B_s^0

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions. NODE=S086

B_s^0 MASS

NODE=S086205

The fit uses m_{B^+}, $(m_{B^0} - m_{B^+})$, $m_{B_s^0}$, and $(m_{B_s^0} - (m_{B^+} + m_{B^0})/2)$ to determine m_{B^+}, m_{B^0}, $m_{B_s^0}$, and the mass differences. NODE=S086205

NODE=S086M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
5369.3± 2.0 OUR FIT						
5369.6± 2.4 OUR AVERAGE						
5369.9± 2.3±1.3	32	[1] ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV	
5374 ±16 ±2	3	ABREU	94D	DLPH	$e^+e^- \rightarrow Z$	
5359 ±19 ±7	1	[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	$e^+e^- \rightarrow Z$	OCCUR=2
5383.3± 4.5±5.0	14	ABE	93F	CDF	Repl by ABE 96B	

[1] From the decay $B_s \rightarrow J/\psi(1S)\phi$. NODE=S086M;LINKAGE=A

[2] From the decay $B_s \rightarrow D_s^- \pi^+$. NODE=S086M;LINKAGE=B

$m_{B_s^0} - m_B$

NODE=S086210

m_B is the average of our B masses $(m_{B^\pm}+m_{B^0})/2$. The fits uses m_{B^+}, $(m_{B^0} - m_{B^+})$, $m_{B_s^0}$, and $m_{B_s^0} - m_B$ to determine m_{B^+}, m_{B^0}, $m_{B_s^0}$, and the mass differences. NODE=S086210

NODE=S086DM

VALUE (MeV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
90.2±2.2 OUR FIT					
89.7±2.7±1.2		ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
80 to 130	68	LEE-FRANZINI	90	CSB2	$e^+e^- \rightarrow \Upsilon(5S)$

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

NODE=S086214

See the B_s^0-$\overline{B}_s^0$ MIXING section near the end of these B_s^0 Listings. NODE=S086214

B_s^0 MEAN LIFE

NODE=S086211

"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. NODE=S086T

NODE=S086T

→ NOT CHECKED ←

VALUE (10^{-12} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
1.54±0.07 OUR EVALUATION						
Average is meaningless. [(1.54 ± 0.07) × 10^{-12} s OUR 1998 AVERAGE]						
$1.36\pm0.09^{+0.06}_{-0.05}$		[3] ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV	
$1.34^{+0.23}_{-0.19}\pm0.05$		[4] ABE	98B	CDF	$p\overline{p}$ at 1.8 TeV	
$1.72^{+0.20}_{-0.19}{}^{+0.18}_{-0.17}$		[5] ACKERSTAFF	98F	OPAL	$e^+e^- \rightarrow Z$	
$1.50^{+0.16}_{-0.15}\pm0.04$		[3] ACKERSTAFF	98G	OPAL	$e^+e^- \rightarrow Z$	
$1.47\pm0.14\pm0.08$		[6] BARATE	98C	ALEP	$e^+e^- \rightarrow Z$	OCCUR=2
$1.56^{+0.29}_{-0.26}{}^{+0.08}_{-0.07}$		[3] ABREU	96F	DLPH	$e^+e^- \rightarrow Z$	
$1.65^{+0.34}_{-0.31}\pm0.12$		[6] ABREU	96F	DLPH	$e^+e^- \rightarrow Z$	OCCUR=2
$1.76\pm0.20^{+0.15}_{-0.10}$		[7] ABREU	96F	DLPH	$e^+e^- \rightarrow Z$	OCCUR=3
$1.60\pm0.26^{+0.13}_{-0.15}$		[8] ABREU	96F	DLPH	$e^+e^- \rightarrow Z$	OCCUR=4
$1.54^{+0.14}_{-0.13}\pm0.04$		[3] BUSKULIC	96M	ALEP	$e^+e^- \rightarrow Z$	OCCUR=2

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

1.51 ± 0.11		[9] BARATE	98C ALEP	$e^+e^- \to Z$	OCCUR=3
$1.34^{+0.23}_{-0.19} \pm 0.05$		[10] ABE	96N CDF	Repl. by ABE 98B	
1.67 ± 0.14		[11] ABREU	96F DLPH	$e^+e^- \to Z$	OCCUR=5
$1.61^{+0.30}_{-0.29}{}^{+0.18}_{-0.16}$	90	[6] BUSKULIC	96E ALEP	Repl. by BARATE 98C	
$1.42^{+0.27}_{-0.23} \pm 0.11$	76	[3] ABE	95R CDF	Repl. by ABE 99D	
$1.74^{+1.08}_{-0.69} \pm 0.07$	8	[12] ABE	95R CDF	Sup. by ABE 96N	OCCUR=2
$1.54^{+0.25}_{-0.21} \pm 0.06$	79	[3] AKERS	95G OPAL	Repl. by ACKERSTAFF 98G	
$1.59^{+0.17}_{-0.15} \pm 0.03$	134	[3] BUSKULIC	95O ALEP	Sup. by BUSKULIC 96M	
0.96 ± 0.37	41	[13] ABREU	94E DLPH	Sup. by ABREU 96F	
$1.92^{+0.45}_{-0.35} \pm 0.04$	31	[3] BUSKULIC	94C ALEP	Sup. by BUSKULIC 95O	
$1.13^{+0.35}_{-0.26} \pm 0.09$	22	[3] ACTON	93H OPAL	Sup. by AKERS 95G	

[3] Measured using $D_s^- \ell^+$ vertices. NODE=S086T;LINKAGE=C

[4] Measured using fully reconstructed $B_s \to J/\psi(1S)\phi$ decay. NODE=S086T;LINKAGE=CD

[5] ACKERSTAFF 98F use fully reconstructed $D_s^- \to \phi\pi^-$ and $D_s^- \to K^{*0}K^-$ in the inclusive B_s^0 decay. NODE=S086T;LINKAGE=K

[6] Measured using D_s hadron vertices. NODE=S086T;LINKAGE=F

[7] Measured using $\phi\ell$ vertices. NODE=S086T;LINKAGE=G

[8] Measured using inclusive D_s vertices. NODE=S086T;LINKAGE=H

[9] Combined results from $D_s^- \ell^+$ and D_s hadron. NODE=S086T;LINKAGE=K6

[10] ABE 96N uses 58 ± 12 exclusive $B_s \to J/\psi(1S)\phi$ events. NODE=S086T;LINKAGE=J

[11] Combined result for the four ABREU 96F methods. NODE=S086T;LINKAGE=I

[12] Exclusive reconstruction of $B_s \to \psi\phi$. NODE=S086T;LINKAGE=D

[13] ABREU 94E uses the flight-distance distribution of D_s vertices, ϕ-lepton vertices, and $D_s\mu$ vertices. NODE=S086T;LINKAGE=B

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

NODE=S086212

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

NODE=S086212

NODE=S086DRA

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<0.67	95	[14] ACCIARRI	98S L3	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.83	95	[15] ABE	99D CDF	$p\overline{p}$ at 1.8 TeV

[14] ACCIARRI 98S assumes $\tau_{B_s^0} = 1.49 \pm 0.06$ ps and PDG 98 values of b production fraction. NODE=S086DRA;LINKAGE=A

[15] ABE 99D assumes $\tau_{B_s^0} = 1.55 \pm 0.05$ ps. NODE=S086DRA;LINKAGE=B

B_s^0 DECAY MODES

NODE=S086215;NODE=S086

These branching fractions all scale with B($\overline{b} \to B_s^0$), the LEP B_s^0 production fraction. The first four were evaluated using B($\overline{b} \to B_s^0$) = $(10.5^{+1.8}_{-1.7})$% and the rest assume B($\overline{b} \to B_s^0$) = 12%.

NODE=S086

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

	Mode		Fraction (Γ_i/Γ)	Confidence level	
Γ_1	D_s^- anything		(92 ± 33) %		DESIG=8
Γ_2	$D_s^- \ell^+ \nu_\ell$ anything	[a]	(8.1 ± 2.5) %		DESIG=4
Γ_3	$D_s^- \pi^+$		< 13 %		DESIG=5
Γ_4	$D_s{}^{(*)+} D_s{}^{(*)-}$		< 21.8 %	90%	DESIG=24
Γ_5	$J/\psi(1S)\phi$		$(9.3 \pm 3.3) \times 10^{-4}$		DESIG=7
Γ_6	$J/\psi(1S)\pi^0$		$< 1.2 \times 10^{-3}$	90%	DESIG=21
Γ_7	$J/\psi(1S)\eta$		$< 3.8 \times 10^{-3}$	90%	DESIG=22
Γ_8	$\psi(2S)\phi$		seen		DESIG=6
Γ_9	$\pi^+\pi^-$		$< 1.7 \times 10^{-4}$	90%	DESIG=16
Γ_{10}	$\pi^0\pi^0$		$< 2.1 \times 10^{-4}$	90%	DESIG=14
Γ_{11}	$\eta\pi^0$		$< 1.0 \times 10^{-3}$	90%	DESIG=13
Γ_{12}	$\eta\eta$		$< 1.5 \times 10^{-3}$	90%	DESIG=12
Γ_{13}	$\pi^+ K^-$		$< 2.1 \times 10^{-4}$	90%	DESIG=9
Γ_{14}	$K^+ K^-$		$< 5.9 \times 10^{-5}$	90%	DESIG=10
Γ_{15}	$p\overline{p}$		$< 5.9 \times 10^{-5}$	90%	DESIG=17
Γ_{16}	$\gamma\gamma$		$< 1.48 \times 10^{-4}$	90%	DESIG=11
Γ_{17}	$\phi\gamma$		$< 7 \times 10^{-4}$	90%	DESIG=18
	Lepton Family number (LF) violating modes or $\Delta B = 1$ weak neutral current ($B1$) modes				NODE=S086;CLUMP=B
Γ_{18}	$\mu^+\mu^-$	$B1$	$< 2.0 \times 10^{-6}$	90%	DESIG=15
Γ_{19}	e^+e^-	$B1$	$< 5.4 \times 10^{-5}$	90%	DESIG=20
Γ_{20}	$e^\pm\mu^\mp$	LF [b]	$< 6.1 \times 10^{-6}$	90%	DESIG=23
Γ_{21}	$\phi\nu\overline{\nu}$	$B1$	$< 5.4 \times 10^{-3}$	90%	DESIG=19

[a] Not a pure measurement. See note at head of B_s^0 Decay Modes. LINKAGE=X86

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

B_s^0 BRANCHING RATIOS

NODE=S086230

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

NODE=S086R5
NODE=S086R5

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
0.92±0.33 OUR AVERAGE					NODE=S086R5
0.81±0.24±0.24	90	[16] BUSKULIC	96E ALEP	$e^+e^- \to Z$	SYCLP1=A
1.56±0.58±0.47	147	[17] ACTON	92N OPAL	$e^+e^- \to Z$	SYCLP1=A

[16] 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 $B(\overline{b} \to B_s^0) \times B(B_s^0 \to D_s^- \text{anything}) = 0.088 \pm 0.020 \pm 0.020$ 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 $B(\overline{b} \to B_s^0) = 0.105^{+0.018}_{-0.017}$ and $B(D_s \to \phi\pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \to B_s^0)$ and $B(D_s \to \phi\pi)$. NODE=S086R5;LINKAGE=B

[17] 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 $B(\overline{b} \to B_s^0)B(B_s^0 \to D_s^- \text{anything}) \times B(D_s^- \to \phi\pi^-) = (5.9 \pm 1.9 \pm 1.1) \times 10^{-3}$. We evaluate using our current values $B(\overline{b} \to B_s^0) = 0.105^{+0.018}_{-0.017}$ and $B(D_s \to \phi\pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \to B_s^0)$ and $B(D_s \to \phi\pi)$. NODE=S086R5;LINKAGE=A

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

NODE=S086R2

NODE=S086R2

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 determinine B($\overline{b} \to B_s^0$) as described in the note on "Production and Decay of b-Flavored Hadrons."

NODE=S086R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.081±0.025 OUR AVERAGE					
0.076±0.012±0.022	134	[18] BUSKULIC	95O	ALEP	$e^+e^- \to Z$
0.107±0.043±0.032		[19] ABREU	92M	DLPH	$e^+e^- \to Z$
0.103±0.036±0.031	18	[20] ACTON	92N	OPAL	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.13 ±0.04 ±0.04	27	[21] BUSKULIC	92E	ALEP	$e^+e^- \to Z$

SYCLP1=A

SYCLP1=A

SYCLP1=A

[18] BUSKULIC 95O use $D_s \ell$ correlations. The measured product branching ratio is B($\overline{b} \to B_s$) × B($B_s \to D_s^- \ell^+ \nu_\ell$anything) = $(0.82 \pm 0.09^{+0.13}_{-0.14})$% assuming B($D_s \to \phi\pi$) = $(3.5 \pm 0.4) \times 10^{-2}$ and PDG 1994 values for the relative partial widths to the six other D_s channels used in this analysis. Combined with results from $\Upsilon(4S)$ experiments this can be used to extract B($\overline{b} \to B_s$) = $(11.0 \pm 1.2^{+2.5}_{-2.6})$%. We evaluate using our current values B($\overline{b} \to B_s^0$) = $0.105^{+0.018}_{-0.017}$ 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($D_s \to \phi\pi$).

NODE=S086R2;LINKAGE=AE

[19] ABREU 92M measured muons only and obtained product branching ratio B($Z \to b$ or $\overline{b}$) × B($\overline{b} \to B_s$) × B($B_s \to D_s \mu^+ \nu_\mu$anything) × B($D_s \to \phi\pi$) = $(18 \pm 8) \times 10^{-5}$. We evaluate using our current values B($\overline{b} \to B_s^0$) = $0.105^{+0.018}_{-0.017}$ and B($D_s \to \phi\pi$) = 0.036 ± 0.009. Our first error is their experiment's and our second error is that due to B($\overline{b} \to B_s^0$) and B($D_s \to \phi\pi$). We use B($Z \to b$ or $\overline{b}$) = 2B($Z \to b\overline{b}$) = 2×(0.2212 ± 0.0019).

NODE=S086R2;LINKAGE=A

[20] ACTON 92N is measured using $D_s \to \phi\pi^+$ and $K^*(892)^0 K^+$ events. The product branching fraction measured is measured to be B($\overline{b} \to B_s^0$)B($B_s^0 \to D_s^- \ell^+ \nu_\ell$anything) ×B($D_s^- \to \phi\pi^-$) = $(3.9 \pm 1.1 \pm 0.8) \times 10^{-4}$. We evaluate using our current values B($\overline{b} \to B_s^0$) = $0.105^{+0.018}_{-0.017}$ 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($D_s \to \phi\pi$).

NODE=S086R2;LINKAGE=C

[21] BUSKULIC 92E is measured using $D_s \to \phi\pi^+$ and $K^*(892)^0 K^+$ events. They use 2.7 ± 0.7% for the $\phi\pi^+$ branching fraction. The average product branching fraction is measured to be B($\overline{b} \to B_s^0$)B($B_s^0 \to D_s^- \ell^+ \nu_\ell$anything) =$0.020 \pm 0.0055^{+0.005}_{-0.006}$. We evaluate using our current values B($\overline{b} \to B_s^0$) = $0.105^{+0.018}_{-0.017}$ and B($D_s \to \phi\pi$) = 0.036 ± 0.009. Our first error is their experiment's and our second error is that due to B($\overline{b} \to B_s^0$) and B($D_s \to \phi\pi$). Superseded by BUSKULIC 95O.

NODE=S086R2;LINKAGE=D

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

NODE=S086R3

NODE=S086R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
<0.13	6	[22] AKERS	94J	OPAL	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	1	BUSKULIC	93G	ALEP	$e^+e^- \to Z$

[22] AKERS 94J sees ≤ 6 events and measures the limit on the product branching fraction $f(\overline{b} \to B_s^0)$·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.

NODE=S086R3;LINKAGE=A

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

NODE=S086R23

NODE=S086R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.218	90	BARATE	98Q	ALEP	$e^+e^- \to Z$

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

NODE=S086R6

NODE=S086R6

NODE=S086R6

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.28±0.17		[23] ABE	96Q	CDF	$p\overline{p}$

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

<6	1	[24] AKERS	94J OPAL	$e^+e^- \to Z$
seen	14	[25] ABE	93F CDF	$p\overline{p}$ at 1.8 TeV
seen	1	[26] ACTON	92N OPAL	Sup. by AKERS 94J

[23] ABE 96Q assumes $f_u = f_d$ and $f_s/f_u = 0.40 \pm 0.06$. Uses $B \to J/\psi(1S)K$ and $B \to J/\psi(1S)K^*$ 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. NODE=S086R6;LINKAGE=D

[24] AKERS 94J sees one event and measures the limit on the product branching fraction $f(\overline{b} \to B^0_s)\cdot B(B^0_s \to J/\psi(1S)\phi) < 7\times10^{-4}$ at CL = 90%. We divide by our current value $B(\overline{b} \to B^0_s) = 0.112$. NODE=S086R6;LINKAGE=B

[25] ABE 93F measured using $J/\psi(1S) \to \mu^+\mu^-$ and $\phi \to K^+K^-$. NODE=S086R6;LINKAGE=A

[26] In ACTON 92N a limit on the product branching fraction is measured to be $f(\overline{b} \to B^0_s)\cdot B(B^0_s \to J/\psi(1S)\phi) \le 0.22 \times 10^{-2}$. NODE=S086R6;LINKAGE=AA

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

NODE=S086R19
NODE=S086R19

VALUE	CL%	DOCUMENT ID	TECN
<1.2 × 10⁻³ → **$<1.2 \times 10^{-3}$**	90	[27] ACCIARRI	97C L3

[27] ACCIARRI 97C assumes B^0 production fraction (39.5 ± 4.0%) and B_s (12.0 ± 3.0%). NODE=S086R19;LINKAGE=CQ

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

NODE=S086R20
NODE=S086R20

VALUE	CL%	DOCUMENT ID	TECN
$<3.8 \times 10^{-3}$	90	[28] ACCIARRI	97C L3

[28] ACCIARRI 97C assumes B^0 production fraction (39.5 ± 4.0%) and B_s (12.0 ± 3.0%). NODE=S086R20;LINKAGE=CQ

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

NODE=S086R4
NODE=S086R4

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

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

NODE=S086R15
NODE=S086R15

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.7 \times 10^{-4}$	90	[29] BUSKULIC	96V ALEP	$e^+e^- \to Z$

[29] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons. NODE=S086R15;LINKAGE=BV

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

NODE=S086R13
NODE=S086R13

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.1 \times 10^{-4}$	90	[30] ACCIARRI	95H L3	$e^+e^- \to Z$

[30] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0$%. NODE=S086R13;LINKAGE=A

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

NODE=S086R12
NODE=S086R12

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.0 \times 10^{-3}$	90	[31] ACCIARRI	95H L3	$e^+e^- \to Z$

[31] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0$%. NODE=S086R12;LINKAGE=A

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

NODE=S086R11
NODE=S086R11

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.5 \times 10^{-3}$	90	[32] ACCIARRI	95H L3	$e^+e^- \to Z$

[32] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0$%. NODE=S086R11;LINKAGE=A

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

NODE=S086R7
NODE=S086R7

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.1 \times 10^{-4}$	90	[33] BUSKULIC	96V ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<2.6 \times 10^{-4}$	90	[34] AKERS	94L OPAL	$e^+e^- \to Z$

[33] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons. NODE=S086R7;LINKAGE=BV

[34] Assumes $B(Z \to b\overline{b}) = 0.217$ and B^0_d (B^0_s) fraction 39.5% (12%). NODE=S086R7;LINKAGE=A

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=S086R8
NODE=S086R8

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.9 \times 10^{-5}$	90	[35] BUSKULIC	96V ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.4 \times 10^{-4}$	90	[36] AKERS	94L OPAL	$e^+e^- \to Z$

[35] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons. NODE=S086R8;LINKAGE=BV

[36] Assumes $B(Z \to b\overline{b}) = 0.217$ and B^0_d (B^0_s) fraction 39.5% (12%). NODE=S086R8;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{15}/Γ

NODE=S086R16
NODE=S086R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.9 × 10^{-5}	90	[37] BUSKULIC	96V	ALEP	$e^+e^- \to Z$

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

NODE=S086R16;LINKAGE=BV

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=S086R10
NODE=S086R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<14.8 × 10^{-5}	90	[38] ACCIARRI	95I	L3	$e^+e^- \to Z$

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

NODE=S086R10;LINKAGE=A

$\Gamma(\phi\gamma)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=S086R17
NODE=S086R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7 × 10^{-4}	90	[39] ADAM	96D	DLPH	$e^+e^- \to Z$

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

NODE=S086R17;LINKAGE=DQ

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=S086R14

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

NODE=S086R14
NODE=S086R14

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0 × 10^{-6}	90	[40] ABE	98	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.8 × 10^{-5}	90	[41] ACCIARRI	97B	L3	$e^+e^- \to Z$
<8.4 × 10^{-6}	90	[42] ABE	96L	CDF	Repl. by ABE 98

[40] 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.

NODE=S086R14;LINKAGE=C

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

NODE=S086R14;LINKAGE=BQ

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

NODE=S086R14;LINKAGE=PA

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

NODE=S086R18

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

NODE=S086R18
NODE=S086R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.4 × 10^{-5}	90	[43] ACCIARRI	97B	L3	$e^+e^- \to Z$

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

NODE=S086R18;LINKAGE=BQ

$\Gamma(e^\pm\mu^\mp)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=S086R22

test of lepton family number conservation.

NODE=S086R22
NODE=S086R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.1 × 10^{-6} (CL = 90%) [<4.1 × 10^{-5} (CL = 90%) OUR 1998 BEST LIMIT]					
<6.1 × 10^{-6}	90	ABE	98V	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.1 × 10^{-5}	90	[44] ACCIARRI	97B	L3	$e^+e^- \to Z$

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

NODE=S086R22;LINKAGE=BQ

$\Gamma(\phi\nu\overline{\nu})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=S086R21

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

NODE=S086R21
NODE=S086R21

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.4 × 10^{-3}	90	[45] ADAM	96D	DLPH	$e^+e^- \to Z$

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

NODE=S086R21;LINKAGE=DQ

POLARIZATION IN B_s^0 DECAY

NODE=S086233

Γ_L/Γ in $B_s^0 \to J/\psi(1S)\phi$

NODE=S086P1
NODE=S086P1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.56 \pm 0.21^{+0.02}_{-0.04}$	19	ABE	95Z	CDF	$p\overline{p}$ at 1.8 TeV

B^0_s-$\overline{B}^0_s$ MIXING

NODE=S086235

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.

NODE=S086235

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 $\tau_{B^0_s} = \frac{1}{0.5(\Gamma_{B^0_{sH}}+\Gamma_{B^0_{sL}})}$.

χ_B at high energy

NODE=S086CHB

This is a B-$\overline{B}$ mixing measurement for an admixture of B^0 and B^0_s at high energy.

NODE=S086CHB

$\chi_B = f'_d \chi_d + f'_s \chi_s$

where f'_d and f'_s are the branching ratio times production fractions of B^0_d and B^0_s mesons relative to all b-flavored hadrons which decay weakly. Mixing violates $\Delta B \neq 2$ rule.

NODE=S086CHB

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
0.118 ±0.006 OUR AVERAGE							
0.131 ±0.020 ±0.016			[46] ABE	97I	CDF	$p\overline{p}$ 1.8 TeV	
0.1107±0.0062±0.0055			[47] ALEXANDER	96	OPAL	$e^+e^- \rightarrow Z$	
0.121 ±0.016 ±0.006			[48] ABREU	94J	DLPH	$e^+e^- \rightarrow Z$	
0.123 ±0.012 ±0.008			ACCIARRI	94D	L3	$e^+e^- \rightarrow Z$	
0.114 ±0.014 ±0.008			[49] BUSKULIC	94G	ALEP	$e^+e^- \rightarrow Z$	
0.129 ±0.022			[50] BUSKULIC	92B	ALEP	$e^+e^- \rightarrow Z$	
0.176 ±0.031 ±0.032		1112	[51] ABE	91G	CDF	$p\overline{p}$ 1.8 TeV	
0.148 ±0.029 ±0.017			[52] ALBAJAR	91D	UA1	$p\overline{p}$ 630 GeV	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
0.136 ±0.037 ±0.040			[53] UENO	96	AMY	e^+e^- at 57.9 GeV	
0.144 ±0.014 $^{+0.017}_{-0.011}$			[54] ABREU	94F	DLPH	Sup. by ABREU 94J	
0.131 ±0.014			[55] ABREU	94J	DLPH	$e^+e^- \rightarrow Z$	OCCUR=2
0.157 ±0.020 ±0.032			[56] ALBAJAR	94	UA1	$\sqrt{s}$ = 630 GeV	
0.121 $^{+0.044}_{-0.040}$ ±0.017		1665	[57] ABREU	93C	DLPH	Sup. by ABREU 94J	
0.143 $^{+0.022}_{-0.021}$ ±0.007			[58] AKERS	93B	OPAL	Sup. by ALEXANDER 96	
0.145 $^{+0.041}_{-0.035}$ ±0.018			[59] ACTON	92C	OPAL	$e^+e^- \rightarrow Z$	
0.121 ±0.017 ±0.006			[60] ADEVA	92C	L3	Sup. by ACCIARRI 94D	
0.132 ±0.22 $^{+0.015}_{-0.012}$		823	[61] DECAMP	91	ALEP	$e^+e^- \rightarrow Z$	
0.178 $^{+0.049}_{-0.040}$ ±0.020			[62] ADEVA	90P	L3	$e^+e^- \rightarrow Z$	
0.17 $^{+0.15}_{-0.08}$			[63,64] WEIR	90	MRK2	e^+e^- 29 GeV	
0.21 $^{+0.29}_{-0.15}$			[63] BAND	88	MAC	$E^{ee}_{\rm cm}$= 29 GeV	
>0.02	90		[63] BAND	88	MAC	$E^{ee}_{\rm cm}$= 29 GeV	OCCUR=2
0.121 ±0.047			[63,65] ALBAJAR	87C	UA1	Repl. by ALBAJAR 91D	
<0.12	90		[63,66] SCHAAD	85	MRK2	$E^{ee}_{\rm cm}$= 29 GeV	

[46] Uses di-muon events. NODE=S086CHB;LINKAGE=T

[47] ALEXANDER 96 uses a maximum likelihood fit to simultaneously extract χ as well as the forward-backward asymmetries in $e^+e^- \rightarrow Z \rightarrow b\overline{b}$ and $c\overline{c}$. NODE=S086CHB;LINKAGE=R

[48] This ABREU 94J result is from 5182 $\ell\ell$ and 279 $\Lambda\ell$ events. The systematic error includes 0.004 for model dependence. NODE=S086CHB;LINKAGE=D

[49] BUSKULIC 94G data analyzed using ee, $e\mu$, and $\mu\mu$ events. NODE=S086CHB;LINKAGE=H

[50] BUSKULIC 92B uses a jet charge technique combined with electrons and muons. NODE=S086CHB;LINKAGE=O

[51] ABE 91G measurement of χ is done with $e\mu$ and ee events. NODE=S086CHB;LINKAGE=I

52 ALBAJAR 91D measurement of χ is done with dimuons. NODE=S086CHB;LINKAGE=J

53 UENO 96 extracted χ from the energy dependence of the forward-backward asymmetry. NODE=S086CHB;LINKAGE=S

54 ABREU 94F uses the average electric charge sum of the jets recoiling against a b-quark jet tagged by a high p_T muon. The result is for $\overline{\chi} = f_d \chi_d + 0.9 f_s \chi_s$. NODE=S086CHB;LINKAGE=B

55 This ABREU 94J result combines $\ell\ell$, $\Lambda\ell$, and jet-charge ℓ (ABREU 94F) analyses. It is for $\overline{\chi} = f_d \chi_d + 0.96 f_s \chi_s$. NODE=S086CHB;LINKAGE=Q

56 ALBAJAR 94 uses dimuon events. Not independent of ALBAJAR 91D. NODE=S086CHB;LINKAGE=L

57 ABREU 93C data analyzed using ee, $e\mu$, and $\mu\mu$ events. NODE=S086CHB;LINKAGE=P

58 AKERS 93B analysis performed using dilepton events. NODE=S086CHB;LINKAGE=A

59 ACTON 92C uses electrons and muons. Superseded by AKERS 93B. NODE=S086CHB;LINKAGE=N

60 ADEVA 92C uses electrons and muons. NODE=S086CHB;LINKAGE=M

61 DECAMP 91 done with opposite and like-sign dileptons. Superseded by BUSKULIC 92B. NODE=S086CHB;LINKAGE=K

62 ADEVA 90P measurement uses ee, $\mu\mu$, and $e\mu$ events from 118k events at the Z. Superseded by ADEVA 92C. NODE=S086CHB;LINKAGE=C

63 These experiments are not in the average because the combination of B_s and B_d mesons which they see could differ from those at higher energy. NODE=S086CHB;LINKAGE=E9

64 The WEIR 90 measurement supersedes the limit obtained in SCHAAD 85. The 90% CL are 0.06 and 0.38. NODE=S086CHB;LINKAGE=G

65 ALBAJAR 87C measured $\chi = (\overline{B}^0 \rightarrow B^0 \rightarrow \mu^+ X)$ divided by the average production weighted semileptonic branching fraction for B hadrons at 546 and 630 GeV. NODE=S086CHB;LINKAGE=E

66 Limit is average probability for hadron containing B quark to produce a positive lepton. NODE=S086CHB;LINKAGE=BB

$\Delta m_{B^0_s} = m_{B^0_{sH}} - m_{B^0_{sL}}$

NODE=S086D

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

NODE=S086D

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

NODE=S086D

VALUE (10^{12} $\hbar$ s^{-1})	CL%	DOCUMENT ID		TECN	COMMENT	
> 9.1 (CL = 95%) OUR EVALUATION						→ NOT CHECKED ←
> 5.8	95	67 ABE	99J	CDF	$p\overline{p}$ at 1.8 TeV	
> 9.6	95	68 BARATE	99J	ALEP	$e^+e^- \rightarrow Z$	
> 3.1	95	69 ACKERSTAFF	97U	OPAL	$e^+e^- \rightarrow Z$	OCCUR=2
> 6.5	95	70 ADAM	97	DLPH	$e^+e^- \rightarrow Z$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<96	95	71 ABE	99D	CDF	$p\overline{p}$ at 1.8 TeV	
> 7.9	95	72 BARATE	98C	ALEP	Repl. by BARATE 99J	OCCUR=2
> 2.2	95	73 ACKERSTAFF	97V	OPAL	$e^+e^- \rightarrow Z$	OCCUR=2
> 6.6	95	74 BUSKULIC	96M	ALEP	Repl. by BARATE 98C	
> 2.2	95	73 AKERS	95J	OPAL	Sup. by ACKERSTAFF 97V	
> 5.7	95	75 BUSKULIC	95J	ALEP	$e^+e^- \rightarrow Z$	OCCUR=2
> 1.8	95	73 BUSKULIC	94B	ALEP	$e^+e^- \rightarrow Z$	

67 ABE 99J uses ϕ ℓ-ℓ correlation. NODE=S086D;LINKAGE=PH

68 BARATE 99J uses combination of an inclusive lepton and D_s^--based analyses. NODE=S086D;LINKAGE=JB

69 Uses ℓ-$Q_{\rm hem}$. NODE=S086D;LINKAGE=A2

70 ADAM 97 combines results from $D_s\,\ell$-$Q_{\rm hem}$, ℓ-$Q_{\rm hem}$, and ℓ-ℓ. NODE=S086D;LINKAGE=C3

71 ABE 99D assumes $\tau_{B^0_s} = 1.55 \pm 0.05$ ps and $\Delta\Gamma/\Delta m = (5.6 \pm 2.6) \times 10^{-3}$. NODE=S086D;LINKAGE=N2

72 BARATE 98C combines results from $D_s\,h$-$\ell/Q_{\rm hem}$, $D_s\,h$-K in the same side, $D_s\,\ell$-$\ell/Q_{\rm hem}$ and $D_s\,\ell$-K in the same side. NODE=S086D;LINKAGE=C2

73 Uses ℓ-ℓ. NODE=S086D;LINKAGE=A1

74 BUSKULIC 96M uses D_s lepton correlations and lepton, kaon, and jet charge tags. NODE=S086D;LINKAGE=C

75 BUSKULIC 95J uses ℓ-$Q_{\rm hem}$. They find $\Delta m_s > 5.6$ [> 6.1] for f_s=10% [12%]. We interpolate to our central value f_s=10.5%. NODE=S086D;LINKAGE=M2

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

NODE=S086DG

This is derived from "OUR EVALUATION" of $\Delta m_{B^0_s}$ measurements and $\tau_{B^0_s}$ = 1.54 ps, our central value.

NODE=S086DG

VALUE	CL%	DOCUMENT ID	
>14.0 (CL = 95%) OUR EVALUATION			→ NOT CHECKED ←

NODE=S086DG

NODE=S086CHS

χ_s

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

NODE=S086CHS

VALUE	CL%	DOCUMENT ID
>0.4975 (CL = 95%) OUR EVALUATION		

NODE=S086CHS

→ NOT CHECKED ←

B^0_s REFERENCES

NODE=S086

ABE	99D	PR D59 032004	F. Abe+	(CDF Collab.)	REFID=46705
ABE	99J	PRL 82 3576	F. Abe+	(CDF Collab.)	REFID=47003
BARATE	99J	EPJ C7 553	R Barate+	(ALEPH Collab.)	REFID=47010
ABE	98	PR D57 R3811	F. Abe+	(CDF Collab.)	REFID=45879
ABE	98B	PR D57 5382	F. Abe+	(CDF Collab.)	REFID=45880
ABE	98V	PRL 81 5742	F. Abe+	(CDF Collab.)	REFID=46697
ACCIARRI	98S	PL B438 417	M. Acciarri+	(L3 Collab.)	REFID=46503
ACKERSTAFF	98F	EPJ C2 407	K. Ackerstaff+	(OPAL Collab.)	REFID=45873
ACKERSTAFF	98G	PL B426 161	K. Ackerstaff+	(OPAL Collab.)	REFID=45875
BARATE	98C	EPJ C4 367	R. Barate+	(ALEPH Collab.)	REFID=45877
BARATE	98Q	EPJ C4 387	R. Barate+	(ALEPH Collab.)	REFID=46146
PDG	98	EPJ C3 1	C. Caso+		REFID=45838
ABE	97I	PR D55 2546	F. Abe+	(CDF Collab.)	REFID=45362
ACCIARRI	97B	PL B391 474	M. Acciarri+	(L3 Collab.)	REFID=45248
ACCIARRI	97C	PL B391 481	M. Acciarri+	(L3 Collab.)	REFID=45249
ACKERSTAFF	97U	ZPHY C76 401	K. Ackerstaff+	(OPAL Collab.)	REFID=45786
ACKERSTAFF	97V	ZPHY C76 417	K. Ackerstaff+	(OPAL Collab.)	REFID=45787
ADAM	97	PL B414 382	W. Adam+	(DELPHI Collab.)	REFID=45799
ABE	96B	PR D53 3496	+Albrow, Amendolia, Amidei+	(CDF Collab.)	REFID=44688
ABE	96L	PRL 76 4675	+Akimoto, Akopian, Albrow+	(CDF Collab.)	REFID=44807
ABE	96N	PRL 77 1945	+Akimoto, Akopian, Albrow+	(CDF Collab.)	REFID=44811
ABE	96Q	PR D54 6596	+Akimoto, Akopian, Albrow+	(CDF Collab.)	REFID=44974
ABREU	96F	ZPHY C71 11	+Adam, Adye, Agasi+	(DELPHI Collab.)	REFID=44704
ADAM	96D	ZPHY C72 207	W. Adam+	(DELPHI Collab.)	REFID=45276
ALEXANDER	96	ZPHY C70 357	+Allison, Altekamp+	(OPAL Collab.)	REFID=44628
BUSKULIC	96E	ZPHY C69 585	+Casper, De Bonis, Decamp+	(ALEPH Collab.)	REFID=44689
BUSKULIC	96M	PL B377 205	+De Bonis, Decamp, Ghez+	(ALEPH Collab.)	REFID=44859
BUSKULIC	96V	PL B384 471	+De Bonis, Decamp, Ghez+	(ALEPH Collab.)	REFID=44909
PDG	96	PR D54 1			REFID=44495
UENO	96	PL B381 365	+Kanda, Olsen, Kirk+	(AMY Collab.)	REFID=44850
ABE	95R	PRL 74 4988	+Albrow, Amendolia, Amidei+	(CDF Collab.)	REFID=44274
ABE	95Z	PRL 75 3068	+Albrow, Amendolia, Amidei+	(CDF Collab.)	REFID=44490
ACCIARRI	95H	PL B363 127	+Adam, Adriani, Aguilar-Benitez+	(L3 Collab.)	REFID=44544
ACCIARRI	95I	PL B363 137	+Adam, Adriani, Aguilar-Benitez+	(L3 Collab.)	REFID=44545
AKERS	95G	PL B350 273	+Alexander, Allison, Ametewee+	(OPAL Collab.)	REFID=44272
AKERS	95J	ZPHY C66 555	+Alexander, Allison, Ametewee+	(OPAL Collab.)	REFID=44289
BUSKULIC	95J	PL B356 409	+Casper, De Bonis, Decamp+	(ALEPH Collab.)	REFID=44400
BUSKULIC	95O	PL B361 221	+Casper, De Bonis, Decamp+	(ALEPH Collab.)	REFID=44543
ABREU	94D	PL B324 500	+Adam, Adye, Agasi, Aleksan+	(DELPHI Collab.)	REFID=43729
ABREU	94E	ZPHY C61 407	+Adam, Adye, Agasi, Aleksan+	(DELPHI Collab.)	REFID=43739
Also	92M	PL B289 199	Abreu, Adam, Adye, Agasi, Alekseev+	(DELPHI Collab.)	REFID=42151
ABREU	94F	PL B322 459	+Adam, Adye, Agasi, Ajinenko+	(DELPHI Collab.)	REFID=43740
ABREU	94J	PL B332 488	+Adam, Adye, Agasi, Ajinenko+	(DELPHI Collab.)	REFID=43901
ACCIARRI	94D	PL B335 542	+Adam, Adriani, Aguilar-Benitez, Ahlen+	(L3 Collab.)	REFID=43963
AKERS	94J	PL B337 196	+Alexander, Allison, Anderson, Arcelli+	(OPAL Collab.)	REFID=44014
AKERS	94L	PL B337 393	+Alexander, Allison, Anderson, Arcelli+	(OPAL Collab.)	REFID=44018
ALBAJAR	94	ZPHY C61 41	+Ankoviak, Bartha, Bezaguet, Boehrer+	(UA1 Collab.)	REFID=43909
BUSKULIC	94B	PL B322 441	+De Bonis, Decamp, Ghez, Goy, Lees+	(ALEPH Collab.)	REFID=43741
BUSKULIC	94C	PL B322 275	+De Bonis, Decamp, Ghez, Goy, Lees+	(ALEPH Collab.)	REFID=43742
BUSKULIC	94G	ZPHY C62 179	+Casper, De Bonis, Decamp, Ghez+	(ALEPH Collab.)	REFID=43911
PDG	94	PR D50 1173	Montanet+	(CERN, LBL, BOST, IFIC+)	REFID=43653
ABE	93F	PRL 71 1685	+Albrow, Amidei, Anway-Wiese+	(CDF Collab.)	REFID=43508
ABREU	93C	PL B301 145	+Adam, Adye, Agasi, Aleksan+	(DELPHI Collab.)	REFID=43236
ACTON	93H	PL B312 501	+Akers, Alexander, Allison, Anderson+	(OPAL Collab.)	REFID=43476
AKERS	93B	ZPHY C60 199	+Alexander, Allison, Anderson, Arcelli+	(OPAL Collab.)	REFID=43594
BUSKULIC	93G	PL B311 425	+De Bonis, Decamp, Ghez, Goy, Lees+	(ALEPH Collab.)	REFID=43439
ABREU	92M	PL B289 199	+Adam, Adye, Agasi, Alekseev+	(DELPHI Collab.)	REFID=42151
ACTON	92C	PL B276 379	+Alexander, Allison, Allport, Anderson+	(OPAL Collab.)	REFID=41981
ACTON	92N	PL B295 357	+Alexander, Allison, Allport, Anderson+	(OPAL Collab.)	REFID=43139
ADEVA	92C	PL B288 395	+Adriani, Aguilar-Benitez, Ahlen+	(L3 Collab.)	REFID=42153
BUSKULIC	92B	PL B284 177	+Decamp, Goy, Lees, Minard+	(ALEPH Collab.)	REFID=42157
BUSKULIC	92E	PL B294 145	+Decamp, Goy, Lees, Minard+	(ALEPH Collab.)	REFID=42241
ABE	91G	PRL 67 3351	+Amidei, Apollinari, Atac, Auchincloss+	(CDF Collab.)	REFID=41872
ALBAJAR	91D	PL B262 171	+Albrow, Allkofer, Ankoviak, Apsimon+	(UA1 Collab.)	REFID=41552
DECAMP	91	PL B258 236	+Deschizeaux, Goy, Lees, Minard+	(ALEPH Collab.)	REFID=41485
ADEVA	90P	PL B252 703	+Adriani, Aguilar-Benitez, Akbari, Alcaraz+	(L3 Collab.)	REFID=41431
LEE-FRANZINI	90	PRL 65 2947	+Heintz, Lovelock, Narain, Schamberger+	(CUSB II Collab.)	REFID=41398
WEIR	90	PL B240 289	+Abrams, Adolphsen, Alexander, Alvarez+	(Mark II Collab.)	REFID=41213
BAND	88	PL B200 221	+Camporesi, Chadwick+	(MAC Collab.)	REFID=40478
ALBAJAR	87C	PL B186 247	+Albrow, Allkofer, Arnison+	(UA1 Collab.)	REFID=40390
SCHAAD	85	PL 160B 188	+Nelson, Abrams, Amidei+	(Mark II Collab.)	REFID=11575