$
seen	14	[3] ABE	93F	CDF	$p\overline{p}$ at 1.8 TeV
seen	1	[4] ACTON	92N	OPAL	Sup. by AKERS 94J

[1] ABE 96Q reports $[\Gamma(B^0_s \to J/\psi(1S)\phi)/\Gamma_{total}] \times [\Gamma(\overline{b} \to B^0_s)/[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^0)]] = (0.185 \pm 0.055 \pm 0.020) \times 10^{-3}$ which we divide by our best value $\Gamma(\overline{b} \to B^0_s)/[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^0)] = 0.131 \pm 0.008$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

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

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{total}$ — Γ_{19}/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_{20}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
$5.10 \pm 0.50^{+1.17}_{-0.83}$		[1] LI	12	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<38	90	[2] ACCIARRI	97C	L3	

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

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

$\Gamma(J/\psi(1S)K^0)/\Gamma_{total}$ — Γ_{21}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
3.6±0.7±0.3	[1] AALTONEN	11A	CDF	$p\overline{p}$ at 1.96 TeV

[1] AALTONEN 11A reports $[\Gamma(B_s^0 \to J/\psi(1S)K^0)/\Gamma_{total}] \times [B(\overline{b} \to B_s^0)] / [B(\overline{b} \to B^0)] / [B(B^0 \to J/\psi(1S)K^0)] = 0.0109 \pm 0.0019 \pm 0.0011$ which we multiply or divide by our best values $B(\overline{b} \to B_s^0) = (10.5 \pm 0.6) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.1 \pm 0.8) \times 10^{-2}$, $B(B^0 \to J/\psi(1S)K^0) = (8.74 \pm 0.32) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi(1S)K^{*0})/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
9±4±1	[1] AALTONEN	11A	CDF	$p\overline{p}$ at 1.96 TeV

[1] AALTONEN 11A reports $[\Gamma(B_s^0 \to J/\psi(1S)K^{*0})/\Gamma_{total}] \times [B(\overline{b} \to B_s^0)] / [B(\overline{b} \to B^0)] / [B(B^0 \to J/\psi(1S)K^*(892)^0)] = 0.0168 \pm 0.0024 \pm 0.0068$ which we multiply or divide by our best values $B(\overline{b} \to B_s^0) = (10.5 \pm 0.6) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.1 \pm 0.8) \times 10^{-2}$, $B(B^0 \to J/\psi(1S)K^*(892)^0) = (1.34 \pm 0.06) \times 10^{-3}$. 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_{23}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$3.71 \pm 0.61^{+0.85}_{-0.60}$	[1] LI	12	BELL	$e^+e^- \to \Upsilon(4S)$

[1] 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_{20}/Γ_{23}

VALUE	DOCUMENT ID		TECN	COMMENT
0.73±0.14±0.02	LI	12	BELL	$e^+e^- \to \Upsilon(4S)$

$\Gamma(J/\psi(1S)f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.36^{+0.35}_{-0.28}$ OUR FIT				
$1.16^{+0.31}_{-0.19}{}^{+0.30}_{-0.25}$	[1] LI	11	BELL	$e^+e^- \to \Upsilon(5S)$

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

$\Gamma(J/\psi(1S)f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{24}/Γ_{18}

VALUE	DOCUMENT ID		TECN	COMMENT
0.125±0.010 OUR FIT				
0.126±0.010 OUR AVERAGE				
0.135±0.036±0.001	[1] ABAZOV	12C	D0	$p\overline{p}$ at 1.96 TeV
$0.123^{+0.026}_{-0.022} \pm 0.001$	[2] AAIJ	11	LHCB	pp at 7 TeV
0.126±0.012±0.001	[3] AALTONEN	11AB	CDF	$p\overline{p}$ at 1.96 TeV

[1] ABAZOV 12C reports $[\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)] = 0.275 \pm 0.041 \pm 0.061$ 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] AAIJ 11 reports $[\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)] = 0.252^{+0.046}_{-0.032}{}^{+0.027}_{-0.033}$ 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.

[3] AALTONEN 11AB reports $[\Gamma(B_s^0 \to J/\psi(1S) f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(B_s^0 \to J/\psi(1S)\phi)]$ / $[B(\phi(1020) \to K^+K^-)] = 0.257 \pm 0.020 \pm 0.014$ 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.

$\Gamma(J/\psi(1S) f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{25}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$0.34^{+0.11}_{-0.14}{}^{+0.085}_{-0.054}$	[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.

$\Gamma(\psi(2S)\phi)/\Gamma_{total}$ — Γ_{26}/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_{26}/Γ_{18}

VALUE	DOCUMENT ID		TECN	COMMENT
0.53±0.10 OUR AVERAGE				
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

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{27}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.2	90	[1] AALTONEN	09C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 12	90	[2] PENG	10	BELL	$e^+e^- \to \Upsilon(5S)$
< 1.7	90	[3] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 09C
<232	90	[4] ABE	00C	SLD	$e^+e^- \to Z$
<170	90	[5] BUSKULIC	96V	ALEP	$e^+e^- \to Z$

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

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

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

[4] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

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

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ — Γ_{28}/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_{29}/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_{30}/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_{31}/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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\phi\rho^0)/\Gamma_{total}$ — Γ_{32}/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_{33}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$19 \pm 3^{+5}_{-4}$		[1] AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 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] AALTONEN 11AN reports $[\Gamma(B^0_s \to \phi\phi)/\Gamma_{total}] / [B(B^0_s \to J/\psi(1S)\phi)] = (1.78 \pm 0.14 \pm 0.20) \times 10^{-2}$ which we multiply by our best value $B(B^0_s \to J/\psi(1S)\phi) = (1.09^{+0.28}_{-0.23}) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
5.3±0.9±0.4		[1] AALTONEN	09C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 26	90	[2] PENG	10	BELL	$e^+e^- \to \Upsilon(5S)$
$<$ 5.6	90	[3] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 09C
$<$261	90	[4] ABE	00C	SLD	$e^+e^- \to Z$
$<$210	90	[5] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
$<$260	90	[6] AKERS	94L	OPAL	$e^+e^- \to Z$

[1] AALTONEN 09C reports $[\Gamma(B^0_s \to \pi^+K^-)/\Gamma_{total}] / [B(B^0 \to K^+\pi^-)] \times [B(\overline{b} \to B^0_s)] / [B(\overline{b} \to B^0)] = 0.071 \pm 0.010 \pm 0.007$ which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.94 \pm 0.06) \times 10^{-5}$, $B(\overline{b} \to B^0_s) = (10.5 \pm 0.6) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.1 \pm 0.8) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

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

[3] 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 $B(B^0 \to K^+\pi^-) = (18.9 \pm 0.7) \times 10^{-6}$.

[4] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

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

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

$\Gamma(K^+ K^-)/\Gamma_{total}$ — Γ_{35}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
26.4± 2.8 OUR AVERAGE					
25.8± 2.2±1.7		[1] AALTONEN	11N	CDF	$p\overline{p}$ at 1.96 TeV
38 $^{+10}_{-9}$ ±7		[2] PENG	10	BELL	$e^+e^- \to \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$310	90	DRUTSKOY	07A	BELL	$e^+e^- \to \Upsilon(5S)$
33 ± 6 ±7		[3] ABULENCIA,A	06D	CDF	Repl. by AALTONEN 11N
$<$283	90	[4] ABE	00C	SLD	$e^+e^- \to Z$
$<$ 59	90	[5] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
$<$140	90	[6] AKERS	94L	OPAL	$e^+e^- \to Z$

[1] AALTONEN 11N reports (f_s/f_d) $(B(B_s^0 \to K^+K^-)$ / $B(B^0 \to K^+\pi^-)) = 0.347 \pm 0.020 \pm 0.021$. We multiply this result by our best value of $B(B^0 \to K^+\pi^-) = (1.94 \pm 0.06) \times 10^{-5}$ and divide by our best value of f_s/f_d, where 1/2 $f_s/f_d = 0.131 \pm 0.008$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

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

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

[4] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.

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

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

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

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

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

$\Gamma(\overline{K}^*(892)^0\rho^0)/\Gamma_{total}$ — Γ_{37}/Γ

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

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

$\Gamma(\overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{total}$ — Γ_{38}/Γ

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

[1] 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.

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

$\Gamma(\phi K^*(892)^0)/\Gamma_{total}$ — Γ_{39}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<10.13 × 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{40}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.9 \times 10^{-5}$	90	[1] BUSKULIC	96V	ALEP	$e^+e^- \to Z$

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

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{41}/Γ

Test for ΔB=1 weak neutral current.

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

[1] Assumes $\Upsilon(5S) \to B_s^* \overline{B}_s^* = (19.5^{+3.0}_{-2.3})\%$.

[2] 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_{42}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$57^{+18}_{-15}{}^{+12}_{-11}$		[1] WICHT	08A	BELL	$e^+e^- \to \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<390	90	DRUTSKOY	07A	BELL	$e^+e^- \to \Upsilon(5S)$
<120	90	ACOSTA	02G	CDF	$p\overline{p}$ at 1.8 TeV
<700	90	[2] ADAM	96D	DLPH	$e^+e^- \to Z$

[1] Assumes $\Upsilon(5S) \to B_s^* \overline{B}_s^* = (19.5^{+3.0}_{-2.3})\%$.

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

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_{43}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.4 \times 10^{-9}$	90	[1] CHATRCHYAN	12A	CMS	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2 \times 10^{-8}$	90	[2] AAIJ	12A	LHCB	pp at 7 TeV
$<4.3 \times 10^{-8}$	90	[3] AAIJ	11B	LHCB	Repl. by AAIJ 12A
$<3.5 \times 10^{-8}$	90	[4] AALTONEN	11AG	CDF	$p\overline{p}$ at 1.96 TeV
$<1.6 \times 10^{-8}$	90	[5] CHATRCHYAN	11T	CMS	Repl. by CHATRCHYAN 12A
$<4.2 \times 10^{-8}$	90	[6] ABAZOV	10S	D0	$p\overline{p}$ at 1.96 TeV
$<4.7 \times 10^{-8}$	90	[6] AALTONEN	08I	CDF	Repl. by AALTONEN 11AG
$<9.4 \times 10^{-8}$	90	[7] ABAZOV	07Q	D0	Repl. by ABAZOV 10S
$<4.1 \times 10^{-7}$	90	[8] ABAZOV	05E	D0	$p\overline{p}$ at 1.96 TeV
$<1.5 \times 10^{-7}$	90	[9] ABULENCIA	05	CDF	$p\overline{p}$ at 1.96 TeV
$<5.8 \times 10^{-7}$	90	[10] ACOSTA	04D	CDF	$p\overline{p}$ at 1.96 TeV
$<2.0 \times 10^{-6}$	90	[11] ABE	98	CDF	$p\overline{p}$ at 1.8 TeV
$<3.8 \times 10^{-5}$	90	[12] ACCIARRI	97B	L3	$e^+e^- \to Z$
$<8.4 \times 10^{-6}$	90	[13] ABE	96L	CDF	Repl. by ABE 98

[1] Uses $f_s/f_u = 0.267 \pm 0.021$ and $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$.
[2] 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 $B(B^0_s \to J/\psi\phi \to \mu^+\mu^- K^+ K^-) = (3.4 \pm 0.9) \times 10^{-5}$.
[3] Uses B production ratio $f(\overline{b} \to B^+)/f(\overline{b} \to B^0_s) = 3.71 \pm 0.47$ and three normalization modes.
[4] Uses B production ratio $f(\overline{b} \to B^+)/f(\overline{b} \to B^0_s) = 3.55 \pm 0.47$ and $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$.
[5] Uses B production ratio $f(\overline{b} \to B^+)/f(\overline{b} \to B^0_s) = 3.55 \pm 0.42$ and $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$.
[6] Uses B production ratio $f(\overline{b} \to B^+)/f(\overline{b} \to B^0_s) = 3.86 \pm 0.59$, and the number of $B^+ \to J/\psi K^+$ decays.
[7] Uses B production ratio $f(\overline{b} \to B^+)/f(\overline{b} \to B^0_s) = 3.86 \pm 0.54$ and the number of $B^+ \to J/\psi K^+$ decays.
[8] Assumes production cross-section $\sigma(B_s)/\sigma(B^+) = 0.270 \pm 0.034$.
[9] Assumes production cross section $\sigma(B^+)/\sigma(B_s) = 3.71 \pm 0.41$ and $B(B^+ \to J/\psi K^+ \to \mu^+\mu^- K^+) = (5.88 \pm 0.26) \times 10^{-5}$.
[10] 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.
[11] 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.
[12] ACCIARRI 97B assume PDG 96 production fractions for B^+, B^0, B_s, and Λ_b.
[13] ABE 96L assumes B^+/B_s production ratio 3/1. They normalize to their measured $\sigma(B^+, p_T(B) > 6\ \text{GeV}/c, |y| < 1) = 2.39 \pm 0.54\ \mu$b.

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_{44}/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.

$\Gamma(e^\pm\mu^\mp)/\Gamma_{total}$ — Γ_{45}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.0 \times 10^{-7}$	90	AALTONEN	09P	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.1 \times 10^{-6}$	90	ABE	98V	CDF	Repl. by AALTONEN 09P
$<4.1 \times 10^{-5}$	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.

$\Gamma(\phi(1020)\mu^+\mu^-)/\Gamma_{total}$ — Γ_{46}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.2 \times 10^{-6}$	90	[1] ABAZOV	06G	D0	$p\overline{p}$ at 1.96 TeV
$<4.7 \times 10^{-5}$	90	ACOSTA	02D	CDF	$p\overline{p}$ at 1.8 TeV

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

$\Gamma(\phi(1020)\mu^+\mu^-)/\Gamma(J/\psi(1S)\phi)$ — Γ_{46}/Γ_{18}

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
1.13±0.19±0.07		AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.11±0.25±0.09		AALTONEN	11L	CDF	Repl. by AALTONEN 11AI
<2.3	90	AALTONEN	09B	CDF	Repl. by AALTONEN 11L

$\Gamma(\phi\nu\overline{\nu})/\Gamma_{total}$ — Γ_{47}/Γ

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

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

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

POLARIZATION IN B_s^0 DECAY

Γ_L/Γ in $B_s^0 \rightarrow D_s^*\rho^+$

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

Γ_L/Γ in $B_s^0 \rightarrow J/\psi(1S)\phi$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.543±0.016 OUR AVERAGE		Error includes scale factor of 1.2.			
0.524±0.013±0.015		[1] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$0.558^{+0.017}_{-0.019}$		[1,2] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
0.61 ±0.14 ±0.02		[3] AFFOLDER	00N	CDF	$p\overline{p}$ at 1.8 TeV
$0.56 \pm 0.21\ ^{+0.02}_{-0.04}$	19	ABE	95Z	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.555±0.027±0.006		[4] ABAZOV	09E	D0	Repl. by ABAZOV 12D
0.531±0.020±0.007		[1] AALTONEN	08J	CDF	Repl. by AALTONEN 12D
0.62 ±0.06 ±0.01		ACOSTA	05	CDF	Repl. by AALTONEN 08J

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

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

[3] 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 $0.23 \pm 0.19 \pm 0.04$.

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

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

VALUE		DOCUMENT ID		TECN	COMMENT
0.231±0.016 OUR AVERAGE					
0.231±0.014±0.015	[1]	AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$0.231^{+0.024}_{-0.030}$	[1,2]	ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.244±0.032±0.014	[3]	ABAZOV	09E	D0	Repl. by ABAZOV 12D
0.239±0.029±0.011	[1]	AALTONEN	08J	CDF	Repl. by AALTONEN 12D
0.125±0.069±0.002		ACOSTA	05	CDF	Repl. by AALTONEN 08J

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

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

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

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

VALUE (rad)		DOCUMENT ID		TECN	COMMENT
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. • • •					
$2.72^{+1.12}_{-0.27}\pm0.26$		ABAZOV	09E	D0	Repl. by ABAZOV 12D

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

Γ_L/Γ in $B_s^0 \to \phi\phi$

VALUE	DOCUMENT ID		TECN	COMMENT
0.348±0.041±0.021	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.365±0.044±0.027	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV

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

VALUE (rad)		DOCUMENT ID		TECN	COMMENT
$\mathbf{2.71^{+0.31}_{-0.36}\pm0.22}$	[1]	AALTONEN	11AN	CDF	$p\overline{p}$ at 1.96 TeV

[1] AALTONEN 11AN quotes $\cos\phi_{\parallel} = -0.91^{+0.15}_{-0.13} \pm 0.09$ which we convert to $\phi_{\parallel}$ taking the smaller solution.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.31±0.12±0.04	AAIJ	12F	LHCB	pp at 7 TeV

$\Gamma_{\perp}/\Gamma$ 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

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
17.69±0.08 OUR EVALUATION					
17.69±0.08 OUR AVERAGE					
17.63±0.11±0.02		[1] AAIJ	12I	LHCB	pp at 7 TeV
17.77±0.10±0.07		[2] 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	[3] ABAZOV	06B	D0	$p\overline{p}$ at 1.96 TeV
$17.31^{+0.33}_{-0.18}\pm0.07$		[4] ABULENCIA	06Q	CDF	Repl. by ABULENCIA,A 06G
> 8.0	95	[5] ABDALLAH	04J	DLPH	$e^+e^- \to Z^0$
> 4.9	95	[6] ABDALLAH	04J	DLPH	$e^+e^- \to Z^0$
> 8.5	95	[7] ABDALLAH	04J	DLPH	$e^+e^- \to Z^0$
> 5.0	95	[8] ABDALLAH	03B	DLPH	$e^+e^- \to Z$
>10.3	95	[9] ABE	03	SLD	$e^+e^- \to Z$
>10.9	95	[10] HEISTER	03E	ALEP	$e^+e^- \to Z$
> 5.3	95	[11] ABE	02V	SLD	$e^+e^- \to Z$
> 1.0	95	[12] ABBIENDI	01D	OPAL	$e^+e^- \to Z$
> 7.4	95	[13] ABREU	00Y	DLPH	Repl. by ABDALLAH 04J
> 4.0	95	[14] ABREU,P	00G	DLPH	$e^+e^- \to Z$
> 5.2	95	[15] ABBIENDI	99S	OPAL	$e^+e^- \to Z$
<96	95	[16] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV
> 5.8	95	[17] ABE	99J	CDF	$p\overline{p}$ at 1.8 TeV

$>$ 9.6	95	[18] BARATE	99J	ALEP	$e^+e^- \to Z$
$>$ 7.9	95	[19] BARATE	98C	ALEP	Repl. by BARATE 99J
$>$ 3.1	95	[20] ACKERSTAFF	97U	OPAL	Repl. by ABBIENDI 99S
$>$ 2.2	95	[21] ACKERSTAFF	97V	OPAL	Repl. by ABBIENDI 99S
$>$ 6.5	95	[22] ADAM	97	DLPH	Repl. by ABREU 00Y
$>$ 6.6	95	[23] BUSKULIC	96M	ALEP	Repl. by BARATE 98C
$>$ 2.2	95	[21] AKERS	95J	OPAL	Sup. by ACKERSTAFF 97V
$>$ 5.7	95	[24] BUSKULIC	95J	ALEP	$e^+e^- \to Z$
$>$ 1.8	95	[21] BUSKULIC	94B	ALEP	$e^+e^- \to Z$

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

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

[3] 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

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

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

[6] Updates of D_s-lepton analysis.

[7] Combined results from all Delphi analyses.

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

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

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

[11] 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.

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

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

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

[15] Uses ℓ-Q_{hem} and ℓ-ℓ.

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

[17] ABE 99J uses ϕ ℓ-ℓ correlation.

[18] BARATE 99J uses combination of an inclusive lepton and D^-_s-based analyses.

[19] BARATE 98C combines results from $D_s h$-ℓ/Q_{hem}, $D_s h$-K in the same side, $D_s \ell$-ℓ/Q_{hem} and $D_s \ell$-K in the same side.

[20] Uses ℓ-Q_{hem}.

[21] Uses ℓ-ℓ.

[22] ADAM 97 combines results from $D_s \ell$-Q_{hem}, ℓ-Q_{hem}, and ℓ-ℓ.

[23] BUSKULIC 96M uses D_s lepton correlations and lepton, kaon, and jet charge tags.

[24] BUSKULIC 95J uses ℓ-Q_{hem}. They find Δm_s > 5.6 [> 6.1] for f_s=10% [12%]. We interpolate to our central value f_s=10.5%.

$x_s = \Delta m_{B_s^0} / \Gamma_{B_s^0}$

This is derived by the Heavy Flavor Averaging Group (HFAG) from the results on $\Delta m_{B_s^0}$ and "OUR EVALUATION" of the B_s^0 mean lifetime.

VALUE	DOCUMENT ID
26.49±0.29 OUR EVALUATION	

χ_s

This is a B_s^0-$\overline{B}_s^0$ integrated mixing parameter derived from x_s above and OUR EVALUATION of $\Delta\Gamma_{B_s^0}/\Gamma_{B_s^0}$.

VALUE	DOCUMENT ID
0.499292±0.000016 OUR EVALUATION	

CP VIOLATION PARAMETERS in B_s^0

$\mathrm{Re}(\epsilon_{B_s^0}) \,/\, (1 + |\epsilon_{B_s^0}|^2)$

CP impurity in B_s^0 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
−2.6±1.6 OUR EVALUATION				
−2.2±2.0 OUR AVERAGE Error includes scale factor of 1.1.				
−4.5±2.7	[1] ABAZOV	11U	D0	$p\overline{p}$ at 1.96 TeV
−0.4±2.3±0.4	[2] ABAZOV	10E	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−3.6±1.9	[3] ABAZOV	10H	D0	Repl. by ABAZOV 11U
6.1±4.8±0.9	[4] ABAZOV	07A	D0	Repl. by ABAZOV 10E

[1] Uses the dimuon charge asymmetry with different impact parameters from which it reports $A^s_{SL} = (-18.1 \pm 10.6) \times 10^{-3}$.

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

[3] ABAZOV 10H reports a measurement of like-sign dimuon charge asymmetry of $A^b_{SL} = (-9.57 \pm 2.51 \pm 1.46) \times 10^{-3}$ in semileptonic b-hadron decays. Using the measured production ratio of B_d^0 and B_s^0, and the asymmetry of B_d^0 $A^d_{SL} = (-4.7 \pm 4.6) \times 10^{-3}$ measured from B-factories, they obtain the asymmetry for B_s^0.

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

CP Violation phase β_s

$-2\beta_s$ is the weak phase difference between B^0_s mixing amplitude and the $B^0_s \to J/\psi\phi$ decay amplitude. The Standard Model value of β_s is arg($-\frac{V_{ts}V^*_{tb}}{V_{cs}V^*_{cb}}$).

"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	DOCUMENT ID		TECN	COMMENT
$0.08^{+0.05}_{-0.07}$ OUR EVALUATION				
0.02 ± 0.11 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.				
$0.22 \pm 0.22 \pm 0.01$	[1] AAIJ	12B	LHCB	pp at 7 TeV
$-0.075 \pm 0.09 \pm 0.03$	[2] AAIJ	12D	LHCB	pp at 7 TeV
	[3] AALTONEN	12D	CDF	$p\overline{p}$ at 1.96 TeV
$0.275^{+0.18}_{-0.19}$	[4,5,6] ABAZOV	12D	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
	[7] AALTONEN	08G	CDF	Repl. by AALTONEN 12D
$0.28^{+0.12}_{-0.15}{}^{+0.04}_{-0.01}$	[5,8] ABAZOV	08AM	D0	Repl. by ABAZOV 12D
$0.395 \pm 0.280^{+0.005}_{-0.070}$	[6,9] ABAZOV	07	D0	Repl. by ABAZOV 07N
$0.35^{+0.20}_{-0.24}$	[6,10] ABAZOV	07N	D0	Repl. by ABAZOV 08AM

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

[2] Reports $\phi_s = -2\,\beta_s = 0.15 \pm 0.18 \pm 0.06$ that was measured using a time-dependent angular analysis of $B^0_s \to J/\psi\phi$ decays.

[3] Reports $0.02 < \phi_s < 0.52$ or $1.08 < \phi_s < 1.55$ at 68% C.L. confidence regions in the two-dimensional space of ϕ_s and $\Delta\Gamma_{B^0_s}$ from $B^0_s \to J/\psi\phi$ decays.

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

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

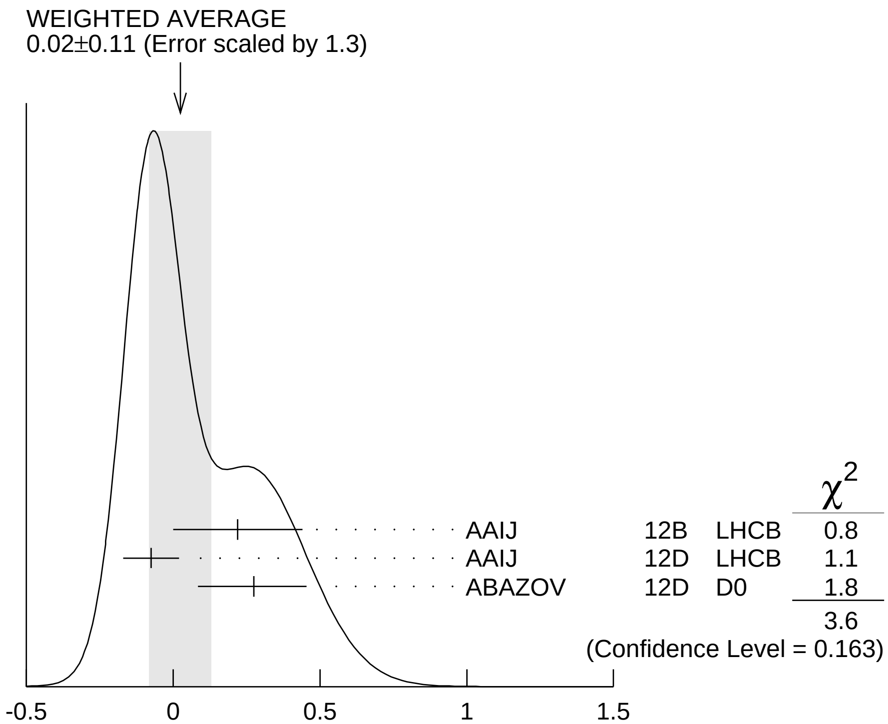
[6] Reports ϕ_s which equals to $-2\beta_s$.

[7] Reports $0.32 < 2\beta_s < 2.82$ at 68% C.L. and confidence regions in the two-dimensional space of $2\beta_s$ and $\Delta\Gamma$ from the first measurement of $B^0_s \to J/\psi\phi$ decays using flavor tagging. The probability of a deviation from SM prediction as large as the level of observed data is 15%.

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

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

[10] Combines D0 collaboration 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.



CP Violation phase β_s

$A_{CP}(B_s \to \pi^+ K^-)$

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*
0.39±0.15±0.08	AALTONEN	11N	CDF	$p\overline{p}$ at 1.96 TeV

PARTIAL BRANCHING FRACTIONS IN $B_s \to \phi \ell^+ \ell^-$

$B(B_s \to \phi \ell^+ \ell^-)$ ($q^2 < 2.0$ GeV^2/c^2)

VALUE (units 10^{-7})	*DOCUMENT ID*		*TECN*	*COMMENT*
2.78±0.95±0.89	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(B_s \to \phi \ell^+ \ell^-)$ ($2.0 < q^2 < 4.3$ GeV^2/c^2)

VALUE (units 10^{-7})	*DOCUMENT ID*		*TECN*	*COMMENT*
0.58±0.55±0.19	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(B_s \to \phi \ell^+ \ell^-)$ ($4.3 < q^2 < 8.68$ GeV^2/c^2)

VALUE (units 10^{-7})	*DOCUMENT ID*		*TECN*	*COMMENT*
1.34±0.83±0.43	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(B_s \to \phi \ell^+ \ell^-)$ $(10.09 < q^2 < 12.86 \text{ GeV}^2/c^2)$

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
2.98±0.95±0.95	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(B_s \to \phi \ell^+ \ell^-)$ $(14.18 < q^2 < 16.0 \text{ GeV}^2/c^2)$

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
1.86±0.66±0.59	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(B_s \to \phi \ell^+ \ell^-)$ $(16.0 < q^2 \text{ GeV}^2/c^2)$

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
2.32±0.76±0.74	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

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

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
1.14±0.79±0.36	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(B_s \to \phi \ell^+ \ell^-)$ $(0.0 < q^2 < 4.3 \text{ GeV}^2/c^2)$

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
3.30±1.09±1.05	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

B_s^0 REFERENCES

AAIJ	12	PL B707 349	R. Aaij et al.	(LHCb Collab.)
AAIJ	12A	PL B708 55	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.)
AALTONEN	12C	PRL 108 201801	T. Aaltonen et al.	(CDF Collab.)
AALTONEN	12D	PR D85 072002	T. Aaltonen et al.	(CDF 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.)
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.)
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	PR D82 032001	V.M. Abazov et al.	(D0 Collab.)
ABAZOV	10S	PL B693 539	V.M. Abazov et al.	
ESEN	10	PRL 105 201802	S. Esen et al.	
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 011104R	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 111102R	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.*	(FNAL 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 031107R	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 (erratum)	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 111101R	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 071101R	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 (erratum)	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.*	
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.*	
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.)