B^0

$I(J^P) = \frac{1}{2}(0^-)$

Quantum numbers not measured. Values shown are quark-model predictions.

See also the $B^{\pm}/B^0$ ADMIXTURE and $B^{\pm}/B^0/B^0_s/b$-baryon ADMIXTURE sections.

See the Note "Production and Decay of b-flavored Hadrons" at the beginning of the $B^{\pm}$ Particle Listings and the Note on "B^0-$\overline{B}^0$ Mixing and CP Violation in B Decay" near the end of the B^0 Particle Listings.

B^0 MASS

The fit uses m_{B^+}, $(m_{B^0} - m_{B^+})$, and m_{B^0} to determine m_{B^+}, m_{B^0}, and the mass difference.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5279.4±0.5 OUR FIT					
5279.3±0.7 OUR AVERAGE					
5279.1±0.7 ±0.3	135	[1] CSORNA	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
5281.3±2.2 ±1.4	51	ABE	96B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5279.2±0.54±2.0	340	ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
5278.0±0.4 ±2.0		BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
5279.6±0.7 ±2.0	40	[2] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
5278.2±1.0 ±3.0	40	ALBRECHT	87C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
5279.5±1.6 ±3.0	7	[3] ALBRECHT	87D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
5280.6±0.8 ±2.0		BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[1] CSORNA 00 uses fully reconstructed 135 $B^0 \rightarrow J/\psi^{(\prime)} K^0_S$ events and invariant masses without beam constraint.

[2] ALBRECHT 90J assumes 10580 for $\Upsilon(4S)$ mass. Supersedes ALBRECHT 87C and ALBRECHT 87D.

[3] Found using fully reconstructed decays with J/ψ. ALBRECHT 87D assume $m_{\Upsilon(4S)} =$ 10577 MeV.

$m_{B^0} - m_{B^+}$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.33±0.28 OUR FIT Error includes scale factor of 1.1.				
0.34±0.32 OUR AVERAGE Error includes scale factor of 1.2.				
0.41±0.25±0.19	ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
−0.4 ±0.6 ±0.5	BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
−0.9 ±1.2 ±0.5	ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
2.0 ±1.1 ±0.3	[4] BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[4] BEBEK 87 actually measure the difference between half of E_{cm} and the $B^{\pm}$ or B^0 mass, so the $m_{B^0} - m_{B^{\pm}}$ is more accurate. Assume $m_{\Upsilon(4S)} = 10580$ MeV.

$m_{B^0_H} - m_{B^0_L}$

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

B^0 MEAN LIFE

See $B^{\pm}/B^0/B^0_s/b$-baryon ADMIXTURE section for data on B-hadron mean life averaged over species of bottom particles.

"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*
1.540±0.024 OUR EVALUATION					
1.541±0.028±0.023		[5] ABBIENDI,G	00B	OPAL	$e^+e^- \to Z$
1.518±0.053±0.034		[6] BARATE	00R	ALEP	$e^+e^- \to Z$
1.523±0.057±0.053		[7] ABBIENDI	99J	OPAL	$e^+e^- \to Z$
1.58 ±0.09 ±0.02		[8] ABE	98B	CDF	$p\overline{p}$ at 1.8 TeV
$1.474 \pm 0.039 {}^{+0.052}_{-0.051}$		[6] ABE	98Q	CDF	$p\overline{p}$ at 1.8 TeV
1.52 ±0.06 ±0.04		[7] ACCIARRI	98S	L3	$e^+e^- \to Z$
1.64 ±0.08 ±0.08		[7] ABE	97J	SLD	$e^+e^- \to Z$
1.532±0.041±0.040		[9] ABREU	97F	DLPH	$e^+e^- \to Z$
$1.25 {}^{+0.15}_{-0.13} \pm 0.05$	121	[8] BUSKULIC	96J	ALEP	$e^+e^- \to Z$
$1.49 {}^{+0.17}_{-0.15} {}^{+0.08}_{-0.06}$		[10] BUSKULIC	96J	ALEP	$e^+e^- \to Z$
$1.61 {}^{+0.14}_{-0.13} \pm 0.08$		[6,11] ABREU	95Q	DLPH	$e^+e^- \to Z$
1.63 ±0.14 ±0.13		[12] ADAM	95	DLPH	$e^+e^- \to Z$
1.53 ±0.12 ±0.08		[6,13] AKERS	95T	OPAL	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.54 ±0.08 ±0.06		[6] ABE	96C	CDF	Repl. by ABE 98Q
1.55 ±0.06 ±0.03		[14] BUSKULIC	96J	ALEP	$e^+e^- \to Z$
1.61 ±0.07 ±0.04		[6] BUSKULIC	96J	ALEP	Repl. by BARATE 00R
1.62 ±0.12		[15] ADAM	95	DLPH	$e^+e^- \to Z$
1.57 ±0.18 ±0.08	121	[8] ABE	94D	CDF	Repl. by ABE 98B
$1.17 {}^{+0.29}_{-0.23} \pm 0.16$	96	[6] ABREU	93D	DLPH	Sup. by ABREU 95Q
1.55 ±0.25 ±0.18	76	[12] ABREU	93G	DLPH	Sup. by ADAM 95
$1.51 {}^{+0.24}_{-0.23} {}^{+0.12}_{-0.14}$	78	[6] ACTON	93C	OPAL	Sup. by AKERS 95T
$1.52 {}^{+0.20}_{-0.18} {}^{+0.07}_{-0.13}$	77	[6] BUSKULIC	93D	ALEP	Sup. by BUSKULIC 96J
$1.20 {}^{+0.52}_{-0.36} {}^{+0.16}_{-0.14}$	15	[16] WAGNER	90	MRK2	E^{ee}_{cm}= 29 GeV
$0.82 {}^{+0.57}_{-0.37} \pm 0.27$		[17] AVERILL	89	HRS	E^{ee}_{cm}= 29 GeV

[5] Data analyzed using partially reconsturcted $\overline{B}^0 \to D^{*+}\ell^-\overline{\nu}$ decays.
[6] Data analyzed using $D/D^*\ell X$ event vertices.
[7] Data analyzed using charge of secondary vertex.

[8] Measured mean life using fully reconstructed decays.
[9] Data analyzed using inclusive $D/D^* \ell X$.
[10] Measured mean life using partially reconstructed $D^{*-} \pi^+$ X vertices.
[11] ABREU 95Q assumes B($B^0 \rightarrow D^{**-} \ell^+ \nu_\ell$) = 3.2 ± 1.7%.
[12] Data analyzed using vertex-charge technique to tag B charge.
[13] AKERS 95T assumes B($B^0 \rightarrow D_s^{(*)} D^{0(*)}$) = 5.0 ± 0.9% to find B^+/B^0 yield.
[14] Combined result of $D/D^* \ell$x analysis, fully reconstructed B analysis, and partially reconstructed $D^{*-} \pi^+$ X analysis.
[15] Combined ABREU 95Q and ADAM 95 result.
[16] WAGNER 90 tagged B^0 mesons by their decays into $D^{*-} e^+ \nu$ and $D^{*-} \mu^+ \nu$ where the D^{*-} is tagged by its decay into $\pi^- \overline{D}^0$.
[17] AVERILL 89 is an estimate of the B^0 mean lifetime assuming that $B^0 \rightarrow D^{*+}$ + X always.

MEAN LIFE RATIO τ_{B^+}/τ_{B^0}

τ_{B^+}/τ_{B^0} (average of direct and inferred)

VALUE	DOCUMENT ID
1.073±0.027 OUR AVERAGE	Includes data from the 2 datablocks that follow this one.

τ_{B^+}/τ_{B^0} (direct measurements)

"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	EVTS	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.					
1.074±0.028 OUR EVALUATION					
1.085±0.059±0.018		[18] BARATE	00R	ALEP	$e^+e^- \rightarrow Z$
1.079±0.064±0.041		[19] ABBIENDI	99J	OPAL	$e^+e^- \rightarrow Z$
1.06 ±0.07 ±0.02		[20] ABE	98B	CDF	$p\overline{p}$ at 1.8 TeV
$1.110 \pm 0.056 ^{+0.033}_{-0.030}$		[18] ABE	98Q	CDF	$p\overline{p}$ at 1.8 TeV
1.09 ±0.07 ±0.03		[19] ACCIARRI	98S	L3	$e^+e^- \rightarrow Z$
1.01 ±0.07 ±0.06		[19] ABE	97J	SLD	$e^+e^- \rightarrow Z$
$1.27 ^{+0.23}_{-0.19} {}^{+0.03}_{-0.02}$		[20] BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$1.00 ^{+0.17}_{-0.15} \pm 0.10$		[18,21] ABREU	95Q	DLPH	$e^+e^- \rightarrow Z$
$1.06 ^{+0.13}_{-0.10} \pm 0.10$		[22] ADAM	95	DLPH	$e^+e^- \rightarrow Z$
$0.99 \pm 0.14 ^{+0.05}_{-0.04}$		[18,23] AKERS	95T	OPAL	$e^+e^- \rightarrow Z$

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

1.01	± 0.11	± 0.02		[18] ABE	96C	CDF	Repl. by ABE 98Q
1.03	± 0.08	± 0.02		[24] BUSKULIC	96J	ALEP	$e^+e^- \to Z$
0.98	± 0.08	± 0.03		[18] BUSKULIC	96J	ALEP	Repl. by BARATE 00R
1.02	± 0.16	± 0.05	269	[20] ABE	94D	CDF	Repl. by ABE 98B
1.11	$^{+0.51}_{-0.39}$	± 0.11	188	[18] ABREU	93D	DLPH	Sup. by ABREU 95Q
1.01	$^{+0.29}_{-0.22}$	± 0.12	253	[22] ABREU	93G	DLPH	Sup. by ADAM 95
1.0	$^{+0.33}_{-0.25}$	± 0.08	130	ACTON	93C	OPAL	Sup. by AKERS 95T
0.96	$^{+0.19}_{-0.15}$	$^{+0.18}_{-0.12}$	154	[18] BUSKULIC	93D	ALEP	Sup. by BUSKULIC 96J

[18] Data analyzed using $D/D^* \ell X$ vertices.
[19] Data analyzed using charge of secondary vertex.
[20] Measured using fully reconstructed decays.
[21] ABREU 95Q assumes $B(B^0 \to D^{**-} \ell^+ \nu_\ell) = 3.2 \pm 1.7\%$.
[22] Data analyzed using vertex-charge technique to tag B charge.
[23] AKERS 95T assumes $B(B^0 \to D_s^{(*)} D^{0(*)}) = 5.0 \pm 0.9\%$ to find B^+/B^0 yield.
[24] Combined result of $D/D^* \ell X$ analysis and fully reconstructed B analysis.

τ_{B^+}/τ_{B^0} (inferred from branching fractions)

These measurements are inferred from the branching fractions for semileptonic decay or other spectator-dominated decays by assuming that the rates for such decays are equal for B^0 and B^+. We do not use measurements which assume equal production of B^0 and B^+ because of the large uncertainty in the production ratio.

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.						
$0.95^{+0.117}_{-0.080} \pm 0.091$			[25] ARTUSO	97	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.15 \pm 0.17 \pm 0.06$			[26] JESSOP	97	CLE2	$e^+e^- \to \Upsilon(4S)$
$0.93 \pm 0.18 \pm 0.12$			[27] ATHANAS	94	CLE2	Sup. by ARTUSO 97
$0.91 \pm 0.27 \pm 0.21$			[28] ALBRECHT	92C	ARG	$e^+e^- \to \Upsilon(4S)$
1.0 ± 0.4		29	[28,29] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$
$0.89 \pm 0.19 \pm 0.13$			[28] FULTON	91	CLEO	$e^+e^- \to \Upsilon(4S)$
$1.00 \pm 0.23 \pm 0.14$			[28] ALBRECHT	89L	ARG	$e^+e^- \to \Upsilon(4S)$
0.49 to 2.3	90		[30] BEAN	87B	CLEO	$e^+e^- \to \Upsilon(4S)$

[25] ARTUSO 97 uses partial reconstruction of $B \to D^* \ell \nu_\ell$ and independent of B^0 and B^+ production fraction.
[26] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[27] ATHANAS 94 uses events tagged by fully reconstructed B^- decays and partially or fully reconstructed B^0 decays.
[28] Assumes equal production of B^0 and B^+.
[29] ALBRECHT 92G data analyzed using $B \to D_s \overline{D}$, $D_s \overline{D}^*$, $D_s^* \overline{D}$, $D_s^* \overline{D}^*$ events.
[30] BEAN 87B assume the fraction of $B^0 \overline{B}^0$ events at the $\Upsilon(4S)$ is 0.41.

$|\Delta\Gamma_{B^0_d}|/\Gamma_{B^0_d}$

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

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<0.40	95	[31,32] BEHRENS 00B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

[31] BEHRENS 00B uses high-momentum lepton tags and partially reconstructed $\overline{B}^0 \rightarrow D^{*+}\pi^-$, ρ^- decays to determine the flavor of the *B* meson.

[32] Assumes Δ_{md}=0.478 ± 0.018 ps^{-1} and τ_{B^0}=1.548 ± 0.032 ps.

B^0 DECAY MODES

$\overline{B}^0$ modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing. Modes which do not identify the charge state of the *B* are listed in the $B^\pm/B^0$ ADMIXTURE section.

The branching fractions listed below assume 50% $B^0\overline{B}^0$ and 50% B^+B^- production at the $\Upsilon(4S)$. We have attempted to bring older measurements up to date by rescaling their assumed $\Upsilon(4S)$ production ratio to 50:50 and their assumed D, D_s, D^*, and ψ branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\ell^+\nu_\ell$ anything	[a]	(10.5 ±0.8) %	
Γ_2	$D^-\ell^+\nu_\ell$	[a]	(2.10±0.19) %	
Γ_3	$D^*(2010)^-\ell^+\nu_\ell$	[a]	(4.68±0.22) %	
Γ_4	$\rho^-\ell^+\nu_\ell$	[a]	$(2.6\ ^{+0.6}_{-0.7}) \times 10^{-4}$	
Γ_5	$\pi^-\ell^+\nu_\ell$		$(1.8 \pm 0.6) \times 10^{-4}$	
	Inclusive modes			
Γ_6	$\pi^-\mu^+\nu_\mu$			
Γ_7	K^+ anything		(78 ±8) %	

D, D^*, or D_s modes

Γ_{8}	$D^- \pi^+$	$(3.0 \pm 0.4) \times 10^{-3}$	
Γ_{9}	$D^- \rho^+$	$(7.9 \pm 1.4) \times 10^{-3}$	
Γ_{10}	$\overline{D}^0 \pi^+ \pi^-$	$< 1.6 \times 10^{-3}$	CL=90%
Γ_{11}	$D^*(2010)^- \pi^+$	$(2.76 \pm 0.21) \times 10^{-3}$	
Γ_{12}	$D^- \pi^+ \pi^+ \pi^-$	$(8.0 \pm 2.5) \times 10^{-3}$	
Γ_{13}	$(D^- \pi^+ \pi^+ \pi^-)$ nonresonant	$(3.9 \pm 1.9) \times 10^{-3}$	
Γ_{14}	$D^- \pi^+ \rho^0$	$(1.1 \pm 1.0) \times 10^{-3}$	
Γ_{15}	$D^- a_1(1260)^+$	$(6.0 \pm 3.3) \times 10^{-3}$	
Γ_{16}	$D^*(2010)^- \pi^+ \pi^0$	(1.5 ± 0.5) %	
Γ_{17}	$D^*(2010)^- \rho^+$	$(7.3 \pm 1.5) \times 10^{-3}$	
Γ_{18}	$D^*(2010)^- \pi^+ \pi^+ \pi^-$	$(7.6 \pm 1.8) \times 10^{-3}$	S=1.4
Γ_{19}	$(D^*(2010)^- \pi^+ \pi^+ \pi^-)$ nonresonant	$(0.0 \pm 2.5) \times 10^{-3}$	
Γ_{20}	$D^*(2010)^- \pi^+ \rho^0$	$(5.7 \pm 3.2) \times 10^{-3}$	
Γ_{21}	$D^*(2010)^- a_1(1260)^+$	(1.30 ± 0.27) %	
Γ_{22}	$D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0$	(3.5 ± 1.8) %	
Γ_{23}	$\overline{D}{}_2^*(2460)^- \pi^+$	$< 2.2 \times 10^{-3}$	CL=90%
Γ_{24}	$\overline{D}{}_2^*(2460)^- \rho^+$	$< 4.9 \times 10^{-3}$	CL=90%
Γ_{25}	$D^- D^+$	$< 9.4 \times 10^{-4}$	CL=90%
Γ_{26}	$D^- D_s^+$	$(8.0 \pm 3.0) \times 10^{-3}$	
Γ_{27}	$D^*(2010)^- D_s^+$	(1.05 ± 0.34) %	
Γ_{28}	$D^- D_s^{*+}$	(1.0 ± 0.5) %	
Γ_{29}	$D^*(2010)^- D_s^{*+}$	(1.9 ± 0.6) %	
Γ_{30}	$D_s^+ \pi^-$	$< 2.8 \times 10^{-4}$	CL=90%
Γ_{31}	$D_s^{*+} \pi^-$	$< 5 \times 10^{-4}$	CL=90%
Γ_{32}	$D_s^+ \rho^-$	$< 7 \times 10^{-4}$	CL=90%
Γ_{33}	$D_s^{*+} \rho^-$	$< 8 \times 10^{-4}$	CL=90%
Γ_{34}	$D_s^+ a_1(1260)^-$	$< 2.6 \times 10^{-3}$	CL=90%
Γ_{35}	$D_s^{*+} a_1(1260)^-$	$< 2.2 \times 10^{-3}$	CL=90%
Γ_{36}	$D_s^- K^+$	$< 2.4 \times 10^{-4}$	CL=90%
Γ_{37}	$D_s^{*-} K^+$	$< 1.7 \times 10^{-4}$	CL=90%
Γ_{38}	$D_s^- K^*(892)^+$	$< 9.9 \times 10^{-4}$	CL=90%
Γ_{39}	$D_s^{*-} K^*(892)^+$	$< 1.1 \times 10^{-3}$	CL=90%
Γ_{40}	$D_s^- \pi^+ K^0$	$< 5 \times 10^{-3}$	CL=90%
Γ_{41}	$D_s^{*-} \pi^+ K^0$	$< 3.1 \times 10^{-3}$	CL=90%
Γ_{42}	$D_s^- \pi^+ K^*(892)^0$	$< 4 \times 10^{-3}$	CL=90%
Γ_{43}	$D_s^{*-} \pi^+ K^*(892)^0$	$< 2.0 \times 10^{-3}$	CL=90%
Γ_{44}	$\overline{D}^0 \pi^0$	$< 1.2 \times 10^{-4}$	CL=90%
Γ_{45}	$\overline{D}^0 \rho^0$	$< 3.9 \times 10^{-4}$	CL=90%

Γ_{46}	$\overline{D}^0\eta$	$< 1.3 \times 10^{-4}$	CL=90%
Γ_{47}	$\overline{D}^0\eta'$	$< 9.4 \times 10^{-4}$	CL=90%
Γ_{48}	$\overline{D}^0\omega$	$< 5.1 \times 10^{-4}$	CL=90%
Γ_{49}	$\overline{D}^{*0}\gamma$	$< 5.0 \times 10^{-5}$	CL=90%
Γ_{50}	$\overline{D}^*(2007)^0\pi^0$	$< 4.4 \times 10^{-4}$	CL=90%
Γ_{51}	$\overline{D}^*(2007)^0\rho^0$	$< 5.6 \times 10^{-4}$	CL=90%
Γ_{52}	$\overline{D}^*(2007)^0\eta$	$< 2.6 \times 10^{-4}$	CL=90%
Γ_{53}	$\overline{D}^*(2007)^0\eta'$	$< 1.4 \times 10^{-3}$	CL=90%
Γ_{54}	$\overline{D}^*(2007)^0\omega$	$< 7.4 \times 10^{-4}$	CL=90%
Γ_{55}	$D^*(2010)^+D^*(2010)^-$	$(9.9\ ^{+4.4}_{-3.5}) \times 10^{-4}$	
Γ_{56}	$D^*(2010)^+D^-$	$< 6.3 \times 10^{-4}$	CL=90%
Γ_{57}	$D^{(*)0}\overline{D}^{(*)0}$	< 2.7 %	CL=90%

Charmonium modes

Γ_{58}	$\eta_c K^0$	$(1.1\ ^{+0.6}_{-0.5}) \times 10^{-3}$	
Γ_{59}	$J/\psi(1S)K^0$	$(9.6 \pm 0.9) \times 10^{-4}$	
Γ_{60}	$J/\psi(1S)K^+\pi^-$	$(1.2 \pm 0.6) \times 10^{-3}$	
Γ_{61}	$J/\psi(1S)K^*(892)^0$	$(1.50 \pm 0.17) \times 10^{-3}$	
Γ_{62}	$J/\psi(1S)\phi K^0$	$(8.8\ ^{+3.7}_{-3.3}) \times 10^{-5}$	
Γ_{63}	$J/\psi(1S)\pi^0$	$(2.5\ ^{+1.1}_{-0.9}) \times 10^{-5}$	
Γ_{64}	$J/\psi(1S)\eta$	$< 1.2 \times 10^{-3}$	CL=90%
Γ_{65}	$J/\psi(1S)\rho^0$	$< 2.5 \times 10^{-4}$	CL=90%
Γ_{66}	$J/\psi(1S)\omega$	$< 2.7 \times 10^{-4}$	CL=90%
Γ_{67}	$\psi(2S)K^0$	$< 8 \times 10^{-4}$	CL=90%
Γ_{68}	$\psi(2S)K^+\pi^-$	$< 1 \times 10^{-3}$	CL=90%
Γ_{69}	$\psi(2S)K^*(892)^0$	$(9.3 \pm 2.3) \times 10^{-4}$	
Γ_{70}	$\chi_{c0}(1P)K^0$	$< 5.0 \times 10^{-4}$	CL=90%
Γ_{71}	$\chi_{c1}(1P)K^0$	$(3.9\ ^{+1.9}_{-1.4}) \times 10^{-4}$	
Γ_{72}	$\chi_{c1}(1P)K^*(892)^0$	$< 2.1 \times 10^{-3}$	CL=90%

K or K^* modes

Γ_{73}	$K^+\pi^-$	$(1.72 \pm 0.27) \times 10^{-5}$	
Γ_{74}	$K^0\pi^0$	$(1.5 \pm 0.6) \times 10^{-5}$	
Γ_{75}	$\eta' K^0$	$(8.9 \pm 1.9) \times 10^{-5}$	
Γ_{76}	$\eta' K^*(892)^0$	$< 2.4 \times 10^{-5}$	CL=90%
Γ_{77}	$\eta K^*(892)^0$	$(1.4\ ^{+0.6}_{-0.5}) \times 10^{-5}$	
Γ_{78}	ηK^0	$< 9.3 \times 10^{-6}$	CL=90%
Γ_{79}	ωK^0	$< 2.1 \times 10^{-5}$	CL=90%
Γ_{80}	$\omega K^*(892)^0$	$< 2.3 \times 10^{-5}$	CL=90%
Γ_{81}	K^+K^-	$< 1.9 \times 10^{-6}$	CL=90%
Γ_{82}	$K^0\overline{K}^0$	$< 1.7 \times 10^{-5}$	CL=90%
Γ_{83}	$K^+\rho^-$	$< 3.2 \times 10^{-5}$	CL=90%

Γ_{84}	$K^0\pi^+\pi^-$				
Γ_{85}	$K^0\rho^0$		$<$ 3.9	$\times 10^{-5}$	CL=90%
Γ_{86}	$K^0 f_0(980)$		$<$ 3.6	$\times 10^{-4}$	CL=90%
Γ_{87}	$K^*(892)^+\pi^-$		$<$ 7.2	$\times 10^{-5}$	CL=90%
Γ_{88}	$K^*(892)^0\pi^0$		$<$ 3.6	$\times 10^{-6}$	CL=90%
Γ_{89}	$K_2^*(1430)^+\pi^-$		$<$ 2.6	$\times 10^{-3}$	CL=90%
Γ_{90}	$K^0K^+K^-$		$<$ 1.3	$\times 10^{-3}$	CL=90%
Γ_{91}	$K^0\phi$		$<$ 3.1	$\times 10^{-5}$	CL=90%
Γ_{92}	$K^-\pi^+\pi^+\pi^-$	[b]	$<$ 2.3	$\times 10^{-4}$	CL=90%
Γ_{93}	$K^*(892)^0\pi^+\pi^-$		$<$ 1.4	$\times 10^{-3}$	CL=90%
Γ_{94}	$K^*(892)^0\rho^0$		$<$ 2.86	$\times 10^{-4}$	CL=90%
Γ_{95}	$K^*(892)^0 f_0(980)$		$<$ 1.7	$\times 10^{-4}$	CL=90%
Γ_{96}	$K_1(1400)^+\pi^-$		$<$ 1.1	$\times 10^{-3}$	CL=90%
Γ_{97}	$K^- a_1(1260)^+$	[b]	$<$ 2.3	$\times 10^{-4}$	CL=90%
Γ_{98}	$K^*(892)^0K^+K^-$		$<$ 6.1	$\times 10^{-4}$	CL=90%
Γ_{99}	$K^*(892)^0\phi$		$<$ 2.1	$\times 10^{-5}$	CL=90%
Γ_{100}	$\overline{K}^*(892)^0K^*(892)^0$		$<$ 4.69	$\times 10^{-4}$	CL=90%
Γ_{101}	$K_1(1400)^0\rho^0$		$<$ 3.0	$\times 10^{-3}$	CL=90%
Γ_{102}	$K_1(1400)^0\phi$		$<$ 5.0	$\times 10^{-3}$	CL=90%
Γ_{103}	$K_2^*(1430)^0\rho^0$		$<$ 1.1	$\times 10^{-3}$	CL=90%
Γ_{104}	$K_2^*(1430)^0\phi$		$<$ 1.4	$\times 10^{-3}$	CL=90%
Γ_{105}	$K^*(892)^0\gamma$		(4.5 $\pm$0.8)	$\times 10^{-5}$	
Γ_{106}	$K_1(1270)^0\gamma$		$<$ 7.0	$\times 10^{-3}$	CL=90%
Γ_{107}	$K_1(1400)^0\gamma$		$<$ 4.3	$\times 10^{-3}$	CL=90%
Γ_{108}	$K_2^*(1430)^0\gamma$		$<$ 4.0	$\times 10^{-4}$	CL=90%
Γ_{109}	$K^*(1680)^0\gamma$		$<$ 2.0	$\times 10^{-3}$	CL=90%
Γ_{110}	$K_3^*(1780)^0\gamma$		$<$ 1.0	%	CL=90%
Γ_{111}	$K_4^*(2045)^0\gamma$		$<$ 4.3	$\times 10^{-3}$	CL=90%

Light unflavored meson modes

Γ_{112}	$\rho^0\gamma$		$<$ 1.7	$\times 10^{-5}$	CL=90%
Γ_{113}	$\omega\gamma$		$<$ 9.2	$\times 10^{-6}$	CL=90%
Γ_{114}	$\phi\gamma$		$<$ 3.3	$\times 10^{-6}$	CL=90%
Γ_{115}	$\pi^+\pi^-$		(4.3 $^{+1.7}_{-1.5}$)	$\times 10^{-6}$	
Γ_{116}	$\pi^0\pi^0$		$<$ 9.3	$\times 10^{-6}$	CL=90%
Γ_{117}	$\eta\pi^0$		$<$ 2.9	$\times 10^{-6}$	CL=90%
Γ_{118}	$\eta\eta$		$<$ 1.8	$\times 10^{-5}$	CL=90%
Γ_{119}	$\eta'\pi^0$		$<$ 5.7	$\times 10^{-6}$	CL=90%
Γ_{120}	$\eta'\eta'$		$<$ 4.7	$\times 10^{-5}$	CL=90%
Γ_{121}	$\eta'\eta$		$<$ 2.7	$\times 10^{-5}$	CL=90%
Γ_{122}	$\eta'\rho^0$		$<$ 1.2	$\times 10^{-5}$	CL=90%
Γ_{123}	$\eta\rho^0$		$<$ 1.0	$\times 10^{-5}$	CL=90%
Γ_{124}	$\omega\eta$		$<$ 1.2	$\times 10^{-5}$	CL=90%
Γ_{125}	$\omega\eta'$		$<$ 6.0	$\times 10^{-5}$	CL=90%

Γ_{126}	$\omega\rho^0$		<1.1	$\times 10^{-5}$	CL=90%
Γ_{127}	$\omega\omega$		<1.9	$\times 10^{-5}$	CL=90%
Γ_{128}	$\phi\pi^0$		<5	$\times 10^{-6}$	CL=90%
Γ_{129}	$\phi\eta$		<9	$\times 10^{-6}$	CL=90%
Γ_{130}	$\phi\eta'$		<3.1	$\times 10^{-5}$	CL=90%
Γ_{131}	$\phi\rho^0$		<1.3	$\times 10^{-5}$	CL=90%
Γ_{132}	$\phi\omega$		<2.1	$\times 10^{-5}$	CL=90%
Γ_{133}	$\phi\phi$		<1.2	$\times 10^{-5}$	CL=90%
Γ_{134}	$\pi^+\pi^-\pi^0$		<7.2	$\times 10^{-4}$	CL=90%
Γ_{135}	$\rho^0\pi^0$		<5.5	$\times 10^{-6}$	CL=90%
Γ_{136}	$\rho^\mp\pi^\pm$	[c]	(2.8 ± 0.9)	$\times 10^{-5}$	
Γ_{137}	$\pi^+\pi^-\pi^+\pi^-$		<2.3	$\times 10^{-4}$	CL=90%
Γ_{138}	$\rho^0\rho^0$		<1.36	$\times 10^{-4}$	CL=90%
Γ_{139}	$a_1(1260)^\mp\pi^\pm$	[c]	<4.9	$\times 10^{-4}$	CL=90%
Γ_{140}	$a_2(1320)^\mp\pi^\pm$	[c]	<3.0	$\times 10^{-4}$	CL=90%
Γ_{141}	$\pi^+\pi^-\pi^0\pi^0$		<3.1	$\times 10^{-3}$	CL=90%
Γ_{142}	$\rho^+\rho^-$		<2.2	$\times 10^{-3}$	CL=90%
Γ_{143}	$a_1(1260)^0\pi^0$		<1.1	$\times 10^{-3}$	CL=90%
Γ_{144}	$\omega\pi^0$		<5.5	$\times 10^{-6}$	CL=90%
Γ_{145}	$\pi^+\pi^+\pi^-\pi^-\pi^0$		<9.0	$\times 10^{-3}$	CL=90%
Γ_{146}	$a_1(1260)^+\rho^-$		<3.4	$\times 10^{-3}$	CL=90%
Γ_{147}	$a_1(1260)^0\rho^0$		<2.4	$\times 10^{-3}$	CL=90%
Γ_{148}	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$		<3.0	$\times 10^{-3}$	CL=90%
Γ_{149}	$a_1(1260)^+a_1(1260)^-$		<2.8	$\times 10^{-3}$	CL=90%
Γ_{150}	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$		<1.1	%	CL=90%

Baryon modes

Γ_{151}	$p\overline{p}$		<7.0	$\times 10^{-6}$	CL=90%
Γ_{152}	$p\overline{p}\pi^+\pi^-$		<2.5	$\times 10^{-4}$	CL=90%
Γ_{153}	$p\overline{\Lambda}\pi^-$		<1.3	$\times 10^{-5}$	CL=90%
Γ_{154}	$\overline{\Lambda}\Lambda$		<3.9	$\times 10^{-6}$	CL=90%
Γ_{155}	$\Delta^0\overline{\Delta}^0$		<1.5	$\times 10^{-3}$	CL=90%
Γ_{156}	$\Delta^{++}\Delta^{--}$		<1.1	$\times 10^{-4}$	CL=90%
Γ_{157}	$\overline{\Sigma}_c^{--}\Delta^{++}$		<1.0	$\times 10^{-3}$	CL=90%
Γ_{158}	$\overline{\Lambda}_c^-p\pi^+\pi^-$		(1.3 ± 0.6)	$\times 10^{-3}$	
Γ_{159}	$\overline{\Lambda}_c^-p$		<2.1	$\times 10^{-4}$	CL=90%
Γ_{160}	$\overline{\Lambda}_c^-p\pi^0$		<5.9	$\times 10^{-4}$	CL=90%
Γ_{161}	$\overline{\Lambda}_c^-p\pi^+\pi^-\pi^0$		<5.07	$\times 10^{-3}$	CL=90%
Γ_{162}	$\overline{\Lambda}_c^-p\pi^+\pi^-\pi^+\pi^-$		<2.74	$\times 10^{-3}$	CL=90%

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

Γ_{163}	$\gamma\gamma$		<	3.9	$\times 10^{-5}$	CL=90%
Γ_{164}	$e^+ e^-$	*B1*	<	8.3	$\times 10^{-7}$	CL=90%
Γ_{165}	$\mu^+ \mu^-$	*B1*	<	6.1	$\times 10^{-7}$	CL=90%
Γ_{166}	$K^0 e^+ e^-$	*B1*	<	3.0	$\times 10^{-4}$	CL=90%
Γ_{167}	$K^0 \mu^+ \mu^-$	*B1*	<	3.6	$\times 10^{-4}$	CL=90%
Γ_{168}	$K^*(892)^0 e^+ e^-$	*B1*	<	2.9	$\times 10^{-4}$	CL=90%
Γ_{169}	$K^*(892)^0 \mu^+ \mu^-$	*B1*	<	4.0	$\times 10^{-6}$	CL=90%
Γ_{170}	$K^*(892)^0 \nu \overline{\nu}$	*B1*	<	1.0	$\times 10^{-3}$	CL=90%
Γ_{171}	$e^\pm \mu^\mp$	*LF*	[c] <	1.5	$\times 10^{-6}$	CL=90%
Γ_{172}	$e^\pm \tau^\mp$	*LF*	[c] <	5.3	$\times 10^{-4}$	CL=90%
Γ_{173}	$\mu^\pm \tau^\mp$	*LF*	[c] <	8.3	$\times 10^{-4}$	CL=90%

[a] An ℓ indicates an e or a μ mode, not a sum over these modes.

[b] B^0 and B^0_s contributions not separated. Limit is on weighted average of the two decay rates.

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

B^0 BRANCHING RATIOS

For branching ratios in which the charge of the decaying B is not determined, see the $B^\pm$ section.

$\Gamma(\ell^+ \nu_\ell \text{anything})/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.105 ±0.008 OUR AVERAGE				
0.1078±0.0060±0.0069	[33] ARTUSO	97	CLE2	$e^+ e^- \to \Upsilon(4S)$
0.093 ±0.011 ±0.015	ALBRECHT	94	ARG	$e^+ e^- \to \Upsilon(4S)$
0.099 ±0.030 ±0.009	HENDERSON	92	CLEO	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.109 ±0.007 ±0.011	ATHANAS	94	CLE2	Sup. by ARTUSO 97

[33] ARTUSO 97 uses partial reconstruction of $B \to D^* \ell \nu_\ell$ and inclusive semileptonic branching ratio from BARISH 96B (0.1049 ± 0.0017 ± 0.0043).

$\Gamma(D^- \ell^+ \nu_\ell)/\Gamma_{total}$ — Γ_2/Γ

ℓ denotes e or μ, not the sum.

VALUE	DOCUMENT ID		TECN	COMMENT
0.0210±0.0019 OUR AVERAGE				
0.0209±0.0013±0.0018	[34] BARTELT	99	CLE2	$e^+ e^- \to \Upsilon(4S)$
0.0235±0.0020±0.0044	[35] BUSKULIC	97	ALEP	$e^+ e^- \to Z$
0.018 ±0.006 ±0.003	[36] FULTON	91	CLEO	$e^+ e^- \to \Upsilon(4S)$
0.020 ±0.007 ±0.006	[37] ALBRECHT	89J	ARG	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0187±0.0015±0.0032	[38] ATHANAS	97	CLE2	Repl. by BARTELT 99

[34] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[35] BUSKULIC 97 assumes fraction (B^+) = fraction (B^0) = (37.8 ± 2.2)% and PDG 96 values for B lifetime and branching ratio of D^* and D decays.

[36] FULTON 91 assumes assuming equal production of B^0 and B^+ at the $\Upsilon(4S)$ and uses Mark III D and D^* branching ratios.

[37] ALBRECHT 89J reports 0.018 ± 0.006 ± 0.005. We rescale using the method described in STONE 94 but with the updated PDG 94 B($D^0 \to K^- \pi^+$).

[38] ATHANAS 97 uses missing energy and missing momentum to reconstruct neutrino.

$\Gamma(D^*(2010)^- \ell^+ \nu_\ell)/\Gamma_{total}$ Γ_3/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0468±0.0022 OUR AVERAGE					
$0.0470 \pm 0.0013 ^{+0.0036}_{-0.0031}$		[39] ABREU	01H	DLPH	$e^+e^- \to Z$
0.0526±0.0020±0.0046		[40] ABBIENDI	00Q	OPAL	$e^+e^- \to Z$
0.0553±0.0026±0.0052		[41] BUSKULIC	97	ALEP	$e^+e^- \to Z$
0.0449±0.0032±0.0039	376	[42] BARISH	95	CLE2	$e^+e^- \to \Upsilon(4S)$
0.045 ±0.003 ±0.004		[43] ALBRECHT	94	ARG	$e^+e^- \to \Upsilon(4S)$
0.047 ±0.005 ±0.005	235	[44] ALBRECHT	93	ARG	$e^+e^- \to \Upsilon(4S)$
0.040 ±0.004 ±0.006		[45] BORTOLETTO	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0508±0.0021±0.0066		[46] ACKERSTAFF	97G	OPAL	Repl. by ABBIENDI 00Q
0.0552±0.0017±0.0068		[47] ABREU	96P	DLPH	Repl. by ABREU 01H
0.0518±0.0030±0.0062	410	[48] BUSKULIC	95N	ALEP	Sup. by BUSKULIC 97
seen	398	[49] SANGHERA	93	CLE2	$e^+e^- \to \Upsilon(4S)$
0.070 ±0.018 ±0.014		[50] ANTREASYAN	90B	CBAL	$e^+e^- \to \Upsilon(4S)$
		[51] ALBRECHT	89C	ARG	$e^+e^- \to \Upsilon(4S)$
0.060 ±0.010 ±0.014		[52] ALBRECHT	89J	ARG	$e^+e^- \to \Upsilon(4S)$
0.070 ±0.012 ±0.019	47	[53] ALBRECHT	87J	ARG	$e^+e^- \to \Upsilon(4S)$

[39] ABREU 01H measured using about 5000 partial reconstructed D^* sample.

[40] ABBIENDI 00Q assumes the fraction B($b \to B^0$)= $(39.7^{+1.8}_{-2.2})$%. This result is an average of two methods using exclusive and partial D^* reconstruction.

[41] BUSKULIC 97 assumes fraction (B^+) = fraction (B^0) = (37.8 ± 2.2)% and PDG 96 values for B lifetime and D^* and D branching fractions.

[42] BARISH 95 use B($D^0 \to K^- \pi^+$) = (3.91 ± 0.08 ± 0.17)% and B($D^{*+} \to D^0 \pi^+$) = (68.1 ± 1.0 ± 1.3)%.

[43] ALBRECHT 94 assumes B($D^{*+} \to D^0 \pi^+$) = 68.1 ± 1.0 ± 1.3%. Uses partial reconstruction of D^{*+} and is independent of D^0 branching ratios.

[44] ALBRECHT 93 reports 0.052 ± 0.005 ± 0.006. We rescale using the method described in STONE 94 but with the updated PDG 94 B($D^0 \to K^- \pi^+$). We have taken their average e and μ value. They also obtain $\alpha = 2*\Gamma^0/(\Gamma^- + \Gamma^+) - 1$ = 1.1 ± 0.4 ± 0.2, $A_{AF} = 3/4*(\Gamma^- - \Gamma^+)/\Gamma$ = 0.2 ± 0.08 ± 0.06 and a value of $|V_{cb}|$ = 0.036–0.045 depending on model assumptions.

[45] We have taken average of the the BORTOLETTO 89B values for electrons and muons, 0.046 ± 0.005 ± 0.007. We rescale using the method described in STONE 94 but with the updated PDG 94 B($D^0 \to K^- \pi^+$). The measurement suggests a D^* polarization parameter value α = 0.65 ± 0.66 ± 0.25.

[46] ACKERSTAFF 97G assumes fraction (B^+) = fraction (B^0) = (37.8±2.2)% and PDG 96 values for B lifetime and branching ratio of D^* and D decays.

[47] ABREU 96P result is the average of two methods using exclusive and partial D^* reconstruction.

[48] BUSKULIC 95N assumes fraction (B^+) = fraction (B^0) = 38.2 ± 1.3 ± 2.2% and τ_{B^0} = 1.58 ± 0.06 ps. $\Gamma(D^{*-}\ell^+\nu_\ell)$/total = [5.18 − 0.13(fraction(B^0)−38.2)−1.5(τ_{B^0} − 1.58)]%.

[49] Combining $\overline{D}^{*0}\ell^+\nu_\ell$ and $\overline{D}^{*-}\ell^+\nu_\ell$ SANGHERA 93 test $V-A$ structure and fit the decay angular distributions to obtain $A_{FB} = 3/4*(\Gamma^- - \Gamma^+)/\Gamma = 0.14 \pm 0.06 \pm 0.03$. Assuming a value of V_{cb}, they measure V, A_1, and A_2, the three form factors for the $D^*\ell\nu_\ell$ decay, where results are slightly dependent on model assumptions.

[50] ANTREASYAN 90B is average over B and $\overline{D}^*(2010)$ charge states.

[51] The measurement of ALBRECHT 89C suggests a D^* polarization γ_L/γ_T of 0.85 ± 0.45. or $\alpha = 0.7 \pm 0.9$.

[52] ALBRECHT 89J is ALBRECHT 87J value rescaled using B($D^*(2010)^- \to D^0\pi^-$) = 0.57 ± 0.04 ± 0.04. Superseded by ALBRECHT 93.

[53] ALBRECHT 87J assume μ-e universality, the B($\Upsilon(4S) \to B^0\overline{B}^0$) = 0.45, the B($D^0 \to K^-\pi^+$) = (0.042 ± 0.004 ± 0.004), and the B($D^*(2010)^- \to D^0\pi^-$) = 0.49 ± 0.08. Superseded by ALBRECHT 89J.

$\Gamma(\rho^-\ell^+\nu_\ell)/\Gamma_{total}$ Γ_4/Γ

$\ell = e$ or μ, not sum over e and μ modes.

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.57 \pm 0.29^{+0.53}_{-0.62}}$		[54] BEHRENS	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.69 \pm 0.41^{+0.61}_{-0.64}$		[55] BEHRENS	00	CLE2	$e^+e^- \to \Upsilon(4S)$
$2.5 \pm 0.4\ ^{+0.7}_{-0.9}$		[56] ALEXANDER	96T	CLE2	Repl. by BEHRENS 00
<4.1	90	[57] BEAN	93B	CLE2	$e^+e^- \to \Upsilon(4S)$

[54] Averaging with ALEXANDER 96T results including experimental and theoretical correlations considered, BEHRENS 00 reports systematic errors $^{+0.33}_{-0.46} \pm 0.41$, where the second error is theoretical model dependence. We combine these in quadrature.

[55] BEHRENS 00 reports $^{+0.35}_{-0.40} \pm 0.50$, where the second error is the theoretical model dependence. We combine these in quadrature. B^+ and B^0 decays combined using isospin symmetry: $\Gamma(B^0 \to \rho^-\ell^+\nu)$=2$\Gamma(B^+ \to \rho^0\ell^+\nu)\approx$ 2$\Gamma(B^+ \to \omega\ell^+\nu)$. No evidence for $\omega\ell\nu$ is reported.

[56] ALEXANDER 96T reports $^{+0.5}_{-0.7} \pm 0.5$ where the second error is the theoretical model dependence. We combine these in quadrature. B^+ and B^0 decays combined using isospin symmetry: $\Gamma(B^0 \to \rho^-\ell^+\nu)$ =2$\Gamma(B^+ \to \rho^0\ell^+\nu) \approx$ 2$\Gamma(B^+ \to \omega\ell^+\nu)$. No evidence for $\omega\ell\nu$ is reported.

[57] BEAN 93B limit set using ISGW Model. Using isospin and the quark model to combine $\Gamma(\rho^0\ell^+\nu_\ell)$ and $\Gamma(\omega\ell^+\nu_\ell)$ with this result, they obtain a limit <(1.6–2.7) × 10^{-4} at 90% CL for $B^+ \to (\omega \text{ or } \rho^0)\ell^+\nu_\ell$. The range corresponds to the ISGW, WSB, and KS models. An upper limit on $|V_{ub}/V_{cb}| < 0.08$–0.13 at 90% CL is derived as well.

$\Gamma(\pi^-\ell^+\nu_\ell)/\Gamma_{total}$ Γ_5/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.8±0.4±0.4	[58] ALEXANDER	96T	CLE2	$e^+e^- \to \Upsilon(4S)$

[58] ALEXANDER 96T gives systematic errors ±0.3 ± 0.2 where the second error reflects the estimated model dependence. We combine these in quadrature. Assumes isospin symmetry: $\Gamma(B^0 \to \pi^-\ell^+\nu) = 2 \times \Gamma(B^+ \to \pi^0\ell^+\nu)$.

$\Gamma(\pi^- \mu^+ \nu_\mu)/\Gamma_{total}$ — Γ_6/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	[59] ALBRECHT	91C	ARG

[59] In ALBRECHT 91C, one event is fully reconstructed providing evidence for the $b \rightarrow u$ transition.

$\Gamma(K^+ \text{anything})/\Gamma_{total}$ — Γ_7/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.78±0.08	[60] ALBRECHT	96D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[60] Average multiplicity.

$\Gamma(D^- \pi^+)/\Gamma_{total}$ — Γ_8/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0030±0.0004 OUR AVERAGE					
0.0029±0.0004±0.0002	81	[61] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.0027±0.0006±0.0005		[62] BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.0048±0.0011±0.0011	22	[63] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$0.0051^{+0.0028+0.0013}_{-0.0025-0.0012}$	4	[64] BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0031±0.0013±0.0010	7	[63] ALBRECHT	88K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[61] ALAM 94 reports $[B(B^0 \rightarrow D^- \pi^+) \times B(D^+ \rightarrow K^- \pi^+ \pi^+)] = 0.000265 \pm 0.000032 \pm 0.000023$. We divide by our best value $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.0 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[62] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[63] ALBRECHT 88K assumes $B^0 \overline{B}^0 : B^+ B^-$ production ratio is 45:55. Superseded by ALBRECHT 90J which assumes 50:50.

[64] BEBEK 87 value has been updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92.

$\Gamma(D^- \rho^+)/\Gamma_{total}$ — Γ_9/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0079±0.0014 OUR AVERAGE					
0.0078±0.0013±0.0005	79	[65] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.009 ±0.005 ±0.003	9	[66] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.022 ±0.012 ±0.009	6	[66] ALBRECHT	88K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[65] ALAM 94 reports $[B(B^0 \rightarrow D^- \rho^+) \times B(D^+ \rightarrow K^- \pi^+ \pi^+)] = 0.000704 \pm 0.000096 \pm 0.000070$. We divide by our best value $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.0 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[66] ALBRECHT 88K assumes $B^0 \overline{B}^0 : B^+ B^-$ production ratio is 45:55. Superseded by ALBRECHT 90J which assumes 50:50.

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

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.0016	90		[67] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.007	90		[68] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
<0.034	90		[69] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
0.07 ±0.05		5	[70] BEHRENDS	83	CLEO	$e^+e^- \to \Upsilon(4S)$

[67] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[68] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D. The product branching fraction into $D_0^*(2340)\pi$ followed by $D_0^*(2340) \to D^0\pi$ is < 0.0001 at 90% CL and into $D_2^*(2460)$ followed by $D_2^*(2460) \to D^0\pi$ is < 0.0004 at 90% CL.

[69] BEBEK 87 assume the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%. $B(D^0 \to K^-\pi^+) = (4.2 \pm 0.4 \pm 0.4)\%$ and $B(D^0 \to K^-\pi^+\pi^+\pi^-) = (9.1 \pm 0.8 \pm 0.8)\%$ were used.

[70] Corrected by us using assumptions: $B(D^0 \to K^-\pi^+) = (0.042 \pm 0.006)$ and $B(\Upsilon(4S) \to B^0\overline{B}^0) = 50\%$. The product branching ratio is $B(B^0 \to \overline{D}^0\pi^+\pi^-)B(\overline{D}^0 \to K^+\pi^-) = (0.39 \pm 0.26) \times 10^{-2}$.

$\Gamma(D^*(2010)^-\pi^+)/\Gamma_{total}$ Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.00276±0.00021 OUR AVERAGE					
0.00281±0.00024±0.00005		[71] BRANDENB...	98	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0026 ±0.0003 ±0.0004	82	[72] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.00337±0.00096±0.00002		[73] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.00236±0.00088±0.00002	12	[74] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
$0.00236^{+0.00150}_{-0.00110}\pm0.00002$	5	[75] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.010 ±0.004 ±0.001	8	[76] AKERS	94J	OPAL	$e^+e^- \to Z$
0.0027 ±0.0014 ±0.0010	5	[77] ALBRECHT	87C	ARG	$e^+e^- \to \Upsilon(4S)$
0.0035 ±0.002 ±0.002		[78] ALBRECHT	86F	ARG	$e^+e^- \to \Upsilon(4S)$
0.017 ±0.005 ±0.005	41	[79] GILES	84	CLEO	$e^+e^- \to \Upsilon(4S)$

[71] BRANDENBURG 98 assume equal production of B^+ and B^0 at $\Upsilon(4S)$ and use the D^* reconstruction technique. The first error is their experiment's error and the second error is the systematic error from the PDG 96 value of $B(D^* \to D\pi)$.

[72] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II $B(D^*(2010)^+ \to D^0\pi^+)$ and absolute $B(D^0 \to K^-\pi^+)$ and the PDG 1992 $B(D^0 \to K^-\pi^+\pi^0)/B(D^0 \to K^-\pi^+)$ and $B(D^0 \to K^-\pi^+\pi^+\pi^-)/B(D^0 \to K^-\pi^+)$.

[73] BORTOLETTO 92 reports $0.0040 \pm 0.0010 \pm 0.0007$ for $B(D^*(2010)^+ \to D^0\pi^+) = 0.57 \pm 0.06$. We rescale to our best value $B(D^*(2010)^+ \to D^0\pi^+) = (67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[74] ALBRECHT 90J reports $0.0028 \pm 0.0009 \pm 0.0006$ for $B(D^*(2010)^+ \to D^0\pi^+) = 0.57 \pm 0.06$. We rescale to our best value $B(D^*(2010)^+ \to D^0\pi^+) = (67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[75] BEBEK 87 reports $0.0028^{+0.0015}_{-0.0012}{}^{+0.0010}_{-0.0006}$ for B($D^*(2010)^+ \rightarrow D^0\pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0\pi^+$) = (67.7 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. Updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92 and ALBRECHT 90J.

[76] Assumes B($Z \rightarrow b\overline{b}$) = 0.217 and 38% B_d production fraction.

[77] ALBRECHT 87C use PDG 86 branching ratios for D and $D^*(2010)$ and assume B($\Upsilon(4S) \rightarrow B^+B^-$) = 55% and B($\Upsilon(4S) \rightarrow B^0\overline{B}^0$) = 45%. Superseded by ALBRECHT 90J.

[78] ALBRECHT 86F uses pseudomass that is independent of D^0 and D^+ branching ratios.

[79] Assumes B($D^*(2010)^+ \rightarrow D^0\pi^+$) = $0.60^{+0.08}_{-0.15}$. Assumes B($\Upsilon(4S) \rightarrow B^0\overline{B}^0$) = 0.40 ± 0.02 Does not depend on D branching ratios.

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

VALUE	DOCUMENT ID	TECN	COMMENT
0.0080±0.0021±0.0014	[80] BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[80] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

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

VALUE	DOCUMENT ID	TECN	COMMENT
0.0039±0.0014±0.0013	[81] BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[81] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

$\Gamma(D^-\pi^+\rho^0)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0011±0.0009±0.0004	[82] BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[82] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

$\Gamma(D^-a_1(1260)^+)/\Gamma_{total}$ — Γ_{15}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0060±0.0022±0.0024	[83] BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[83] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

$\Gamma(D^*(2010)^-\pi^+\pi^0)/\Gamma_{total}$ — Γ_{16}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0152±0.0052±0.0001	51	[84] ALBRECHT 90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.015 ±0.008 ±0.008	8	[85] ALBRECHT 87C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[84] ALBRECHT 90J reports 0.018 ± 0.004 ± 0.005 for B($D^*(2010)^+ \rightarrow D^0\pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0\pi^+$) = (67.7 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[85] ALBRECHT 87C use PDG 86 branching ratios for D and $D^*(2010)$ and assume B($\Upsilon(4S) \rightarrow B^+B^-$) = 55% and B($\Upsilon(4S) \rightarrow B^0\overline{B}^0$) = 45%. Superseded by ALBRECHT 90J.

$\Gamma(D^*(2010)^- \rho^+)/\Gamma_{total}$ Γ_{17}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0073 ±0.0015 OUR AVERAGE				
0.0074 ±0.0010 ±0.0014	76	[86,87] ALAM 94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0160 ±0.0113 ±0.0001		[88] BORTOLETTO 92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
0.00589±0.00352±0.00004	19	[89] ALBRECHT 90J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.081 ±0.029 $^{+0.059}_{-0.024}$	19	[90] CHEN 85	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

[86] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2010)^+ \rightarrow D^0 \pi^+$) and absolute B($D^0 \rightarrow K^- \pi^+$) and the PDG 1992 B($D^0 \rightarrow K^- \pi^+ \pi^0$)/B($D^0 \rightarrow K^- \pi^+$) and B($D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$)/B($D^0 \rightarrow K^- \pi^+$).

[87] This decay is nearly completely longitudinally polarized, $\Gamma_L/\Gamma = (93 \pm 5 \pm 5)\%$, as expected from the factorization hypothesis (ROSNER 90). The nonresonant $\pi^+ \pi^0$ contribution under the ρ^+ is less than 9% at 90% CL.

[88] BORTOLETTO 92 reports 0.019 ± 0.008 ± 0.011 for B($D^*(2010)^+ \rightarrow D^0 \pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0 \pi^+$) = $(67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[89] ALBRECHT 90J reports 0.007 ± 0.003 ± 0.003 for B($D^*(2010)^+ \rightarrow D^0 \pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0 \pi^+$) = $(67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[90] Uses B($D^* \rightarrow D^0 \pi^+$) = 0.6 ± 0.15 and B($\Upsilon(4S) \rightarrow B^0 \overline{B}^0$) = 0.4. Does not depend on D branching ratios.

$\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}$ Γ_{18}/Γ

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.0076±0.0018 OUR AVERAGE			Error includes scale factor of 1.4. See the ideogram below.		
0.0063±0.0010±0.0011		49	[91,92] ALAM 94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0134±0.0036±0.0001			[93] BORTOLETTO 92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0101±0.0041±0.0001		26	[94] ALBRECHT 90J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.033 ±0.009 ±0.016		27	[95] ALBRECHT 87C	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
<0.042	90		[96] BEBEK 87	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

[91] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2010)^+ \rightarrow D^0 \pi^+$) and absolute B($D^0 \rightarrow K^- \pi^+$) and the PDG 1992 B($D^0 \rightarrow K^- \pi^+ \pi^0$)/B($D^0 \rightarrow K^- \pi^+$) and B($D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$)/B($D^0 \rightarrow K^- \pi^+$).

[92] The three pion mass is required to be between 1.0 and 1.6 GeV consistent with an a_1 meson. (If this channel is dominated by a_1^+, the branching ratio for $\overline{D}^{*-} a_1^+$ is twice that for $\overline{D}^{*-} \pi^+ \pi^+ \pi^-$.)

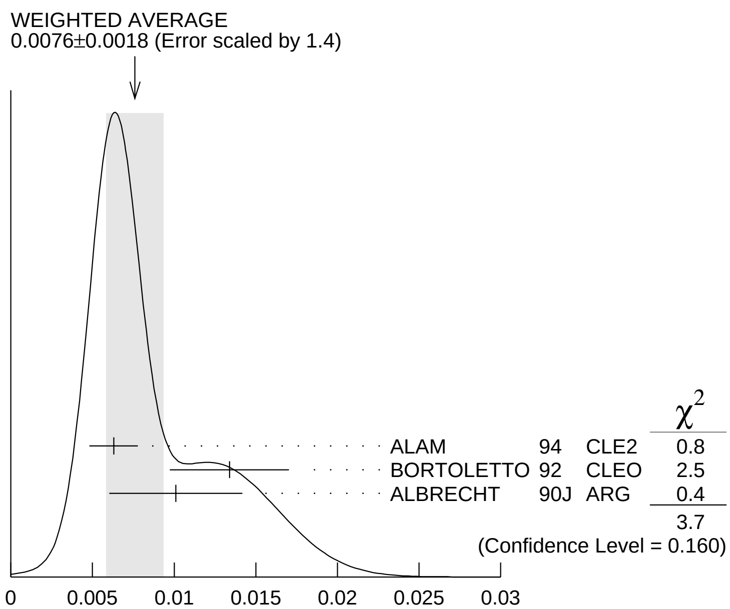
[93] BORTOLETTO 92 reports 0.0159 ± 0.0028 ± 0.0037 for B($D^*(2010)^+ \rightarrow D^0 \pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0 \pi^+$) = $(67.7 \pm 0.5) \times$

10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[94] ALBRECHT 90J reports $0.012 \pm 0.003 \pm 0.004$ for $B(D^*(2010)^+ \to D^0\pi^+) = 0.57 \pm 0.06$. We rescale to our best value $B(D^*(2010)^+ \to D^0\pi^+) = (67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[95] ALBRECHT 87C use PDG 86 branching ratios for D and $D^*(2010)$ and assume $B(\Upsilon(4S) \to B^+B^-) = 55\%$ and $B(\Upsilon(4S) \to B^0\overline{B}^0) = 45\%$. Superseded by ALBRECHT 90J.

[96] BEBEK 87 value has been updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92.



$\Gamma\left(D^*(2010)^-\pi^+\pi^+\pi^-\right)/\Gamma_{total}$

$\Gamma\left((D^*(2010)^-\pi^+\pi^+\pi^-) \text{ nonresonant}\right)/\Gamma_{total}$ $\qquad\Gamma_{19}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
0.0000±0.0019±0.0016	[97] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[97] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D and $D^*(2010)$.

$\Gamma\left(D^*(2010)^-\pi^+\rho^0\right)/\Gamma_{total}$ $\qquad\Gamma_{20}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
0.00573±0.00317±0.00004	[98] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[98] BORTOLETTO 92 reports $0.0068 \pm 0.0032 \pm 0.0021$ for $B(D^*(2010)^+ \to D^0\pi^+) = 0.57 \pm 0.06$. We rescale to our best value $B(D^*(2010)^+ \to D^0\pi^+) = (67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic

error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

$\Gamma(D^*(2010)^- a_1(1260)^+)/\Gamma_{total}$ — Γ_{21}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0130±0.0027 OUR AVERAGE				
0.0126±0.0020±0.0022	[99,100] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.0152±0.0070±0.0001	[101] BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[99] ALAM 94 value is twice their $\Gamma(D^*(2010)^-\pi^+\pi^+\pi^-)/\Gamma_{total}$ value based on their observation that the three pions are dominantly in the $a_1(1260)$ mass range 1.0 to 1.6 GeV.

[100] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2010)^+ \rightarrow D^0\pi^+$) and absolute B($D^0 \rightarrow K^-\pi^+$) and the PDG 1992 B($D^0 \rightarrow K^-\pi^+\pi^0$)/B($D^0 \rightarrow K^-\pi^+$) and B($D^0 \rightarrow K^-\pi^+\pi^+\pi^-$)/B($D^0 \rightarrow K^-\pi^+$).

[101] BORTOLETTO 92 reports $0.018 \pm 0.006 \pm 0.006$ for B($D^*(2010)^+ \rightarrow D^0\pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0\pi^+$) = $(67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

$\Gamma(D^*(2010)^-\pi^+\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0345±0.0181±0.0003	28	[102] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[102] ALBRECHT 90J reports $0.041 \pm 0.015 \pm 0.016$ for B($D^*(2010)^+ \rightarrow D^0\pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \rightarrow D^0\pi^+$) = $(67.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

$\Gamma(\overline{D}{}_2^*(2460)^-\pi^+)/\Gamma_{total}$ — Γ_{23}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0022	90	[103] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[103] ALAM 94 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^-\pi^+$) and B($D_2^*(2460)^+ \rightarrow D^0\pi^+$) = 30%.

$\Gamma(\overline{D}{}_2^*(2460)^-\rho^+)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0049	90	[104] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[104] ALAM 94 assumesequal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^-\pi^+$) and B($D_2^*(2460)^+ \rightarrow D^0\pi^+$) = 30%.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9.4 \times 10^{-4}$	90	[105] LIPELES	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.9 \times 10^{-3}$	90	BARATE	98Q	ALEP	$e^+e^- \rightarrow Z$
$<1.2 \times 10^{-3}$	90	ASNER	97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[105] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(D^- D_s^+)/\Gamma_{total}$ — Γ_{26}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0080±0.0030 OUR AVERAGE					
$0.0084\pm0.0030^{+0.0020}_{-0.0021}$		[106] GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
$0.013 \pm0.011 \pm0.003$		[107] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$
$0.007 \pm0.004 \pm0.002$		[108] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.012 ± 0.007	3	[109] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[106] GIBAUT 96 reports $0.0087 \pm 0.0024 \pm 0.0020$ for B($D_s^+ \to \phi\pi^+$) = 0.035. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[107] ALBRECHT 92G reports $0.017 \pm 0.013 \pm 0.006$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ branching ratios, e.g., B($D^+ \to K^-\pi^+\pi^+$) = 7.7 ± 1.0%.

[108] BORTOLETTO 92 reports $0.0080 \pm 0.0045 \pm 0.0030$ for B($D_s^+ \to \phi\pi^+$) = 0.030 ± 0.011. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.

[109] BORTOLETTO 90 assume B($D_s \to \phi\pi^+$) = 2%. Superseded by BORTOLETTO 92.

$\Gamma(D^*(2010)^- D_s^+)/\Gamma_{total}$ — Γ_{27}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0105±0.0034 OUR AVERAGE					
$0.0110\pm0.0021\pm0.0028$		[110] AHMED	00B	CLE2	$e^+e^- \to \Upsilon(4S)$
$0.0090\pm0.0027\pm0.0022$		[111] GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
$0.010 \pm0.008 \pm0.003$		[112] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$
$0.013 \pm0.008 \pm0.003$		[113] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.024 ± 0.014	3	[114] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[110] AHMED 00B reports their experiment's uncertainties ($\pm0.18 \pm 0.11 \pm 0.28$)%, where the first error is statistical, the second is systematic, and the third is the uncertainty in the $D_s \to \phi\pi$ branching fraction. We combine the first two in quadrature.

[111] GIBAUT 96 reports $0.0093 \pm 0.0023 \pm 0.0016$ for B($D_s^+ \to \phi\pi^+$) = 0.035. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[112] ALBRECHT 92G reports $0.014 \pm 0.010 \pm 0.003$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ and $D^*(2010)^+$ branching ratios, e.g., B($D^0 \to K^-\pi^+$) = 3.71 ± 0.25%, B($D^+ \to K^-\pi^+\pi^+$) = 7.1 ± 1.0%, and B($D^*(2010)^+ \to D^0\pi^+$) = 55 ± 4%.

[113] BORTOLETTO 92 reports $0.016 \pm 0.009 \pm 0.006$ for B($D_s^+ \to \phi\pi^+$) = 0.030 ± 0.011. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our

best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D and $D^*(2010)$.

[114] BORTOLETTO 90 assume B($D_s \to \phi\pi^+$) = 2%. Superseded by BORTOLETTO 92.

$\Gamma(D^- D_s^{*+})/\Gamma_{total}$ Γ_{28}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.010±0.005 OUR AVERAGE				
0.010±0.004±0.002	[115] GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
0.020±0.014±0.005	[116] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$

[115] GIBAUT 96 reports $0.0100 \pm 0.0035 \pm 0.0022$ for B($D_s^+ \to \phi\pi^+$) = 0.035. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[116] ALBRECHT 92G reports $0.027 \pm 0.017 \pm 0.009$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ branching ratios, e.g., B($D^+ \to K^-\pi^+\pi^+$) = 7.7 ± 1.0%.

$\left[\Gamma(D^*(2010)^- D_s^+) + \Gamma(D^*(2010)^- D_s^{*+})\right]/\Gamma_{total}$ $(\Gamma_{27}+\Gamma_{29})/\Gamma$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$4.15\pm1.11^{+0.99}_{-1.02}$	22	[117] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[117] BORTOLETTO 90 reports 7.5 ± 2.0 for B($D_s^+ \to \phi\pi^+$) = 0.02. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^*(2010)^- D_s^{*+})/\Gamma_{total}$ Γ_{29}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.019 ±0.006 OUR AVERAGE				
0.0182±0.0045±0.0046	[118] AHMED	00B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.020 ±0.006 ±0.005	[119] GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
0.019 ±0.011 ±0.005	[120] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$

[118] AHMED 00B reports their experiment's uncertainties (±0.37 ± 0.25 ± 0.46)%, where the first error is statistical, the second is systematic, and the third is the uncertainty in the $D_s \to \phi\pi$ branching fraction. We combine the first two in quadrature.

[119] GIBAUT 96 reports $0.0203 \pm 0.0050 \pm 0.0036$ for B($D_s^+ \to \phi\pi^+$) = 0.035. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[120] ALBRECHT 92G reports $0.026 \pm 0.014 \pm 0.006$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = $(3.6 \pm 0.9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ and $D^*(2010)^+$ branching ratios, e.g., B($D^0 \to K^-\pi^+$) = 3.71 ± 0.25%, B($D^+ \to K^-\pi^+\pi^+$) = 7.1 ± 1.0%, and B($D^*(2010)^+ \to D^0\pi^+$) = 55 ± 4%.

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.00028	90	[121] ALEXANDER 93B	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0013	90	[122] BORTOLETTO90	CLEO	$e^+ e^- \to \Upsilon(4S)$

[121] ALEXANDER 93B reports $< 2.7 \times 10^{-4}$ for B($D_s^+ \to \phi \pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi \pi^+$) = 0.036.

[122] BORTOLETTO 90 assume B($D_s \to \phi \pi^+$) = 2%.

$[\Gamma(D_s^+ \pi^-) + \Gamma(D_s^- K^+)]/\Gamma_{total}$ — $(\Gamma_{30}+\Gamma_{36})/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0013	90	[123] ALBRECHT 93E	ARG	$e^+ e^- \to \Upsilon(4S)$

[123] ALBRECHT 93E reports $< 1.7 \times 10^{-3}$ for B($D_s^+ \to \phi \pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi \pi^+$) = 0.036.

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0005	90	[124] ALEXANDER 93B	CLE2	$e^+ e^- \to \Upsilon(4S)$

[124] ALEXANDER 93B reports $< 4.4 \times 10^{-4}$ for B($D_s^+ \to \phi \pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi \pi^+$) = 0.036.

$[\Gamma(D_s^{*+} \pi^-) + \Gamma(D_s^{*-} K^+)]/\Gamma_{total}$ — $(\Gamma_{31}+\Gamma_{37})/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0009	90	[125] ALBRECHT 93E	ARG	$e^+ e^- \to \Upsilon(4S)$

[125] ALBRECHT 93E reports $< 1.2 \times 10^{-3}$ for B($D_s^+ \to \phi \pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi \pi^+$) = 0.036.

$\Gamma(D_s^+ \rho^-)/\Gamma_{total}$ — Γ_{32}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0007	90	[126] ALEXANDER 93B	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0016	90	[127] ALBRECHT 93E	ARG	$e^+ e^- \to \Upsilon(4S)$

[126] ALEXANDER 93B reports $< 6.6 \times 10^{-4}$ for B($D_s^+ \to \phi \pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi \pi^+$) = 0.036.

[127] ALBRECHT 93E reports $< 2.2 \times 10^{-3}$ for B($D_s^+ \to \phi \pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi \pi^+$) = 0.036.

$\Gamma(D_s^{*+}\rho^-)/\Gamma_{total}$ Γ_{33}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0008	90	[128] ALEXANDER	93B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0019	90	[129] ALBRECHT	93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[128] ALEXANDER 93B reports $< 7.4 \times 10^{-4}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$.

[129] ALBRECHT 93E reports $< 2.5 \times 10^{-3}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$.

$\Gamma(D_s^+ a_1(1260)^-)/\Gamma_{total}$ Γ_{34}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0026	90	[130] ALBRECHT	93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[130] ALBRECHT 93E reports $< 3.5 \times 10^{-3}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$.

$\Gamma(D_s^{*+} a_1(1260)^-)/\Gamma_{total}$ Γ_{35}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0022	90	[131] ALBRECHT	93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[131] ALBRECHT 93E reports $< 2.9 \times 10^{-3}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$.

$\Gamma(D_s^- K^+)/\Gamma_{total}$ Γ_{36}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00024	90	[132] ALEXANDER	93B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0013	90	[133] BORTOLETTO	90	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[132] ALEXANDER 93B reports $< 2.3 \times 10^{-4}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$.

[133] BORTOLETTO 90 assume $B(D_s \rightarrow \phi\pi^+) = 2\%$.

$\Gamma(D_s^{*-} K^+)/\Gamma_{total}$ Γ_{37}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00017	90	[134] ALEXANDER	93B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[134] ALEXANDER 93B reports $< 1.7 \times 10^{-4}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$.

$\Gamma(D_s^- K^*(892)^+)/\Gamma_{total}$ — Γ_{38}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0010	90	[135] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0034	90	[136] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[135] ALEXANDER 93B reports $< 9.7 \times 10^{-4}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

[136] ALBRECHT 93E reports $< 4.6 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

$\Gamma(D_s^{*-} K^*(892)^+)/\Gamma_{total}$ — Γ_{39}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0011	90	[137] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.004	90	[138] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[137] ALEXANDER 93B reports $< 11.0 \times 10^{-4}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

[138] ALBRECHT 93E reports $< 5.8 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

$\Gamma(D_s^- \pi^+ K^0)/\Gamma_{total}$ — Γ_{40}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.005	90	[139] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[139] ALBRECHT 93E reports $< 7.3 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

$\Gamma(D_s^{*-} \pi^+ K^0)/\Gamma_{total}$ — Γ_{41}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0031	90	[140] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[140] ALBRECHT 93E reports $< 4.2 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

$\Gamma(D_s^- \pi^+ K^*(892)^0)/\Gamma_{total}$ — Γ_{42}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	90	[141] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[141] ALBRECHT 93E reports $< 5.0 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

$\Gamma(D_s^{*-} \pi^+ K^*(892)^0)/\Gamma_{total}$ — Γ_{43}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0020	90	[142] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[142] ALBRECHT 93E reports $< 2.7 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.036.

$\Gamma(\overline{D}^0 \pi^0)/\Gamma_{total}$ — Γ_{44}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00012	90	[143] NEMATI	98	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.00048	90	[144] ALAM	94	CLE2	Repl. by NEMATI 98

[143] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.
[144] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^- \pi^+$) and the PDG 1992 B($D^0 \rightarrow K^- \pi^+ \pi^0$)/B($D^0 \rightarrow K^- \pi^+$) and B($D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$)/B($D^0 \rightarrow K^- \pi^+$).

$\Gamma(\overline{D}^0 \rho^0)/\Gamma_{total}$ — Γ_{45}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.00039	90		[145] NEMATI	98	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.00055	90		[146] ALAM	94	CLE2	Repl. by NEMATI 98
<0.0006	90		[147] BORTOLETTO	92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
<0.0027	90	4	[148] ALBRECHT	88K	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[145] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.
[146] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^- \pi^+$) and the PDG 1992 B($D^0 \rightarrow K^- \pi^+ \pi^0$)/B($D^0 \rightarrow K^- \pi^+$) and B($D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$)/B($D^0 \rightarrow K^- \pi^+$).
[147] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D.
[148] ALBRECHT 88K reports < 0.003 assuming $B^0 \overline{B}^0$:$B^+ B^-$ production ratio is 45:55. We rescale to 50%.

$\Gamma(\overline{D}^0 \eta)/\Gamma_{total}$ — Γ_{46}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00013	90	[149] NEMATI	98	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.00068	90	[150] ALAM	94	CLE2	Repl. by NEMATI 98

[149] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.
[150] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^- \pi^+$) and the PDG 1992 B($D^0 \rightarrow K^- \pi^+ \pi^0$)/B($D^0 \rightarrow K^- \pi^+$) and B($D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$)/B($D^0 \rightarrow K^- \pi^+$).

$\Gamma(\overline{D}^0 \eta')/\Gamma_{total}$ — Γ_{47}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00094	90	[151] NEMATI	98	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.00086	90	[152] ALAM	94	CLE2	Repl. by NEMATI 98

[151] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.
[152] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^- \pi^+$) and the PDG 1992 B($D^0 \rightarrow K^- \pi^+ \pi^0$)/B($D^0 \rightarrow K^- \pi^+$) and B($D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$)/B($D^0 \rightarrow K^- \pi^+$).

$\Gamma(\overline{D}^0\omega)/\Gamma_{total}$ — Γ_{48}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00051	90	[153] NEMATI	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$0.00063	90	[154] ALAM	94	CLE2	Repl. by NEMATI 98

[153] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.

[154] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II absolute B($D^0 \rightarrow K^-\pi^+$) and the PDG 1992 B($D^0 \rightarrow K^-\pi^+\pi^0$)/B($D^0 \rightarrow K^-\pi^+$) and B($D^0 \rightarrow K^-\pi^+\pi^+\pi^-$)/B($D^0 \rightarrow K^-\pi^+$).

$\Gamma(\overline{D}^{*0}\gamma)/\Gamma_{total}$ — Γ_{49}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.0 \times 10^{-5}$	90	[155] ARTUSO	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[155] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\overline{D}^*(2007)^0\pi^0)/\Gamma_{total}$ — Γ_{50}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00044	90	[156] NEMATI	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$0.00097	90	[157] ALAM	94	CLE2	Repl. by NEMATI 98

[156] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.

[157] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2007)^0 \rightarrow D^0\pi^0$) and absolute B($D^0 \rightarrow K^-\pi^+$) and the PDG 1992 B($D^0 \rightarrow K^-\pi^+\pi^0$)/B($D^0 \rightarrow K^-\pi^+$) and B($D^0 \rightarrow K^-\pi^+\pi^+\pi^-$)/B($D^0 \rightarrow K^-\pi^+$).

$\Gamma(\overline{D}^*(2007)^0\rho^0)/\Gamma_{total}$ — Γ_{51}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00056	90	[158] NEMATI	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$0.00117	90	[159] ALAM	94	CLE2	Repl. by NEMATI 98

[158] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.

[159] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2007)^0 \rightarrow D^0\pi^0$) and absolute B($D^0 \rightarrow K^-\pi^+$) and the PDG 1992 B($D^0 \rightarrow K^-\pi^+\pi^0$)/B($D^0 \rightarrow K^-\pi^+$) and B($D^0 \rightarrow K^-\pi^+\pi^+\pi^-$)/B($D^0 \rightarrow K^-\pi^+$).

$\Gamma(\overline{D}^*(2007)^0\eta)/\Gamma_{total}$ — Γ_{52}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00026	90	[160] NEMATI	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$0.00069	90	[161] ALAM	94	CLE2	Repl. by NEMATI 98

[160] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.

[161] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2007)^0 \rightarrow D^0\pi^0$) and absolute B($D^0 \rightarrow K^-\pi^+$) and the PDG 1992 B($D^0 \rightarrow K^-\pi^+\pi^0$)/B($D^0 \rightarrow K^-\pi^+$) and B($D^0 \rightarrow K^-\pi^+\pi^+\pi^-$)/B($D^0 \rightarrow K^-\pi^+$).

$\Gamma(\overline{D}^*(2007)^0\eta')/\Gamma_{total}$ Γ_{53}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0014	90	BRANDENB...	98	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0019	90	[162] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<0.0027	90	[163] ALAM	94	CLE2	Repl. by NEMATI 98

[162] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.

[163] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2007)^0 \to D^0\pi^0$) and absolute B($D^0 \to K^-\pi^+$) and the PDG 1992 B($D^0 \to K^-\pi^+\pi^0$)/B($D^0 \to K^-\pi^+$) and B($D^0 \to K^-\pi^+\pi^+\pi^-$)/B($D^0 \to K^-\pi^+$).

$\Gamma(\overline{D}^*(2007)^0\omega)/\Gamma_{total}$ Γ_{54}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00074	90	[164] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0021	90	[165] ALAM	94	CLE2	Repl. by NEMATI 98

[164] NEMATI 98 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the PDG 96 values for D^0, D^{*0}, η, η', and ω branching fractions.

[165] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II B($D^*(2007)^0 \to D^0\pi^0$) and absolute B($D^0 \to K^-\pi^+$) and the PDG 1992 B($D^0 \to K^-\pi^+\pi^0$)/B($D^0 \to K^-\pi^+$) and B($D^0 \to K^-\pi^+\pi^+\pi^-$)/B($D^0 \to K^-\pi^+$).

$\Gamma(D^*(2010)^+D^*(2010)^-)/\Gamma_{total}$ Γ_{55}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{(9.9^{+4.2}_{-3.3}\pm1.2)\times10^{-4}}$		[166] LIPELES	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$(6.2^{+4.0}_{-2.9}\pm1.0)\times10^{-4}$		[167] ARTUSO	99	CLE2	Repl. by LIPELES 00
$<6.1\times10^{-3}$	90	[168] BARATE	98Q	ALEP	$e^+e^- \to Z$
$<2.2\times10^{-3}$	90	[169] ASNER	97	CLE2	Repl. by ARTUSO 99

[166] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[167] ARTUSO 99 uses B($\Upsilon(4S) \to B^0\overline{B}^0$)=(48 ± 4)%.

[168] BARATE 98Q (ALEPH) observes 2 events with an expected background of 0.10 ± 0.03 which corresponds to a branching ratio of $(2.3^{+1.9}_{-1.2} \pm 0.4) \times 10^{-3}$.

[169] ASNER 97 at CLEO observes 1 event with an expected background of 0.022 ± 0.011. This correcsponds to a branching ratio of $(5.3^{+7.1}_{-3.7} \pm 1.0) \times 10^{-4}$.

$\Gamma(D^*(2010)^+D^-)/\Gamma_{total}$ Γ_{56}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<6.3\times10^{-4}}$	90	[170] LIPELES	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.6\times10^{-3}$	90	BARATE	98Q	ALEP	$e^+e^- \to Z$
$<1.8\times10^{-3}$	90	ASNER	97	CLE2	$e^+e^- \to \Upsilon(4S)$

[170] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(D^{(*)0}\overline{D}^{(*)0})/\Gamma_{total}$ — Γ_{57}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.027	90	BARATE	98Q	ALEP	$e^+e^- \to Z$

$\Gamma(\eta_c K^0)/\Gamma_{total}$ — Γ_{58}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.09^{+0.55}_{-0.42}\pm0.33}$	[171] EDWARDS	01	CLE2	$e^+e^- \to \Upsilon(4S)$

[171] EDWARDS 01 assumes equal production of B^0 and B^+ at the $\Upsilon(4S)$. The correlated uncertainties (28.3)% from B($J/\psi(1S) \to \gamma\eta_c$) in those modes have been accounted for.

$\Gamma(J/\psi(1S)K^0)/\Gamma_{total}$ — Γ_{59}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±0.9 OUR AVERAGE						
9.5±0.8±0.6			[172] AVERY	00	CLE2	$e^+e^- \to \Upsilon(4S)$
11.5±2.3±1.7			[173] ABE	96H	CDF	$p\overline{p}$ at 1.8 TeV
7.0±4.1±0.1			[174] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
9.3±7.3±0.2		2	[175] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$8.5^{+1.4}_{-1.2}\pm0.6$			[172] JESSOP	97	CLE2	Repl. by AVERY 00
7.5±2.4±0.8		10	[174] ALAM	94	CLE2	Sup. by JESSOP 97
<50	90		ALAM	86	CLEO	$e^+e^- \to \Upsilon(4S)$

[172] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[173] ABE 96H assumes that B($B^+ \to J/\psi K^+$) = $(1.02 \pm 0.14) \times 10^{-3}$.
[174] BORTOLETTO 92 reports $6 \pm 3 \pm 2$ for B($J/\psi(1S) \to e^+e^-$) = 0.069 ± 0.009. We rescale to our best value B($J/\psi(1S) \to e^+e^-$) = $(5.93 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[175] ALBRECHT 90J reports $8 \pm 6 \pm 2$ for B($J/\psi(1S) \to e^+e^-$) = 0.069 ± 0.009. We rescale to our best value B($J/\psi(1S) \to e^+e^-$) = $(5.93 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(J/\psi(1S)K^+\pi^-)/\Gamma_{total}$ — Γ_{60}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.00116±0.00056±0.00002			[176] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.0013	90		[177] ALBRECHT	87D	ARG	$e^+e^- \to \Upsilon(4S)$
<0.0063	90	2	GILES	84	CLEO	$e^+e^- \to \Upsilon(4S)$

[176] BORTOLETTO 92 reports $0.0010 \pm 0.0004 \pm 0.0003$ for B($J/\psi(1S) \to e^+e^-$) = 0.069 ± 0.009. We rescale to our best value B($J/\psi(1S) \to e^+e^-$) = $(5.93 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[177] ALBRECHT 87D assume $B^+B^-/B^0\overline{B}^0$ ratio is 55/45. $K\pi$ system is specifically selected as nonresonant.

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.00150±0.00017 OUR AVERAGE					
0.00174±0.00020±0.00018		[178] ABE	98O	CDF	$p\overline{p}$ 1.8 TeV
0.00132±0.00017±0.00017		[179] JESSOP	97	CLE2	$e^+e^- \to \Upsilon(4S)$
0.00128±0.00066±0.00002		[180] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.00128±0.00060±0.00002	6	[181] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
0.0041 ±0.0018 ±0.0001	5	[182] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00136±0.00027±0.00022		[183] ABE	96H	CDF	Sup. by ABE 98O
0.00169±0.00031±0.00018	29	[184] ALAM	94	CLE2	Sup. by JESSOP 97
		[185] ALBRECHT	94G	ARG	$e^+e^- \to \Upsilon(4S)$
0.0040 ±0.0030		[186] ALBAJAR	91E	UA1	$E^{p\overline{p}}_{\text{cm}}$= 630 GeV
0.0033 ±0.0018	5	[187] ALBRECHT	87D	ARG	$e^+e^- \to \Upsilon(4S)$
0.0041 ±0.0018	5	[188] ALAM	86	CLEO	Repl. by BEBEK 87

[178] ABE 98O reports $[B(B^0 \to J/\psi(1S)K^*(892)^0)]/[B(B^+ \to J/\psi(1S)K^+)] = 1.76 \pm 0.14 \pm 0.15$. We multiply by our best value $B(B^+ \to J/\psi(1S)K^+) = (9.9 \pm 1.0) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[179] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[180] BORTOLETTO 92 reports $0.0011 \pm 0.0005 \pm 0.0003$ for $B(J/\psi(1S) \to e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \to e^+e^-) = (5.93 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[181] ALBRECHT 90J reports $0.0011 \pm 0.0005 \pm 0.0002$ for $B(J/\psi(1S) \to e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \to e^+e^-) = (5.93 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[182] BEBEK 87 reports $0.0035 \pm 0.0016 \pm 0.0003$ for $B(J/\psi(1S) \to e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \to e^+e^-) = (5.93 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Updated in BORTOLETTO 92 to use the same assumptions.

[183] ABE 96H assumes that $B(B^+ \to J/\psi K^+) = (1.02 \pm 0.14) \times 10^{-3}$.

[184] The neutral and charged B events together are predominantly longitudinally polarized, $\Gamma_L/\Gamma = 0.080 \pm 0.08 \pm 0.05$. This can be compared with a prediction using HQET, 0.73 (KRAMER 92). This polarization indicates that the $B \to \psi K^*$ decay is dominated by the $CP = -1$ CP eigenstate. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[185] ALBRECHT 94G measures the polarization in the vector-vector decay to be predominantly longitudinal, $\Gamma_T/\Gamma = 0.03 \pm 0.16 \pm 0.15$ making the neutral decay a CP eigenstate when the K^{*0} decays through $K^0_S\pi^0$.

[186] ALBAJAR 91E assumes B^0_d production fraction of 36%.

[187] ALBRECHT 87D assume $B^+B^-/B^0\overline{B}^0$ ratio is 55/45. Superseded by ALBRECHT 90J.

[188] ALAM 86 assumes $B^\pm/B^0$ ratio is 60/40. The observation of the decay $B^+ \to J/\psi K^*(892)^+$ (HAAS 85) has been retracted in this paper.

$\Gamma(J/\psi(1S)K^*(892)^0)/\Gamma(J/\psi(1S)K^0)$ Γ_{61}/Γ_{59}

VALUE	DOCUMENT ID		TECN	COMMENT
1.39±0.36±0.10	ABE	96Q	CDF	$p\overline{p}$

$\Gamma(J/\psi(1S)\phi K^0)/\Gamma_{total}$ — Γ_{62}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
$(8.8^{+3.5}_{-3.0}\pm1.3)\times10^{-5}$	[189] ANASTASSOV 00	CLE2	$e^+e^- \to \Upsilon(4S)$

[189] ANASTASSOV 00 finds 10 events on a background of 0.5 ± 0.2. Assumes equal production of B^0 and B^+ at the $\Upsilon(4S)$, a uniform Dalitz plot distribution, isotropic $J/\psi(1S)$ and ϕ decays, and $B(B^+ \to J/\psi(1S)\phi K^+) = B(B^0 \to J/\psi(1S)\phi K^0)$.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{total}$ — Γ_{63}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$2.5^{+1.1}_{-0.9}\pm0.2$			[190] AVERY	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 32	90		[191] ACCIARRI	97C	L3	
$<$ 5.8	90		BISHAI	96	CLE2	$e^+e^- \to \Upsilon(4S)$
$<$690	90	1	[192] ALEXANDER	95	CLE2	Sup. by BISHAI 96

[190] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[191] ACCIARRI 97C assumes B^0 production fraction $(39.5 \pm 4.0\%)$ and B_s $(12.0 \pm 3.0\%)$.
[192] Assumes equal production of B^+B^- and $B^0\overline{B}^0$ on $\Upsilon(4S)$.

$\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$ — Γ_{64}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<1.2\times10^{-3}$	90	[193] ACCIARRI	97C	L3

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

$\Gamma(J/\psi(1S)\rho^0)/\Gamma_{total}$ — Γ_{65}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.5\times10^{-4}$	90	BISHAI	96	CLE2	$e^+e^- \to \Upsilon(4S)$

$\Gamma(J/\psi(1S)\omega)/\Gamma_{total}$ — Γ_{66}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7\times10^{-4}$	90	BISHAI	96	CLE2	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\psi(2S)K^0)/\Gamma_{total}$ — Γ_{67}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0008	90	[194] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0015	90	[194] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
<0.0028	90	[194] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$

[194] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\psi(2S)K^+\pi^-)/\Gamma_{total}$ — Γ_{68}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.001	90	[195] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$

[195] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\psi(2S)K^*(892)^0)/\Gamma_{total}$ — Γ_{69}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
(9.3 ±2.3) × 10^{-4} OUR AVERAGE					
0.00090±0.00022±0.00009		[196] ABE	98O	CDF	$p\overline{p}$ 1.8 TeV
0.0014 ±0.0008 ±0.0004		[197] BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.0019	90	[197] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 0.0023	90	[197] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[196] ABE 98O reports $[B(B^0 \rightarrow \psi(2S)K^*(892)^0)]/[B(B^+ \rightarrow J/\psi(1S)K^+)] = 0.908 \pm 0.194 \pm 0.10$. We multiply by our best value $B(B^+ \rightarrow J/\psi(1S)K^+) = (9.9 \pm 1.0) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[197] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\chi_{c0}(1P)K^0)/\Gamma_{total}$ — Γ_{70}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.0 × 10^{-4}	90	[198] EDWARDS	01	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[198] EDWARDS 01 assumes equal production of B^0 and B^+ at the $\Upsilon(4S)$. The correlated uncertainties (28.3)% from $B(J/\psi(1S) \rightarrow \gamma\eta_c)$ in those modes have been accounted for.

$\Gamma(\chi_{c1}(1P)K^0)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
$3.9^{+1.9}_{-1.3}\pm0.4$		[199] AVERY	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<27	90	[199] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[199] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\chi_{c1}(1P)K^*(892)^0)/\Gamma_{total}$ — Γ_{72}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0021	90	[200] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[200] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(K^+\pi^-)/\Gamma_{total}$ — Γ_{73}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$1.72^{+0.25}_{-0.24}\pm0.12$		[201] CRONIN-HEN..	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					

<6.6	90	[202] ABE	00C	SLD	$e^+e^- \to Z$
$1.5\ ^{+0.5}_{-0.4}\ \pm0.14$		GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
$2.4\ ^{+1.7}_{-1.1}\ \pm0.2$		[203] ADAM	96D	DLPH	$e^+e^- \to Z$
<1.7	90	ASNER	96	CLE2	Sup. by ADAM 96D
<3.0	90	[204] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
<9	90	[205] ABREU	95N	DLPH	Sup. by ADAM 96D
<8.1	90	[206] AKERS	94L	OPAL	$e^+e^- \to Z$
<2.6	90	[207] BATTLE	93	CLE2	$e^+e^- \to \Upsilon(4S)$
<18	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$
<9	90	[208] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
<32	90	AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[201] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

[203] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$. Contributions from B^0 and B_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

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

[205] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12. Contributions from B^0 and B^0_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

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

[207] BATTLE 93 assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

[208] Assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$.

$\Gamma(K^0\pi^0)/\Gamma_{\text{total}}$ — Γ_{74}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$1.46^{+0.59}_{-0.51}{}^{+0.24}_{-0.33}$		[209] CRONIN-HEN..00		CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.1	90	GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
<4.0	90	ASNER	96	CLE2	Rep. by GODANG 98

[209] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\eta' K^0)/\Gamma_{\text{total}}$ — Γ_{75}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(8.9^{+1.8}_{-1.6}\pm0.9)\times10^{-5}$	[210] RICHICHI	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(4.7^{+2.7}_{-2.0}\pm0.9)\times10^{-5}$	BEHRENS	98	CLE2	Repl. by RICHICHI 00

[210] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\eta' K^*(892)^0)/\Gamma_{total}$ — Γ_{76}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.4 \times 10^{-5}$	90	[211] RICHICHI 00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<3.9 \times 10^{-5}$	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

[211] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\eta K^*(892)^0)/\Gamma_{total}$ — Γ_{77}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
$1.38^{+0.55}_{-0.46} \pm 0.16$		[212] RICHICHI 00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<3.0	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

[212] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\eta K^0)/\Gamma_{total}$ — Γ_{78}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<9.3 \times 10^{-6}$	90	[213] RICHICHI 00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<3.3 \times 10^{-5}$	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

[213] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega K^0)/\Gamma_{total}$ — Γ_{79}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.1 \times 10^{-5}$	90	[214] JESSOP 00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<5.7 \times 10^{-5}$	90	[214] BERGFELD 98	CLE2	Repl. by JESSOP 00

[214] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega K^*(892)^0)/\Gamma_{total}$ — Γ_{80}/Γ

VALUE	CL%	DOCUMENT ID	TECN
$<2.3 \times 10^{-5}$	90	[215] BERGFELD 98	CLE2

[215] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\left[\Gamma(K^+\pi^-) + \Gamma(\pi^+\pi^-)\right]/\Gamma_{total}$ — $(\Gamma_{73}+\Gamma_{115})/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$(1.9 \pm 0.6) \times 10^{-5}$ OUR AVERAGE				
$(2.8^{+1.5}_{-1.0} \pm 2.0) \times 10^{-5}$		[216] ADAM 96D	DLPH	$e^+e^- \rightarrow Z$
$(1.8^{+0.6+0.3}_{-0.5-0.4}) \times 10^{-5}$	17.2	ASNER 96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(2.4^{+0.8}_{-0.7} \pm 0.2) \times 10^{-5}$		[217] BATTLE 93	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[216] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$. Contributions from B^0 and B_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

[217] BATTLE 93 assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{81}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.9 × 10^{-6}	90	[218] CRONIN-HEN...	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.6 \times 10^{-5}$	90	[219] ABE	00C	SLD	$e^+e^- \to Z$
$<4.3 \times 10^{-6}$	90	GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
$<4.6 \times 10^{-5}$		[220] ADAM	96D	DLPH	$e^+e^- \to Z$
$<0.4 \times 10^{-5}$	90	ASNER	96	CLE2	Repl. by GODANG 98
$<1.8 \times 10^{-5}$	90	[221] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
$<1.2 \times 10^{-4}$	90	[222] ABREU	95N	DLPH	Sup. by ADAM 96D
$<0.7 \times 10^{-5}$	90	[223] BATTLE	93	CLE2	$e^+e^- \to \Upsilon(4S)$

[218] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

[220] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$. Contributions from B^0 and B_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

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

[222] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12. Contributions from B^0 and B^0_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

[223] BATTLE 93 assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(K^0\overline{K}^0)/\Gamma_{total}$ — Γ_{82}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.7 × 10^{-5}	90	GODANG	98	CLE2	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^+\rho^-)/\Gamma_{total}$ — Γ_{83}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.2 × 10^{-5}	90	[224] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.5 \times 10^{-5}$	90	ASNER	96	CLE2	Repl. by JESSOP 00

[224] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.4 \times 10^{-4}$	90	ALBRECHT	91E	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^0\rho^0)/\Gamma_{total}$ — Γ_{85}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.9 × 10^{-5}	90	ASNER	96	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$<3.2 \times 10^{-4}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$
$<5.0 \times 10^{-4}$	90	[225] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
<0.064	90	[226] AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[225] AVERY 89B reports $< 5.8 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

[226] AVERY 87 reports < 0.08 assuming the $\Upsilon(4S)$ decays 40% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K^0 f_0(980))/\Gamma_{total}$ — Γ_{86}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.6 \times 10^{-4}$	90	[227] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$

[227] AVERY 89B reports $< 4.2 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K^*(892)^+\pi^-)/\Gamma_{total}$ — Γ_{87}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.2 \times 10^{-5}$	90	ASNER	96	CLE2	$e^+e^- \to \Upsilon(4S)$
$<3.8 \times 10^{-4}$	90	[228] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.2 \times 10^{-4}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$
$<5.6 \times 10^{-4}$	90	[229] AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[228] AVERY 89B reports $< 4.4 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

[229] AVERY 87 reports $< 7 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K^*(892)^0\pi^0)/\Gamma_{total}$ — Γ_{88}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.6 \times 10^{-6}$	90	[170] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.8 \times 10^{-5}$	90	ASNER	96	CLE2	Repl. by JESSOP 00

$\Gamma(K_2^*(1430)^+\pi^-)/\Gamma_{total}$ — Γ_{89}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.6 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^0 K^+ K^-)/\Gamma_{total}$ — Γ_{90}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-3}$	90	ALBRECHT	91E	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^0\phi)/\Gamma_{total}$ — Γ_{91}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.1 \times 10^{-5}$	90	[230] BERGFELD	98	CLE2	

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

$<8.8 \times 10^{-5}$	90	ASNER	96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<7.2 \times 10^{-4}$	90	ALBRECHT	91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<4.2 \times 10^{-4}$	90	[231] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.0 \times 10^{-3}$	90	[232] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[230] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[231] AVERY 89B reports $< 4.9 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.

[232] AVERY 87 reports $< 1.3 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3 \times 10^{-4}$	90	[233] ADAM	96D	DLPH	$e^+e^- \rightarrow Z$

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

$<2.1 \times 10^{-4}$	90	[234] ABREU	95N	DLPH	Sup. by ADAM 96D

[233] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$. Contributions from B^0 and B_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

[234] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12. Contributions from B^0 and B_s^0 decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

$\Gamma(K^*(892)^0 \pi^+ \pi^-)/\Gamma_{total}$ Γ_{93}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.4 \times 10^{-3}$	90	ALBRECHT	91E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(K^*(892)^0 \rho^0)/\Gamma_{total}$ Γ_{94}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.86 \times 10^{-4}$	90	[235] ABE	00C	SLD	$e^+e^- \rightarrow Z$

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

$<4.6 \times 10^{-4}$	90	ALBRECHT	91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<5.8 \times 10^{-4}$	90	[236] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<9.6 \times 10^{-4}$	90	[237] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

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

[236] AVERY 89B reports $< 6.7 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.

[237] AVERY 87 reports $< 1.2 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K^*(892)^0 f_0(980))/\Gamma_{total}$ Γ_{95}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-4}$	90	[238] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[238] AVERY 89B reports $< 2.0 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K_1(1400)^+\pi^-)/\Gamma_{total}$ — Γ_{96}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(K^- a_1(1260)^+)/\Gamma_{total}$ — Γ_{97}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3 \times 10^{-4}$	90	[239] ADAM	96D	DLPH	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.9 \times 10^{-4}$	90	[240] ABREU	95N	DLPH	Sup. by ADAM 96D

[239] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$. Contributions from B^0 and B_s decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

[240] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12. Contributions from B^0 and B_s^0 decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral B mesons.

$\Gamma(K^*(892)^0 K^+ K^-)/\Gamma_{total}$ — Γ_{98}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.1 \times 10^{-4}$	90	ALBRECHT	91E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-5}$	90	[241] BERGFELD	98	CLE2	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.84 \times 10^{-4}$	90	[242] ABE	00C	SLD	$e^+e^- \rightarrow Z$
$<4.3 \times 10^{-5}$	90	ASNER	96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<3.2 \times 10^{-4}$	90	ALBRECHT	91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<3.8 \times 10^{-4}$	90	[243] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<3.8 \times 10^{-4}$	90	[244] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[241] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

[243] AVERY 89B reports $< 4.4 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

[244] AVERY 87 reports $< 4.7 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\overline{K}^*(892)^0 K^*(892)^0)/\Gamma_{total}$ — Γ_{100}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.69 \times 10^{-4}$	90	[245] ABE	00C	SLD	$e^+e^- \rightarrow Z$

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

$\Gamma(K_1(1400)^0 \rho^0)/\Gamma_{total}$ — Γ_{101}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.0 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(K_1(1400)^0\phi)/\Gamma_{total}$ — Γ_{102}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.0 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K_2^*(1430)^0\rho^0)/\Gamma_{total}$ — Γ_{103}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K_2^*(1430)^0\phi)/\Gamma_{total}$ — Γ_{104}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.4 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^*(892)^0\gamma)/\Gamma_{total}$ — Γ_{105}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$4.55^{+0.72}_{-0.68}\pm0.34$			[246] COAN	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<21	90		[247] ADAM	96D	DLPH	$e^+e^- \to Z$
$4.0\ \pm1.7\ \pm0.8$		8	[248] AMMAR	93	CLE2	Repl. by COAN 00
<42	90		ALBRECHT	89G	ARG	$e^+e^- \to \Upsilon(4S)$
<24	90		[249] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
<210	90		AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[246] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$. No evidence for a nonresonant $K\pi\gamma$ contamination was seen; the central value assumes no contamination.

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

[248] AMMAR 93 observed 6.6 ± 2.8 events above background.

[249] AVERY 89B reports $< 2.8 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K_1(1270)^0\gamma)/\Gamma_{total}$ — Γ_{106}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0070	90	[250] ALBRECHT	89G	ARG	$e^+e^- \to \Upsilon(4S)$

[250] ALBRECHT 89G reports < 0.0078 assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K_1(1400)^0\gamma)/\Gamma_{total}$ — Γ_{107}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0043	90	[251] ALBRECHT	89G	ARG	$e^+e^- \to \Upsilon(4S)$

[251] ALBRECHT 89G reports < 0.0048 assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K_2^*(1430)^0\gamma)/\Gamma_{total}$ — Γ_{108}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.0 \times 10^{-4}$	90	[252] ALBRECHT	89G	ARG	$e^+e^- \to \Upsilon(4S)$

[252] ALBRECHT 89G reports $< 4.4 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K^*(1680)^0\gamma)/\Gamma_{total}$ — Γ_{109}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0020	90	[253] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[253] ALBRECHT 89G reports < 0.0022 assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K_3^*(1780)^0\gamma)/\Gamma_{total}$ — Γ_{110}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.010	90	[254] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[254] ALBRECHT 89G reports < 0.011 assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K_4^*(2045)^0\gamma)/\Gamma_{total}$ — Γ_{111}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0043	90	[255] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[255] ALBRECHT 89G reports < 0.0048 assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\rho^0\gamma)/\Gamma_{total}$ — Γ_{112}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-5}$	90	[256] COAN	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[256] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega\gamma)/\Gamma_{total}$ — Γ_{113}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.92 \times 10^{-5}$	90	[257] COAN	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[257] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\phi\gamma)/\Gamma_{total}$ — Γ_{114}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.33 \times 10^{-5}$	90	[258] COAN	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[258] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{115}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$4.3^{+1.6}_{-1.4}\pm0.5$			[259] CRONIN-HEN..	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 67	90		[260] ABE	00C	SLD	$e^+e^- \rightarrow Z$
$<$ 15	90		GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
$<$ 45	90		[261] ADAM	96D	DLPH	$e^+e^- \rightarrow Z$
$<$ 20	90		ASNER	96	CLE2	Repl. by GODANG 98
$<$ 41	90		[262] BUSKULIC	96V	ALEP	$e^+e^- \rightarrow Z$
$<$ 55	90		[263] ABREU	95N	DLPH	Sup. by ADAM 96D

$<$ 47	90		[264] AKERS	94L	OPAL	$e^+e^- \to Z$
$<$ 29	90		[265] BATTLE	93	CLE2	$e^+e^- \to \Upsilon(4S)$
$<$130	90		[265] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$
$<$ 77	90		[266] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
$<$260	90		[266] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
$<$500	90	4	GILES	84	CLEO	$e^+e^- \to \Upsilon(4S)$

[259] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[260] 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}=$(10.5^{+1.8}_{-2.2})$%.

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

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

[263] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.

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

[265] Assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

[266] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

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

VALUE	CL%		DOCUMENT ID		TECN	COMMENT
$<9.3 \times 10^{-6}$	90		GODANG	98	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<0.91 \times 10^{-5}$	90		ASNER	96	CLE2	Repl. by GODANG 98
$<6.0 \times 10^{-5}$	90	[267]	ACCIARRI	95H	L3	$e^+e^- \to Z$

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

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

VALUE	CL%		DOCUMENT ID		TECN	COMMENT
$<2.9 \times 10^{-6}$	90	[268]	RICHICHI	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<8 \times 10^{-6}$	90		BEHRENS	98	CLE2	Repl. by RICHICHI 00
$<2.5 \times 10^{-4}$	90	[269]	ACCIARRI	95H	L3	$e^+e^- \to Z$
$<1.8 \times 10^{-3}$	90	[270]	ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[268] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

[270] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_{118}/Γ

VALUE	CL%		DOCUMENT ID		TECN	COMMENT
$<1.8 \times 10^{-5}$	90		BEHRENS	98	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<4.1 \times 10^{-4}$	90	[271]	ACCIARRI	95H	L3	$e^+e^- \to Z$

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

$\Gamma(\eta' \pi^0)/\Gamma_{total}$ — Γ_{119}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.7 \times 10^{-6}$	90	[272] RICHICHI	00	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.1 \times 10^{-5}$	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00

[272] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\eta' \eta')/\Gamma_{total}$ — Γ_{120}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.7 \times 10^{-5}$	90	BEHRENS	98	CLE2	$e^+ e^- \to \Upsilon(4S)$

$\Gamma(\eta' \eta)/\Gamma_{total}$ — Γ_{121}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7 \times 10^{-5}$	90	BEHRENS	98	CLE2	$e^+ e^- \to \Upsilon(4S)$

$\Gamma(\eta' \rho^0)/\Gamma_{total}$ — Γ_{122}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-5}$	90	[273] RICHICHI	00	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.3 \times 10^{-5}$	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00

[273] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\eta \rho^0)/\Gamma_{total}$ — Γ_{123}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-5}$	90	[274] RICHICHI	00	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-5}$	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00

[274] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega \eta)/\Gamma_{total}$ — Γ_{124}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<1.2 \times 10^{-5}$	90	[275] BERGFELD	98	CLE2

[275] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega \eta')/\Gamma_{total}$ — Γ_{125}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<6.0 \times 10^{-5}$	90	[276] BERGFELD	98	CLE2

[276] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega \rho^0)/\Gamma_{total}$ — Γ_{126}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<1.1 \times 10^{-5}$	90	[277] BERGFELD	98	CLE2

[277] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{127}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<1.9 \times 10^{-5}$	90	[278] BERGFELD	98	CLE2

[278] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\phi\pi^0)/\Gamma_{total}$ — Γ_{128}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<0.5 \times 10^{-5}$	90	[279] BERGFELD	98	CLE2

[279] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\phi\eta)/\Gamma_{total}$ — Γ_{129}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<0.9 \times 10^{-5}$	90	[280] BERGFELD	98	CLE2

[280] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\phi\eta')/\Gamma_{total}$ — Γ_{130}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<3.1 \times 10^{-5}$	90	[281] BERGFELD	98	CLE2

[281] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\phi\rho^0)/\Gamma_{total}$ — Γ_{131}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-5}$	90	[282] BERGFELD	98	CLE2	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.56 \times 10^{-4}$	90	[283] ABE	00C	SLD	$e^+e^- \rightarrow Z$

[282] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

$\Gamma(\phi\omega)/\Gamma_{total}$ — Γ_{132}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<2.1 \times 10^{-5}$	90	[284] BERGFELD	98	CLE2

[284] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-5}$	90	[285] BERGFELD	98	CLE2	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.21 \times 10^{-4}$	90	[286] ABE	00C	SLD	$e^+e^- \rightarrow Z$
$<3.9 \times 10^{-5}$	90	ASNER	96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[285] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{134}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.2 \times 10^{-4}$	90	[287] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[287] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\rho^0\pi^0)/\Gamma_{\text{total}}$ — Γ_{135}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.5 \times 10^{-6}$	90	[166] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.4 \times 10^{-5}$	90	ASNER	96	CLE2	Repl. by JESSOP 00
$<4.0 \times 10^{-4}$	90	[288] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[288] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\rho^\mp\pi^\pm)/\Gamma_{\text{total}}$ — Γ_{136}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$2.76^{+0.84}_{-0.74}\pm0.42$		[289] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 8.8	90	ASNER	96	CLE2	Repl. by JESSOP 00
$<$ 52	90	[290] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$
$<$520	90	[291] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[289] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[290] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.
[291] BEBEK 87 reports $< 6.1\times10^{-3}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{137}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3 \times 10^{-4}$	90	[292] ADAM	96D	DLPH	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.8 \times 10^{-4}$	90	[293] ABREU	95N	DLPH	Sup. by ADAM 96D
$<6.7 \times 10^{-4}$	90	[294] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[292] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.
[293] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.
[294] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\rho^0\rho^0)/\Gamma_{\text{total}}$ — Γ_{138}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.36 \times 10^{-4}$	90	[295] ABE	00C	SLD	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.8 \times 10^{-4}$	90	[296] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$
$<2.9 \times 10^{-4}$	90	[297] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
$<4.3 \times 10^{-4}$	90	[297] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[295] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.
[296] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.
[297] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(a_1(1260)^{\mp}\pi^{\pm})/\Gamma_{total}$ — Γ_{139}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.9 \times 10^{-4}$	90	[298] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.3 \times 10^{-4}$	90	[299] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$
$<1.0 \times 10^{-3}$	90	[298] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[298] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[299] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(a_2(1320)^{\mp}\pi^{\pm})/\Gamma_{total}$ — Γ_{140}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.0 \times 10^{-4}$	90	[300] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.4 \times 10^{-3}$	90	[300] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[300] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_{141}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.1 \times 10^{-3}$	90	[301] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[301] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.2 \times 10^{-3}$	90	[302] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[302] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(a_1(1260)^0\pi^0)/\Gamma_{total}$ — Γ_{143}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-3}$	90	[303] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[303] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{144}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.5 \times 10^{-6}$	90	[304] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.4 \times 10^{-5}$	90	[304] BERGFELD	98	CLE2	Repl. by JESSOP 00
$<4.6 \times 10^{-4}$	90	[305] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[304] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[305] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\pi^+\pi^+\pi^-\pi^-\pi^0)/\Gamma_{total}$ — Γ_{145}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9.0 \times 10^{-3}$	90	[306] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[306] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(a_1(1260)^+\rho^-)/\Gamma_{total}$ — Γ_{146}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.4 \times 10^{-3}$	90	[307] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[307] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(a_1(1260)^0\rho^0)/\Gamma_{total}$ — Γ_{147}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.4 \times 10^{-3}$	90	[308] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[308] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-)/\Gamma_{total}$ — Γ_{148}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.0 \times 10^{-3}$	90	[309] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[309] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(a_1(1260)^+a_1(1260)^-)/\Gamma_{total}$ — Γ_{149}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8 \times 10^{-3}$	90	[310] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.0 \times 10^{-3}$	90	[311] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[310] BORTOLETTO 89 reports $< 3.2 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

[311] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0)/\Gamma_{total}$ — Γ_{150}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-2}$	90	[312] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[312] ALBRECHT 90B limit assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.0 \times 10^{-6}$	90	[313] COAN	99	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.8 \times 10^{-5}$	90	[314] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
$<3.5 \times 10^{-4}$	90	[315] ABREU	95N	DLPH	Sup. by ADAM 96D
$<3.4 \times 10^{-5}$	90	[316] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
$<1.2 \times 10^{-4}$	90	[317] ALBRECHT	88F	ARG	$e^+e^- \to \Upsilon(4S)$
$<1.7 \times 10^{-4}$	90	[316] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[313] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

[315] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.

[316] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

[317] ALBRECHT 88F reports $< 1.3 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{152}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[318] BEBEK	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.5	90	[319] ABREU	95N	DLPH	Sup. by ADAM 96D
5.4±1.8±2.0		[320] ALBRECHT	88F	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[318] BEBEK 89 reports $< 2.9 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[319] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.
[320] ALBRECHT 88F reports $6.0 \pm 2.0 \pm 2.2$ assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(p\overline{\Lambda}\pi^-)/\Gamma_{total}$ Γ_{153}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-5}$	90	[321] COAN	99	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.8 \times 10^{-4}$	90	[322] ALBRECHT	88F	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[321] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[322] ALBRECHT 88F reports $< 2.0 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\overline{\Lambda}\Lambda)/\Gamma_{total}$ Γ_{154}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.9 \times 10^{-6}$	90	[323] COAN	99	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[323] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(\Delta^0\overline{\Delta}^0)/\Gamma_{total}$ Γ_{155}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0015	90	[324] BORTOLETTO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[324] BORTOLETTO 89 reports < 0.0018 assuming $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\Delta^{++}\Delta^{--})/\Gamma_{total}$ Γ_{156}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-4}$	90	[325] BORTOLETTO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[325] BORTOLETTO 89 reports $< 1.3 \times 10^{-4}$ assuming $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\overline{\Sigma}_c^{--}\Delta^{++})/\Gamma_{total}$ Γ_{157}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0010	90	[326] PROCARIO	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[326] PROCARIO 94 reports < 0.0012 for $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = 0.043$. We rescale to our best value $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = 0.050$.

$\Gamma(\overline{\Lambda}_c^- p \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{158}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$1.33^{+0.46}_{-0.42} \pm 0.37$	[327] FU	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[327] FU 97 uses PDG 96 values of Λ_c branching fraction.

$\Gamma(\overline{\Lambda}_c^- p)/\Gamma_{total}$ — Γ_{159}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-4}$	90	[328] FU	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[328] FU 97 uses PDG 96 values of Λ_c branching ratio.

$\Gamma(\overline{\Lambda}_c^- p \pi^0)/\Gamma_{total}$ — Γ_{160}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.9 \times 10^{-4}$	90	[329] FU	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[329] FU 97 uses PDG 96 values of Λ_c branching ratio.

$\Gamma(\overline{\Lambda}_c^- p \pi^+ \pi^- \pi^0)/\Gamma_{total}$ — Γ_{161}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.07 \times 10^{-3}$	90	[330] FU	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[330] FU 97 uses PDG 96 values of Λ_c branching ratio.

$\Gamma(\overline{\Lambda}_c^- p \pi^+ \pi^- \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{162}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.74 \times 10^{-3}$	90	[331] FU	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[331] FU 97 uses PDG 96 values of Λ_c branching ratio.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{163}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.9 \times 10^{-5}$	90	[332] ACCIARRI	95I	L3	$e^+ e^- \to Z$

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

$\Gamma(e^+ e^-)/\Gamma_{total}$ — Γ_{164}/Γ

Test for $\Delta B = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8.3 \times 10^{-7}$	90	[333] BERGFELD	00B	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.4 \times 10^{-5}$	90	[334] ACCIARRI	97B	L3	$e^+ e^- \to Z$
$<5.9 \times 10^{-6}$	90	AMMAR	94	CLE2	Repl. by BERGFELD 00B
$<2.6 \times 10^{-5}$	90	[335] AVERY	89B	CLEO	$e^+ e^- \to \Upsilon(4S)$
$<7.6 \times 10^{-5}$	90	[336] ALBRECHT	87D	ARG	$e^+ e^- \to \Upsilon(4S)$
$<6.4 \times 10^{-5}$	90	[337] AVERY	87	CLEO	$e^+ e^- \to \Upsilon(4S)$
$<3 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

[333] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

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

[335] AVERY 89B reports $< 3 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.
[336] ALBRECHT 87D reports $< 8.5 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0 \overline{B}^0$. We rescale to 50%.
[337] AVERY 87 reports $< 8 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_{165}/Γ

Test for $\Delta B = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.1 \times 10^{-7}$	90	[338] BERGFELD	00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.0 \times 10^{-5}$	90	ABBOTT	98B	D0	$p\overline{p}$ 1.8 TeV
$<6.8 \times 10^{-7}$	90	[339] ABE	98	CDF	$p\overline{p}$ at 1.8 TeV
$<1.0 \times 10^{-5}$	90	[340] ACCIARRI	97B	L3	$e^+e^- \rightarrow Z$
$<1.6 \times 10^{-6}$	90	[341] ABE	96L	CDF	Repl. by ABE 98
$<5.9 \times 10^{-6}$	90	AMMAR	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<8.3 \times 10^{-6}$	90	[342] ALBAJAR	91C	UA1	$E_{cm}^{p\overline{p}}$= 630 GeV
$<1.2 \times 10^{-5}$	90	[343] ALBAJAR	91C	UA1	$E_{cm}^{p\overline{p}}$= 630 GeV
$<4.3 \times 10^{-5}$	90	[344] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<4.5 \times 10^{-5}$	90	[345] ALBRECHT	87D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<7.7 \times 10^{-5}$	90	[346] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<2 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

[338] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[339] 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.
[340] ACCIARRI 97B assume PDG 96 production fractions for B^+, B^0, B_s, and Λ_b.
[341] ABE 96L assumes equal B^0 and B^+ production. They normalize to their measured $\sigma(B^+,\ p_T(B) > 6\ \text{GeV}/c,\ |y| < 1) = 2.39 \pm 0.54\ \mu$b.
[342] B^0 and B_s^0 are not separated.
[343] Obtained from unseparated B^0 and B_s^0 measurement by assuming a B^0:B_s^0 ratio 2:1.
[344] AVERY 89B reports $< 5 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.
[345] ALBRECHT 87D reports $< 5 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0 \overline{B}^0$. We rescale to 50%.
[346] AVERY 87 reports $< 9 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K^0 e^+ e^-)/\Gamma_{total}$ Γ_{166}/Γ

Test for $\Delta B = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.0 \times 10^{-4}$	90	ALBRECHT	91E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.2 \times 10^{-4}$	90	[347] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[347] AVERY 87 reports $< 6.5 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K^0 \mu^+ \mu^-)/\Gamma_{total}$ Γ_{167}/Γ

Test for $\Delta B = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.6 × 10^−4	90	[348] AVERY	87	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.2 \times 10^{-4}$	90	ALBRECHT	91E	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[348] AVERY 87 reports $< 4.5 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K^*(892)^0 e^+ e^-)/\Gamma_{total}$ Γ_{168}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.9 × 10^−4	90	ALBRECHT	91E	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(K^*(892)^0 \mu^+ \mu^-)/\Gamma_{total}$ Γ_{169}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.0 × 10^−6	90	[349] AFFOLDER	99B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.5 \times 10^{-5}$	90	[350] ABE	96L	CDF	Repl. by AFFOLDER 99B
$<2.3 \times 10^{-5}$	90	[351] ALBAJAR	91C	UA1	$E_{cm}^{p\overline{p}} = 630$ GeV
$<3.4 \times 10^{-4}$	90	ALBRECHT	91E	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[349] AFFOLDER 99B measured relative to $B^0 \rightarrow J/\psi(1S) K^*(892)^0$.
[350] ABE 96L measured relative to $B^0 \rightarrow J/\psi(1S) K^*(892)^0$ using PDG 94 branching ratios.
[351] ALBAJAR 91C assumes 36% of $\overline{b}$ quarks give B^0 mesons.

$\Gamma(K^*(892)^0 \nu\overline{\nu})/\Gamma_{total}$ Γ_{170}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.0 × 10^−3	90	[352] ADAM	96D	DLPH	$e^+ e^- \rightarrow Z$

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

$\Gamma(e^\pm \mu^\mp)/\Gamma_{total}$ Γ_{171}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<15 × 10^−7	90	[353] BERGFELD	00B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 3.5 \times 10^{-6}$	90	ABE	98V	CDF	$p\overline{p}$ at 1.8 TeV
$< 1.6 \times 10^{-5}$	90	[354] ACCIARRI	97B	L3	$e^+ e^- \rightarrow Z$
$< 5.9 \times 10^{-6}$	90	AMMAR	94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 3.4 \times 10^{-5}$	90	[355] AVERY	89B	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 4.5 \times 10^{-5}$	90	[356] ALBRECHT	87D	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 7.7 \times 10^{-5}$	90	[357] AVERY	87	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 3 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

[353] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[354] ACCIARRI 97B assume PDG 96 production fractions for B^+, B^0, B_s, and Λ_b.
[355] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.
[356] ALBRECHT 87D reports $< 5 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0 \overline{B}^0$. We rescale to 50%.
[357] AVERY 87 reports $< 9 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(e^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{172}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.3 × 10^−4	90	AMMAR	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(\mu^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{173}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.3 × 10^−4	90	AMMAR	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

POLARIZATION IN B^0 DECAY

Γ_L/Γ in $B^0 \rightarrow J/\psi(1S)K^*(892)^0$

$\Gamma_L/\Gamma = 1$ would indicate that $B^0 \rightarrow J/\psi(1S)K^*(892)^0$ followed by $K^*(892)^0 \rightarrow K^0_S\pi^0$ is a pure CP eigenstate with $CP = -1$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.59±0.05 OUR AVERAGE	Error includes scale factor of 1.2.				
0.59±0.06±0.01		[358] AFFOLDER	00N	CDF	$p\overline{p}$ at 1.8 TeV
0.52±0.07±0.04		[359] JESSOP	97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.65±0.10±0.04	65	ABE	95Z	CDF	$p\overline{p}$ at 1.8 TeV
0.97±0.16±0.15	13	[360] ALBRECHT	94G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.80±0.08±0.05	42	[360] ALAM	94	CLE2	Sup. by JESSOP 97

[358] AFFOLDER 00N measurements are based on 190 B^0 candidates obtained from a data sample of 89 pb^{-1}. The P-wave fraction is found to be $0.13^{+0.12}_{-0.9} \pm 0.06$.

[359] JESSOP 97 is the average over a mixture of B^0 and B^+ decays. The P-wave fraction is found to be $0.16 \pm 0.08 \pm 0.04$.

[360] Averaged over an admixture of B^0 and B^+ decays.

Γ_L/Γ in $B^0 \rightarrow D_s^{*+}D^{*-}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.506±0.139±0.036	AHMED	00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

Γ_L/Γ in $B^0 \rightarrow D^{*-}\rho^+$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.05±0.05	76	ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

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

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

$$\chi_d = \frac{x_d^2}{2(1+x_d^2)}$$

$$x_d = \frac{\Delta m_{B^0}}{\Gamma_{B^0}} = (m_{B^0_H} - m_{B^0_L})\,\tau_{B^0}\ ,$$

where H, L stand for heavy and light states of two B^0 CP eigenstates and $\tau_{B^0} = \frac{1}{0.5(\Gamma_{B^0_H}+\Gamma_{B^0_L})}$.

χ_d

This B^0-$\overline{B}^0$ mixing parameter is the probability (integrated over time) that a produced B^0 (or $\overline{B}^0$) decays as a $\overline{B}^0$ (or B^0), e.g. for inclusive lepton decays

$$\chi_d = \Gamma(B^0 \rightarrow \ell^- X\ (\text{via } \overline{B}^0))/\Gamma(B^0 \rightarrow \ell^\pm X)$$
$$= \Gamma(\overline{B}^0 \rightarrow \ell^+ X\ (\text{via } B^0))/\Gamma(\overline{B}^0 \rightarrow \ell^\pm X)$$

Where experiments have measured the parameter $r = \chi/(1-\chi)$, we have converted to χ. Mixing violates the $\Delta B \neq 2$ rule.

Note that the measurement of χ at energies higher than the $\Upsilon(4S)$ have not separated χ_d from χ_s where the subscripts indicate $B^0(\overline{b}d)$ or $B^0_s(\overline{b}s)$. They are listed in the B^0_s-$\overline{B}^0_s$ MIXING section.

The experiments at $\Upsilon(4S)$ make an assumption about the $B^0\overline{B}^0$ fraction and about the ratio of the $B^\pm$ and B^0 semileptonic branching ratios (usually that it equals one).

OUR EVALUATION, provided by the LEP B Oscillation Working Group, includes χ_d calculated from Δm_{B^0} and τ_{B^0}.

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.176±0.006 OUR EVALUATION					
0.182±0.015 OUR AVERAGE					
0.198±0.013±0.014		[361] BEHRENS	00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.16 ±0.04 ±0.04		[362] ALBRECHT	94	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.149±0.023±0.022		[363] BARTELT	93	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.171±0.048		[364] ALBRECHT	92L	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.20 ±0.13 ±0.12		[365] ALBRECHT	96D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.19 ±0.07 ±0.09		[366] ALBRECHT	96D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.24 ±0.12		[367] ELSEN	90	JADE	e^+e^- 35–44 GeV
$0.158^{+0.052}_{-0.059}$		ARTUSO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.17 ±0.05		[368] ALBRECHT	87I	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<0.19	90	[369] BEAN	87B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<0.27	90	[370] AVERY	84	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[361] BEHRENS 00B uses high-momentum lepton tags and partially reconstructed $\overline{B}^0 \rightarrow D^{*+}\pi^-$, ρ^- decays to determine the flavor of the B meson.

[362] ALBRECHT 94 reports r=0.194 ± 0.062 ± 0.054. We convert to χ for comparison. Uses tagged events (lepton + pion from D^*).

[363] BARTELT 93 analysis performed using tagged events (lepton+pion from D^*). Using dilepton events they obtain $0.157 \pm 0.016^{+0.033}_{-0.028}$.

[364] ALBRECHT 92L is a combined measurement employing several lepton-based techniques. It uses all previous ARGUS data in addition to new data and therefore supersedes ALBRECHT 87I. A value of r = 20.6 ± 7.0% is directly measured. The value can be used

to measure $x = \Delta M/\Gamma = 0.72 \pm 0.15$ for the B_d meson. Assumes $f_{+-}/f_0 = 1.0 \pm 0.05$ and uses $\tau_{B^\pm}/\tau_{B^0} = (0.95 \pm 0.14)\ (f_{+-}/f_0)$.

[365] Uses $D^{*+} K^\pm$ correlations.

[366] Uses $(D^{*+}\ell^-)\ K^\pm$ correlations.

[367] These experiments see a combination of B_s and B_d mesons.

[368] ALBRECHT 87I is inclusive measurement with like-sign dileptons, with tagged B decays plus leptons, and one fully reconstructed event. Measures r=0.21 ± 0.08. We convert to χ for comparison. Superseded by ALBRECHT 92L.

[369] BEAN 87B measured $r <$ 0.24; we converted to χ.

[370] Same-sign dilepton events. Limit assumes semileptonic BR for B^+ and B^0 equal. If $B^0/B^\pm$ ratio <0.58, no limit exists. The limit was corrected in BEAN 87B from $r <$ 0.30 to $r <$ 0.37. We converted this limit to χ.

$\Delta m_{B^0} = m_{B^0_H} - m_{B^0_L}$

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

The second "OUR EVALUATION" (0.476 ± 0.012) is an average of the data listed below performed by the LEP B Oscillation Working Group as described in our "Review of B-$\overline{B}$ Mixing" in the B^0 Section of these Listings. The averaging procedure takes into account correlations between the measurements.

The first "OUR EVALUATION" (0.479 ± 0.012), also provided by the LEP B Oscillation Working Group, includes Δm_d calculated from χ_d measured at $\Upsilon(4S)$.

VALUE ($10^{12}\ \hbar\ s^{-1}$)	EVTS	DOCUMENT ID		TECN	COMMENT
0.479±0.012 OUR EVALUATION					
0.476±0.012 OUR EVALUATION					
$0.463 \pm 0.008 \pm 0.016$		[371] ABE	01D	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.497 \pm 0.024 \pm 0.025$		[372] ABBIENDI,G	00B	OPAL	$e^+e^- \rightarrow Z$
$0.503 \pm 0.064 \pm 0.071$		[373] ABE	99K	CDF	$p\overline{p}$ at 1.8 TeV
$0.500 \pm 0.052 \pm 0.043$		[374] ABE	99Q	CDF	$p\overline{p}$ at 1.8 TeV
$0.516 \pm 0.099 ^{+0.029}_{-0.035}$		[375] AFFOLDER	99C	CDF	$p\overline{p}$ at 1.8 TeV
$0.471 ^{+0.078}_{-0.068} {}^{+0.033}_{-0.034}$		[376] ABE	98C	CDF	$p\overline{p}$ at 1.8 TeV
$0.458 \pm 0.046 \pm 0.032$		[377] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
$0.437 \pm 0.043 \pm 0.044$		[378] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
$0.472 \pm 0.049 \pm 0.053$		[379] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
$0.523 \pm 0.072 \pm 0.043$		[380] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.493 \pm 0.042 \pm 0.027$		[378] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.499 \pm 0.053 \pm 0.015$		[381] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.480 \pm 0.040 \pm 0.051$		[377] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.444 \pm 0.029 ^{+0.020}_{-0.017}$		[378] ACKERSTAFF	97U	OPAL	$e^+e^- \rightarrow Z$
$0.430 \pm 0.043 ^{+0.028}_{-0.030}$		[377] ACKERSTAFF	97V	OPAL	$e^+e^- \rightarrow Z$
$0.482 \pm 0.044 \pm 0.024$		[382] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.404 \pm 0.045 \pm 0.027$		[378] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.452 \pm 0.039 \pm 0.044$		[377] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.539 \pm 0.060 \pm 0.024$		[383] ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
$0.567 \pm 0.089 ^{+0.029}_{-0.023}$		[384] ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$

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

$0.444 \pm 0.028 \pm 0.028$		[385] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
0.497 ± 0.035		[386] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.467 \pm 0.022 {}^{+0.017}_{-0.015}$		[387] ACKERSTAFF	97V	OPAL	$e^+e^- \rightarrow Z$
0.446 ± 0.032		[388] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.531 {}^{+0.050}_{-0.046} \pm 0.078$		[389] ABREU	96Q	DLPH	Sup. by ABREU 97N
$0.496 {}^{+0.055}_{-0.051} \pm 0.043$		[377] ACCIARRI	96E	L3	Repl. by ACCIARRI 98D
$0.548 \pm 0.050 {}^{+0.023}_{-0.019}$		[390] ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
0.496 ± 0.046		[391] AKERS	95J	OPAL	Repl. by ACKERSTAFF 97V
$0.462 {}^{+0.040}_{-0.053} {}^{+0.052}_{-0.035}$		[377] AKERS	95J	OPAL	Repl. by ACKERSTAFF 97V
$0.50 \pm 0.12 \pm 0.06$		[380] ABREU	94M	DLPH	Sup. by ABREU 97N
$0.508 \pm 0.075 \pm 0.025$		[383] AKERS	94C	OPAL	Repl. by ALEXANDER 96V
$0.57 \pm 0.11 \pm 0.02$	153	[384] AKERS	94H	OPAL	Repl. by ALEXANDER 96V
$0.50 {}^{+0.07}_{-0.06} {}^{+0.11}_{-0.10}$		[377] BUSKULIC	94B	ALEP	Sup. by BUSKULIC 97D
$0.52 {}^{+0.10}_{-0.11} {}^{+0.04}_{-0.03}$		[384] BUSKULIC	93K	ALEP	Sup. by BUSKULIC 97D

[371] Measured based on the time evolution of dilepton events in $\Upsilon(4S)$ decays. This is the first result from time-evolution measurements at the $\Upsilon(4S)$.

[372] Data analyzed using partially reconsturcted $\overline{B}^0 \rightarrow D^{*+} \ell^- \overline{\nu}$ decay and a combination of flavor tags from the rest of the event.

[373] Uses di-muon events.

[374] Uses jet-charge and lepton-flavor tagging.

[375] Uses $\ell^- D^{*+} - \ell$ events.

[376] Uses π-B in the same side.

[377] Uses ℓ-ℓ.

[378] Uses ℓ-Q_{hem}.

[379] Uses ℓ-ℓ with impact parameters.

[380] Uses $D^{*\pm}$-Q_{hem}.

[381] Uses $\pi_s^{\pm} \ell$-Q_{hem}.

[382] Uses $D^{*\pm}$-ℓ/Q_{hem}.

[383] Uses $D^{*\pm} \ell$-Q_{hem}.

[384] Uses $D^{*\pm}$-ℓ.

[385] ACCIARRI 98D combines results from ℓ-ℓ, ℓ-Q_{hem}, and ℓ-ℓ with impact parameters.

[386] ABREU 97N combines results from $D^{*\pm}$-Q_{hem}, ℓ-Q_{hem}, $\pi_s^{\pm} \ell$-Q_{hem}, and ℓ-ℓ.

[387] ACKERSTAFF 97V combines results from ℓ-ℓ, ℓ-Q_{hem}, D^*-ℓ, and $D^{*\pm}$-Q_{hem}.

[388] BUSKULIC 97D combines results from $D^{*\pm}$-ℓ/Q_{hem}, ℓ-Q_{hem}, and ℓ-ℓ.

[389] ABREU 96Q analysis performed using lepton, kaon, and jet-charge tags.

[390] ALEXANDER 96V combines results from $D^{*\pm}$-ℓ and $D^{*\pm} \ell$-Q_{hem}.

[391] AKERS 95J combines results fromt charge measurement, $D^{*\pm} \ell$-Q_{hem} and ℓ-ℓ.

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

The second "OUR EVALUATION" (0.734 ± 0.022) is an average of the data listed in Δm_{B^0} section performed by the LEP *B* Oscillation Working Group as described in our "Review of B-$\overline{B}$ Mixing" in the B^0 Section of these Listings. The averaging procedure takes into account correlations between the measurements.

The first "OUR EVALUATION" (0.738 ± 0.020), also provided by the LEP *B* Oscillation Working Group, includes χ_d measured at $\Upsilon(4S)$.

VALUE	DOCUMENT ID
0.738±0.020 OUR EVALUATION	
0.734±0.022 OUR EVALUATION	

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CP VIOLATION PARAMETERS

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

CP Impurity in B^0_d system. It is obtained from either $a_{\ell\ell}$, the charge asymmetry in like-sign dilepton events or a_{cp}, the time-dependent asymmetry of inclusive B^0 and $\overline{B}^0$ decays.

VALUE	DOCUMENT ID	TECN	COMMENT
(0 ±5) × 10⁻³ OUR AVERAGE			
−0.003±0.007	[392] BARATE 01D	ALEP	$e^+e^- \to Z$
0.004±0.018±0.003	[393] BEHRENS 00B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.001±0.014±0.003	[394] ABBIENDI 99J	OPAL	$e^+e^- \to Z$
0.002±0.007±0.003	[395] ACKERSTAFF 97U	OPAL	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
< 0.045	[396] BARTELT 93	CLE2	$e^+e^- \to \Upsilon(4S)$

[392] BARATE 01D measured by investigating time-dependent asymmetries in semileptonic and fully inclusive B^0_d decays.

[393] BEHRENS 00B uses high-momentum lepton tags and partially reconstructed $\overline{B}^0 \to D^{*+}\pi^-$, ρ^- decays to determine the flavor of the *B* meson.

[394] Data analyzed using the time-dependent asymmetry of inclusive B^0 decay. The production flavor of B^0 mesons is determined using both the jet charge and the charge of secondary vertex in the opposite hemisphere.

[395] ACKERSTAFF 97U assumes *CPT* and is based on measuring the charge asymmetry in a sample of B^0 decays defined by lepton and Q_{hem} tags. If *CPT* is not invoked, $\mathrm{Re}(\epsilon_B) = -0.006 \pm 0.010 \pm 0.006$ is found. The indirect *CPT* violation parameter is determined to $\mathrm{Im}(\delta B) = -0.020 \pm 0.016 \pm 0.006$.

[396] BARTELT 93 finds $a_{\ell\ell} = 0.031 \pm 0.096 \pm 0.032$ which corresponds to $|a_{\ell\ell}| < 0.18$, which yields the above $|\mathrm{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2)|$.

A_{CP} ($B^0 \to K^+ \pi^-$)

A_{CP} is defined as

$$\frac{B(\overline{B}^0 \to \overline{f}) - B(B^0 \to f)}{B(\overline{B}^0 \to \overline{f}) + B(B^0 \to f)},$$

the *CP*-violation charge asymmetry of inclusive B^0 and $\overline{B}^0$ decay.

VALUE	DOCUMENT ID		TECN	COMMENT
-0.04 ± 0.16	[397] CHEN	00	CLE2	$e^+ e^- \to \Upsilon(4S)$

[397] A 90%CL range is $-0.30 < A_{CP} < 0.22$.

sin(2β)

For a discussion of *CP* violation, see the note on "*CP* Violation in *B* Decay Standard Model Predictions" in the B^0 Particle Listings above. sin(2β) is a measure of the *CP*-violating amplitude in the $B_d^0 \to J/\psi(1S) K_S^0$.

VALUE	DOCUMENT ID		TECN	COMMENT
0.9 ±0.4 OUR AVERAGE				
$0.79^{+0.41}_{-0.44}$	[398] AFFOLDER	00C	CDF	$p\overline{p}$ at 1.8 TeV
$0.84^{+0.82}_{-1.04} \pm 0.16$	[399] BARATE	00Q	ALEP	$e^+ e^- \to Z$
$3.2\ ^{+1.8}_{-2.0}\ \pm 0.5$	[400] ACKERSTAFF	98Z	OPAL	$e^+ e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.8\ \pm 1.1\ \pm 0.3$	[401] ABE	98U	CDF	Repl. by AFFOLDER 00C

[398] AFFOLDER 00C uses about 400 $B^0 \to J/\psi(1S) K_S^0$ events. The production flavor of B^0 was determined using three tagging algorithms: a same-side tag, a jet-charge tag, and a soft-lepton tag.

[399] BARATE 00Q uses 23 candidates for $B^0 \to J/\psi(1S) K_S^0$ decays. A combination of jet-charge, vertex-charge, and same-side tagging techniques were used to determine the B^0 production flavor.

[400] ACKERSTAFF 98Z uses 24 candidates for $B_d^0 \to J/\psi(1S) K_S^0$ decay. A combination of jet-charge and vertex-charge techniques were used to tag the B_d^0 production flavor.

[401] ABE 98U uses 198 ± 17 $B_d^0 \to J/\psi(1S) K^0$ events. The production flavor of B^0 was determined using the same side tagging technique.

$B^0 \to D^{*-} \ell^+ \nu_\ell$ FORM FACTORS

R_1 (form factor ratio $\sim V/A_1$)

VALUE	DOCUMENT ID		TECN	COMMENT
$1.18 \pm 0.30 \pm 0.12$	DUBOSCQ	96	CLE2	$e^+ e^- \to \Upsilon(4S)$

R_2 (form factor ratio $\sim A_2/A_1$)

VALUE	DOCUMENT ID		TECN	COMMENT
$0.71 \pm 0.22 \pm 0.07$	DUBOSCQ	96	CLE2	$e^+ e^- \to \Upsilon(4S)$

$\rho^2_{A_1}$ (form factor slope)

VALUE	DOCUMENT ID		TECN	COMMENT
$0.91 \pm 0.15 \pm 0.06$	DUBOSCQ	96	CLE2	$e^+ e^- \to \Upsilon(4S)$

B^0 REFERENCES

ABE	01D	PRL 86 3228	K. Abe *et al.*	(BELLE Collab.)
ABREU	01H	CERN-EP/2001-002	P. Abreu *et al.*	(DELPHI Collab.)
PL B (to be publ.)				
BARATE	01D	CERN EP/2000-105	R. Barate *et al.*	(ALEPH Collab.)
EPJ (to be publ.)				
EDWARDS	01	PRL 86 30	K.W. Edwards *et al.*	(CLEO Collab.)
ABBIENDI	00Q	PL B482 15	G. Abbiendi *et al.*	(OPAL Collab.)
ABBIENDI,G	00B	PL B493 266	G. Abbiendi *et al.*	(OPAL Collab.)
ABE	00C	PR D62 071101R	K. Abe *et al.*	(SLD Collab.)
AFFOLDER	00C	PR D61 072005	T. Affolder *et al.*	(CDF Collab.)
AFFOLDER	00N	PRL 85 4668	T. Affolder *et al.*	(CDF Collab.)
AHMED	00B	PR D62 112003	S. Ahmed *et al.*	(CLEO Collab.)
ANASTASSOV	00	PRL 84 1393	A. Anastassov *et al.*	(CLEO Collab.)
ARTUSO	00	PRL 84 4292	M. Artuso *et al.*	(CLEO Collab.)
AVERY	00	PR D62 051101	P. Avery *et al.*	(CLEO Collab.)
BARATE	00Q	PL B492 259	R. Barate *et al.*	(ALEPH Collab.)
BARATE	00R	PL B492 275	R. Barate *et al.*	(ALEPH Collab.)
BEHRENS	00	PR D61 052001	B.H. Behrens *et al.*	(CLEO Collab.)
BEHRENS	00B	PL B490 36	B.H. Behrens *et al.*	(CLEO Collab.)
BERGFELD	00B	PR D62 091102R	T. Bergfeld *et al.*	(CLEO Collab.)
CHEN	00	PRL 85 525	S. Chen *et al.*	(CLEO Collab.)
COAN	00	PRL 84 5283	T.E. Coan *et al.*	(CLEO Collab.)
CRONIN-HEN...	00	PRL 85 515	D. Cronin-Hennessy *et al.*	(CLEO Collab.)
CSORNA	00	PR D61 111101	S.E. Csorna *et al.*	(CLEO Collab.)
JESSOP	00	PRL 85 2881	C.P. Jessop *et al.*	(CLEO Collab.)
LIPELES	00	PR D62 032005	E. Lipeles *et al.*	(CLEO Collab.)
RICHICHI	00	PRL 85 520	S.J. Richichi *et al.*	(CLEO Collab.)
ABBIENDI	99J	EPJ C12 609	G. Abbiendi *et al.*	(OPAL Collab.)
ABE	99K	PR D60 051101	F. Abe *et al.*	(CDF Collab.)
ABE	99Q	PR D60 072003	F. Abe *et al.*	(CDF Collab.)
AFFOLDER	99B	PRL 83 3378	T. Affolder *et al.*	(CDF Collab.)
AFFOLDER	99C	PR D60 112004	T. Affolder *et al.*	(CDF Collab.)
ARTUSO	99	PRL 82 3020	M. Artuso *et al.*	(CLEO Collab.)
BARTELT	99	PRL 82 3746	J. Bartelt *et al.*	(CLEO Collab.)
COAN	99	PR D59 111101	T.E. Coan *et al.*	(CLEO Collab.)
ABBOTT	98B	PL B423 419	B. Abbott *et al.*	(D0 Collab.)
ABE	98	PR D57 R3811	F. Abe *et al.*	(CDF Collab.)
ABE	98B	PR D57 5382	F. Abe *et al.*	(CDF Collab.)
ABE	98C	PRL 80 2057	F. Abe *et al.*	(CDF Collab.)
Also	99C	PR D59 032001	F. Abe *et al.*	(CDF Collab.)
ABE	98O	PR D58 072001	F. Abe *et al.*	(CDF Collab.)
ABE	98Q	PR D58 092002	F. Abe *et al.*	(CDF Collab.)
ABE	98U	PRL 81 5513	F. Abe *et al.*	(CDF Collab.)
ABE	98V	PRL 81 5742	F. Abe *et al.*	(CDF Collab.)
ACCIARRI	98D	EPJ C5 195	M. Acciarri *et al.*	(L3 Collab.)
ACCIARRI	98S	PL B438 417	M. Acciarri *et al.*	(L3 Collab.)
ACKERSTAFF	98Z	EPJ C5 379	K. Ackerstaff *et al.*	(OPAL Collab.)
BARATE	98Q	EPJ C4 387	R. Barate *et al.*	(ALEPH Collab.)
BEHRENS	98	PRL 80 3710	B.H. Behrens *et al.*	(CLEO Collab.)
BERGFELD	98	PRL 81 272	T. Bergfeld *et al.*	(CLEO Collab.)
BRANDENB...	98	PRL 80 2762	G. Brandenbrug *et al.*	(CLEO Collab.)
GODANG	98	PRL 80 3456	R. Godang *et al.*	(CLEO Collab.)
NEMATI	98	PR D57 5363	B. Nemati *et al.*	(CLEO Collab.)
ABE	97J	PRL 79 590	K. Abe *et al.*	(SLD Collab.)
ABREU	97F	ZPHY C74 19	P. Abreu *et al.*	(DELPHI Collab.)
Also	97K	ZPHY C75 579 erratum	P. Abreu *et al.*	(DELPHI Collab.)
ABREU	97N	ZPHY C76 579	P. Abreu *et al.*	(DELPHI Collab.)
ACCIARRI	97B	PL B391 474	M. Acciarri *et al.*	(L3 Collab.)
ACCIARRI	97C	PL B391 481	M. Acciarri *et al.*	(L3 Collab.)
ACKERSTAFF	97G	PL B395 128	K. Ackerstaff *et al.*	(OPAL Collab.)
ACKERSTAFF	97U	ZPHY C76 401	K. Ackerstaff *et al.*	(OPAL Collab.)
ACKERSTAFF	97V	ZPHY C76 417	K. Ackerstaff *et al.*	(OPAL Collab.)
ARTUSO	97	PL B399 321	M. Artuso *et al.*	(CLEO Collab.)
ASNER	97	PRL 79 799	D. Asner *et al.*	(CLEO Collab.)
ATHANAS	97	PRL 79 2208	M. Athanas *et al.*	(CLEO Collab.)
BUSKULIC	97	PL B395 373	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	97D	ZPHY C75 397	D. Buskulic *et al.*	(ALEPH Collab.)
FU	97	PRL 79 3125	X. Fu *et al.*	(CLEO Collab.)
JESSOP	97	PRL 79 4533	C.P. Jessop *et al.*	(CLEO Collab.)

ABE	96B	PR D53 3496	F. Abe *et al.*	(CDF Collab.)
ABE	96C	PRL 76 4462	F. Abe *et al.*	(CDF Collab.)
ABE	96H	PRL 76 2015	F. Abe *et al.*	(CDF Collab.)
ABE	96L	PRL 76 4675	F. Abe *et al.*	(CDF Collab.)
ABE	96Q	PR D54 6596	F. Abe *et al.*	(CDF Collab.)
ABREU	96P	ZPHY C71 539	P. Abreu *et al.*	(DELPHI Collab.)
ABREU	96Q	ZPHY C72 17	P. Abreu *et al.*	(DELPHI Collab.)
ACCIARRI	96E	PL B383 487	M. Acciarri *et al.*	(L3 Collab.)
ADAM	96D	ZPHY C72 207	W. Adam *et al.*	(DELPHI Collab.)
ALBRECHT	96D	PL B374 256	H. Albrecht *et al.*	(ARGUS Collab.)
ALEXANDER	96T	PRL 77 5000	J.P. Alexander *et al.*	(CLEO Collab.)
ALEXANDER	96V	ZPHY C72 377	G. Alexander *et al.*	(OPAL Collab.)
ASNER	96	PR D53 1039	D.M. Asner *et al.*	(CLEO Collab.)
BARISH	96B	PRL 76 1570	B.C. Barish *et al.*	(CLEO Collab.)
BISHAI	96	PL B369 186	M. Bishai *et al.*	(CLEO Collab.)
BUSKULIC	96J	ZPHY C71 31	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	96V	PL B384 471	D. Buskulic *et al.*	(ALEPH Collab.)
DUBOSCQ	96	PRL 76 3898	J.E. Duboscq *et al.*	(CLEO Collab.)
GIBAUT	96	PR D53 4734	D. Gibaut *et al.*	(CLEO Collab.)
PDG	96	PR D54 1	R. M. Barnett *et al.*	
ABE	95Z	PRL 75 3068	F. Abe *et al.*	(CDF Collab.)
ABREU	95N	PL B357 255	P. Abreu *et al.*	(DELPHI Collab.)
ABREU	95Q	ZPHY C68 13	P. Abreu *et al.*	(DELPHI Collab.)
ACCIARRI	95H	PL B363 127	M. Acciarri *et al.*	(L3 Collab.)
ACCIARRI	95I	PL B363 137	M. Acciarri *et al.*	(L3 Collab.)
ADAM	95	ZPHY C68 363	W. Adam *et al.*	(DELPHI Collab.)
AKERS	95J	ZPHY C66 555	R. Akers *et al.*	(OPAL Collab.)
AKERS	95T	ZPHY C67 379	R. Akers *et al.*	(OPAL Collab.)
ALEXANDER	95	PL B341 435	J. Alexander *et al.*	(CLEO Collab.)
Also	95C	PL B347 469 (erratum)	J. Alexander *et al.*	(CLEO Collab.)
BARISH	95	PR D51 1014	B.C. Barish *et al.*	(CLEO Collab.)
BUSKULIC	95N	PL B359 236	D. Buskulic *et al.*	(ALEPH Collab.)
ABE	94D	PRL 72 3456	F. Abe *et al.*	(CDF Collab.)
ABREU	94M	PL B338 409	P. Abreu *et al.*	(DELPHI Collab.)
AKERS	94C	PL B327 411	R. Akers *et al.*	(OPAL Collab.)
AKERS	94H	PL B336 585	R. Akers *et al.*	(OPAL Collab.)
AKERS	94J	PL B337 196	R. Akers *et al.*	(OPAL Collab.)
AKERS	94L	PL B337 393	R. Akers *et al.*	(OPAL Collab.)
ALAM	94	PR D50 43	M.S. Alam *et al.*	(CLEO Collab.)
ALBRECHT	94	PL B324 249	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	94G	PL B340 217	H. Albrecht *et al.*	(ARGUS Collab.)
AMMAR	94	PR D49 5701	R. Ammar *et al.*	(CLEO Collab.)
ATHANAS	94	PRL 73 3503	M. Athanas *et al.*	(CLEO Collab.)
Also	95	PRL 74 3090 (erratum)	M. Athanas *et al.*	(CLEO Collab.)
BUSKULIC	94B	PL B322 441	D. Buskulic *et al.*	(ALEPH Collab.)
PDG	94	PR D50 1173	L. Montanet *et al.*	(CERN, LBL, BOST+)
PROCARIO	94	PRL 73 1306	M. Procario *et al.*	(CLEO Collab.)
STONE	94	HEPSY 93-11	S. Stone	
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ABREU	93D	ZPHY C57 181	P. Abreu *et al.*	(DELPHI Collab.)
ABREU	93G	PL B312 253	P. Abreu *et al.*	(DELPHI Collab.)
ACTON	93C	PL B307 247	P.D. Acton *et al.*	(OPAL Collab.)
ALBRECHT	93	ZPHY C57 533	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	93E	ZPHY C60 11	H. Albrecht *et al.*	(ARGUS Collab.)
ALEXANDER	93B	PL B319 365	J. Alexander *et al.*	(CLEO Collab.)
AMMAR	93	PRL 71 674	R. Ammar *et al.*	(CLEO Collab.)
BARTELT	93	PRL 71 1680	J.E. Bartelt *et al.*	(CLEO Collab.)
BATTLE	93	PRL 71 3922	M. Battle *et al.*	(CLEO Collab.)
BEAN	93B	PRL 70 2681	A. Bean *et al.*	(CLEO Collab.)
BUSKULIC	93D	PL B307 194	D. Buskulic *et al.*	(ALEPH Collab.)
Also	94H	PL B325 537 (errata)	D. Buskulic *et al.*	(ALEPH Collab.)
BUSKULIC	93K	PL B313 498	D. Buskulic *et al.*	(ALEPH Collab.)
SANGHERA	93	PR D47 791	S. Sanghera *et al.*	(CLEO Collab.)
ALBRECHT	92C	PL B275 195	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	92G	ZPHY C54 1	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	92L	ZPHY C55 357	H. Albrecht *et al.*	(ARGUS Collab.)
BORTOLETTO	92	PR D45 21	D. Bortoletto *et al.*	(CLEO Collab.)
HENDERSON	92	PR D45 2212	S. Henderson *et al.*	(CLEO Collab.)
KRAMER	92	PL B279 181	G. Kramer, W.F. Palmer	(HAMB, OSU)

ALBAJAR	91C	PL B262 163	C. Albajar *et al.*	(UA1 Collab.)
ALBAJAR	91E	PL B273 540	C. Albajar *et al.*	(UA1 Collab.)
ALBRECHT	91B	PL B254 288	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	91C	PL B255 297	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	91E	PL B262 148	H. Albrecht *et al.*	(ARGUS Collab.)
BERKELMAN	91	ARNPS 41 1	K. Berkelman, S. Stone	(CORN, SYRA)
"Decays of *B* Mesons"				
FULTON	91	PR D43 651	R. Fulton *et al.*	(CLEO Collab.)
ALBRECHT	90B	PL B241 278	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	90J	ZPHY C48 543	H. Albrecht *et al.*	(ARGUS Collab.)
ANTREASYAN	90B	ZPHY C48 553	D. Antreasyan *et al.*	(Crystal Ball Collab.)
BORTOLETTO	90	PRL 64 2117	D. Bortoletto *et al.*	(CLEO Collab.)
ELSEN	90	ZPHY C46 349	E. Elsen *et al.*	(JADE Collab.)
ROSNER	90	PR D42 3732	J.L. Rosner	
WAGNER	90	PRL 64 1095	S.R. Wagner *et al.*	(Mark II Collab.)
ALBRECHT	89C	PL B219 121	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	89G	PL B229 304	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	89J	PL B229 175	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	89L	PL B232 554	H. Albrecht *et al.*	(ARGUS Collab.)
ARTUSO	89	PRL 62 2233	M. Artuso *et al.*	(CLEO Collab.)
AVERILL	89	PR D39 123	D.A. Averill *et al.*	(HRS Collab.)
AVERY	89B	PL B223 470	P. Avery *et al.*	(CLEO Collab.)
BEBEK	89	PRL 62 8	C. Bebek *et al.*	(CLEO Collab.)
BORTOLETTO	89	PRL 62 2436	D. Bortoletto *et al.*	(CLEO Collab.)
BORTOLETTO	89B	PRL 63 1667	D. Bortoletto *et al.*	(CLEO Collab.)
ALBRECHT	88F	PL B209 119	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	88K	PL B215 424	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	87C	PL B185 218	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	87D	PL B199 451	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	87I	PL B192 245	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	87J	PL B197 452	H. Albrecht *et al.*	(ARGUS Collab.)
AVERY	87	PL B183 429	P. Avery *et al.*	(CLEO Collab.)
BEAN	87B	PRL 58 183	A. Bean *et al.*	(CLEO Collab.)
BEBEK	87	PR D36 1289	C. Bebek *et al.*	(CLEO Collab.)
ALAM	86	PR D34 3279	M.S. Alam *et al.*	(CLEO Collab.)
ALBRECHT	86F	PL B182 95	H. Albrecht *et al.*	(ARGUS Collab.)
PDG	86	PL 170B	M. Aguilar-Benitez *et al.*	(CERN, CIT+)
CHEN	85	PR D31 2386	A. Chen *et al.*	(CLEO Collab.)
HAAS	85	PRL 55 1248	J. Haas *et al.*	(CLEO Collab.)
AVERY	84	PRL 53 1309	P. Avery *et al.*	(CLEO Collab.)
GILES	84	PR D30 2279	R. Giles *et al.*	(CLEO Collab.)
BEHRENDS	83	PRL 50 881	S. Behrends *et al.*	(CLEO Collab.)