



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

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

B_s^0 MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
5369.6 ± 2.4 OUR FIT				
5369.6 ± 2.4 OUR AVERAGE				
5369.9 ± 2.3 ± 1.3	32	¹ ABE	96B CDF	$p\bar{p}$ at 1.8 TeV
5374 ± 16 ± 2	3	ABREU	94D DLPH	$e^+e^- \rightarrow Z$
5359 ± 19 ± 7	1	¹ 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 ± 40	6	² AKERS	94J OPAL	$e^+e^- \rightarrow Z$
5383.3 ± 4.5 ± 5.0	14	ABE	93F CDF	Repl by ABE 96B
¹ From the decay $B_s \rightarrow J/\psi(1S)\phi$.				
² From the decay $B_s \rightarrow D_s^- \pi^+$.				

$$m_{B_s^0} - m_B$$

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

VALUE (MeV)	CL%	DOCUMENT ID	TECN	COMMENT
90.4 ± 2.4 OUR FIT				
89.7 ± 2.7 ± 1.2		ABE	96B CDF	$p\bar{p}$ at 1.8 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
80 to 130	68	LEE-FRANZINI 90	CSB2	$e^+e^- \rightarrow \Upsilon(5S)$

$$m_{B_{sH}^0} - m_{B_{sL}^0}$$

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

B_s^0 MEAN LIFE

"OUR EVALUATION" is an average of the data listed below performed by the LEP B Lifetimes Working Group as described in our review "Production and Decay of b -flavored Hadrons" in the B^\pm Section of the Listings. The averaging procedure takes into account correlations between the measurements and asymmetric lifetime errors.

VALUE (10^{-12} s)	EVTS	DOCUMENT ID	TECN	COMMENT
1.464 ± 0.057 OUR EVALUATION				
1.42 $\begin{smallmatrix} +0.14 \\ -0.13 \end{smallmatrix}$ ± 0.03		³ ABREU	00Y DLPH	$e^+e^- \rightarrow Z$

1.53	$\begin{smallmatrix} +0.16 \\ -0.15 \end{smallmatrix}$	± 0.07		4	ABREU,P	00G DLPH	$e^+ e^- \rightarrow Z$
1.36	± 0.09	$\begin{smallmatrix} +0.06 \\ -0.05 \end{smallmatrix}$		5	ABE	99D CDF	$p\bar{p}$ at 1.8 TeV
1.34	$\begin{smallmatrix} +0.23 \\ -0.19 \end{smallmatrix}$	± 0.05		6	ABE	98B CDF	$p\bar{p}$ at 1.8 TeV
1.72	$\begin{smallmatrix} +0.20 \\ -0.19 \end{smallmatrix}$	$\begin{smallmatrix} +0.18 \\ -0.17 \end{smallmatrix}$		7	ACKERSTAFF	98F OPAL	$e^+ e^- \rightarrow Z$
1.50	$\begin{smallmatrix} +0.16 \\ -0.15 \end{smallmatrix}$	± 0.04		5	ACKERSTAFF	98G OPAL	$e^+ e^- \rightarrow Z$
1.47	± 0.14	± 0.08		4	BARATE	98C ALEP	$e^+ e^- \rightarrow Z$
1.60	± 0.26	$\begin{smallmatrix} +0.13 \\ -0.15 \end{smallmatrix}$		8	ABREU	96F DLPH	$e^+ e^- \rightarrow Z$
1.54	$\begin{smallmatrix} +0.14 \\ -0.13 \end{smallmatrix}$	± 0.04		5	BUSKULIC	96M ALEP	$e^+ e^- \rightarrow Z$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●							
1.51	± 0.11			9	BARATE	98C ALEP	$e^+ e^- \rightarrow Z$
1.34	$\begin{smallmatrix} +0.23 \\ -0.19 \end{smallmatrix}$	± 0.05		10	ABE	96N CDF	Repl. by ABE 98B
1.56	$\begin{smallmatrix} +0.29 \\ -0.26 \end{smallmatrix}$	$\begin{smallmatrix} +0.08 \\ -0.07 \end{smallmatrix}$		5	ABREU	96F DLPH	Repl. by ABREU 00Y
1.65	$\begin{smallmatrix} +0.34 \\ -0.31 \end{smallmatrix}$	± 0.12		4	ABREU	96F DLPH	Repl. by ABREU 00Y
1.76	± 0.20	$\begin{smallmatrix} +0.15 \\ -0.10 \end{smallmatrix}$		11	ABREU	96F DLPH	Repl. by ABREU 00Y
1.67	± 0.14			12	ABREU	96F DLPH	$e^+ e^- \rightarrow Z$
1.61	$\begin{smallmatrix} +0.30 \\ -0.29 \end{smallmatrix}$	$\begin{smallmatrix} +0.18 \\ -0.16 \end{smallmatrix}$	90	4	BUSKULIC	96E ALEP	Repl. by BARATE 98C
1.42	$\begin{smallmatrix} +0.27 \\ -0.23 \end{smallmatrix}$	± 0.11	76	5	ABE	95R CDF	Repl. by ABE 99D
1.74	$\begin{smallmatrix} +1.08 \\ -0.69 \end{smallmatrix}$	± 0.07	8	13	ABE	95R CDF	Sup. by ABE 96N
1.54	$\begin{smallmatrix} +0.25 \\ -0.21 \end{smallmatrix}$	± 0.06	79	5	AKERS	95G OPAL	Repl. by ACKERSTAFF 98G
1.59	$\begin{smallmatrix} +0.17 \\ -0.15 \end{smallmatrix}$	± 0.03	134	5	BUSKULIC	95O ALEP	Sup. by BUSKULIC 96M
0.96	± 0.37		41	14	ABREU	94E DLPH	Sup. by ABREU 96F
1.92	$\begin{smallmatrix} +0.45 \\ -0.35 \end{smallmatrix}$	± 0.04	31	5	BUSKULIC	94C ALEP	Sup. by BUSKULIC 95O
1.13	$\begin{smallmatrix} +0.35 \\ -0.26 \end{smallmatrix}$	± 0.09	22	5	ACTON	93H OPAL	Sup. by AKERS 95G

³ Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices.

⁴ Measured using D_s hadron vertices.

⁵ Measured using $D_s^- \ell^+$ vertices.

⁶ Measured using fully reconstructed $B_s \rightarrow J/\psi(1S)\phi$ decay.

⁷ ACKERSTAFF 98F use fully reconstructed $D_s^- \rightarrow \phi \pi^-$ and $D_s^- \rightarrow K^{*0} K^-$ in the inclusive B_s^0 decay.

⁸ Measured using inclusive D_s vertices.

⁹ Combined results from $D_s^- \ell^+$ and D_s hadron.

¹⁰ ABE 96N uses 58 ± 12 exclusive $B_s \rightarrow J/\psi(1S)\phi$ events.

¹¹ Measured using $\phi \ell$ vertices.

¹² Combined result for the four ABREU 96F methods.

¹³ Exclusive reconstruction of $B_s \rightarrow \psi \phi$.

¹⁴ ABREU 94E uses the flight-distance distribution of D_s vertices, ϕ -lepton vertices, and $D_s\mu$ vertices.

B_{sL}^0 MEAN LIFE

B_{sL}^0 is a long-lived CP-even state of two B_s^0 CP eigenstates.

VALUE (10^{-12} s)	DOCUMENT ID	TECN	COMMENT
1.27 ± 0.33 ± 0.08	¹⁵ BARATE	00K ALEP	$e^+ e^- \rightarrow Z$
¹⁵ Uses $\phi\phi$ correlations from $B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-}$.			

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

$\Gamma_{B_s^0}$ and $|\Delta\Gamma_{B_s^0}|$ are the decay rate average and difference between two B_s^0 CP eigenstates.

The first "OUR EVALUATION," < 0.32 (CL=95%), also provided by the LEP B Oscillation Working Group, including the assumption of $\Gamma_s = \frac{1}{\tau_{B_d}}$.

The second "OUR EVALUATION," < 0.52 (CL=95%), is an average of all available B_s semi-leptonic lifetime measurements with the $\Delta\Gamma_{B_s^0}/\Gamma_s$ analyses performed by the LEP B Oscillation Working Group as described in our "Review on B - \bar{B} Mixing" in the B^0 Section of these Listings.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.32 (CL = 95%) OUR EVALUATION				
<0.52 (CL = 95%) OUR EVALUATION				
<0.46	95	¹⁶ ABREU	00Y DLPH	$e^+ e^- \rightarrow Z$
<0.69	95	¹⁷ ABREU,P	00G DLPH	$e^+ e^- \rightarrow Z$
$0.25^{+0.21}_{-0.14}$		¹⁸ BARATE	00K ALEP	$e^+ e^- \rightarrow Z$
<0.83	95	¹⁹ ABE	99D CDF	$p\bar{p}$ at 1.8 TeV
<0.67	95	²⁰ ACCIARRI	98S L3	$e^+ e^- \rightarrow Z$
¹⁶ Uses $D_s^- \ell^+$, and $\phi\ell^+$ vertices.				
¹⁷ Measured using D_s hadron vertices.				
¹⁸ Uses $\phi\phi$ correlations from $B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-}$.				
¹⁹ ABE 99D assumes $\tau_{B_s^0} = 1.55 \pm 0.05$ ps.				
²⁰ ACCIARRI 98S assumes $\tau_{B_s^0} = 1.49 \pm 0.06$ ps and PDG 98 values of b production fraction.				

B_s^0 DECAY MODES

These branching fractions all scale with $B(\bar{b} \rightarrow B_s^0)$, the LEP B_s^0 production fraction. The first four were evaluated using $B(\bar{b} \rightarrow B_s^0) = (10.7 \pm 1.4)\%$ and the rest assume $B(\bar{b} \rightarrow B_s^0) = 12\%$.

The branching fraction $B(B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything})$ is not a pure measurement since the measured product branching fraction $B(\bar{b} \rightarrow B_s^0) \times B(B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything})$ was used to determine $B(\bar{b} \rightarrow B_s^0)$, as described in the note on "Production and Decay of b -Flavored Hadrons."

Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1 D_s^- anything	(92 \pm 31) %	
Γ_2 $D_s^- \ell^+ \nu_\ell$ anything	[a] (8.1 \pm 2.4) %	
Γ_3 $D_s^- \pi^+$	< 13 %	
Γ_4 $D_s^{(*)+} D_s^{(*)-}$	(23 $^{+21}_{-13}$) %	
Γ_5 $J/\psi(1S)\phi$	(9.3 \pm 3.3) $\times 10^{-4}$	
Γ_6 $J/\psi(1S)\pi^0$	< 1.2 $\times 10^{-3}$	90%
Γ_7 $J/\psi(1S)\eta$	< 3.8 $\times 10^{-3}$	90%
Γ_8 $\psi(2S)\phi$	seen	
Γ_9 $\pi^+ \pi^-$	< 1.7 $\times 10^{-4}$	90%
Γ_{10} $\pi^0 \pi^0$	< 2.1 $\times 10^{-4}$	90%
Γ_{11} $\eta \pi^0$	< 1.0 $\times 10^{-3}$	90%
Γ_{12} $\eta \eta$	< 1.5 $\times 10^{-3}$	90%
Γ_{13} $\rho^0 \rho^0$	< 3.20 $\times 10^{-4}$	90%
Γ_{14} $\phi \rho^0$	< 6.17 $\times 10^{-4}$	90%
Γ_{15} $\phi \phi$	< 1.183 $\times 10^{-3}$	90%
Γ_{16} $\pi^+ K^-$	< 2.1 $\times 10^{-4}$	90%
Γ_{17} $K^+ K^-$	< 5.9 $\times 10^{-5}$	90%
Γ_{18} $\bar{K}^*(892)^0 \rho^0$	< 7.67 $\times 10^{-4}$	90%
Γ_{19} $\bar{K}^*(892)^0 K^*(892)^0$	< 1.681 $\times 10^{-3}$	90%
Γ_{20} $\phi K^*(892)^0$	< 1.013 $\times 10^{-3}$	90%
Γ_{21} $\rho \bar{\rho}$	< 5.9 $\times 10^{-5}$	90%
Γ_{22} $\gamma \gamma$	< 1.48 $\times 10^{-4}$	90%
Γ_{23} $\phi \gamma$	< 7 $\times 10^{-4}$	90%

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

Γ_{24} $\mu^+ \mu^-$	$B1$	< 2.0 $\times 10^{-6}$	90%
Γ_{25} $e^+ e^-$	$B1$	< 5.4 $\times 10^{-5}$	90%
Γ_{26} $e^\pm \mu^\mp$	LF [b]	< 6.1 $\times 10^{-6}$	90%
Γ_{27} $\phi \nu \bar{\nu}$	$B1$	< 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.

B_s^0 BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.92 ± 0.31 OUR AVERAGE				
0.81 ± 0.24 ± 0.22	90	21 BUSKULIC	96E ALEP	$e^+ e^- \rightarrow Z$
1.56 ± 0.58 ± 0.44	147	22 ACTON	92N OPAL	$e^+ e^- \rightarrow Z$

	90	21	BUSKULIC	96E	ALEP	$e^+ e^- \rightarrow Z$
	147	22	ACTON	92N	OPAL	$e^+ e^- \rightarrow Z$

²¹ BUSKULIC 96E separate $c\bar{c}$ and $b\bar{b}$ sources of D_s^+ mesons using a lifetime tag, subtract generic $\bar{b} \rightarrow W^+ \rightarrow D_s^+$ events, and obtain $B(\bar{b} \rightarrow B_s^0) \times B(B_s^0 \rightarrow D_s^- \text{ anything}) = 0.088 \pm 0.020 \pm 0.020$ 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 $B(\bar{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ 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 $B(\bar{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$.

²² ACTON 92N assume that excess of $147 \pm 48 D_s^0$ events over that expected from B^0 , B^+ , and $c\bar{c}$ is all from B_s^0 decay. The product branching fraction is measured to be $B(\bar{b} \rightarrow B_s^0)B(B_s^0 \rightarrow D_s^- \text{ anything}) \times B(D_s \rightarrow \phi\pi^-) = (5.9 \pm 1.9 \pm 1.1) \times 10^{-3}$. We evaluate using our current values $B(\bar{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ 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 $B(\bar{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$.

$\Gamma(D_s^- \ell^+ \nu_\ell \text{ anything})/\Gamma_{\text{total}}$ Γ_2/Γ

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.081 ± 0.024 OUR AVERAGE				
0.076 ± 0.012 ± 0.021	134	23 BUSKULIC	95O ALEP	$e^+ e^- \rightarrow Z$
0.107 ± 0.043 ± 0.029		24 ABREU	92M DLPH	$e^+ e^- \rightarrow Z$
0.103 ± 0.036 ± 0.028	18	25 ACTON	92N OPAL	$e^+ e^- \rightarrow Z$

	134	23	BUSKULIC	95O	ALEP	$e^+ e^- \rightarrow Z$
		24	ABREU	92M	DLPH	$e^+ e^- \rightarrow Z$
	18	25	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	26	BUSKULIC	92E	ALEP	$e^+ e^- \rightarrow Z$
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²³ BUSKULIC 95O use $D_s \ell$ correlations. The measured product branching ratio is $B(\bar{b} \rightarrow B_s) \times B(B_s \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything}) = (0.82 \pm 0.09_{-0.14}^{+0.13})\%$ 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 $\mathcal{T}(4S)$ experiments this can be used to extract $B(\bar{b} \rightarrow B_s) = (11.0 \pm 1.2_{-2.6}^{+2.5})\%$. We evaluate using our current values $B(\bar{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ 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 $B(\bar{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$.

²⁴ ABREU 92M measured muons only and obtained product branching ratio $B(Z \rightarrow b \text{ or } \bar{b}) \times B(\bar{b} \rightarrow B_s) \times B(B_s \rightarrow D_s \mu^+ \nu_\mu \text{ anything}) \times B(D_s \rightarrow \phi\pi) = (18 \pm 8) \times 10^{-5}$.

We evaluate using our current values $B(\bar{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ 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 $B(\bar{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$. We use $B(Z \rightarrow b \text{ or } \bar{b}) = 2B(Z \rightarrow b\bar{b}) = 2 \times (0.2212 \pm 0.0019)$.

²⁵ 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 $B(\bar{b} \rightarrow B_s^0)B(B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything}) \times B(D_s^- \rightarrow \phi\pi^-) = (3.9 \pm 1.1 \pm 0.8) \times 10^{-4}$. We evaluate using our current values $B(\bar{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ 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 $B(\bar{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$.

²⁶ BUSKULIC 92E is measured using $D_s \rightarrow \phi\pi^+$ and $K^*(892)^0 K^+$ events. They use $2.7 \pm 0.7\%$ for the $\phi\pi^+$ branching fraction. The average product branching fraction is measured to be $B(\bar{b} \rightarrow B_s^0)B(B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything}) = 0.020 \pm 0.0055^{+0.005}_{-0.006}$. We evaluate using our current values $B(\bar{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ 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 $B(\bar{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$. Superseded by BUSKULIC 950.

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<0.13	6	²⁷ AKERS	94J OPAL	$e^+ e^- \rightarrow Z$

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

seen	1	BUSKULIC	93G ALEP	$e^+ e^- \rightarrow Z$
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²⁷ AKERS 94J sees ≤ 6 events and measures the limit on the product branching fraction $f(\bar{b} \rightarrow B_s^0) \cdot B(B_s^0 \rightarrow D_s^- \pi^+) < 1.3\%$ at CL = 90%. We divide by our current value $B(\bar{b} \rightarrow B_s^0) = 0.105$.

$\Gamma(D_s^{(*)+} D_s^{(*)-})/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$0.23 \pm 0.10^{+0.19}_{-0.09}$		²⁸ BARATE	00K ALEP	$e^+ e^- \rightarrow Z$

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

<0.218	90	BARATE	98Q ALEP	$e^+ e^- \rightarrow Z$
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²⁸ Uses $\phi\phi$ correlations from $B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-}$.

$\Gamma(J/\psi(1S)\phi)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.93 \pm 0.28 \pm 0.17$		²⁹ ABE	96Q CDF	$p\bar{p}$

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

<6	1	³⁰ AKERS	94J OPAL	$e^+ e^- \rightarrow Z$
seen	14	³¹ ABE	93F CDF	$p\bar{p}$ at 1.8 TeV
seen	1	³² ACTON	92N OPAL	Sup. by AKERS 94J

²⁹ ABE 96Q assumes $f_u = f_d$ and $f_s/f_u = 0.40 \pm 0.06$. Uses $B \rightarrow J/\psi(1S)K$ and $B \rightarrow J/\psi(1S)K^*$ branching fractions from PDG 94. They quote two systematic errors, ± 0.10 and ± 0.14 where the latter is the uncertainty in f_s . We combine in quadrature.

³⁰ AKERS 94J sees one event and measures the limit on the product branching fraction $f(\bar{b} \rightarrow B_s^0) \cdot B(B_s^0 \rightarrow J/\psi(1S)\phi) < 7 \times 10^{-4}$ at CL = 90%. We divide by $B(\bar{b} \rightarrow B_s^0) = 0.112$.

³¹ ABE 93F measured using $J/\psi(1S) \rightarrow \mu^+ \mu^-$ and $\phi \rightarrow K^+ K^-$.

³² In ACTON 92N a limit on the product branching fraction is measured to be $f(\bar{b} \rightarrow B_s^0) \cdot B(B_s^0 \rightarrow J/\psi(1S)\phi) \leq 0.22 \times 10^{-2}$.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE	CL%	DOCUMENT ID	TECN
$<1.2 \times 10^{-3}$	90	³³ ACCIARRI	97C L3

³³ ACCIARRI 97C assumes B^0 production fraction ($39.5 \pm 4.0\%$) and B_s ($12.0 \pm 3.0\%$).

$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE	CL%	DOCUMENT ID	TECN
$<3.8 \times 10^{-3}$	90	³⁴ ACCIARRI	97C L3

³⁴ ACCIARRI 97C assumes B^0 production fraction ($39.5 \pm 4.0\%$) and B_s ($12.0 \pm 3.0\%$).

$\Gamma(\psi(2S)\phi)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
seen	1	BUSKULIC	93G ALEP	$e^+ e^- \rightarrow Z$

$\Gamma(\pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.7 \times 10^{-4}$	90	³⁵ BUSKULIC	96V ALEP	$e^+ e^- \rightarrow Z$

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

$<2.32 \times 10^{-4}$	90	³⁶ ABE	00C SLD	$e^+ e^- \rightarrow Z$
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³⁵ BUSKULIC 96V assumes PDG 96 production fractions for B^0 , B^+ , B_s , b baryons.

³⁶ ABE 00C assumes $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$ and the B fractions $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$ and $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$.

$\Gamma(\pi^0 \pi^0)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.1 \times 10^{-4}$	90	³⁷ ACCIARRI	95H L3	$e^+ e^- \rightarrow Z$

³⁷ ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.

$\Gamma(\eta \pi^0)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.0 \times 10^{-3}$	90	³⁸ ACCIARRI	95H L3	$e^+ e^- \rightarrow Z$

³⁸ ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.

$\Gamma(\eta \eta)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.5 \times 10^{-3}$	90	³⁹ ACCIARRI	95H L3	$e^+ e^- \rightarrow Z$

³⁹ ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.

$\Gamma(\rho^0 \rho^0)/\Gamma_{\text{total}}$ Γ_{13}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.20 \times 10^{-4}$	90	40 ABE	00C SLD	$e^+ e^- \rightarrow Z$
40 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				

$\Gamma(\phi \rho^0)/\Gamma_{\text{total}}$ Γ_{14}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.17 \times 10^{-4}$	90	41 ABE	00C SLD	$e^+ e^- \rightarrow Z$
41 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				

$\Gamma(\phi \phi)/\Gamma_{\text{total}}$ Γ_{15}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<11.83 \times 10^{-4}$	90	42 ABE	00C SLD	$e^+ e^- \rightarrow Z$
42 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				

$\Gamma(\pi^+ K^-)/\Gamma_{\text{total}}$ Γ_{16}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.1 \times 10^{-4}$	90	43 BUSKULIC	96V ALEP	$e^+ e^- \rightarrow Z$
••• We do not use the following data for averages, fits, limits, etc. •••				
$<2.61 \times 10^{-4}$	90	44 ABE	00C SLD	$e^+ e^- \rightarrow Z$
$<2.6 \times 10^{-4}$	90	45 AKERS	94L OPAL	$e^+ e^- \rightarrow Z$
43 BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.				
44 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				
45 Assumes $B(Z \rightarrow b\bar{b}) = 0.217$ and $B_d^0 (B_s^0)$ fraction 39.5% (12%).				

$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$ Γ_{17}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.9 \times 10^{-5}$	90	46 BUSKULIC	96V ALEP	$e^+ e^- \rightarrow Z$
••• We do not use the following data for averages, fits, limits, etc. •••				
$<2.83 \times 10^{-4}$	90	47 ABE	00C SLD	$e^+ e^- \rightarrow Z$
$<1.4 \times 10^{-4}$	90	48 AKERS	94L OPAL	$e^+ e^- \rightarrow Z$
46 BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.				
47 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				
48 Assumes $B(Z \rightarrow b\bar{b}) = 0.217$ and $B_d^0 (B_s^0)$ fraction 39.5% (12%).				

$\Gamma(\overline{K}^*(892)^0 \rho^0)/\Gamma_{\text{total}}$ Γ_{18}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<7.67 \times 10^{-4}$	90	49 ABE	00C SLD	$e^+ e^- \rightarrow Z$
49 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				

$\Gamma(\overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{\text{total}}$ Γ_{19}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<16.81 \times 10^{-4}$	90	50 ABE	00C SLD	$e^+ e^- \rightarrow Z$
50 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				

$\Gamma(\phi K^*(892)^0)/\Gamma_{\text{total}}$ Γ_{20}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<10.13 \times 10^{-4}$	90	51 ABE	00C SLD	$e^+ e^- \rightarrow Z$
51 ABE 00C assumes $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$ and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$.				

$\Gamma(\rho\bar{\rho})/\Gamma_{\text{total}}$ Γ_{21}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.9 \times 10^{-5}$	90	52 BUSKULIC	96V ALEP	$e^+ e^- \rightarrow Z$
52 BUSKULIC 96V assumes PDG 96 production fractions for B^0 , B^+ , B_s , b baryons.				

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Γ_{22}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<14.8 \times 10^{-5}$	90	53 ACCIARRI	95I L3	$e^+ e^- \rightarrow Z$
53 ACCIARRI 95I assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0\%$.				

$\Gamma(\phi\gamma)/\Gamma_{\text{total}}$ Γ_{23}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<7 \times 10^{-4}$	90	54 ADAM	96D DLPH	$e^+ e^- \rightarrow Z$
54 ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.				

$\Gamma(\mu^+ \mu^-)/\Gamma_{\text{total}}$ Γ_{24}/Γ

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.0 \times 10^{-6}$	90	55 ABE	98 CDF	$p\bar{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<3.8 \times 10^{-5}$	90	56 ACCIARRI	97B L3	$e^+ e^- \rightarrow Z$
$<8.4 \times 10^{-6}$	90	57 ABE	96L CDF	Repl. by ABE 98
55 ABE 98 assumes production of $\sigma(B^0) = \sigma(B^+)$ and $\sigma(B_s)/\sigma(B^0) = 1/3$. They normalize to their measured $\sigma(B^0, p_T(B) > 6, y < 1.0) = 2.39 \pm 0.32 \pm 0.44 \mu\text{b}$.				
56 ACCIARRI 97B assume PDG 96 production fractions for B^+ , B^0 , B_s , and Λ_b .				
57 ABE 96L assumes B^+/B_s production ratio 3/1. They normalize to their measured $\sigma(B^+, p_T(B) > 6 \text{ GeV}/c, y < 1) = 2.39 \pm 0.54 \mu\text{b}$.				

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ Γ_{25}/Γ

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.4 \times 10^{-5}$	90	58 ACCIARRI	97B L3	$e^+e^- \rightarrow Z$
⁵⁸ ACCIARRI 97B assume PDG 96 production fractions for B^+ , B^0 , B_s , and Λ_b .				

$\Gamma(e^\pm\mu^\mp)/\Gamma_{\text{total}}$ Γ_{26}/Γ

test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.1 \times 10^{-6}$	90	ABE	98V CDF	$p\bar{p}$ at 1.8 TeV
••• We do not use the following data for averages, fits, limits, etc. •••				
$<4.1 \times 10^{-5}$	90	⁵⁹ ACCIARRI	97B L3	$e^+e^- \rightarrow Z$
⁵⁹ ACCIARRI 97B assume PDG 96 production fractions for B^+ , B^0 , B_s , and Λ_b .				

$\Gamma(\phi\nu\bar{\nu})/\Gamma_{\text{total}}$ Γ_{27}/Γ

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.4 \times 10^{-3}$	90	⁶⁰ ADAM	96D DLPH	$e^+e^- \rightarrow Z$
⁶⁰ 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 $B_s^0 \rightarrow J/\psi(1S)\phi$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.59 ± 0.12 OUR AVERAGE				
$0.61 \pm 0.14 \pm 0.02$		⁶¹ AFFOLDER	00N CDF	$p\bar{p}$ at 1.8 TeV
$0.56 \pm 0.21^{+0.02}_{-0.04}$	19	ABE	95Z CDF	$p\bar{p}$ at 1.8 TeV

⁶¹ 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 $0.23 \pm 0.19 \pm 0.04$.

$B_s^0-\bar{B}_s^0$ MIXING

For a discussion of $B_s^0-\bar{B}_s^0$ mixing see the note on " $B^0-\bar{B}^0$ Mixing" in the B^0 Particle Listings above.

χ_s is a measure of the time-integrated $B_s^0-\bar{B}_s^0$ mixing probability that produced $B_s^0(\bar{B}_s^0)$ decays as a $\bar{B}_s^0(B_s^0)$. Mixing violates $\Delta B \neq 2$ rule.

$$\chi_s = \frac{x_s^2}{2(1+x_s^2)}$$

$$\chi_s = \frac{\Delta m_{B_s^0}}{\Gamma_{B_s^0}} = (m_{B_{sH}^0} - m_{B_{sL}^0}) \tau_{B_s^0},$$

where H, L stand for heavy and light states of two B_s^0 CP eigenstates and

$$\tau_{B_s^0} = \frac{1}{0.5(\Gamma_{B_{sH}^0} + \Gamma_{B_{sL}^0})}$$

$$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0}$$

$\Delta m_{B_s^0}$ is a measure of 2π times the $B_s^0-\bar{B}_s^0$ oscillation frequency in time-dependent mixing experiments.

“OUR EVALUATION” is an average of the data listed below performed by the LEP B Oscillation Working Group as described in our “Review of $B-\bar{B}$ Mixing” in the B^0 Section of these Listings. The averaging procedure takes into account correlations between the measurements.

VALUE ($10^{12} \text{ } \hbar \text{ s}^{-1}$)	CL%	DOCUMENT ID	TECN	COMMENT
>13.1 (CL = 95%) OUR EVALUATION				
> 1.0	95	62 ABBIENDI	01D OPAL	$e^+ e^- \rightarrow Z$
> 7.4	95	63 ABREU	00Y DLPH	$e^+ e^- \rightarrow Z$
> 4.0	95	64 ABREU,P	00G DLPH	$e^+ e^- \rightarrow Z$
> 5.2	95	65 ABBIENDI	99S OPAL	$e^+ e^- \rightarrow Z$
> 5.8	95	66 ABE	99J CDF	$p\bar{p}$ at 1.8 TeV
> 9.6	95	67 BARATE	99J ALEP	$e^+ e^- \rightarrow Z$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<96	95	68 ABE	99D CDF	$p\bar{p}$ at 1.8 TeV
> 7.9	95	69 BARATE	98C ALEP	Repl. by BARATE 99J
> 3.1	95	70 ACKERSTAFF	97U OPAL	Repl. by ABBIENDI 99S
> 2.2	95	71 ACKERSTAFF	97V OPAL	Repl. by ABBIENDI 99S
> 6.5	95	72 ADAM	97 DLPH	Repl. by ABREU 00Y
> 6.6	95	73 BUSKULIC	96M ALEP	Repl. by BARATE 98C
> 2.2	95	71 AKERS	95J OPAL	Sup. by ACKER-STAFF 97V
> 5.7	95	74 BUSKULIC	95J ALEP	$e^+ e^- \rightarrow Z$
> 1.8	95	71 BUSKULIC	94B ALEP	$e^+ e^- \rightarrow Z$

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

63 Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices, and a multi-variable discriminant as a flavor tagging.

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

65 Uses $l-Q_{\text{hem}}$ and $l-l$.

66 ABE 99J uses ϕ $l-l$ correlation.

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

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

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

70 Uses $l-Q_{\text{hem}}$.

71 Uses $l-l$.

72 ADAM 97 combines results from $D_s l-Q_{\text{hem}}$, $l-Q_{\text{hem}}$, and $l-l$.

73 BUSKULIC 96M uses D_s lepton correlations and lepton, kaon, and jet charge tags.

74 BUSKULIC 95J uses $l-Q_{\text{hem}}$. They find $\Delta m_s > 5.6$ [> 6.1] for $f_s=10\%$ [12%]. We interpolate to our central value $f_s=10.5\%$.

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

This is derived by the LEP B Oscillation Working Group from the results on $\Delta m_{B_s^0}$ and "OUR EVALUATION" of the B_s^0 mean lifetime.

VALUE CL% DOCUMENT ID
>19.0 (CL = 95%) OUR EVALUATION

x_s

This B_s^0 - \bar{B}_s^0 integrated mixing parameter is derived from x_s above.

VALUE CL% DOCUMENT ID
>0.49862 (CL = 95%) OUR EVALUATION

B_s^0 REFERENCES

ABBIENDI	01D	hep-ex/0011052	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
EPJ C (to be publ.)		CERN-EP-2000-136		
ABE	00C	PR D62 071101R	K. Abe <i>et al.</i>	(SLD Collab.)
ABREU	00Y	EPJ C16 555	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU,P	00G	EPJ C18 229	P. Abreu <i>et al.</i>	(DELPHI Collab.)
AFFOLDER	00N	PRL 85 4668	T. Affolder <i>et al.</i>	(CDF Collab.)
BARATE	00K	PL B486 286	R. Barate <i>et al.</i>	(ALEPH Collab.)
ABBIENDI	99S	EPJ C11 587	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
ABE	99D	PR D59 032004	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	99J	PRL 82 3576	F. Abe <i>et al.</i>	(CDF Collab.)
BARATE	99J	EPJ C7 553	R. Barate <i>et al.</i>	(ALEPH Collab.)
Also	00	EPJ C12 181 (erratum)	R. Barate <i>et al.</i>	(ALEPH Collab.)
ABE	98	PR D57 R3811	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98B	PR D57 5382	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98V	PRL 81 5742	F. Abe <i>et al.</i>	(CDF Collab.)
ACCIARRI	98S	PL B438 417	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACKERSTAFF	98F	EPJ C2 407	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ACKERSTAFF	98G	PL B426 161	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
BARATE	98C	EPJ C4 367	R. Barate <i>et al.</i>	(ALEPH Collab.)
BARATE	98Q	EPJ C4 387	R. Barate <i>et al.</i>	(ALEPH Collab.)
PDG	98	EPJ C3 1	C. Caso <i>et al.</i>	
ACCIARRI	97B	PL B391 474	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACCIARRI	97C	PL B391 481	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACKERSTAFF	97U	ZPHY C76 401	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ACKERSTAFF	97V	ZPHY C76 417	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ADAM	97	PL B414 382	W. Adam <i>et al.</i>	(DELPHI Collab.)
ABE	96B	PR D53 3496	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	96L	PRL 76 4675	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	96N	PRL 77 1945	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	96Q	PR D54 6596	F. Abe <i>et al.</i>	(CDF Collab.)
ABREU	96F	ZPHY C71 11	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ADAM	96D	ZPHY C72 207	W. Adam <i>et al.</i>	(DELPHI Collab.)
BUSKULIC	96E	ZPHY C69 585	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	96M	PL B377 205	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	96V	PL B384 471	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
PDG	96	PR D54 1	R. M. Barnett <i>et al.</i>	
ABE	95R	PRL 74 4988	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	95Z	PRL 75 3068	F. Abe <i>et al.</i>	(CDF Collab.)
ACCIARRI	95H	PL B363 127	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACCIARRI	95I	PL B363 137	M. Acciarri <i>et al.</i>	(L3 Collab.)
AKERS	95G	PL B350 273	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	95J	ZPHY C66 555	R. Akers <i>et al.</i>	(OPAL Collab.)

BUSKULIC	95J	PL B356 409	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	95O	PL B361 221	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
ABREU	94D	PL B324 500	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU	94E	ZPHY C61 407	P. Abreu <i>et al.</i>	(DELPHI Collab.)
Also	92M	PL B289 199	P. Abreu <i>et al.</i>	(DELPHI Collab.)
AKERS	94J	PL B337 196	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	94L	PL B337 393	R. Akers <i>et al.</i>	(OPAL Collab.)
BUSKULIC	94B	PL B322 441	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	94C	PL B322 275	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
PDG	94	PR D50 1173	L. Montanet <i>et al.</i>	(CERN, LBL, BOST+)
ABE	93F	PRL 71 1685	F. Abe <i>et al.</i>	(CDF Collab.)
ACTON	93H	PL B312 501	P.D. Acton <i>et al.</i>	(OPAL Collab.)
BUSKULIC	93G	PL B311 425	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
ABREU	92M	PL B289 199	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ACTON	92N	PL B295 357	P.D. Acton <i>et al.</i>	(OPAL Collab.)
BUSKULIC	92E	PL B294 145	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
LEE-FRANZINI	90	PRL 65 2947	J. Lee-Franzini <i>et al.</i>	(CUSB II Collab.)
