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" 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	$e^+e^- \to \Upsilon(4S)$
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	$e^+e^- \to \Upsilon(4S)$
5278.0±0.4 ±2.0		BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
5279.6±0.7 ±2.0	40	[2] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
5278.2±1.0 ±3.0	40	ALBRECHT	87C	ARG	$e^+e^- \to \Upsilon(4S)$
5279.5±1.6 ±3.0	7	[3] ALBRECHT	87D	ARG	$e^+e^- \to \Upsilon(4S)$
5280.6±0.8 ±2.0		BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[1] CSORNA 00 uses fully reconstructed 135 $B^0 \to J/\psi^{(\prime)} K^0_S$ 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	$e^+e^- \to \Upsilon(4S)$
−0.4 ±0.6 ±0.5	BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
−0.9 ±1.2 ±0.5	ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
2.0 ±1.1 ±0.3	[4] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

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

VALUE (10^{-12} s)	EVTS	DOCUMENT ID		TECN	COMMENT
1.530±0.009 OUR EVALUATION					
$1.504 \pm 0.013 ^{+0.018}_{-0.013}$		[5] AUBERT	06G	BABR	$e^+e^- \to \Upsilon(4S)$
$1.40 ^{+0.11}_{-0.10} \pm 0.03$		[6] ABAZOV	05C	D0	$p\overline{p}$ at 1.96 TeV
$1.530 \pm 0.043 \pm 0.023$		[7] ABAZOV	05W	D0	$p\overline{p}$ at 1.96 TeV
$1.534 \pm 0.008 \pm 0.010$		[8] ABE	05B	BELL	$e^+e^- \to \Upsilon(4S)$
$1.54 \pm 0.05 \pm 0.02$		[9] ACOSTA	05	CDF	$p\overline{p}$ at 1.96 TeV
$1.531 \pm 0.021 \pm 0.031$		[10] ABDALLAH	04E	DLPH	$e^+e^- \to Z$
$1.533 \pm 0.034 \pm 0.038$		[11] AUBERT	03H	BABR	$e^+e^- \to \Upsilon(4S)$
$1.497 \pm 0.073 \pm 0.032$		[12] ACOSTA	02C	CDF	$p\overline{p}$ at 1.8 TeV
$1.529 \pm 0.012 \pm 0.029$		[13] AUBERT	02H	BABR	$e^+e^- \to \Upsilon(4S)$
$1.546 \pm 0.032 \pm 0.022$		[14] AUBERT	01F	BABR	$e^+e^- \to \Upsilon(4S)$
$1.541 \pm 0.028 \pm 0.023$		[13] ABBIENDI,G	00B	OPAL	$e^+e^- \to Z$
$1.518 \pm 0.053 \pm 0.034$		[15] BARATE	00R	ALEP	$e^+e^- \to Z$
$1.523 \pm 0.057 \pm 0.053$		[16] ABBIENDI	99J	OPAL	$e^+e^- \to Z$
$1.474 \pm 0.039 ^{+0.052}_{-0.051}$		[15] ABE	98Q	CDF	$p\overline{p}$ at 1.8 TeV
$1.52 \pm 0.06 \pm 0.04$		[16] ACCIARRI	98S	L3	$e^+e^- \to Z$
$1.64 \pm 0.08 \pm 0.08$		[16] ABE	97J	SLD	$e^+e^- \to Z$
$1.532 \pm 0.041 \pm 0.040$		[17] ABREU	97F	DLPH	$e^+e^- \to Z$
$1.25 ^{+0.15}_{-0.13} \pm 0.05$	121	[12] BUSKULIC	96J	ALEP	$e^+e^- \to Z$
$1.49 ^{+0.17}_{-0.15} {}^{+0.08}_{-0.06}$		[18] BUSKULIC	96J	ALEP	$e^+e^- \to Z$
$1.61 ^{+0.14}_{-0.13} \pm 0.08$		[15,19] ABREU	95Q	DLPH	$e^+e^- \to Z$
$1.63 \pm 0.14 \pm 0.13$		[20] ADAM	95	DLPH	$e^+e^- \to Z$
$1.53 \pm 0.12 \pm 0.08$		[15,21] AKERS	95T	OPAL	$e^+e^- \to Z$

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

$1.473^{+0.052}_{-0.050}\pm0.023$		[7] ABAZOV	05B	D0	Repl. by ABAZOV 05W
$1.523^{+0.024}_{-0.023}\pm0.022$		[22] AUBERT	03C	BABR	Repl. by AUBERT 06G
$1.554\pm0.030\pm0.019$		[14] ABE	02H	BELL	Repl. by ABE 05B
$1.58\pm0.09\pm0.02$		[12] ABE	98B	CDF	Repl. by ACOSTA 02C
$1.54\pm0.08\pm0.06$		[15] ABE	96C	CDF	Repl. by ABE 98Q
$1.55\pm0.06\pm0.03$		[23] BUSKULIC	96J	ALEP	$e^+e^-\rightarrow Z$
$1.61\pm0.07\pm0.04$		[15] BUSKULIC	96J	ALEP	Repl. by BARATE 00R
1.62 ± 0.12		[24] ADAM	95	DLPH	$e^+e^-\rightarrow Z$
$1.57\pm0.18\pm0.08$	121	[12] ABE	94D	CDF	Repl. by ABE 98B
$1.17^{+0.29}_{-0.23}\pm0.16$	96	[15] ABREU	93D	DLPH	Sup. by ABREU 95Q
$1.55\pm0.25\pm0.18$	76	[20] ABREU	93G	DLPH	Sup. by ADAM 95
$1.51^{+0.24}_{-0.23}{}^{+0.12}_{-0.14}$	78	[15] ACTON	93C	OPAL	Sup. by AKERS 95T
$1.52^{+0.20}_{-0.18}{}^{+0.07}_{-0.13}$	77	[15] BUSKULIC	93D	ALEP	Sup. by BUSKULIC 96J
$1.20^{+0.52}_{-0.36}{}^{+0.16}_{-0.14}$	15	[25] WAGNER	90	MRK2	E^{ee}_{cm}= 29 GeV
$0.82^{+0.57}_{-0.37}\pm0.27$		[26] AVERILL	89	HRS	E^{ee}_{cm}= 29 GeV

[5] Measured using a simultaneous fit of the B^0 lifetime and $\overline{B}^0 B^0$ oscillation frequency Δm_d in the partially reconstructed $B^0 \rightarrow D^{*-}\ell\nu$ decays.
[6] Measured mean life using $B^0 \rightarrow J/\psi K_s$ decays.
[7] Measured mean life using $B^0 \rightarrow J/\psi K^{*0}$ decays.
[8] Measurement performed using a combined fit of CP-violation, mixing and lifetimes.
[9] Measured using the time-dependent angular analysis of $B^0_d \rightarrow J/\psi K^{*0}$ decays.
[10] Measurement performed using an inclusive reconstruction and B flavor identification technique.
[11] Measurement performed with decays $B^0 \rightarrow D^{*-}\pi^+$ and $B^0 \rightarrow D^{*-}\rho^+$ using a partial reconstruction technique.
[12] Measured mean life using fully reconstructed decays.
[13] Data analyzed using partially reconstructed $\overline{B}^0 \rightarrow D^{*+}\ell^-\overline{\nu}$ decays.
[14] Events are selected in which one B meson is fully reconstructed while the second B meson is reconstructed inclusively.
[15] Data analyzed using $D/D^*\ell$X event vertices.
[16] Data analyzed using charge of secondary vertex.
[17] Data analyzed using inclusive $D/D^*\ell X$.
[18] Measured mean life using partially reconstructed $D^{*-}\pi^+$X vertices.
[19] ABREU 95Q assumes B($B^0 \rightarrow D^{**-}\ell^+\nu_\ell$) = 3.2 ± 1.7%.
[20] Data analyzed using vertex-charge technique to tag B charge.
[21] AKERS 95T assumes B($B^0 \rightarrow D_s^{(*)} D^{0\,(*)}$) = 5.0 ± 0.9% to find B^+/B^0 yield.
[22] AUBERT 03C uses a sample of approximately 14,000 exclusively reconstructed $B^0 \rightarrow D^*(2010)^-\ell\nu$ and simultaneously measures the lifetime and oscillation frequency.
[23] Combined result of $D/D^*\ell$x analysis, fully reconstructed B analysis, and partially reconstructed $D^{*-}\pi^+$X analysis.
[24] Combined ABREU 95Q and ADAM 95 result.
[25] 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 $\pi^-\overline{D}^0$.
[26] 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} (direct measurements)

"OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account corrections 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.					
1.071±0.009 OUR EVALUATION					
$1.080 \pm 0.016 \pm 0.014$		[27] ABAZOV	05D	D0	$p\overline{p}$ at 1.96 TeV
$1.066 \pm 0.008 \pm 0.008$		[28] ABE	05B	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$1.060 \pm 0.021 \pm 0.024$		[29] ABDALLAH	04E	DLPH	$e^+e^- \rightarrow Z$
$1.093 \pm 0.066 \pm 0.028$		[30] ACOSTA	02C	CDF	$p\overline{p}$ at 1.8 TeV
$1.082 \pm 0.026 \pm 0.012$		[31] AUBERT	01F	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$1.085 \pm 0.059 \pm 0.018$		[27] BARATE	00R	ALEP	$e^+e^- \rightarrow Z$
$1.079 \pm 0.064 \pm 0.041$		[32] ABBIENDI	99J	OPAL	$e^+e^- \rightarrow Z$
$1.110 \pm 0.056 ^{+0.033}_{-0.030}$		[27] ABE	98Q	CDF	$p\overline{p}$ at 1.8 TeV
$1.09 \pm 0.07 \pm 0.03$		[32] ACCIARRI	98S	L3	$e^+e^- \rightarrow Z$
$1.01 \pm 0.07 \pm 0.06$		[32] ABE	97J	SLD	$e^+e^- \rightarrow Z$
$1.27 ^{+0.23}_{-0.19} {}^{+0.03}_{-0.02}$		[30] BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$1.00 ^{+0.17}_{-0.15} \pm 0.10$		[27,33] ABREU	95Q	DLPH	$e^+e^- \rightarrow Z$
$1.06 ^{+0.13}_{-0.11} \pm 0.10$		[34] ADAM	95	DLPH	$e^+e^- \rightarrow Z$
$0.99 \pm 0.14 ^{+0.05}_{-0.04}$		[27,35] AKERS	95T	OPAL	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.091 \pm 0.023 \pm 0.014$		[31] ABE	02H	BELL	Repl. by ABE 05B
$1.06 \pm 0.07 \pm 0.02$		[30] ABE	98B	CDF	Repl. by ACOSTA 02C
$1.01 \pm 0.11 \pm 0.02$		[27] ABE	96C	CDF	Repl. by ABE 98Q
$1.03 \pm 0.08 \pm 0.02$		[36] BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$0.98 \pm 0.08 \pm 0.03$		[27] BUSKULIC	96J	ALEP	Repl. by BARATE 00R
$1.02 \pm 0.16 \pm 0.05$	269	[30] ABE	94D	CDF	Repl. by ABE 98B
$1.11 ^{+0.51}_{-0.39} \pm 0.11$	188	[27] ABREU	93D	DLPH	Sup. by ABREU 95Q
$1.01 ^{+0.29}_{-0.22} \pm 0.12$	253	[34] ABREU	93G	DLPH	Sup. by ADAM 95
$1.0 ^{+0.33}_{-0.25} \pm 0.08$	130	ACTON	93C	OPAL	Sup. by AKERS 95T
$0.96 ^{+0.19}_{-0.15} {}^{+0.18}_{-0.12}$	154	[27] BUSKULIC	93D	ALEP	Sup. by BUSKULIC 96J

[27] Data analyzed using $D/D^* \mu X$ vertices.

[28] Measurement performed using a combined fit of CP-violation, mixing and lifetimes.

[29] Measurement performed using an inclusive reconstruction and B flavor identification technique.

[30] Measured using fully reconstructed decays.

[31] Events are selected in which one B meson is fully reconstructed while the second B meson is reconstructed inclusively.

[32] Data analyzed using charge of secondary vertex.
[33] ABREU 95Q assumes B($B^0 \to D^{**-} \ell^+ \nu_\ell$) = 3.2 ± 1.7%.
[34] Data analyzed using vertex-charge technique to tag B charge.
[35] AKERS 95T assumes B($B^0 \to D_s^{(*)} D^{0\,(*)}$) = 5.0 ± 0.9% to find B^+/B^0 yield.
[36] 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.						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$0.95^{+0.117}_{-0.080} \pm 0.091$			[37] ARTUSO	97	CLE2	$e^+ e^- \to \Upsilon(4S)$
$1.15 \pm 0.17 \pm 0.06$			[38] JESSOP	97	CLE2	$e^+ e^- \to \Upsilon(4S)$
$0.93 \pm 0.18 \pm 0.12$			[39] ATHANAS	94	CLE2	Sup. by ARTUSO 97
$0.91 \pm 0.27 \pm 0.21$			[40] ALBRECHT	92C	ARG	$e^+ e^- \to \Upsilon(4S)$
1.0 ± 0.4		29	[40,41] ALBRECHT	92G	ARG	$e^+ e^- \to \Upsilon(4S)$
$0.89 \pm 0.19 \pm 0.13$			[40] FULTON	91	CLEO	$e^+ e^- \to \Upsilon(4S)$
$1.00 \pm 0.23 \pm 0.14$			[40] ALBRECHT	89L	ARG	$e^+ e^- \to \Upsilon(4S)$
0.49 to 2.3	90		[42] BEAN	87B	CLEO	$e^+ e^- \to \Upsilon(4S)$

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

---

sgn(Re(λ_{CP})) $\Delta\Gamma_{B^0_d}$ / $\Gamma_{B^0_d}$

$\Gamma_{B^0_d}$ and $\Delta\Gamma_{B^0_d}$ are the decay rate average and difference between two B^0_d CP eigenstates (light − heavy). The λ_{CP} characterizes B^0 and $\overline{B}^0$ decays to states of charmonium plus K^0_L, see the review on "CP Violation" in the reviews section.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.009±0.037 OUR EVALUATION				
0.008±0.037±0.018	[43] AUBERT,B	04C	BABR	$e^+ e^- \to \Upsilon(4S)$

[43] Corresponds to 90% confidence range [−0.084, 0.068].

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
<0.18	95	[44] ABDALLAH 03B	DLPH	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.80	95	[45,46] BEHRENS 00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[44] Using the measured τ_{B^0}=1.55 ± 0.03 ps.

[45] 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.

[46] 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.

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

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\ell^+\nu_\ell$ anything	[a]	(10.4 ± 0.4) %	
Γ_2	$D^-\ell^+\nu_\ell$	[a]	(2.12 ± 0.20) %	
Γ_3	$D^*(2010)^-\ell^+\nu_\ell$	[a]	(5.35 ± 0.20) %	
Γ_4	$\overline{D}^0\pi^+\ell^+\nu_\ell$		(3.2 ± 1.0) × 10^{-3}	
Γ_5	$\overline{D}^{*0}\pi^+\ell^+\nu_\ell$		(6.5 ± 1.5) × 10^{-3}	
Γ_6	$\rho^-\ell^+\nu_\ell$	[a]	(2.3 ± 0.4) × 10^{-4}	
Γ_7	$\pi^-\ell^+\nu_\ell$	[a]	(1.36 ± 0.15) × 10^{-4}	

Inclusive modes

Γ_{8}	$\pi^- \mu^+ \nu_\mu$		
Γ_{9}	$K^\pm$ anything	(78 ± 8) %	
Γ_{10}	$D^0 X$	(6.3 ± 2.0) %	
Γ_{11}	$\overline{D}^0 X$	(51 ± 4) %	
Γ_{12}	$D^+ X$	< 5.1 %	CL=90%
Γ_{13}	$D^- X$	(40 ± 5) %	
Γ_{14}	$D_s^+ X$	$(10.9 {}^{+4.4}_{-3.2})$ %	
Γ_{15}	$D_s^- X$	< 8.7 %	CL=90%
Γ_{16}	$\Lambda_c^+ X$	< 3.8 %	CL=90%
Γ_{17}	$\overline{\Lambda}_c^- X$	$(4.9 {}^{+2.5}_{-2.0})$ %	
Γ_{18}	$\overline{c} X$	(104 ± 8) %	
Γ_{19}	$c X$	(24 ± 5) %	
Γ_{20}	$\overline{c} c X$	$(128 {}^{+11}_{-10})$ %	

D, D^*, or D_s modes

Γ_{21}	$D^- \pi^+$	$(2.83 \pm 0.17) \times 10^{-3}$	
Γ_{22}	$D^- \rho^+$	$(7.5 \pm 1.2) \times 10^{-3}$	
Γ_{23}	$D^- K^0 \pi^+$	$(4.9 \pm 0.9) \times 10^{-4}$	
Γ_{24}	$D^- K^*(892)^+$	$(4.5 \pm 0.7) \times 10^{-4}$	
Γ_{25}	$D^- \omega \pi^+$	$(2.8 \pm 0.6) \times 10^{-3}$	
Γ_{26}	$D^- K^+$	$(2.0 \pm 0.6) \times 10^{-4}$	
Γ_{27}	$D^- K^+ \overline{K}^0$	$< 3.1 \times 10^{-4}$	CL=90%
Γ_{28}	$D^- K^+ \overline{K}^*(892)^0$	$(8.8 \pm 1.9) \times 10^{-4}$	
Γ_{29}	$\overline{D}^0 \pi^+ \pi^-$	$(8.0 \pm 1.6) \times 10^{-4}$	
Γ_{30}	$D^*(2010)^- \pi^+$	$(2.76 \pm 0.21) \times 10^{-3}$	
Γ_{31}	$D^- \pi^+ \pi^+ \pi^-$	$(8.0 \pm 2.5) \times 10^{-3}$	
Γ_{32}	$(D^- \pi^+ \pi^+ \pi^-)$ nonresonant	$(3.9 \pm 1.9) \times 10^{-3}$	
Γ_{33}	$D^- \pi^+ \rho^0$	$(1.1 \pm 1.0) \times 10^{-3}$	
Γ_{34}	$D^- a_1(1260)^+$	$(6.0 \pm 3.3) \times 10^{-3}$	
Γ_{35}	$D^*(2010)^- \pi^+ \pi^0$	(1.5 ± 0.5) %	
Γ_{36}	$D^*(2010)^- \rho^+$	$(6.8 \pm 0.9) \times 10^{-3}$	
Γ_{37}	$D^*(2010)^- K^+$	$(2.14 \pm 0.20) \times 10^{-4}$	
Γ_{38}	$D^*(2010)^- K^0 \pi^+$	$(3.0 \pm 0.8) \times 10^{-4}$	
Γ_{39}	$D^*(2010)^- K^*(892)^+$	$(3.3 \pm 0.6) \times 10^{-4}$	
Γ_{40}	$D^*(2010)^- K^+ \overline{K}^0$	$< 4.7 \times 10^{-4}$	CL=90%
Γ_{41}	$D^*(2010)^- K^+ \overline{K}^*(892)^0$	$(1.29 \pm 0.33) \times 10^{-3}$	
Γ_{42}	$D^*(2010)^- \pi^+ \pi^+ \pi^-$	$(7.0 \pm 0.8) \times 10^{-3}$	S=1.3
Γ_{43}	$(D^*(2010)^- \pi^+ \pi^+ \pi^-)$ non-resonant	$(0.0 \pm 2.5) \times 10^{-3}$	
Γ_{44}	$D^*(2010)^- \pi^+ \rho^0$	$(5.7 \pm 3.2) \times 10^{-3}$	
Γ_{45}	$D^*(2010)^- a_1(1260)^+$	(1.30 ± 0.27) %	
Γ_{46}	$D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0$	(1.76 ± 0.27) %	

Γ_{47}	$D^{*-} 3\pi^+ 2\pi^-$		$(4.7 \pm 0.9) \times 10^{-3}$		
Γ_{48}	$D^*(2010)^- p \overline{p} \pi^+$		$(6.5 \pm 1.6) \times 10^{-4}$		
Γ_{49}	$D^*(2010)^- p \overline{n}$		$(1.5 \pm 0.4) \times 10^{-3}$		
Γ_{50}	$\overline{D}^*(2010)^- \omega \pi^+$		$(2.9 \pm 0.5) \times 10^{-3}$		
Γ_{51}	$D_1(2420)^- \pi^+ \times B(D_1^- \to D^- \pi^+ \pi^-)$		$(8.9 {+2.3 \atop -3.5}) \times 10^{-5}$		
Γ_{52}	$D_1(2420)^- \pi^+ \times B(D_1^- \to D^{*-} \pi^+ \pi^-)$	$<$	3.3×10^{-5}	CL=90%	
Γ_{53}	$\overline{D}_2^*(2460)^- \pi^+$	$<$	2.2×10^{-3}	CL=90%	
Γ_{54}	$D_2^*(2460)^- \pi^+ \times B((D_2^*)^- \to D^{*-} \pi^+ \pi^-)$	$<$	2.4×10^{-5}	CL=90%	
Γ_{55}	$\overline{D}_2^*(2460)^- \rho^+$	$<$	4.9×10^{-3}	CL=90%	
Γ_{56}	$D^- D^+$		$(1.9 \pm 0.6) \times 10^{-4}$		
Γ_{57}	$D^- D_s^+$		$(6.5 \pm 2.1) \times 10^{-3}$		
Γ_{58}	$D^*(2010)^- D_s^+$		$(8.8 \pm 1.6) \times 10^{-3}$		
Γ_{59}	$D^- D_s^{*+}$		$(8.6 \pm 3.4) \times 10^{-3}$		
Γ_{60}	$D^*(2010)^- D_s^{*+}$		$(1.79 \pm 0.16) \%$		
Γ_{61}	$D_{s0}(2317)^+ K^- \times B(D_{s0}(2317)^+ \to D_s^+ \pi^0)$		$(4.3 \pm 1.5) \times 10^{-5}$		
Γ_{62}	$D_{s0}(2317)^+ \pi^- \times B(D_{s0}(2317)^+ \to D_s^+ \pi^0)$	$<$	2.5×10^{-5}	CL=90%	
Γ_{63}	$D_{sJ}(2457)^+ K^- \times B(D_{sJ}(2457)^+ \to D_s^+ \pi^0)$	$<$	9.4×10^{-6}	CL=90%	
Γ_{64}	$D_{sJ}(2457)^+ \pi^- \times B(D_{sJ}(2457)^+ \to D_s^+ \pi^0)$	$<$	4.0×10^{-6}	CL=90%	
Γ_{65}	$D_s^- D_s^+$	$<$	1.0×10^{-4}	CL=90%	
Γ_{66}	$D_s^{*-} D_s^+$	$<$	1.3×10^{-4}	CL=90%	
Γ_{67}	$D_s^{*-} D_s^{*+}$	$<$	2.4×10^{-4}	CL=90%	
Γ_{68}	$D_{s0}(2317)^+ D^- \times B(D_{s0}(2317)^+ \to D_s^+ \pi^0)$		$(9.7 {+4.1 \atop -3.4}) \times 10^{-4}$	S=1.4	
Γ_{69}	$D_{s0}(2317)^+ D^- \times B(D_{s0}(2317)^+ \to D_s^{*+} \gamma)$	$<$	9.5×10^{-4}	CL=90%	
Γ_{70}	$D_{s0}(2317)^+ D^*(2010)^- \times B(D_{s0}(2317)^+ \to D_s^+ \pi^0)$		$(1.5 \pm 0.6) \times 10^{-3}$		
Γ_{71}	$D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^{*+} \pi^0)$		$(2.0 {+0.6 \atop -0.5}) \times 10^{-3}$		
Γ_{72}	$D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^+ \gamma)$		$(6.6 {+1.8 \atop -1.5}) \times 10^{-4}$		

Γ_{73}	$D_{sJ}(2457)^+ D^- \times$ B$(D_{sJ}(2457)^+ \rightarrow D_s^{*+}\gamma)$	$< 6.0 \times 10^{-4}$	CL=90%
Γ_{74}	$D_{sJ}(2457)^+ D^- \times$ B$(D_{sJ}(2457)^+ \rightarrow D_s^+ \pi^+ \pi^-)$	$< 2.0 \times 10^{-4}$	CL=90%
Γ_{75}	$D_{sJ}(2457)^+ D^- \times$ B$(D_{sJ}(2457)^+ \rightarrow D_s^+ \pi^0)$	$< 3.6 \times 10^{-4}$	CL=90%
Γ_{76}	$D_{sJ}(2457)^+ D^*(2010) \times$ B$(D_{sJ}(2457)^+ \rightarrow D_s^{*+} \pi^0)$	$(5.5 {}^{+2.5}_{-2.0}) \times 10^{-3}$	
Γ_{77}	$D_{sJ}(2457)^+ D^*(2010) \times$ B$(D_{sJ}(2457)^+ \rightarrow D_s^+ \gamma)$	$(2.3 {}^{+0.9}_{-0.7}) \times 10^{-3}$	
Γ_{78}	$D^- D_{sJ}(2536)^+ \times$ B$(D_{sJ}(2536)^+ \rightarrow D^*(2007)^0 K^+)$	$< 5 \times 10^{-4}$	CL=90%
Γ_{79}	$D^*(2010)^- D_{sJ}(2536)^+ \times$ B$(D_{sJ}(2536)^+ \rightarrow D^*(2007)^0 K^+)$	$< 7 \times 10^{-4}$	CL=90%
Γ_{80}	$D^- D_{sJ}(2573)^+ \times$ B$(D_{sJ}(2573)^+ \rightarrow D^0 K^+)$	$< 1 \times 10^{-4}$	CL=90%
Γ_{81}	$D^*(2010)^- D_{sJ}(2573)^+ \times$ B$(D_{sJ}(2573)^+ \rightarrow D^0 K^+)$	$< 2 \times 10^{-4}$	CL=90%
Γ_{82}	$D_s^+ \pi^-$	$(2.2 \pm 0.7) \times 10^{-5}$	
Γ_{83}	$D_s^{*+} \pi^-$	$< 4.1 \times 10^{-5}$	CL=90%
Γ_{84}	$D_s^+ \rho^-$	$< 6 \times 10^{-4}$	CL=90%
Γ_{85}	$D_s^{*+} \rho^-$	$< 6 \times 10^{-4}$	CL=90%
Γ_{86}	$D_s^+ a_1(1260)^-$	$< 2.1 \times 10^{-3}$	CL=90%
Γ_{87}	$D_s^{*+} a_1(1260)^-$	$< 1.8 \times 10^{-3}$	CL=90%
Γ_{88}	$D_s^- K^+$	$(3.1 \pm 0.8) \times 10^{-5}$	
Γ_{89}	$D_s^{*-} K^+$	$< 2.5 \times 10^{-5}$	CL=90%
Γ_{90}	$D_s^- K^*(892)^+$	$< 8 \times 10^{-4}$	CL=90%
Γ_{91}	$D_s^{*-} K^*(892)^+$	$< 9 \times 10^{-4}$	CL=90%
Γ_{92}	$D_s^- \pi^+ K^0$	$< 4 \times 10^{-3}$	CL=90%
Γ_{93}	$D_s^{*-} \pi^+ K^0$	$< 2.6 \times 10^{-3}$	CL=90%
Γ_{94}	$D_s^- \pi^+ K^*(892)^0$	$< 3.1 \times 10^{-3}$	CL=90%
Γ_{95}	$D_s^{*-} \pi^+ K^*(892)^0$	$< 1.7 \times 10^{-3}$	CL=90%
Γ_{96}	$\overline{D}^0 K^0$	$(5.0 \pm 1.4) \times 10^{-5}$	
Γ_{97}	$\overline{D}^0 K^+ \pi^-$	$(8.8 \pm 1.7) \times 10^{-5}$	
Γ_{98}	$\overline{D}^0 K^*(892)^0$	$(5.3 \pm 0.8) \times 10^{-5}$	
Γ_{99}	$D_2^*(2460)^- K^+ \times$ B$(D_2^*(2460)^- \rightarrow \overline{D}^0 \pi^-)$	$(1.8 \pm 0.5) \times 10^{-5}$	
Γ_{100}	$\overline{D}^0 K^+ \pi^-$ non-resonant	$< 3.7 \times 10^{-5}$	CL=90%

Γ_{101}	$\overline{D}^0 \pi^0$		$(\ 2.91 \pm\ 0.28) \times 10^{-4}$	
Γ_{102}	$\overline{D}^0 \rho^0$		$(\ 2.9\ \pm\ 1.1\ ) \times 10^{-4}$	
Γ_{103}	$\overline{D}^0 \eta$		$(\ 2.2\ \pm\ 0.5\ ) \times 10^{-4}$	S=1.6
Γ_{104}	$\overline{D}^0 \eta'$		$(\ 1.25 \pm\ 0.23) \times 10^{-4}$	S=1.1
Γ_{105}	$\overline{D}^0 \omega$		$(\ 2.5\ \pm\ 0.6\ ) \times 10^{-4}$	S=1.5
Γ_{106}	$D^0 K^+ \pi^-$	<	1.9×10^{-5}	CL=90%
Γ_{107}	$D^0 K^*(892)^0$	<	1.8×10^{-5}	CL=90%
Γ_{108}	$\overline{D}^{*0} \gamma$	<	2.5×10^{-5}	CL=90%
Γ_{109}	$\overline{D}^*(2007)^0 \pi^0$		$(\ 2.7\ \pm\ 0.5\ ) \times 10^{-4}$	
Γ_{110}	$\overline{D}^*(2007)^0 \rho^0$	<	5.1×10^{-4}	CL=90%
Γ_{111}	$\overline{D}^*(2007)^0 \eta$		$(\ 2.6\ \pm\ 0.6\ ) \times 10^{-4}$	
Γ_{112}	$\overline{D}^*(2007)^0 \eta'$		$(\ 1.23 \pm\ 0.35) \times 10^{-4}$	
Γ_{113}	$\overline{D}^*(2007)^0 \pi^+ \pi^-$		$(\ 6.2\ \pm\ 2.2\ ) \times 10^{-4}$	
Γ_{114}	$\overline{D}^*(2007)^0 K^0$	<	6.6×10^{-5}	CL=90%
Γ_{115}	$\overline{D}^*(2007)^0 K^*(892)^0$	<	6.9×10^{-5}	CL=90%
Γ_{116}	$D^*(2007)^0 K^*(892)^0$	<	4.0×10^{-5}	CL=90%
Γ_{117}	$D^*(2007)^0 \pi^+ \pi^+ \pi^- \pi^-$		$(\ 2.7\ \pm\ 0.5\ ) \times 10^{-3}$	
Γ_{118}	$D^*(2010)^+ D^*(2010)^-$		$(\ 8.3\ \pm\ 1.1\ ) \times 10^{-4}$	
Γ_{119}	$\overline{D}^*(2007)^0 \omega$		$(\ 4.2\ \pm\ 1.1\ ) \times 10^{-4}$	
Γ_{120}	$D^*(2010)^+ D^-$	<	6.3×10^{-4}	CL=90%
Γ_{121}	$D^*(2010)^- D^+ +$ $D^*(2010)^+ D^-$		$(\ 9.3\ \pm\ 1.5\ ) \times 10^{-4}$	
Γ_{122}	$D^*(2007)^0 \overline{D}^*(2007)^0$	<	2.7 %	CL=90%
Γ_{123}	$D^- D^0 K^+$		$(\ 1.7\ \pm\ 0.4\ ) \times 10^{-3}$	
Γ_{124}	$D^- D^*(2007)^0 K^+$		$(\ 4.6\ \pm\ 1.0\ ) \times 10^{-3}$	
Γ_{125}	$D^*(2010)^- D^0 K^+$		$(\ 3.1\ ^{+\ 0.6}_{-\ 0.5}\ ) \times 10^{-3}$	
Γ_{126}	$D^*(2010)^- D^*(2007)^0 K^+$		$(\ 1.18 \pm\ 0.20)$ %	
Γ_{127}	$D^- D^+ K^0$	<	1.7×10^{-3}	CL=90%
Γ_{128}	$D^*(2010)^- D^+ K^0 +$ $D^- D^*(2010)^+ K^0$		$(\ 6.5\ \pm\ 1.6\ ) \times 10^{-3}$	
Γ_{129}	$D^*(2010)^- D^*(2010)^+ K^0$		$(\ 8.8\ \pm\ 1.9\ ) \times 10^{-3}$	
Γ_{130}	$\overline{D}^0 D^0 K^0$	<	1.4×10^{-3}	CL=90%
Γ_{131}	$\overline{D}^0 D^*(2007)^0 K^0 +$ $\overline{D}^*(2007)^0 D^0 K^0$	<	3.7×10^{-3}	CL=90%
Γ_{132}	$\overline{D}^*(2007)^0 D^*(2007)^0 K^0$	<	6.6×10^{-3}	CL=90%
Γ_{133}	$(\overline{D}+\overline{D}^*)(D+D^*)K$		$(\ 4.3\ \pm\ 0.7\ )$ %	

Charmonium modes

Γ_{134}	$\eta_c K^0$		$(\ 9.9\ \pm\ 1.9\ ) \times 10^{-4}$	
Γ_{135}	$\eta_c K^*(892)^0$		$(\ 1.6\ \pm\ 0.7\ ) \times 10^{-3}$	
Γ_{136}	$J/\psi(1S) K^0$		$(\ 8.72 \pm\ 0.33) \times 10^{-4}$	
Γ_{137}	$J/\psi(1S) K^+ \pi^-$		$(\ 1.2\ \pm\ 0.6\ ) \times 10^{-3}$	
Γ_{138}	$J/\psi(1S) K^*(892)^0$		$(\ 1.33 \pm\ 0.06) \times 10^{-3}$	
Γ_{139}	$J/\psi(1S) \eta K^0_S$		$(\ 8\ \pm\ 4\ ) \times 10^{-5}$	

Γ_{140}	$J/\psi(1S)\phi K^0$			$(9.4 \pm 2.6) \times 10^{-5}$	
Γ_{141}	$J/\psi(1S)K(1270)^0$			$(1.3 \pm 0.5) \times 10^{-3}$	
Γ_{142}	$J/\psi(1S)\pi^0$			$(2.2 \pm 0.4) \times 10^{-5}$	
Γ_{143}	$J/\psi(1S)\eta$		$<$	2.7×10^{-5}	CL=90%
Γ_{144}	$J/\psi(1S)\pi^+\pi^-$			$(4.6 \pm 0.9) \times 10^{-5}$	
Γ_{145}	$J/\psi(1S)\rho^0$			$(1.6 \pm 0.7) \times 10^{-5}$	
Γ_{146}	$J/\psi(1S)\omega$		$<$	2.7×10^{-4}	CL=90%
Γ_{147}	$J/\psi(1S)\phi$		$<$	9.2×10^{-6}	CL=90%
Γ_{148}	$J/\psi(1S)\eta'(958)$		$<$	6.3×10^{-5}	CL=90%
Γ_{149}	$J/\psi(1S)K^0\pi^+\pi^-$			$(1.0 \pm 0.4) \times 10^{-3}$	
Γ_{150}	$J/\psi(1S)K^0\rho^0$			$(5.4 \pm 3.0) \times 10^{-4}$	
Γ_{151}	$J/\psi(1S)K^*(892)^+\pi^-$			$(8 \pm 4) \times 10^{-4}$	
Γ_{152}	$J/\psi(1S)K^*(892)^0\pi^+\pi^-$			$(6.6 \pm 2.2) \times 10^{-4}$	
Γ_{153}	$X(3872)^-K^+$		$<$	5×10^{-4}	CL=90%
Γ_{154}	$X(3872)^-K^+ \times$ B$(X(3872)^- \to J/\psi(1S)\pi^-\pi^0)$	[b]	$<$	5.4×10^{-6}	CL=90%
Γ_{155}	$X(3872)K^0 \times$ B$(X \to J/\psi\pi^+\pi^-)$		$<$	1.03×10^{-5}	CL=90%
Γ_{156}	$J/\psi(1S)p\overline{p}$		$<$	8.3×10^{-7}	CL=90%
Γ_{157}	$J/\psi(1S)\gamma$		$<$	1.6×10^{-6}	CL=90%
Γ_{158}	$J/\psi(1S)\overline{D}^0$		$<$	1.3×10^{-5}	CL=90%
Γ_{159}	$\psi(2S)K^0$			$(6.2 \pm 0.6) \times 10^{-4}$	
Γ_{160}	$\psi(2S)K^+\pi^-$		$<$	1×10^{-3}	CL=90%
Γ_{161}	$\psi(2S)K^*(892)^0$			$(7.2 \pm 0.8) \times 10^{-4}$	
Γ_{162}	$\chi_{c0}(1P)K^0$		$<$	5.0×10^{-4}	CL=90%
Γ_{163}	$\chi_{c0}K^*(892)^0$		$<$	7.7×10^{-4}	CL=90%
Γ_{164}	$\chi_{c2}K^0$		$<$	2.6×10^{-5}	CL=90%
Γ_{165}	$\chi_{c2}K^*(892)^0$		$<$	3.6×10^{-5}	CL=90%
Γ_{166}	$\chi_{c1}(1P)K^0$			$(3.9 \pm 0.4) \times 10^{-4}$	
Γ_{167}	$\chi_{c1}(1P)K^*(892)^0$			$(3.2 \pm 0.6) \times 10^{-4}$	

K or *K** modes

Γ_{168}	$K^+\pi^-$		$(1.82 \pm 0.08) \times 10^{-5}$	
Γ_{169}	$K^0\pi^0$		$(1.15 \pm 0.10) \times 10^{-5}$	
Γ_{170}	$\eta' K^0$		$(6.8 \pm 0.4) \times 10^{-5}$	
Γ_{171}	$\eta' K^*(892)^0$	$<$	7.6×10^{-6}	CL=90%
Γ_{172}	$\eta K^*(892)^0$		$(1.77 \pm 0.23) \times 10^{-5}$	
Γ_{173}	ηK^0	$<$	2.0×10^{-6}	CL=90%
Γ_{174}	ωK^0		$(5.5 {}^{+1.2}_{-1.0}) \times 10^{-6}$	
Γ_{175}	$a_0^0 K^0$	$<$	7.8×10^{-6}	CL=90%
Γ_{176}	$a_0^- K^+$	$<$	2.1×10^{-6}	CL=90%
Γ_{177}	$K_S^0 X^0$ (Familon)	$<$	5.3×10^{-5}	CL=90%
Γ_{178}	$\omega K^*(892)^0$	$<$	6.0×10^{-6}	CL=90%
Γ_{179}	K^+K^-	$<$	3.7×10^{-7}	CL=90%

Γ_{180}	$K^0 \overline{K}^0$		$(1.13^{+0.38}_{-0.35}) \times 10^{-6}$	
Γ_{181}	$K^0_S K^0_S K^0_S$		$(6.2^{+1.2}_{-1.1}) \times 10^{-6}$	S=1.3
Γ_{182}	$K^+ \pi^- \pi^0$		$(3.7 \pm 0.5) \times 10^{-5}$	
Γ_{183}	$K^+ \rho^-$		$(8.5 \pm 2.8) \times 10^{-6}$	S=1.7
Γ_{184}	$(K^+ \pi^- \pi^0)$ non-resonant		$< 9.4 \times 10^{-6}$	CL=90%
Γ_{185}	$K^{*0}_x \pi^0$	[c]	$(6.1 \pm 1.6) \times 10^{-6}$	
Γ_{186}	$K^0 \pi^+ \pi^-$		$(4.38 \pm 0.29) \times 10^{-5}$	
Γ_{187}	$K^0 \rho^0$		$< 3.9 \times 10^{-5}$	CL=90%
Γ_{188}	$K^0 f_0(980)$		$(5.5 \pm 0.9) \times 10^{-6}$	
Γ_{189}	$K^*(892)^+ \pi^-$		$(1.18 \pm 0.15) \times 10^{-5}$	
Γ_{190}	$K^{*+}_x \pi^-$	[c]	$(5.1 \pm 1.6) \times 10^{-6}$	
Γ_{191}	$K^*(892)^0 \pi^0$		$< 3.5 \times 10^{-6}$	CL=90%
Γ_{192}	$K^*_2(1430)^+ \pi^-$		$< 1.8 \times 10^{-5}$	CL=90%
Γ_{193}	$K^0 K^- \pi^+$		$< 2.1 \times 10^{-5}$	CL=90%
Γ_{194}	$K^+ K^- \pi^0$		$< 1.9 \times 10^{-5}$	CL=90%
Γ_{195}	$K^0 K^+ K^-$		$(2.47 \pm 0.23) \times 10^{-5}$	
Γ_{196}	$K^0 \phi$		$(8.6^{+1.3}_{-1.1}) \times 10^{-6}$	
Γ_{197}	$K^+ \pi^- \pi^+ \pi^-$	[d]	$< 2.3 \times 10^{-4}$	CL=90%
Γ_{198}	$K^*(892)^0 \pi^+ \pi^-$		$< 1.4 \times 10^{-3}$	CL=90%
Γ_{199}	$K^*(892)^0 \rho^0$		$< 3.4 \times 10^{-5}$	CL=90%
Γ_{200}	$K^*(892)^0 f_0(980)$		$< 1.7 \times 10^{-4}$	CL=90%
Γ_{201}	$K_1(1400)^+ \pi^-$		$< 1.1 \times 10^{-3}$	CL=90%
Γ_{202}	$K^+ a_1(1260)^-$	[d]	$< 2.3 \times 10^{-4}$	CL=90%
Γ_{203}	$K^*(892)^0 K^+ K^-$		$< 6.1 \times 10^{-4}$	CL=90%
Γ_{204}	$K^*(892)^0 \phi$		$(9.5 \pm 0.9) \times 10^{-6}$	
Γ_{205}	$\overline{K}^*(892)^0 K^*(892)^0$		$< 2.2 \times 10^{-5}$	CL=90%
Γ_{206}	$K^*(892)^0 K^*(892)^0$		$< 3.7 \times 10^{-5}$	CL=90%
Γ_{207}	$K^*(892)^+ K^*(892)^-$		$< 1.41 \times 10^{-4}$	CL=90%
Γ_{208}	$K_1(1400)^0 \rho^0$		$< 3.0 \times 10^{-3}$	CL=90%
Γ_{209}	$K_1(1400)^0 \phi$		$< 5.0 \times 10^{-3}$	CL=90%
Γ_{210}	$K^*_0(1430)^0 \phi$		seen	
Γ_{211}	$K^*_2(1430)^0 \rho^0$		$< 1.1 \times 10^{-3}$	CL=90%
Γ_{212}	$K^*_2(1430)^0 \phi$		seen	
Γ_{213}	$K^*(892)^0 \gamma$		$(4.01 \pm 0.20) \times 10^{-5}$	
Γ_{214}	$\eta K^0 \gamma$		$(8.7^{+3.6}_{-3.1}) \times 10^{-6}$	
Γ_{215}	$K^0 \phi \gamma$		$< 8.3 \times 10^{-6}$	CL=90%
Γ_{216}	$K^+ \pi^- \gamma$		$(4.6 \pm 1.4) \times 10^{-6}$	
Γ_{217}	$K^*(1410) \gamma$		$< 1.3 \times 10^{-4}$	CL=90%
Γ_{218}	$K^+ \pi^- \gamma$ nonresonant		$< 2.6 \times 10^{-6}$	CL=90%
Γ_{219}	$K^0 \pi^+ \pi^- \gamma$		$(2.4 \pm 0.5) \times 10^{-5}$	
Γ_{220}	$K_1(1270)^0 \gamma$		$< 5.8 \times 10^{-5}$	

Γ_{221}	$K_1(1400)^0\gamma$		< 1.5	$\times 10^{-5}$	
Γ_{222}	$K_2^*(1430)^0\gamma$		(1.24± 0.24)	$\times 10^{-5}$	
Γ_{223}	$K^*(1680)^0\gamma$		< 2.0	$\times 10^{-3}$	CL=90%
Γ_{224}	$K_3^*(1780)^0\gamma$		< 8.3	$\times 10^{-5}$	CL=90%
Γ_{225}	$K_4^*(2045)^0\gamma$		< 4.3	$\times 10^{-3}$	CL=90%

Light unflavored meson modes

Γ_{226}	$\rho^0\gamma$		< 4	$\times 10^{-7}$	CL=90%
Γ_{227}	$\omega\gamma$		< 8	$\times 10^{-7}$	CL=90%
Γ_{228}	$\phi\gamma$		< 8.5	$\times 10^{-7}$	CL=90%
Γ_{229}	$\pi^+\pi^-$		(4.6 ± 0.4)	$\times 10^{-6}$	
Γ_{230}	$\pi^0\pi^0$		(1.5 ± 0.5)	$\times 10^{-6}$	S=1.7
Γ_{231}	$\eta\pi^0$		< 2.5	$\times 10^{-6}$	CL=90%
Γ_{232}	$\eta\eta$		< 2.0	$\times 10^{-6}$	CL=90%
Γ_{233}	$\eta'\pi^0$		< 3.7	$\times 10^{-6}$	CL=90%
Γ_{234}	$\eta'\eta'$		< 1.0	$\times 10^{-5}$	CL=90%
Γ_{235}	$\eta'\eta$		< 4.6	$\times 10^{-6}$	CL=90%
Γ_{236}	$\eta'\rho^0$		< 4.3	$\times 10^{-6}$	CL=90%
Γ_{237}	$\eta\rho^0$		< 1.5	$\times 10^{-6}$	CL=90%
Γ_{238}	$\omega\eta$		< 1.9	$\times 10^{-6}$	CL=90%
Γ_{239}	$\omega\eta'$		< 2.8	$\times 10^{-6}$	CL=90%
Γ_{240}	$\omega\rho^0$		< 3.3	$\times 10^{-6}$	CL=90%
Γ_{241}	$\omega\omega$		< 1.9	$\times 10^{-5}$	CL=90%
Γ_{242}	$\phi\pi^0$		< 1.0	$\times 10^{-6}$	CL=90%
Γ_{243}	$\phi\eta$		< 1.0	$\times 10^{-6}$	CL=90%
Γ_{244}	$\phi\eta'$		< 4.5	$\times 10^{-6}$	CL=90%
Γ_{245}	$\phi\rho^0$		< 1.3	$\times 10^{-5}$	CL=90%
Γ_{246}	$\phi\omega$		< 2.1	$\times 10^{-5}$	CL=90%
Γ_{247}	$\phi\phi$		< 1.5	$\times 10^{-6}$	CL=90%
Γ_{248}	$a_0^{\mp}\pi^{\pm}$		< 5.1	$\times 10^{-6}$	CL=90%
Γ_{249}	$\pi^+\pi^-\pi^0$		< 7.2	$\times 10^{-4}$	CL=90%
Γ_{250}	$\rho^0\pi^0$		(1.8 ± 0.8)	$\times 10^{-6}$	S=1.3
Γ_{251}	$\rho^{\mp}\pi^{\pm}$	[e]	(2.28± 0.25)	$\times 10^{-5}$	
Γ_{252}	$\pi^+\pi^-\pi^+\pi^-$		< 2.3	$\times 10^{-4}$	CL=90%
Γ_{253}	$\rho^0\rho^0$		< 1.1	$\times 10^{-6}$	CL=90%
Γ_{254}	$a_1(1260)^{\mp}\pi^{\pm}$	[e]	< 4.9	$\times 10^{-4}$	CL=90%
Γ_{255}	$a_2(1320)^{\mp}\pi^{\pm}$	[e]	< 3.0	$\times 10^{-4}$	CL=90%
Γ_{256}	$\pi^+\pi^-\pi^0\pi^0$		< 3.1	$\times 10^{-3}$	CL=90%
Γ_{257}	$\rho^+\rho^-$		(2.5 ± 0.4)	$\times 10^{-5}$	
Γ_{258}	$a_1(1260)^0\pi^0$		< 1.1	$\times 10^{-3}$	CL=90%
Γ_{259}	$\omega\pi^0$		< 1.2	$\times 10^{-6}$	CL=90%
Γ_{260}	$\pi^+\pi^+\pi^-\pi^-\pi^0$		< 9.0	$\times 10^{-3}$	CL=90%
Γ_{261}	$a_1(1260)^+\rho^-$		< 3.4	$\times 10^{-3}$	CL=90%
Γ_{262}	$a_1(1260)^0\rho^0$		< 2.4	$\times 10^{-3}$	CL=90%

Γ_{263}	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$			< 3.0	$\times 10^{-3}$	CL=90%
Γ_{264}	$a_1(1260)^+ a_1(1260)^-$			< 2.8	$\times 10^{-3}$	CL=90%
Γ_{265}	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$			< 1.1	%	CL=90%

Baryon modes

Γ_{266}	$p\overline{p}$			< 2.7	$\times 10^{-7}$	CL=90%
Γ_{267}	$p\overline{p}\pi^+\pi^-$			< 2.5	$\times 10^{-4}$	CL=90%
Γ_{268}	$p\overline{p}K^0$			($2.1 {}^{+0.6}_{-0.4}$)	$\times 10^{-6}$	
Γ_{269}	$\Theta(1540)^+\overline{p}\times$ B($\Theta(1540)^+ \to pK^0_S$)		[f]	< 2.3	$\times 10^{-7}$	CL=90%
Γ_{270}	$p\overline{p}K^*(892)^0$			< 7.6	$\times 10^{-6}$	CL=90%
Γ_{271}	$p\overline{\Lambda}\pi^-$			(2.6 ± 0.5)	$\times 10^{-6}$	
Γ_{272}	$p\overline{\Lambda}K^-$			< 8.2	$\times 10^{-7}$	CL=90%
Γ_{273}	$p\overline{\Sigma}^0\pi^-$			< 3.8	$\times 10^{-6}$	CL=90%
Γ_{274}	$\overline{\Lambda}\Lambda$			< 6.9	$\times 10^{-7}$	CL=90%
Γ_{275}	$\Delta^0\overline{\Delta}^0$			< 1.5	$\times 10^{-3}$	CL=90%
Γ_{276}	$\Delta^{++}\overline{\Delta}^{--}$			< 1.1	$\times 10^{-4}$	CL=90%
Γ_{277}	$\overline{D}^0 p\overline{p}$			(1.18± 0.22)	$\times 10^{-4}$	
Γ_{278}	$\overline{D}^*(2007)^0 p\overline{p}$			(1.2 ± 0.4)	$\times 10^{-4}$	
Γ_{279}	$\overline{\Sigma}_c^{--}\Delta^{++}$			< 1.0	$\times 10^{-3}$	CL=90%
Γ_{280}	$\overline{\Lambda}_c^- p\pi^+\pi^-$			(1.3 ± 0.4)	$\times 10^{-3}$	
Γ_{281}	$\overline{\Lambda}_c^- p$			(2.2 ± 0.8)	$\times 10^{-5}$	
Γ_{282}	$\overline{\Lambda}_c^- p\pi^0$			< 5.9	$\times 10^{-4}$	CL=90%
Γ_{283}	$\overline{\Lambda}_c^- p\pi^+\pi^-\pi^0$			< 5.07	$\times 10^{-3}$	CL=90%
Γ_{284}	$\overline{\Lambda}_c^- p\pi^+\pi^-\pi^+\pi^-$			< 2.74	$\times 10^{-3}$	CL=90%
Γ_{285}	$\overline{\Sigma}_c(2520)^{--} p\pi^+$			(1.6 ± 0.7)	$\times 10^{-4}$	
Γ_{286}	$\overline{\Sigma}_c(2520)^0 p\pi^-$			< 1.21	$\times 10^{-4}$	CL=90%
Γ_{287}	$\overline{\Sigma}_c(2455)^0 p\pi^-$			(10 ± 8)	$\times 10^{-5}$	S=1.7
Γ_{288}	$\overline{\Sigma}_c(2455)^{--} p\pi^+$			(2.8 ± 0.9)	$\times 10^{-4}$	
Γ_{289}	$\overline{\Lambda}_c(2593)^-$ / $\overline{\Lambda}_c(2625)^- p$			< 1.1	$\times 10^{-4}$	CL=90%

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

Γ_{290}	$\gamma\gamma$	B1		< 6.2	$\times 10^{-7}$	CL=90%
Γ_{291}	e^+e^-	B1		< 6.1	$\times 10^{-8}$	CL=90%
Γ_{292}	$\mu^+\mu^-$	B1		< 3.9	$\times 10^{-8}$	CL=90%
Γ_{293}	$K^0 e^+e^-$	B1		< 5.4	$\times 10^{-7}$	CL=90%
Γ_{294}	$K^0\mu^+\mu^-$	B1		($2.0 {}^{+1.3}_{-1.0}$)	$\times 10^{-7}$	S=1.6
Γ_{295}	$K^0\ell^+\ell^-$	B1	[a]	< 6.8	$\times 10^{-7}$	CL=90%
Γ_{296}	$K^*(892)^0 e^+e^-$	B1		< 2.4	$\times 10^{-6}$	CL=90%
Γ_{297}	$K^*(892)^0\mu^+\mu^-$	B1		($1.22 {}^{+0.38}_{-0.32}$)	$\times 10^{-6}$	

Γ_{298}	$K^*(892)^0 \nu\overline{\nu}$	*B1*		< 1.0	$\times 10^{-3}$	CL=90%
Γ_{299}	$K^*(892)^0 \ell^+ \ell^-$	*B1*	[*a*]	(1.17± 0.30)	$\times 10^{-6}$	
Γ_{300}	$e^\pm \mu^\mp$	*LF*	[*e*]	< 1.7	$\times 10^{-7}$	CL=90%
Γ_{301}	$K^0 e^\pm \mu^\mp$	*LF*		< 4.0	$\times 10^{-6}$	CL=90%
Γ_{302}	$K^*(892)^0 e^\pm \mu^\mp$	*LF*		< 3.4	$\times 10^{-6}$	CL=90%
Γ_{303}	$e^\pm \tau^\mp$	*LF*	[*e*]	< 1.1	$\times 10^{-4}$	CL=90%
Γ_{304}	$\mu^\pm \tau^\mp$	*LF*	[*e*]	< 3.8	$\times 10^{-5}$	CL=90%
Γ_{305}	invisible	*B1*		< 2.2	$\times 10^{-4}$	CL=90%
Γ_{306}	$\nu\overline{\nu}\gamma$	*B1*		< 4.7	$\times 10^{-5}$	CL=90%

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

[*b*] $X(3872)^+$ is a hypothetical charged partner of the $X(3872)$.

[*c*] Stands for the possible candidates of $K^*(1410)$, $K^*_0(1430)$ and $K^*_2(1430)$.

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

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

[*f*] $\Theta(1540)^+$ denotes a possible narrow pentaquark state.

B^0 BRANCHING RATIOS

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

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

VALUE (units 10^{-2})	*DOCUMENT ID*		*TECN*	*COMMENT*
10.4 ±0.4 OUR AVERAGE				
10.32±0.36±0.35	[47] OKABE	05	BELL	$e^+ e^- \to \Upsilon(4S)$
10.78±0.60±0.69	[48] ARTUSO	97	CLE2	$e^+ e^- \to \Upsilon(4S)$
9.3 ±1.1 ±1.5	ALBRECHT	94	ARG	$e^+ e^- \to \Upsilon(4S)$
9.9 ±3.0 ±0.9	HENDERSON	92	CLEO	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.9 ±0.7 ±1.1	ATHANAS	94	CLE2	Sup. by ARTUSO 97

[47] The measurements are obtained for charged and neutral B mesons partial rates of semileptonic decay to electrons with momentum above 0.6 GeV/c in the B rest frame, and their ratio of B($B^+ \to e^+ \nu_e X$)/B($B^0 \to e^+ \nu_e X$) = 1.08 ± 0.05 ± 0.02.

[48] 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.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0212±0.0020 OUR EVALUATION				
0.0213±0.0018 OUR AVERAGE				
0.0213±0.0012±0.0039	ABE	02E	BELL	$e^+e^- \to \Upsilon(4S)$
0.0209±0.0013±0.0018	[49] BARTELT	99	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0235±0.0020±0.0044	[50] BUSKULIC	97	ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0187±0.0015±0.0032	[51] ATHANAS	97	CLE2	Repl. by BARTELT 99
0.018 ±0.006 ±0.003	[52] FULTON	91	CLEO	$e^+e^- \to \Upsilon(4S)$
0.020 ±0.007 ±0.006	[53] ALBRECHT	89J	ARG	$e^+e^- \to \Upsilon(4S)$

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

[50] 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.

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

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

[53] 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($D^0 \to K^- \pi^+$).

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

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0535±0.0020 OUR EVALUATION					
0.0520±0.0024 OUR AVERAGE Error includes scale factor of 1.2.					
$0.0490\pm0.0007^{+0.0036}_{-0.0035}$		[54] AUBERT	05E	BABR	$e^+e^- \to \Upsilon(4S)$
0.0590±0.0022±0.0050		[54] ABDALLAH	04D	DLPH	$e^+e^- \to Z^0$
0.0609±0.0019±0.0040		[55] ADAM	03	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0459±0.0023±0.0040		[56] ABE	02F	BELL	$e^+e^- \to \Upsilon(4S)$
$0.0470\pm0.0013^{+0.0036}_{-0.0031}$		[57] ABREU	01H	DLPH	$e^+e^- \to Z$
0.0526±0.0020±0.0046		[58] ABBIENDI	00Q	OPAL	$e^+e^- \to Z$
0.0553±0.0026±0.0052		[59] BUSKULIC	97	ALEP	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0539±0.0011±0.0034		[60] ABDALLAH	04D	DLPH	$e^+e^- \to Z^0$
0.0609±0.0019±0.0040		[61] BRIERE	02	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0508±0.0021±0.0066		[62] ACKERSTAFF	97G	OPAL	Repl. by ABBIENDI 00Q
0.0552±0.0017±0.0068		[63] ABREU	96P	DLPH	Repl. by ABREU 01H
0.0449±0.0032±0.0039	376	[64] BARISH	95	CLE2	Repl. by ADAM 03
0.0518±0.0030±0.0062	410	[65] BUSKULIC	95N	ALEP	Sup. by BUSKULIC 97

0.045 ±0.003 ±0.004		[66] ALBRECHT	94	ARG	$e^+e^- \to$	$\Upsilon(4S)$
0.047 ±0.005 ±0.005	235	[67] ALBRECHT	93	ARG	$e^+e^- \to$	$\Upsilon(4S)$
seen	398	[68] SANGHERA	93	CLE2	$e^+e^- \to$	$\Upsilon(4S)$
0.070 ±0.018 ±0.014		[69] ANTREASYAN	90B	CBAL	$e^+e^- \to$	$\Upsilon(4S)$
		[70] ALBRECHT	89C	ARG	$e^+e^- \to$	$\Upsilon(4S)$
0.060 ±0.010 ±0.014		[71] ALBRECHT	89J	ARG	$e^+e^- \to$	$\Upsilon(4S)$
0.040 ±0.004 ±0.006		[72] BORTOLETTO	89B	CLEO	$e^+e^- \to$	$\Upsilon(4S)$
0.070 ±0.012 ±0.019	47	[73] ALBRECHT	87J	ARG	$e^+e^- \to$	$\Upsilon(4S)$

[54] Measured using fully reconstructed D^* sample.

[55] Uses the combined fit of both $B^0 \to D^*(2010)^- \ell\nu$ and $B^+ \to \overline{D}(2007)^0 \ell\nu$ samples.

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

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

[58] 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.

[59] 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.

[60] Combines with previous partial reconstructed D^* measurement.

[61] The results are based on the same analysis and data sample reported in ADAM 03.

[62] 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.

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

[64] 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)%.

[65] 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)]%.

[66] 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.

[67] 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.

[68] 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 ± 0.06 ± 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.

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

[70] The measurement of ALBRECHT 89C suggests a D^* polarization γ_L/γ_T of 0.85 ± 0.45. or α = 0.7 ± 0.9.

[71] 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.

[72] 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.

[73] 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.

$\Gamma(\overline{D}^0 \pi^+ \ell^+ \nu_\ell)/\Gamma_{total}$ — Γ_4/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.2±0.9±0.3	[74] LIVENTSEV	05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[74] LIVENTSEV 05 reports $[B(B^0 \rightarrow \overline{D}^0 \pi^+ \ell^+ \nu_\ell) / B(B^+ \rightarrow \overline{D}^0 \ell^+ \nu_\ell)] = 0.15 \pm 0.03 \pm 0.03$. We multiply by our best value $B(B^+ \rightarrow \overline{D}^0 \ell^+ \nu_\ell) = (2.15 \pm 0.22) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^{*0} \pi^+ \ell^+ \nu_\ell)/\Gamma_{total}$ — Γ_5/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.5±1.5±0.5	[75,76] LIVENTSEV	05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[75] Excludes D^{*+} contribution to $D\pi$ modes.
[76] LIVENTSEV 05 reports $[B(B^0 \rightarrow \overline{D}^{*0} \pi^+ \ell^+ \nu_\ell) / B(B^+ \rightarrow \overline{D}^*(2007)^0 \ell^+ \nu_\ell)] = 0.10 \pm 0.02 \pm 0.01$. We multiply by our best value $B(B^+ \rightarrow \overline{D}^*(2007)^0 \ell^+ \nu_\ell) = (6.5 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.3 ±0.4 OUR AVERAGE					
$2.14 \pm 0.21 \pm 0.56$		[77] AUBERT,B	05O	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.17 \pm 0.34 ^{+0.62}_{-0.68}$		[78] ATHAR	03	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.57 \pm 0.29 ^{+0.53}_{-0.62}$		[79] BEHRENS	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.29 \pm 0.42 \pm 0.72$		[80] AUBERT	03E	BABR	Repl. by AUBERT,B 05O
$2.69 \pm 0.41 ^{+0.61}_{-0.64}$		[81] BEHRENS	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.5 \pm 0.4 ^{+0.7}_{-0.9}$		[82] ALEXANDER	96T	CLE2	Repl. by BEHRENS 00
<4.1	90	[83] BEAN	93B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

[77] B^+ and B^0 decays combined assuming isospin symmetry. Systematic errors include both experimental and form-factor uncertainties.
[78] ATHAR 03 reports systematic errors $^{+0.47}_{-0.5} \pm 0.41 \pm 0.01$, which are experimental systematic, systematic due to residual form-factor uncertainties in the signal, and systematic due to residual form-factor uncertainties in the cross-feed modes, respectively. We combine these in quadrature.
[79] 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.
[80] Uses isospin constraints and extrapolation to all electron energies according to five different form-factor calculations. The second error combines the systematic and theoretical uncertainties in quadrature.
[81] 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: $\Gamma(B^0 \rightarrow \rho^- \ell^+ \nu) = 2\Gamma(B^+ \rightarrow \rho^0 \ell^+ \nu) \approx 2\Gamma(B^+ \rightarrow \omega \ell^+ \nu)$. No evidence for $\omega \ell \nu$ is reported.

[82] 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.

[83] 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 $<(1.6\text{–}2.7) \times 10^{-4}$ 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 $|V_{ub}/V_{cb}| < 0.08\text{–}0.13$ at 90% CL is derived as well.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.36±0.15 OUR AVERAGE				
1.38±0.10±0.18	[84] AUBERT,B	05O	BABR	$e^+ e^- \to \Upsilon(4S)$
1.33±0.18±0.13	[85] ATHAR	03	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.8 ±0.4 ±0.4	[86] ALEXANDER	96T	CLE2	Repl. by ATHAR 03

[84] B^+ and B^0 decays combined assuming isospin symmetry. Systematic errors include both experimental and form-factor uncertainties.

[85] ATHAR 03 reports systematic errors $0.11 \pm 0.01 \pm 0.07$, which are experimental systematic, systematic due to residual form-factor uncertainties in the signal, and systematic due to residual form-factor uncertainties in the cross-feed modes, respectively. We combine these in quadrature.

[86] ALEXANDER 96T gives systematic errors $\pm 0.3 \pm 0.2$ 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_8/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	[87] ALBRECHT	91C	ARG

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

$\Gamma(K^\pm \text{anything})/\Gamma_{total}$ — Γ_9/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.78±0.08	[88] ALBRECHT	96D	ARG	$e^+ e^- \to \Upsilon(4S)$

[88] Average multiplicity.

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_{10}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.063±0.019±0.005	[89] AUBERT,BE	04B	BABR	$e^+ e^- \to \Upsilon(4S)$

[89] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\overline{D}^0 X)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.511±0.031±0.028	[90] AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[90] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D^0 X)/[\Gamma(D^0 X)+\Gamma(\overline{D}^0 X)]$ — $\Gamma_{10}/(\Gamma_{10}+\Gamma_{11})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.110±0.031±0.008	AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.051	90	[91] AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[91] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

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

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.397 \pm 0.030^{+0.040}_{-0.038}}$	[92] AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[92] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D^+ X)/[\Gamma(D^+ X)+\Gamma(D^- X)]$ — $\Gamma_{12}/(\Gamma_{12}+\Gamma_{13})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.055±0.040±0.006	AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(D_s^+ X)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.109 \pm 0.021^{+0.039}_{-0.024}}$	[93] AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[93] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D_s^- X)/\Gamma_{total}$ — Γ_{15}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.087	90	[94] AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[94] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D_s^+ X)/[\Gamma(D_s^+ X)+\Gamma(D_s^- X)]$ — $\Gamma_{14}/(\Gamma_{14}+\Gamma_{15})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.733±0.092±0.010	AUBERT,BE	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(\Lambda_c^+ X)/\Gamma_{\text{total}}$ — Γ_{16}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.038	90	[95] AUBERT,BE 04B	BABR	$e^+e^- \to \Upsilon(4S)$

[95] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\overline{\Lambda}_c^- X)/\Gamma_{\text{total}}$ — Γ_{17}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.049 \pm 0.017 ^{+0.018}_{-0.011}}$	[96] AUBERT,BE 04B	BABR	$e^+e^- \to \Upsilon(4S)$

[96] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\Lambda_c^+ X)/[\Gamma(\Lambda_c^+ X) + \Gamma(\overline{\Lambda}_c^- X)]$ — $\Gamma_{16}/(\Gamma_{16}+\Gamma_{17})$

VALUE	DOCUMENT ID	TECN	COMMENT
0.286±0.142±0.007	AUBERT,BE 04B	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{c} X)/\Gamma_{\text{total}}$ — Γ_{18}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{1.039 \pm 0.051 ^{+0.063}_{-0.058}}$	[97] AUBERT,BE 04B	BABR	$e^+e^- \to \Upsilon(4S)$

[97] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(c X)/\Gamma_{\text{total}}$ — Γ_{19}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.237 \pm 0.036 ^{+0.041}_{-0.027}}$	[98] AUBERT,BE 04B	BABR	$e^+e^- \to \Upsilon(4S)$

[98] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\overline{c} c X)/\Gamma_{\text{total}}$ — Γ_{20}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{1.276 \pm 0.062 ^{+0.088}_{-0.074}}$	[99] AUBERT,BE 04B	BABR	$e^+e^- \to \Upsilon(4S)$

[99] Events are selected by completely reconstructing one B and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D^- \pi^+)/\Gamma_{\text{total}}$ — Γ_{21}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.00283±0.00017 OUR AVERAGE	See the ideogram below.			
0.00290±0.00021±0.00011		[100,101] AUBERT,B 04O	BABR	$e^+e^- \to \Upsilon(4S)$
0.00268±0.00012±0.00024		[101,102] AHMED 02B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0027 ±0.0006 ±0.0005		[103] BORTOLETTO 92	CLEO	$e^+e^- \to \Upsilon(4S)$

0.0048	± 0.0011 ± 0.0011	22	[104] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.0051	$^{+0.0028}_{-0.0025}$ $^{+0.0013}_{-0.0012}$	4	[105] BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

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

0.0028	± 0.0004 ± 0.0001	81	[106] ALAM	94	CLE2	Repl. by AHMED 02B
0.0031	± 0.0013 ± 0.0010	7	[104] ALBRECHT	88K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[100] AUBERT,B 04O reports $[B(B^0 \rightarrow D^-\pi^+) \times B(D^+ \rightarrow K^0_S\pi^+)] = (42.7 \pm 2.1 \pm 2.2) \times 10^{-6}$. We divide by our best value $B(D^+ \rightarrow K^0_S\pi^+) = (1.47 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

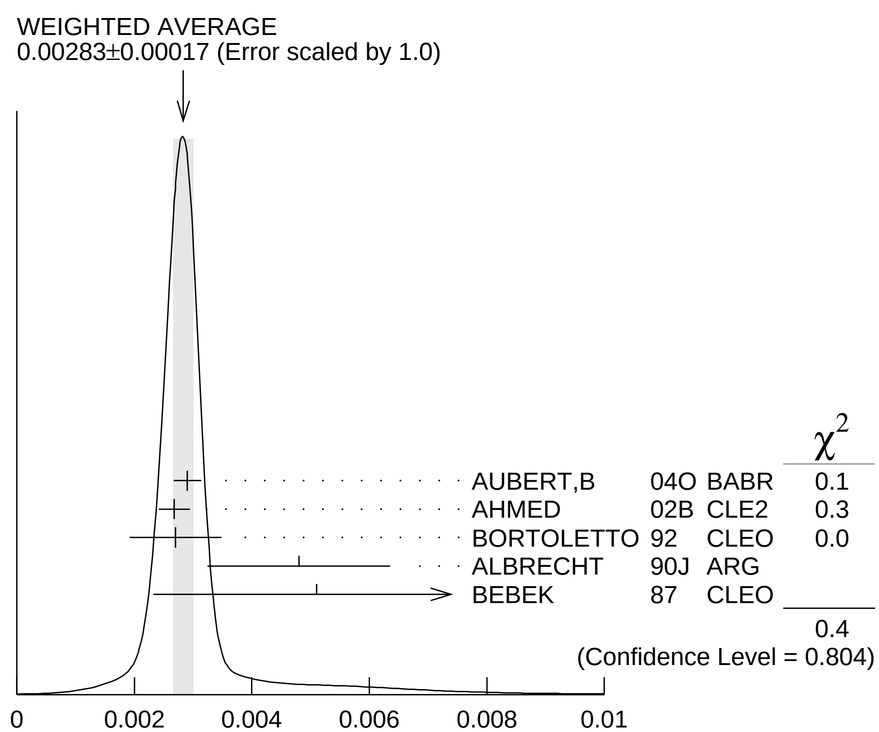
[102] AHMED 02B reports an additional uncertainty on the branching ratios to account for 4.5% uncertainty on relative production of B^0 and B^+, which is not included here.

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

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

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

[106] 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 $B(D^+ \rightarrow K^-\pi^+\pi^+) = (9.51 \pm 0.34) \times 10^{-2}$. 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 $\Upsilon(4S)$.



$\Gamma\left(D^-\pi^+\right)/\Gamma_{\text{total}}$ Γ_{21}/Γ

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0075±0.0012 OUR AVERAGE					
0.0074±0.0012±0.0003	79	[107] ALAM	94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.009 ±0.005 ±0.003	9	[108] 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	[108] ALBRECHT	88K	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[107] 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 $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.51 \pm 0.34) \times 10^{-2}$. 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 $\Upsilon(4S)$.

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

$\Gamma(D^- K^0 \pi^+)/\Gamma_{total}$ Γ_{23}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.9±0.7±0.5	[109] AUBERT,BE	05B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^- K^*(892)^+)/\Gamma_{total}$ Γ_{24}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.5±0.7 OUR AVERAGE				
4.6±0.6±0.5	[110] AUBERT,BE	05B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
3.7±1.5±1.0	[110] MAHAPATRA	02	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0028±0.0005±0.0004	[111] ALEXANDER	01B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

[111] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$. The signal is consistent with all observed $\omega \pi^+$ having proceeded through the ρ'^+ resonance at mass $1349 \pm 25^{+10}_{-5}$ MeV and width $547 \pm 86^{+46}_{-45}$ MeV.

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

VALUE	DOCUMENT ID		TECN	COMMENT
(2.04±0.50±0.27) × 10^{-4}	[112] ABE	01I	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[112] ABE 01I reports $B(B^0 \rightarrow D^- K^+)/B(B^0 \rightarrow D^- \pi^+) = 0.068 \pm 0.015 \pm 0.007$. We multiply by our best value $B(B^0 \rightarrow D^- \pi^+) = (3.0 \pm 0.4) \times 10^{-3}$. Our first error is their experiment's error and the second error is systematic error from using our best value.

$\Gamma(D^- K^+ \overline{K}^0)/\Gamma_{total}$ Γ_{27}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[113] DRUTSKOY	02	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^- K^+ \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{28}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.8±1.1±1.5	[114] DRUTSKOY	02	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}^0 \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{29}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.0± 0.6±1.5			[115,116] SATPATHY	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 16	90		[115] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
$<$ 70	90		[117] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
$<$340	90		[118] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
700 ±500		5	[119] BEHRENDS	83	CLEO	$e^+e^- \to \Upsilon(4S)$

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

[116] No assumption about the intermediate mechanism is made in the analysis.

[117] 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.

[118] 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 ± 0.4 ± 0.4)% and B($D^0 \to K^-\pi^+\pi^+\pi^-$) = (9.1 ± 0.8 ± 0.8)% were used.

[119] Corrected by us using assumptions: B($D^0 \to K^-\pi^+$) = (0.042 ± 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 ± 0.26) × 10^{-2}.

$\Gamma(D^*(2010)^- \pi^+)/\Gamma_{total}$ — Γ_{30}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.00276±0.00021 OUR AVERAGE					
0.00281±0.00024±0.00005		[120] BRANDENB...	98	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0026 ±0.0003 ±0.0004	82	[121] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.00337±0.00096±0.00002		[122] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.00236±0.00088±0.00002	12	[123] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
$0.00236^{+0.00150}_{-0.00110}$±0.00002	5	[124] 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	[125] AKERS	94J	OPAL	$e^+e^- \to Z$
0.0027 ±0.0014 ±0.0010	5	[126] ALBRECHT	87C	ARG	$e^+e^- \to \Upsilon(4S)$
0.0035 ±0.002 ±0.002		[127] ALBRECHT	86F	ARG	$e^+e^- \to \Upsilon(4S)$
0.017 ±0.005 ±0.005	41	[128] GILES	84	CLEO	$e^+e^- \to \Upsilon(4S)$

[120] 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($D^* \to D\pi$).

[121] 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($D^0 \to K^-\pi^+$).

[122] BORTOLETTO 92 reports 0.0040 ± 0.0010 ± 0.0007 for B($D^*(2010)^+ \to D^0\pi^+$) = 0.57 ± 0.06. We rescale to our best value B($D^*(2010)^+ \to D^0\pi^+$) = (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.

[123] 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.

[124] BEBEK 87 reports $0.0028^{+0.0015}_{-0.0012}{}^{+0.0010}_{-0.0006}$ 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. Updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92 and ALBRECHT 90J.

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

[126] 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.

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

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

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

VALUE	DOCUMENT ID	TECN	COMMENT
0.0080±0.0021±0.0014	[129] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[129] 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_{32}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0039±0.0014±0.0013	[130] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[130] 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_{33}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0011±0.0009±0.0004	[131] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[131] 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_{34}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0060±0.0022±0.0024	[132] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[132] 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_{35}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0152±0.0052±0.0001	51	[133] 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	[134] ALBRECHT	87C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[133] ALBRECHT 90J reports $0.018 \pm 0.004 \pm 0.005$ for $B(D^*(2010)^+ \rightarrow D^0\pi^+) = 0.57 \pm 0.06$. 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.

[134] 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_{36}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0068 ±0.0009 OUR AVERAGE					
0.0068 ±0.0003 ±0.0009		[135] CSORNA	03	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.0160 ±0.0113 ±0.0001		[136] BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.00589±0.00352±0.00004	19	[137] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0074 ±0.0010 ±0.0014	76	[138,139] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.081 ±0.029 $^{+0.059}_{-0.024}$	19	[140] CHEN	85	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[135] Assumes equal production of B^0 and B^+ at the $\Upsilon(4S)$ resonance. The second error combines the systematic and theoretical uncertainties in quadrature. CSORNA 03 includes data used in ALAM 94. A full angular fit to three complex helicity amplitudes is performed.

[136] BORTOLETTO 92 reports $0.019 \pm 0.008 \pm 0.011$ for $B(D^*(2010)^+ \rightarrow D^0\pi^+) = 0.57 \pm 0.06$. 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.

[137] ALBRECHT 90J reports $0.007 \pm 0.003 \pm 0.003$ for $B(D^*(2010)^+ \rightarrow D^0\pi^+) = 0.57 \pm 0.06$. 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.

[138] 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 $B(D^0 \rightarrow K^-\pi^+\pi^+\pi^-)/B(D^0 \rightarrow K^-\pi^+)$.

[139] 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.

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

$\Gamma(D^*(2010)^- K^+)/\Gamma_{total}$ — Γ_{37}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
2.14±0.20 OUR AVERAGE			
2.14±0.12±0.16	[141] AUBERT 06A	BABR	$e^+e^- \to \Upsilon(4S)$
2.0 ±0.4 ±0.2	[142] ABE 01I	BELL	$e^+e^- \to \Upsilon(4S)$

[141] AUBERT 06A reports $[B(B^0 \to D^*(2010)^- K^+) / B(B^0 \to D^*(2010)^- \pi^+)] = 0.0776 \pm 0.0034 \pm 0.0029$. We multiply by our best value $B(B^0 \to D^*(2010)^- \pi^+) = (2.76 \pm 0.21) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[142] ABE 01I reports $[B(B^0 \to D^*(2010)^- K^+) / B(B^0 \to D^*(2010)^- \pi^+)] = 0.074 \pm 0.015 \pm 0.006$. We multiply by our best value $B(B^0 \to D^*(2010)^- \pi^+) = (2.76 \pm 0.21) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^*(2010)^- K^0 \pi^+)/\Gamma_{total}$ — Γ_{38}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
3.0±0.7±0.3	[143] AUBERT,BE 05B	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- K^*(892)^+)/\Gamma_{total}$ — Γ_{39}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
3.3±0.6 OUR AVERAGE			
3.2±0.6±0.3	[144] AUBERT,BE 05B	BABR	$e^+e^- \to \Upsilon(4S)$
3.8±1.3±0.8	[145] MAHAPATRA 02	CLE2	$e^+e^- \to \Upsilon(4S)$

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

[145] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and an unpolarized final state.

$\Gamma(D^*(2010)^- K^+ \overline{K}^0)/\Gamma_{total}$ — Γ_{40}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<4.7	90	[146] DRUTSKOY 02	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- K^+ \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{41}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
12.9±2.2±2.5	[147] DRUTSKOY 02	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{42}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
0.0070 ±0.0008 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.				
0.00681±0.00023±0.00072		[148] MAJUMDER 04	BELL	$e^+e^- \to \Upsilon(4S)$
0.0063 ±0.0010 ±0.0011		[149,150] ALAM 94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0134 ±0.0036 ±0.0001		[151] BORTOLETTO 92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.0101 ±0.0041 ±0.0001		[152] ALBRECHT 90J	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.033 ±0.009 ±0.016		[153] ALBRECHT 87C	ARG	$e^+e^- \to \Upsilon(4S)$
<0.042	90	[154] BEBEK 87	CLEO	$e^+e^- \to \Upsilon(4S)$

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

[149] 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($D^0 \to K^-\pi^+$).

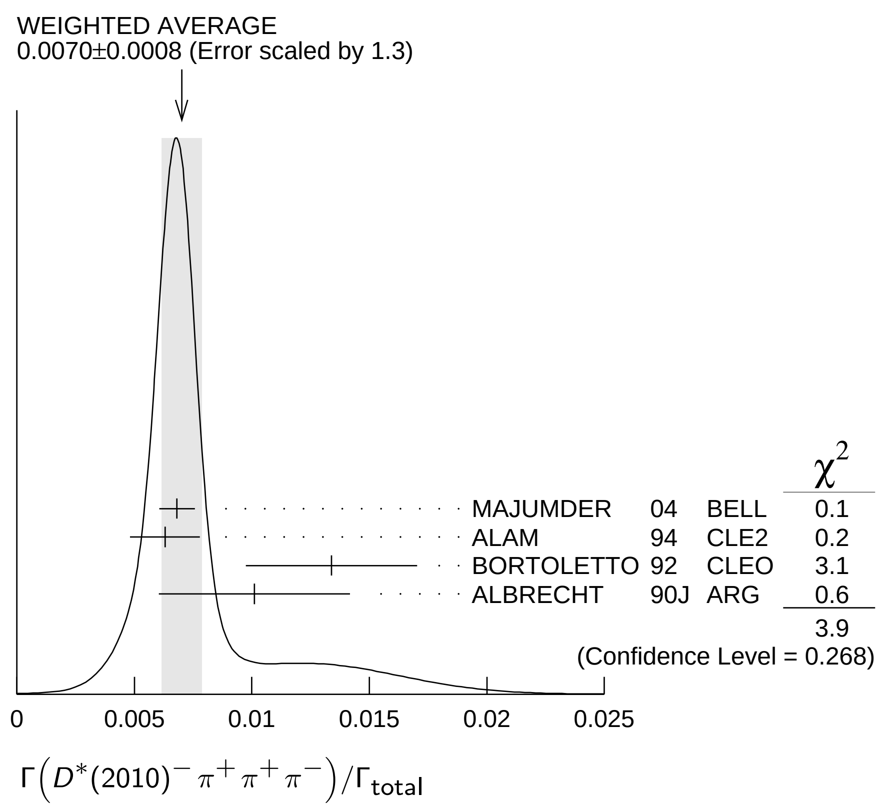
[150] The three pion mass is required to be between 1.0 and 1.6 GeV consistent with an a_1 meson. (If this channel is dominated by a_1^+, the branching ratio for $\overline{D}^{*-} a_1^+$ is twice that for $\overline{D}^{*-}\pi^+\pi^+\pi^-$.)

[151] BORTOLETTO 92 reports $0.0159 \pm 0.0028 \pm 0.0037$ for B($D^*(2010)^+ \to D^0\pi^+$) = 0.57 ± 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.

[152] ALBRECHT 90J reports $0.012 \pm 0.003 \pm 0.004$ for B($D^*(2010)^+ \to D^0\pi^+$) = 0.57 ± 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.

[153] 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.

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



$\Gamma\big((D^*(2010)^-\pi^+\pi^+\pi^-)\text{ nonresonant}\big)/\Gamma_{\text{total}}$ — Γ_{43}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0000±0.0019±0.0016	[155] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma\big(D^*(2010)^-\pi^+\rho^0\big)/\Gamma_{\text{total}}$ — Γ_{44}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.00573±0.00317±0.00004	[156] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

[156] 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.

$\Gamma\big(D^*(2010)^- a_1(1260)^+\big)/\Gamma_{\text{total}}$ — Γ_{45}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0130±0.0027 OUR AVERAGE			
0.0126±0.0020±0.0022	[157,158] ALAM 94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0152±0.0070±0.0001	[159] BORTOLETTO92	CLEO	$e^+e^- \to \Upsilon(4S)$

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

[158] 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 $B(D^0 \to K^-\pi^+\pi^+\pi^-)/B(D^0 \to K^-\pi^+)$.

[159] BORTOLETTO 92 reports $0.018 \pm 0.006 \pm 0.006$ 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.

$\Gamma\big(D^*(2010)^-\pi^+\pi^+\pi^-\pi^0\big)/\Gamma_{\text{total}}$ — Γ_{46}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0176±0.0027 OUR AVERAGE				
0.0172±0.0014±0.0024		[160] ALEXANDER 01B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0345±0.0181±0.0003	28	[161] ALBRECHT 90J	ARG	$e^+e^- \to \Upsilon(4S)$

[160] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$. The signal is consistent with all observed $\omega\pi^+$ having proceeded through the ρ'^+ resonance at mass $1349 \pm 25^{+10}_{-5}$ MeV and width $547 \pm 86^{+46}_{-45}$ MeV.

[161] ALBRECHT 90J reports $0.041 \pm 0.015 \pm 0.016$ 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.

$\Gamma(D^{*-} 3\pi^+ 2\pi^-)/\Gamma_{total}$ — Γ_{47}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.72±0.59±0.71	[162] MAJUMDER	04	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- p\overline{p}\pi^+)/\Gamma_{total}$ — Γ_{48}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$6.5^{+1.3}_{-1.2}\pm1.0$	[163] ANDERSON	01	CLE2	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- p\overline{n})/\Gamma_{total}$ — Γ_{49}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$14.5^{+3.4}_{-3.0}\pm2.7$	[164] ANDERSON	01	CLE2	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}^*(2010)^- \omega\pi^+)/\Gamma_{total}$ — Γ_{50}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0029±0.0003±0.0004	[165] ALEXANDER	01B	CLE2	$e^+ e^- \to \Upsilon(4S)$

[165] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$. The signal is consistent with all observed $\omega\pi^+$ having proceeded through the ρ'^+ resonance at mass $1349 \pm 25^{+10}_{-\ 5}$ MeV and width $547 \pm 86^{+46}_{-45}$ MeV.

$\Gamma(D_1(2420)^- \pi^+ \times B(D_1^- \to D^- \pi^+ \pi^-))/\Gamma_{total}$ — Γ_{51}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$0.89\pm0.15^{+0.17}_{-0.32}$	[166] ABE	05A	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D_1(2420)^- \pi^+ \times B(D_1^- \to D^{*-} \pi^+ \pi^-))/\Gamma_{total}$ — Γ_{52}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.33	90	[167] ABE	05A	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}_2^*(2460)^- \pi^+)/\Gamma_{total}$ — Γ_{53}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0022	90	[168] ALAM	94	CLE2	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D_2^*(2460)^- \pi^+ \times B((D_2^*)^- \to D^{*-} \pi^+ \pi^-))/\Gamma_{total}$ — Γ_{54}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	90	[169] ABE	05A	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}_2^*(2460)^- \rho^+)/\Gamma_{total}$ Γ_{55}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0049	90	[170] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$

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

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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
1.91±0.51±0.30		[171] MAJUMDER	05	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 9.4	90	[171] LIPELES	00	CLE2	$e^+e^- \to \Upsilon(4S)$
<59	90	BARATE	98Q	ALEP	$e^+e^- \to Z$
<12	90	ASNER	97	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D^- D_s^+)/\Gamma_{total}$ Γ_{57}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0065±0.0021 OUR AVERAGE					
0.0069±0.0025±0.0009		[172] GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
0.010 ±0.009 ±0.001		[173] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$
0.0055±0.0031±0.0007		[174] 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	[175] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[172] GIBAUT 96 reports 0.0087 ± 0.0024 ± 0.0020 for B($D_s^+ \to \phi\pi^+$) = 0.035. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = (4.4 ± 0.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[173] ALBRECHT 92G reports 0.017 ± 0.013 ± 0.006 for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = (4.4 ± 0.6) × 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%.

[174] BORTOLETTO 92 reports 0.0080 ± 0.0045 ± 0.0030 for B($D_s^+ \to \phi\pi^+$) = 0.030 ± 0.011. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = (4.4 ± 0.6) × 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.

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

$\Gamma(D^*(2010)^- D_s^+)/\Gamma_{total}$ Γ_{58}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0088±0.0016 OUR AVERAGE					
0.0084±0.0016±0.0011		[176] AUBERT	03I	BABR	$e^+e^- \to \Upsilon(4S)$
0.0090±0.0017±0.0012		[177] AHMED	00B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.009 ±0.006 ±0.001		[178] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$
0.011 ±0.006 ±0.001		[179] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0074±0.0022±0.0010		[180] GIBAUT	96	CLE2	Repl. by AHMED 00B
0.024 ±0.014	3	[181] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[176] AUBERT 03I reports $0.0103 \pm 0.0014 \pm 0.0013$ for $B(D_s^+ \to \phi\pi^+) = 0.036$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[177] AHMED 00B reports $0.0110 \pm 0.0018 \pm 0.0011$ for $B(D_s^+ \to \phi\pi^+) = 0.036$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[178] 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 $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ and $D^*(2010)^+$ branching ratios, e.g., $B(D^0 \to K^-\pi^+) = 3.71 \pm 0.25\%$, $B(D^+ \to K^-\pi^+\pi^+) = 7.1 \pm 1.0\%$, and $B(D^*(2010)^+ \to D^0\pi^+) = 55 \pm 4\%$.

[179] BORTOLETTO 92 reports $0.016 \pm 0.009 \pm 0.006$ for $B(D_s^+ \to \phi\pi^+) = 0.030 \pm 0.011$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D and $D^*(2010)$.

[180] 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 $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(D^- D_s^{*+})/\Gamma_{total}$ — Γ_{59}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0086±0.0034 OUR AVERAGE				
0.0080±0.0033±0.0010	[182] GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
0.017 ±0.012 ±0.002	[183] ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$

[182] 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 $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[183] 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 $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ branching ratios, e.g., $B(D^+ \to K^-\pi^+\pi^+) = 7.7 \pm 1.0\%$.

$\left[\Gamma(D^*(2010)^- D_s^+) + \Gamma(D^*(2010)^- D_s^{*+})\right]/\Gamma_{total}$ — $(\Gamma_{58}+\Gamma_{60})/\Gamma$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6 ±0.5 OUR AVERAGE					
2.45±0.35±0.32		[184] AUBERT	03I	BABR	$e^+e^- \to \Upsilon(4S)$
3.4 ±0.9 ±0.4	22	[185] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[184] AUBERT 03I reports $(3.00 \pm 0.19 \pm 0.39) \times 10^{-2}$ for $B(D_s^+ \to \phi\pi^+) = 0.036$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[185] BORTOLETTO 90 reports $(7.5 \pm 2.0) \times 10^{-2}$ for $B(D_s^+ \to \phi\pi^+) = 0.02$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^*(2010)^- D_s^{*+})/\Gamma_{total}$ — Γ_{60}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.0179±0.0016 OUR AVERAGE			
0.0188±0.0009±0.0017	[186] AUBERT 05V	BABR	$e^+e^- \to \Upsilon(4S)$
0.0161±0.0027±0.0021	[187] AUBERT 03I	BABR	$e^+e^- \to \Upsilon(4S)$
0.015 ±0.004 ±0.002	[188] AHMED 00B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.016 ±0.009 ±0.002	[189] ALBRECHT 92G	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.016 ±0.005 ±0.002	[190] GIBAUT 96	CLE2	Repl. by AHMED 00B

[186] A partial reconstruction technique is used and the result is independent of the particle decay rate of D_S^+ meson. It also provides a model-independent determination of $B(D_S^+ \to \phi\pi^+) = (4.81 \pm 0.52 \pm 0.38)\%$.

[187] AUBERT 03I reports $0.0197 \pm 0.0015 \pm 0.0030$ for $B(D_s^+ \to \phi\pi^+) = 0.036$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[188] AHMED 00B reports $0.0182 \pm 0.0037 \pm 0.0025$ for $B(D_s^+ \to \phi\pi^+) = 0.036$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[189] 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 $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990 D^+ and $D^*(2010)^+$ branching ratios, e.g., $B(D^0 \to K^-\pi^+) = 3.71 \pm 0.25\%$, $B(D^+ \to K^-\pi^+\pi^+) = 7.1 \pm 1.0\%$, and $B(D^*(2010)^+ \to D^0\pi^+) = 55 \pm 4\%$.

[190] 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 $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s0}(2317)^+ K^- \times B(D_{s0}(2317)^+ \to D_s^+\pi^0))/\Gamma_{total}$ — Γ_{61}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
$4.3^{+1.4}_{-1.3}\pm0.6$	[191] DRUTSKOY 05	BELL	$e^+e^- \to \Upsilon(4S)$

[191] DRUTSKOY 05 reports $(5.3^{+1.5}_{-1.3} \pm 1.6) \times 10^{-5}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s0}(2317)^+ \pi^- \times B(D_{s0}(2317)^+ \to D_s^+\pi^0))/\Gamma_{total}$ — Γ_{62}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<2.5	90	[192] DRUTSKOY 05	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ K^- \times B(D_{sJ}(2457)^+ \to D_s^+\pi^0))/\Gamma_{total}$ — Γ_{63}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<0.94	90	[193] DRUTSKOY 05	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ \pi^- \times B(D_{sJ}(2457)^+ \to D_s^+ \pi^0))/\Gamma_{total}$ Γ_{64}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.40	90	[194] DRUTSKOY	05	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_s^- D_s^+)/\Gamma_{total}$ Γ_{65}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-4}$	90	[195] AUBERT,BE	05F	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_s^{*-} D_s^+)/\Gamma_{total}$ Γ_{66}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-4}$	90	[196] AUBERT,BE	05F	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_s^{*-} D_s^{*+})/\Gamma_{total}$ Γ_{67}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.4 \times 10^{-4}$	90	[197] AUBERT,BE	05F	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_{s0}(2317)^+ D^- \times B(D_{s0}(2317)^+ \to D_s^+ \pi^0))/\Gamma_{total}$ Γ_{68}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$0.97^{+0.41}_{-0.34}$ OUR AVERAGE	Error includes scale factor of 1.4.			
$1.5\ ^{+0.5}_{-0.4}\ \pm 0.2$	[198,199] AUBERT,B	04S	BABR	$e^+e^- \to \Upsilon(4S)$
$0.70^{+0.30}_{-0.24}\pm 0.09$	[198,200] KROKOVNY	03B	BELL	$e^+e^- \to \Upsilon(4S)$

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

[199] AUBERT,B 04S reports $(1.8 \pm 0.4^{+0.7}_{-0.5}) \times 10^{-3}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[200] KROKOVNY 03B reports $(0.86^{+0.33}_{-0.26} \pm 0.26) \times 10^{-3}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s0}(2317)^+ D^- \times B(D_{s0}(2317)^+ \to D_s^{*+} \gamma))/\Gamma_{total}$ Γ_{69}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.95	90	[201] KROKOVNY	03B	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_{s0}(2317)^+ D^*(2010)^- \times B(D_{s0}(2317)^+ \to D_s^+ \pi^0))/\Gamma_{total}$ Γ_{70}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$1.5 \pm 0.4^{+0.5}_{-0.4}$	[202] AUBERT,B 04S	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^{*+} \pi^0))/\Gamma_{total}$ Γ_{71}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$2.0^{+0.6}_{-0.5}$ OUR AVERAGE			
$2.3^{+1.0}_{-0.7} \pm 0.3$	[203,204] AUBERT,B 04S	BABR	$e^+e^- \to \Upsilon(4S)$
$1.9^{+0.7}_{-0.6} \pm 0.2$	[203,205] KROKOVNY 03B	BELL	$e^+e^- \to \Upsilon(4S)$

[203] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[204] AUBERT,B 04S reports $(2.8 \pm 0.8^{+1.1}_{-0.8}) \times 10^{-3}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[205] KROKOVNY 03B reports $(2.27^{+0.73}_{-0.62} \pm 0.68) \times 10^{-3}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^+ \gamma))/\Gamma_{total}$ Γ_{72}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$0.66^{+0.18}_{-0.15}$ OUR AVERAGE			
$0.65^{+0.25}_{-0.16} \pm 0.09$	[206,207] AUBERT,B 04S	BABR	$e^+e^- \to \Upsilon(4S)$
$0.67^{+0.21}_{-0.19} \pm 0.09$	[206,208] KROKOVNY 03B	BELL	$e^+e^- \to \Upsilon(4S)$

[206] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[207] AUBERT,B 04S reports $(0.8 \pm 0.2^{+0.3}_{-0.2}) \times 10^{-3}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[208] KROKOVNY 03B reports $(0.82^{+0.22}_{-0.19} \pm 0.25) \times 10^{-3}$ for $B(D_s^+ \to \phi\pi^+) = 0.036 \pm 0.009$. We rescale to our best value $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^{*+} \gamma))/\Gamma_{total}$ Γ_{73}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.60	90	[209] KROKOVNY 03B	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^+ \pi^+ \pi^-))/\Gamma_{total}$ Γ_{74}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	[210] KROKOVNY	03B	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ D^- \times B(D_{sJ}(2457)^+ \to D_s^+ \pi^0))/\Gamma_{total}$ Γ_{75}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.36	90	[211] KROKOVNY	03B	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ D^*(2010) \times B(D_{sJ}(2457)^+ \to D_s^{*+} \pi^0))/\Gamma_{total}$ Γ_{76}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$5.5 \pm 1.2^{+2.2}_{-1.6}$	[212] AUBERT,B	04S	BABR	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D_{sJ}(2457)^+ D^*(2010) \times B(D_{sJ}(2457)^+ \to D_s^+ \gamma))/\Gamma_{total}$ Γ_{77}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$2.3 \pm 0.3^{+0.9}_{-0.6}$	[213] AUBERT,B	04S	BABR	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(D^- D_{sJ}(2536)^+ \times B(D_{sJ}(2536)^+ \to D^*(2007)^0 K^+))/\Gamma_{total}$ Γ_{78}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	AUBERT	03X	BABR	$e^+ e^- \to \Upsilon(4S)$

$\Gamma(D^*(2010)^- D_{sJ}(2536)^+ \times B(D_{sJ}(2536)^+ \to D^*(2007)^0 K^+))/\Gamma_{total}$ Γ_{79}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	AUBERT	03X	BABR	$e^+ e^- \to \Upsilon(4S)$

$\Gamma(D^- D_{sJ}(2573)^+ \times B(D_{sJ}(2573)^+ \to D^0 K^+))/\Gamma_{total}$ Γ_{80}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	AUBERT	03X	BABR	$e^+ e^- \to \Upsilon(4S)$

$\Gamma(D^*(2010)^- D_{sJ}(2573)^+ \times B(D_{sJ}(2573)^+ \to D^0 K^+))/\Gamma_{total}$ Γ_{81}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	AUBERT	03X	BABR	$e^+ e^- \to \Upsilon(4S)$

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
22±7 OUR AVERAGE					
$26. \pm 9. \pm 3.$		[214] AUBERT	03D	BABR	$e^+ e^- \to \Upsilon(4S)$
$20.^{+9.}_{-7.} \pm 3.$		[215] KROKOVNY	02	BELL	$e^+ e^- \to \Upsilon(4S)$

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

< 230	90	[216] ALEXANDER	93B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<1300	90	[217] BORTOLETTO90	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[214] AUBERT 03D reports $[B(B^0 \rightarrow D_s^+\pi^-) \times B(D_s^+ \rightarrow \phi\pi^+)] = (1.13 \pm 0.33 \pm 0.21) \times 10^{-6}$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[215] KROKOVNY 02 reports $[B(B^0 \rightarrow D_s^+\pi^-) \times B(D_s^+ \rightarrow \phi\pi^+)] = (0.86^{+0.37}_{-0.30} \pm 0.11) \times 10^{-6}$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[216] ALEXANDER 93B reports $< 270 \times 10^{-6}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.044$.

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

$[\Gamma(D_s^+\pi^-) + \Gamma(D_s^- K^+)]/\Gamma_{total}$ $(\Gamma_{82}+\Gamma_{88})/\Gamma$

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<0.0010	90	[218] ALBRECHT 93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[218] ALBRECHT 93E reports $< 1.7 \times 10^{-3}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.044$.

$\Gamma(D_s^{*+}\pi^-)/\Gamma_{total}$ Γ_{83}/Γ

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
< 4.1	90	AUBERT 03D	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<40	90	[219] ALEXANDER 93B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[219] ALEXANDER 93B reports $< 44 \times 10^{-5}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.044$.

$[\Gamma(D_s^{*+}\pi^-) + \Gamma(D_s^{*-} K^+)]/\Gamma_{total}$ $(\Gamma_{83}+\Gamma_{89})/\Gamma$

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<0.0007	90	[220] ALBRECHT 93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[220] ALBRECHT 93E reports $< 1.2 \times 10^{-3}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.044$.

$\Gamma(D_s^+\rho^-)/\Gamma_{total}$ Γ_{84}/Γ

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<0.0006	90	[221] ALEXANDER 93B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0013	90	[222] ALBRECHT 93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[221] ALEXANDER 93B reports $< 6.6 \times 10^{-4}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.044$.

[222] ALBRECHT 93E reports $< 2.2 \times 10^{-3}$ for $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 0.044$.

$\Gamma(D_s^{*+}\rho^-)/\Gamma_{total}$ Γ_{85}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0006	90	[223] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0015	90	[224] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[223] ALEXANDER 93B reports $< 7.4 \times 10^{-4}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

[224] ALBRECHT 93E reports $< 2.5 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^+ a_1(1260)^-)/\Gamma_{total}$ Γ_{86}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0021	90	[225] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[225] ALBRECHT 93E reports $< 3.5 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^{*+} a_1(1260)^-)/\Gamma_{total}$ Γ_{87}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0018	90	[226] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[226] ALBRECHT 93E reports $< 2.9 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^- K^+)/\Gamma_{total}$ Γ_{88}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
31± 8 OUR AVERAGE					
$26.\pm10.\pm3.$		[227] AUBERT	03D	BABR	$e^+e^- \to \Upsilon(4S)$
$37.^{+11.}_{-10.}\pm5.$		[228] KROKOVNY	02	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 190	90	[229] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
<1300	90	[230] BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[227] AUBERT 03D reports [B($B^0 \to D_s^- K^+$) × B($D_s^+ \to \phi\pi^+$)] = $(1.16 \pm 0.36 \pm 0.24) \times 10^{-6}$. We divide by our best value B($D_s^+ \to \phi\pi^+$) = $(4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[228] KROKOVNY 02 reports [B($B^0 \to D_s^- K^+$) × B($D_s^+ \to \phi\pi^+$)] = $(1.61^{+0.45}_{-0.38} \pm 0.21) \times 10^{-6}$. We divide by our best value B($D_s^+ \to \phi\pi^+$) = $(4.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[229] ALEXANDER 93B reports $< 230 \times 10^{-6}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

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

$\Gamma(D_s^{*-} K^+)/\Gamma_{total}$ Γ_{89}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.5	90	AUBERT	03D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14	90	[231] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$

[231] ALEXANDER 93B reports $< 17 \times 10^{-5}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^- K^*(892)^+)/\Gamma_{total}$ Γ_{90}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0008	90	[232] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0028	90	[233] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[232] ALEXANDER 93B reports $< 9.7 \times 10^{-4}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

[233] ALBRECHT 93E reports $< 4.6 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^{*-} K^*(892)^+)/\Gamma_{total}$ Γ_{91}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0009	90	[234] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.004	90	[235] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[234] ALEXANDER 93B reports $< 11.0 \times 10^{-4}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

[235] ALBRECHT 93E reports $< 5.8 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^- \pi^+ K^0)/\Gamma_{total}$ Γ_{92}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	90	[236] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[236] ALBRECHT 93E reports $< 7.3 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0026	90	[237] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[237] ALBRECHT 93E reports $< 4.2 \times 10^{-3}$ for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.044.

$\Gamma(D_s^- \pi^+ K^*(892)^0)/\Gamma_{total}$ — Γ_{94}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0031	90	[238] ALBRECHT	93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[238] ALBRECHT 93E reports $< 5.0 \times 10^{-3}$ for B($D_s^+ \rightarrow \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \rightarrow \phi\pi^+$) = 0.044.

$\Gamma(D_s^{*-} \pi^+ K^*(892)^0)/\Gamma_{total}$ — Γ_{95}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0017	90	[239] ALBRECHT	93E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[239] ALBRECHT 93E reports $< 2.7 \times 10^{-3}$ for B($D_s^+ \rightarrow \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \rightarrow \phi\pi^+$) = 0.044.

$\Gamma(\overline{D}^0 K^0)/\Gamma_{total}$ — Γ_{96}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{(5.0^{+1.3}_{-1.2} \pm 0.6) \times 10^{-5}}$	[240] KROKOVNY	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^0 K^+ \pi^-)/\Gamma_{total}$ — Γ_{97}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
88±15±9	[241] AUBERT	06A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

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

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

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
5.3±0.8 OUR AVERAGE				
5.7±0.9±0.6	[242] AUBERT	06A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$4.8^{+1.1}_{-1.0} \pm 0.5$	[242] KROKOVNY	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D_2^*(2460)^- K^+ \times B(D_2^*(2460)^- \rightarrow \overline{D}^0 \pi^-))/\Gamma_{total}$ — Γ_{99}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
18.3±4.0±3.1	[243] AUBERT	06A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^0 K^+ \pi^- \text{ non-resonant})/\Gamma_{total}$ — Γ_{100}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<37	90	[244] AUBERT	06A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^0\pi^0)/\Gamma_{total}$ Γ_{101}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.91±0.28 OUR AVERAGE					
2.9 ±0.2 ±0.3		[245] AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$
3.1 ±0.4 ±0.5		[245] ABE	02J	BELL	$e^+e^- \to \Upsilon(4S)$
$2.74^{+0.36}_{-0.32}\pm0.55$		[245] COAN	02	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.2	90	[246] NEMATI	98	CLE2	Repl. by COAN 02
<4.8	90	[247] ALAM	94	CLE2	Repl. by NEMATI 98

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

[246] 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.

[247] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II 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($D^0 \to K^-\pi^+$).

$\Gamma(\overline{D}^0\rho^0)/\Gamma_{total}$ Γ_{102}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±1.0±0.4			[248] SATPATHY	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.9	90		[249] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
< 5.5	90		[250] ALAM	94	CLE2	Repl. by NEMATI 98
< 6.0	90		[251] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
<27.0	90	4	[252] ALBRECHT	88K	ARG	$e^+e^- \to \Upsilon(4S)$

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

[249] 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.

[250] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II 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($D^0 \to K^-\pi^+$).

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

[252] 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_{103}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.2±0.5 OUR AVERAGE	Error includes scale factor of 1.6.				
2.5±0.2±0.3		[253] AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$
$1.4^{+0.5}_{-0.4}\pm0.3$		[253] ABE	02J	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.3	90	[254] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<6.8	90	[255] ALAM	94	CLE2	Repl. by NEMATI 98

[253] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[254] 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.
[255] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II 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($D^0 \to K^- \pi^+$).

$\Gamma(\overline{D}^0 \eta')/\Gamma_{total}$ — Γ_{104}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
1.25±0.23 OUR AVERAGE		Error includes scale factor of 1.1.			
$1.14\pm0.20^{+0.10}_{-0.13}$		[256] SCHUMANN	05	BELL	$e^+e^- \to \Upsilon(4S)$
1.7 ±0.4 ±0.2		[256] AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.4	90	[257] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<8.6	90	[258] ALAM	94	CLE2	Repl. by NEMATI 98

[256] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[257] 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.
[258] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II 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($D^0 \to K^- \pi^+$).

$\Gamma(\overline{D}^0 \eta')/\Gamma(\overline{D}^0 \eta)$ — $\Gamma_{104}/\Gamma_{103}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.7±0.2 ±0.1	AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{D}^0 \omega)/\Gamma_{total}$ — Γ_{105}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.5±0.6 OUR AVERAGE		Error includes scale factor of 1.5.			
3.0±0.3±0.4		[259] AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$
$1.8\pm0.5^{+0.4}_{-0.3}$		[259] ABE	02J	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<5.1	90	[260] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<6.3	90	[261] ALAM	94	CLE2	Repl. by NEMATI 98

[259] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[260] 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.
[261] ALAM 94 assume equal production of B^+ and B^0 at the $\Upsilon(4S)$ and use the CLEO II 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($D^0 \to K^- \pi^+$).

$\Gamma(D^0 K^*(892)^0)/\Gamma_{total}$ — Γ_{107}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.8 \times 10^{-5}$	90	[262] KROKOVNY	03	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D^0 K^+ \pi^-)/\Gamma_{total}$ Γ_{106}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<19	90	[263] AUBERT	06A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^{*0} \gamma)/\Gamma_{total}$ Γ_{108}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.5 \times 10^{-5}$	90	[264] AUBERT,B	05Q	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.0 \times 10^{-5}$	90	[264] ARTUSO	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^*(2007)^0 \pi^0)/\Gamma_{total}$ Γ_{109}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.7 ±0.5 OUR AVERAGE					
2.9 ±0.4 ±0.5		[265] AUBERT	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.7 {}^{+0.8}_{-0.7} {}^{+0.5}_{-0.6}$		[265] ABE	02J	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.20 {}^{+0.59}_{-0.52} \pm 0.79$		[265] COAN	02	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.4	90	[266] NEMATI	98	CLE2	Repl. by COAN 02
<9.7	90	[267] ALAM	94	CLE2	Repl. by NEMATI 98

[265] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[266] 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.
[267] 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 $B(D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$.

$\Gamma(\overline{D}^0 \pi^0)/\Gamma(\overline{D}^*(2007)^0 \pi^0)$ $\Gamma_{101}/\Gamma_{109}$

VALUE	DOCUMENT ID		TECN	COMMENT
1.0±0.1 ±0.2	AUBERT	04B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(\overline{D}^*(2007)^0 \rho^0)/\Gamma_{total}$ Γ_{110}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.1 \times 10^{-4}$	90	[268] SATPATHY	03	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.00056	90	[269] NEMATI	98	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
<0.00117	90	[270] ALAM	94	CLE2	Repl. by NEMATI 98

[268] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[269] 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.
[270] 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_{111}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.6±0.4±0.4		[271] AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.6	90	[271] ABE	02J	BELL	$e^+e^- \to \Upsilon(4S)$
<2.6	90	[272] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<6.9	90	[273] ALAM	94	CLE2	Repl. by NEMATI 98

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

[272] 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.

[273] 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 $B(D^0 \to K^-\pi^+\pi^+\pi^-)/B(D^0 \to K^-\pi^+)$.

$\Gamma(\overline{D}^0\eta)/\Gamma(\overline{D}^*(2007)^0\eta)$ — $\Gamma_{103}/\Gamma_{111}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.9±0.2 ±0.1	AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{D}^*(2007)^0\eta')/\Gamma(\overline{D}^*(2007)^0\eta)$ — $\Gamma_{112}/\Gamma_{111}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.5±0.3 ±0.1	AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{D}^*(2007)^0\eta')/\Gamma_{total}$ — Γ_{112}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
1.23±0.35 OUR AVERAGE					
1.21±0.34±0.22		[274] SCHUMANN	05	BELL	$e^+e^- \to \Upsilon(4S)$
1.3 ±0.7 ±0.2		[274,275] AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14	90	BRANDENB...	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<19	90	[276] NEMATI	98	CLE2	$e^+e^- \to \Upsilon(4S)$
<27	90	[277] ALAM	94	CLE2	Repl. by NEMATI 98

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

[275] Reports an upper limit $< 2.6 \times 10^{-4}$ at 90% CL.

[276] 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.

[277] 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 $B(D^0 \to K^-\pi^+\pi^+\pi^-)/B(D^0 \to K^-\pi^+)$.

$\Gamma(\overline{D}^0\eta')/\Gamma(\overline{D}^*(2007)^0\eta')$ — $\Gamma_{104}/\Gamma_{112}$

VALUE	DOCUMENT ID		TECN	COMMENT
1.3±0.8±0.2	AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{D}^0\omega)/\Gamma(\overline{D}^*(2007)^0\omega)$ — $\Gamma_{105}/\Gamma_{119}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.7±0.1 ±0.1	AUBERT	04B	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{D}^*(2007)^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{113}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(6.2\pm1.2\pm1.8)\times10^{-4}$	[278,279] SATPATHY	03	BELL	$e^+e^-\to\Upsilon(4S)$

[278] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[279] No assumption about the intermediate mechanism is made in the analysis.

$\Gamma(\overline{D}^*(2007)^0K^0)/\Gamma_{total}$ — Γ_{114}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.6\times10^{-5}$	90	[280] KROKOVNY	03	BELL	$e^+e^-\to\Upsilon(4S)$

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

$\Gamma(\overline{D}^*(2007)^0K^*(892)^0)/\Gamma_{total}$ — Γ_{115}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.9\times10^{-5}$	90	[281] KROKOVNY	03	BELL	$e^+e^-\to\Upsilon(4S)$

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

$\Gamma(D^*(2007)^0K^*(892)^0)/\Gamma_{total}$ — Γ_{116}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.0\times10^{-5}$	90	[282] KROKOVNY	03	BELL	$e^+e^-\to\Upsilon(4S)$

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

$\Gamma(D^*(2007)^0\pi^+\pi^+\pi^-\pi^-)/\Gamma_{total}$ — Γ_{117}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.7 ±0.5 OUR AVERAGE				
$2.60\pm0.47\pm0.37$	[283] MAJUMDER	04	BELL	$e^+e^-\to\Upsilon(4S)$
$3.0\pm0.7\pm0.6$	[283] EDWARDS	02	CLE2	$e^+e^-\to\Upsilon(4S)$

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

$\Gamma(D^*(2007)^0\pi^+\pi^+\pi^-\pi^-)/\Gamma(D^*(2010)^-\pi^+\pi^+\pi^-\pi^0)$ — Γ_{117}/Γ_{46}

VALUE	DOCUMENT ID		TECN	COMMENT
$0.17\pm0.04\pm0.02$	[284] EDWARDS	02	CLE2	$e^+e^-\to\Upsilon(4S)$

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

$\Gamma(D^*(2010)^+D^*(2010)^-)/\Gamma_{total}$ — Γ_{118}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
8.3±1.1 OUR AVERAGE					
$8.1\pm0.8\pm1.1$		[285] MIYAKE	05	BELL	$e^+e^-\to\Upsilon(4S)$
$8.3\pm1.6\pm1.2$		[285,286] AUBERT	02M	BABR	$e^+e^-\to\Upsilon(4S)$
$9.9^{+4.2}_{-3.3}\pm1.2$		[285] LIPELES	00	CLE2	$e^+e^-\to\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.2^{+4.0}_{-2.9}\pm1.0$		[287] ARTUSO	99	CLE2	Repl. by LIPELES 00
<61	90	[288] BARATE	98Q	ALEP	$e^+e^-\to Z$
<22	90	[289] ASNER	97	CLE2	Repl. by ARTUSO 99

[285] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[286] AUBERT 02M also assumes the measured CP-odd fraction of the final states is 0.22 ± 0.18 ± 0.03.
[287] ARTUSO 99 uses B($\Upsilon(4S) \rightarrow B^0 \overline{B}^0$)=(48 ± 4)%.
[288] BARATE 98Q (ALEPH) observes 2 events with an expected background of 0.10 ± 0.03 which corresponds to a branching ratio of $(2.3^{+1.9}_{-1.2} \pm 0.4) \times 10^{-3}$.
[289] ASNER 97 at CLEO observes 1 event with an expected background of 0.022 ± 0.011. This corresponds to a branching ratio of $(5.3^{+7.1}_{-3.7} \pm 1.0) \times 10^{-4}$.

$\Gamma(\overline{D}^*(2007)^0 \omega)/\Gamma_{total}$ Γ_{119}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
4.2±0.7±0.9	90	[290] AUBERT	04B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 7.9	90	[290] ABE	02J	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 7.4	90	[291] NEMATI	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<21	90	[292] ALAM	94	CLE2	Repl. by NEMATI 98

[290] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[291] 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.
[292] 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($D^0 \rightarrow K^- \pi^+$).

$\Gamma(D^*(2010)^+ D^-)/\Gamma_{total}$ Γ_{120}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.3 × 10^{-4}	90	[293] LIPELES	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<5.6 × 10^{-3}	90	BARATE	98Q	ALEP	$e^+e^- \rightarrow Z$
<1.8 × 10^{-3}	90	ASNER	97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$[\Gamma(D^*(2010)^- D^+) + \Gamma(D^*(2010)^+ D^-)]/\Gamma_{total}$ Γ_{121}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.93±0.15 OUR AVERAGE				
0.88±0.10±0.13	[294] AUBERT	03J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$1.17 \pm 0.26^{+0.22}_{-0.25}$	[294,295] ABE	02Q	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.48 \pm 0.38^{+0.28}_{-0.31}$	[294,296] ABE	02Q	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[294] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[295] The measurement is performed using fully reconstructed D^* and D^+ decays.
[296] The measurement is performed using a partial reconstruction technique for the D^* and fully reconstructed D^+ decays as a cross check.

$\Gamma(D^*(2007)^0 \overline{D}^*(2007)^0)/\Gamma_{total}$ Γ_{122}/Γ

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

$\Gamma(D^- D^0 K^+)/\Gamma_{total}$ — Γ_{123}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.7±0.3±0.3	[297] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^- D^*(2007)^0 K^+)/\Gamma_{total}$ — Γ_{124}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.6±0.7±0.7	[298] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- D^0 K^+)/\Gamma_{total}$ — Γ_{125}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.1^{+0.4}_{-0.3}\pm0.4}$	[299] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- D^*(2007)^0 K^+)/\Gamma_{total}$ — Γ_{126}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
11.8±1.0±1.7	[300] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^- D^+ K^0)/\Gamma_{total}$ — Γ_{127}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	90	[301] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$[\Gamma(D^*(2010)^- D^+ K^0) + \Gamma(D^- D^*(2010)^+ K^0)]/\Gamma_{total}$ — Γ_{128}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.5±1.2±1.0	[302] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^*(2010)^- D^*(2010)^+ K^0)/\Gamma_{total}$ — Γ_{129}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{8.8^{+1.5}_{-1.4}\pm1.3}$	[303] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^0 D^0 K^0)/\Gamma_{total}$ — Γ_{130}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[304] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$[\Gamma(\overline{D}^0 D^*(2007)^0 K^0) + \Gamma(\overline{D}^*(2007)^0 D^0 K^0)]/\Gamma_{total}$ — Γ_{131}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.7	90	[305] AUBERT	03X	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\overline{D}^*(2007)^0 D^*(2007)^0 K^0)/\Gamma_{total}$ — Γ_{132}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.6	90	[306] AUBERT	03X	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma((\overline{D}+\overline{D}^*)(D+D^*)K)/\Gamma_{total}$ — Γ_{133}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
4.3±0.3±0.6	[307] AUBERT	03X	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\eta_c K^0)/\Gamma_{total}$ — Γ_{134}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.99±0.19 OUR AVERAGE				
0.93±0.16±0.16	[308] AUBERT,B	04B	BABR	$e^+e^- \to \Upsilon(4S)$
$1.23\pm0.23^{+0.40}_{-0.41}$	[309] FANG	03	BELL	$e^+e^- \to \Upsilon(4S)$
$1.09^{+0.55}_{-0.42}\pm0.33$	[310] EDWARDS	01	CLE2	$e^+e^- \to \Upsilon(4S)$

[308] AUBERT,B 04B reports $[B(B^0 \to \eta_c K^0) \times B(\eta_c(1S) \to K\overline{K}\pi)] = (0.0648 \pm 0.0085 \pm 0.0071) \times 10^{-3}$. We divide by our best value $B(\eta_c(1S) \to K\overline{K}\pi) = (7.0 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

[310] 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.

$\Gamma(\eta_c K^0)/\Gamma(J/\psi(1S)K^0)$ — $\Gamma_{134}/\Gamma_{136}$

VALUE	DOCUMENT ID		TECN	COMMENT
1.39±0.20±0.45	[311] AUBERT,B	04B	BABR	$e^+e^- \to \Upsilon(4S)$

[311] Uses BABAR measurement of $B(B^0 \to J/\psi K^0) = (8.5 \pm 0.5 \pm 0.6) \times 10^{-4}$.

$\Gamma(\eta_c K^*(892)^0)/\Gamma_{total}$ — Γ_{135}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.62\pm0.32^{+0.55}_{-0.60}}$	[312] FANG	03	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\eta_c K^*(892)^0)/\Gamma(\eta_c K^0)$ — $\Gamma_{135}/\Gamma_{134}$

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.33\pm0.36^{+0.24}_{-0.33}}$	FANG	03	BELL	$e^+e^- \to \Upsilon(4S)$

$\Gamma(J/\psi(1S)K^0)/\Gamma_{total}$ Γ_{136}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.72±0.33 OUR AVERAGE						
8.69±0.22±0.30			[313] AUBERT	05J	BABR	$e^+e^- \to \Upsilon(4S)$
7.9 ±0.4 ±0.9			[313] ABE	03B	BELL	$e^+e^- \to \Upsilon(4S)$
9.5 ±0.8 ±0.6			[313] AVERY	00	CLE2	$e^+e^- \to \Upsilon(4S)$
11.5 ±2.3 ±1.7			[314] ABE	96H	CDF	$p\overline{p}$ at 1.8 TeV
7.0 ±4.1 ±0.1			[315] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
9.3 ±7.2 ±0.1		2	[316] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
8.3 ±0.4 ±0.5			[313] AUBERT	02	BABR	Repl. by AUBERT 05J
8.5 $^{+1.4}_{-1.2}$ ±0.6			[313] JESSOP	97	CLE2	Repl. by AVERY 00
7.5 ±2.4 ±0.8		10	[315] ALAM	94	CLE2	Sup. by JESSOP 97
<50	90		ALAM	86	CLEO	$e^+e^- \to \Upsilon(4S)$

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

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

[315] BORTOLETTO 92 reports (6 ± 3 ± 2) × 10^{-4} for B($J/\psi(1S) \to e^+e^-$) = 0.069 ± 0.009. We rescale to our best value B($J/\psi(1S) \to e^+e^-$) = (5.94 ± 0.06) × 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 $\Upsilon(4S)$.

[316] ALBRECHT 90J reports (8 ± 6 ± 2) × 10^{-4} for B($J/\psi(1S) \to e^+e^-$) = 0.069 ± 0.009. We rescale to our best value B($J/\psi(1S) \to e^+e^-$) = (5.94 ± 0.06) × 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_{137}/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.16±0.56±0.01			[317] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.3	90		[318] ALBRECHT	87D	ARG	$e^+e^- \to \Upsilon(4S)$
<6.3	90	2	GILES	84	CLEO	$e^+e^- \to \Upsilon(4S)$

[317] BORTOLETTO 92 reports (1.0 ± 0.4 ± 0.3) × 10^{-3} for B($J/\psi(1S) \to e^+e^-$) = 0.069 ± 0.009. We rescale to our best value B($J/\psi(1S) \to e^+e^-$) = (5.94 ± 0.06) × 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 $\Upsilon(4S)$.

[318] ALBRECHT 87D assume $B^+B^-/B^0\overline{B}^0$ ratio is 55/45. $K\pi$ system is specifically selected as nonresonant.

$\Gamma(J/\psi(1S)K^*(892)^0)/\Gamma_{total}$ Γ_{138}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.33 ±0.06 OUR AVERAGE					
1.309±0.026±0.077		[319] AUBERT	05J	BABR	$e^+e^- \to \Upsilon(4S)$
1.29 ±0.05 ±0.13		[319] ABE	02N	BELL	$e^+e^- \to \Upsilon(4S)$
1.74 ±0.20 ±0.18		[320] ABE	98O	CDF	$p\overline{p}$ 1.8 TeV
1.32 ±0.17 ±0.17		[321] JESSOP	97	CLE2	$e^+e^- \to \Upsilon(4S)$

$1.28 \pm 0.66 \pm 0.01$		[322] BORTOLETTO	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$1.28 \pm 0.60 \pm 0.01$	6	[323] ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$4.07 \pm 1.82 \pm 0.04$	5	[324] BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.24 \pm 0.05 \pm 0.09$		[319] AUBERT	02	BABR	Repl. by AUBERT 05J
$1.36 \pm 0.27 \pm 0.22$		[325] ABE	96H	CDF	Sup. by ABE 98O
$1.69 \pm 0.31 \pm 0.18$	29	[326] ALAM	94	CLE2	Sup. by JESSOP 97
		[327] ALBRECHT	94G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
4.0 ± 0.30		[328] ALBAJAR	91E	UA1	$E^{p\overline{p}}_{cm} = 630$ GeV
3.3 ± 0.18	5	[329] ALBRECHT	87D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
4.1 ± 0.18	5	[330] ALAM	86	CLEO	Repl. by BEBEK 87

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

[320] ABE 98O reports $[B(B^0 \rightarrow J/\psi(1S) K^*(892)^0)]/[B(B^+ \rightarrow J/\psi(1S) K^+)] = 1.76 \pm 0.14 \pm 0.15$. 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.

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

[322] BORTOLETTO 92 reports $(1.1 \pm 0.5 \pm 0.3) \times 10^{-3}$ for $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \rightarrow e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$. 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 $\Upsilon(4S)$.

[323] ALBRECHT 90J reports $(1.1 \pm 0.5 \pm 0.2) \times 10^{-3}$ for $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \rightarrow e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$. 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 $\Upsilon(4S)$.

[324] BEBEK 87 reports $(3.5 \pm 1.6 \pm 0.3) \times 10^{-3}$ for $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \rightarrow e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$. 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.

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

[326] 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 $B \rightarrow \psi K^*$ decay is dominated by the $CP = -1$ CP eigenstate. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[327] 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 $K^0_S \pi^0$.

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

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

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

$\Gamma(J/\psi(1S) K^*(892)^0)/\Gamma(J/\psi(1S) K^0)$ $\qquad$ $\Gamma_{138}/\Gamma_{136}$

VALUE	DOCUMENT ID		TECN	COMMENT
1.50±0.09 OUR AVERAGE				
$1.51 \pm 0.05 \pm 0.08$	AUBERT	05J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$1.39 \pm 0.36 \pm 0.10$	ABE	96Q	CDF	$p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.49 \pm 0.10 \pm 0.08$	[331] AUBERT	02	BABR	Repl. by AUBERT 05J

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

$\Gamma(J/\psi(1S)\eta K^0_S)/\Gamma_{total}$ Γ_{139}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
8.4±2.6±2.7	[332] AUBERT	04Y	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)\phi K^0)/\Gamma_{total}$ Γ_{140}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
(9.4±2.6) × 10^{-5} OUR AVERAGE				
$(10.2\pm3.8\pm1.0)\times10^{-5}$	[333] AUBERT	03O	BABR	$e^+e^- \to \Upsilon(4S)$
$(8.8^{+3.5}_{-3.0}\pm1.3)\times10^{-5}$	[334] ANASTASSOV	00	CLE2	$e^+e^- \to \Upsilon(4S)$

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

[334] 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 $B(B^+ \to J/\psi(1S)\phi K^+) = B(B^0 \to J/\psi(1S)\phi K^0)$.

$\Gamma(J/\psi(1S)K(1270)^0)/\Gamma_{total}$ Γ_{141}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.30±0.34±0.32	[335] ABE	01L	BELL	$e^+e^- \to \Upsilon(4S)$

[335] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses the PDG value of $B(B^+ \to J/\psi(1S)K^+) = (1.00 \pm 0.10)\times10^{-3}$.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{total}$ Γ_{142}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.4 OUR AVERAGE						
2.3±0.5±0.2			[336] ABE	03B	BELL	$e^+e^- \to \Upsilon(4S)$
2.0±0.6±0.2			[336] AUBERT	02	BABR	$e^+e^- \to \Upsilon(4S)$
$2.5^{+1.1}_{-0.9}\pm0.2$			[336] AVERY	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 32	90		[337] ACCIARRI	97C	L3	
< 5.8	90		BISHAI	96	CLE2	$e^+e^- \to \Upsilon(4S)$
<690	90	1	[338] ALEXANDER	95	CLE2	Sup. by BISHAI 96

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

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

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

$\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$ Γ_{143}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.7 × 10^{-5}	90	[339] AUBERT	03O	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2\times10^{-3}$	90	[340] ACCIARRI	97C	L3	

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

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

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\rm total}$ — Γ_{144}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
(4.6±0.7±0.6) × 10^{-5}	[341] AUBERT	03B	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)\rho^0)/\Gamma_{\rm total}$ — Γ_{145}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.6±0.6±0.4		[342] AUBERT	03B	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<25	90	BISHAI	96	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)\omega)/\Gamma_{\rm total}$ — Γ_{146}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.7 × 10^{-4}	90	BISHAI	96	CLE2	$e^+e^- \to \Upsilon(4S)$

$\Gamma(J/\psi(1S)\phi)/\Gamma_{\rm total}$ — Γ_{147}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<9.2	90	[343] AUBERT	03O	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)\eta'(958))/\Gamma_{\rm total}$ — Γ_{148}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<6.3	90	[344] AUBERT	03O	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)K^0\pi^+\pi^-)/\Gamma_{\rm total}$ — Γ_{149}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.3±3.3±1.5	[345] AFFOLDER	02B	CDF	$p\overline{p}$ 1.8 TeV

[345] Uses $B^0 \to J/\psi(1S)K^0_S$ decay as a reference and B($B^0 \to J/\psi(1S)K^0$)= 8.3×10^{-4}.

$\Gamma(J/\psi(1S)K^0\rho^0)/\Gamma_{\rm total}$ — Γ_{150}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
5.4±2.9±0.9	[346] AFFOLDER	02B	CDF	$p\overline{p}$ 1.8 TeV

[346] Uses $B^0 \to J/\psi(1S)K^0_S$ decay as a reference and B($B^0 \to J/\psi(1S)K^0$)= 8.3×10^{-4}.

$\Gamma(J/\psi(1S)K^*(892)^+\pi^-)/\Gamma_{\rm total}$ — Γ_{151}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
7.7±4.1±1.3	[347] AFFOLDER	02B	CDF	$p\overline{p}$ 1.8 TeV

[347] Uses $B^0 \to J/\psi(1S)K^0_S$ decay as a reference and B($B^0 \to J/\psi(1S)K^0$)= 8.3×10^{-4}.

$\Gamma(J/\psi(1S)K^*(892)^0\pi^+\pi^-)/\Gamma_{\rm total}$ — Γ_{152}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.6±1.9±1.1	[348] AFFOLDER	02B	CDF	$p\overline{p}$ 1.8 TeV

[348] Uses $B^0 \to J/\psi(1S)K^*(892)^0$ decay as a reference and B($B^0 \to J/\psi(1S)K^0$)= 12.4×10^{-4}.

$\Gamma(X(3872)^- K^+)/\Gamma_{total}$ — Γ_{153}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<5 × 10^{-4}	90	[349] AUBERT 06E	BABR	$e^+e^- \to \Upsilon(4S)$

[349] Perform measurements of absolute branching fractions using a missing mass technique.

$\Gamma(X(3872)^- K^+ \times B(X(3872)^- \to J/\psi(1S)\pi^-\pi^0))/\Gamma_{total}$ — Γ_{154}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<5.4	90	[350] AUBERT 05B	BABR	$e^+e^- \to \Upsilon(4S)$

[350] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$. The isovector-X hypothesis is excluded with a likelihood test at 1×10^{-4} level.

$\Gamma(X(3872)K^0 \times B(X \to J/\psi\pi^+\pi^-))/\Gamma_{total}$ — Γ_{155}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<10.3	90	[351,352] AUBERT 06	BABR	$e^+e^- \to \Upsilon(4S)$

[351] The lower limit is also given to be 1.34×10^{-6} at 90% CL.
[352] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

$\Gamma(J/\psi(1S)p\overline{p})/\Gamma_{total}$ — Γ_{156}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<8.3 × 10^{-7}	90	[353] XIE 05	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.9 \times 10^{-6}$	90	[353] AUBERT 03K	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)\gamma)/\Gamma_{total}$ — Γ_{157}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<1.6	90	[354] AUBERT,B 04T	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(J/\psi(1S)\overline{D}^0)/\Gamma_{total}$ — Γ_{158}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<1.3	90	[355] AUBERT 05U	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2.0	90	[355] ZHANG 05B	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\psi(2S)K^0)/\Gamma_{total}$ — Γ_{159}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
6.2 ±0.6 OUR AVERAGE				
6.46±0.65±0.51		[356] AUBERT 05J	BABR	$e^+e^- \to \Upsilon(4S)$
6.7 ±1.1		[356] ABE 03B	BELL	$e^+e^- \to \Upsilon(4S)$
5.0 ±1.1 ±0.6		[356] RICHICHI 01	CLE2	$e^+e^- \to \Upsilon(4S)$

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

6.9 ±1.1 ±1.1		[356] AUBERT	02	BABR	Repl. by AUBERT 05J
< 8	90	[356] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
<15	90	[356] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
<28	90	[356] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\psi(2S)K^0)/\Gamma(J/\psi(1S)K^0)$ — $\Gamma_{159}/\Gamma_{136}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.82±0.13±0.12	[357] AUBERT	02	BABR	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\psi(2S)K^+\pi^-)/\Gamma_{total}$ — Γ_{160}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.001	90	[358] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\psi(2S)K^*(892)^0)/\Gamma_{total}$ — Γ_{161}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
7.2 ±0.8 OUR AVERAGE					
6.49±0.59±0.97		[359] AUBERT	05J	BABR	$e^+e^- \to \Upsilon(4S)$
7.6 ±1.1 ±1.0		[359] RICHICHI	01	CLE2	$e^+e^- \to \Upsilon(4S)$
9.0 ±2.2 ±0.9		[360] ABE	98O	CDF	$p\overline{p}$ 1.8 TeV

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

<19	90	[359] ALAM	94	CLE2	Repl. by RICHICHI 01
14 ±8 ±4		[359] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
<23	90	[359] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$

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

[360] ABE 98O reports $[B(B^0 \to \psi(2S)K^*(892)^0)]/[B(B^+ \to J/\psi(1S)K^+)] = 0.908 \pm 0.194 \pm 0.10$. 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.

$\Gamma(\psi(2S)K^*(892)^0)/\Gamma(\psi(2S)K^0)$ — $\Gamma_{161}/\Gamma_{159}$

VALUE	DOCUMENT ID		TECN	COMMENT
1.00±0.14±0.09	AUBERT	05J	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\chi_{c0}(1P)K^0)/\Gamma_{total}$ — Γ_{162}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.0 \times 10^{-4}$	90	[361] EDWARDS	01	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$<12.4 \times 10^{-4}$	90	[362] AUBERT	05K	BABR	$e^+e^- \to \Upsilon(4S)$

[361] 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.

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

$\Gamma(\chi_{c0} K^*(892)^0)/\Gamma_{total}$ — Γ_{163}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.7 × 10^{-4}	90	[363] AUBERT	05K	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\chi_{c2} K^0)/\Gamma_{total}$ — Γ_{164}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.6 × 10^{-5}	90	[364] SONI	06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.1 × 10^{-5}	90	[364] AUBERT	05K	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\chi_{c2} K^*(892)^0)/\Gamma_{total}$ — Γ_{165}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.6 × 10^{-5}	90	[365] AUBERT	05K	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7.1 × 10^{-5}	90	[365] SONI	06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\chi_{c1}(1P) K^0)/\Gamma_{total}$ — Γ_{166}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
3.9 ±0.4 OUR AVERAGE					
3.51±0.33±0.45		[366] SONI	06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
4.53±0.41±0.51		[366] AUBERT	05J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$3.0\ ^{+1.5}_{-1.0}\ \pm 0.2$		[367] AVERY	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.1 ±1.3 ±0.2		[368] AUBERT	02	BABR	Repl. by AUBERT 05J
<27	90	[366] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

[367] AVERY 00 reports $(3.9^{+1.9}_{-1.3} \pm 0.4) \times 10^{-4}$ for $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$. We rescale to our best value $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (35.6 \pm 1.9) \times 10^{-2}$. 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 $\Upsilon(4S)$.

[368] AUBERT 02 reports $(5.4 \pm 1.4 \pm 1.1) \times 10^{-4}$ for $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$. We rescale to our best value $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (35.6 \pm 1.9) \times 10^{-2}$. 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 $\Upsilon(4S)$.

$\Gamma(\chi_{c1}(1P) K^*(892)^0)/\Gamma_{total}$ — Γ_{167}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
3.2 ±0.6 OUR AVERAGE					
3.14±0.34±0.72		[369] SONI	06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
3.27±0.42±0.64		[369] AUBERT	05J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.7 ±1.3 ±0.2		[370] AUBERT	02	BABR	Repl. by AUBERT 05J
<21	90	[371] ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

[370] AUBERT 02 reports $(4.8 \pm 1.4 \pm 0.9) \times 10^{-4}$ for $B(\chi_{c1}(1P) \to \gamma J/\psi(1S)) = 0.273 \pm 0.016$. We rescale to our best value $B(\chi_{c1}(1P) \to \gamma J/\psi(1S)) = (35.6 \pm 1.9) \times 10^{-2}$. 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 $\Upsilon(4S)$.

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

$\Gamma(\chi_{c1}(1P)K^0)/\Gamma(J/\psi(1S)K^0)$ — $\Gamma_{166}/\Gamma_{136}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.51±0.15±0.03	[372] AUBERT	02	BABR	$e^+e^- \to \Upsilon(4S)$

[372] AUBERT 02 reports $0.66 \pm 0.11 \pm 0.17$ for $B(\chi_{c1}(1P) \to \gamma J/\psi(1S)) = 0.273 \pm 0.016$. We rescale to our best value $B(\chi_{c1}(1P) \to \gamma J/\psi(1S)) = (35.6 \pm 1.9) \times 10^{-2}$. 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 $\Upsilon(4S)$.

$\Gamma(\chi_{c1}(1P)K^*(892)^0)/\Gamma(\chi_{c1}(1P)K^0)$ — $\Gamma_{167}/\Gamma_{166}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.72±0.11±0.12	AUBERT	05J	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.89±0.34±0.17	[373] AUBERT	02	BABR	Repl. by AUBERT 05J

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

$\Gamma(K^+\pi^-)/\Gamma_{total}$ — Γ_{168}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.82±0.08 OUR AVERAGE					
1.85±0.10±0.07		[374] CHAO	04	BELL	$e^+e^- \to \Upsilon(4S)$
$1.80^{+0.23}_{-0.21}{}^{+0.12}_{-0.09}$		[374] BORNHEIM	03	CLE2	$e^+e^- \to \Upsilon(4S)$
1.79±0.09±0.07		[374] AUBERT	02Q	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.25±0.19±0.18		[374] CASEY	02	BELL	Repl. by CHAO 04
$1.93^{+0.34}_{-0.32}{}^{+0.15}_{-0.06}$		[374] ABE	01H	BELL	Repl. by CASEY 02
1.67±0.16±0.13		[374] AUBERT	01E	BABR	Repl. by AUBERT 02Q
$<$ 6.6	90	[375] ABE	00C	SLD	$e^+e^- \to Z$
$1.72^{+0.25}_{-0.24}\pm0.12$		[374] CRONIN-HEN...	00	CLE2	Repl. by BORNHEIM 03
$1.5\ ^{+0.5}_{-0.4}\ \pm0.14$		GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
$2.4\ ^{+1.7}_{-1.1}\ \pm0.2$		[376] ADAM	96D	DLPH	$e^+e^- \to Z$
$<$ 1.7	90	ASNER	96	CLE2	Sup. by ADAM 96D
$<$ 3.0	90	[377] BUSKULIC	96V	ALEP	$e^+e^- \to Z$
$<$ 9	90	[378] ABREU	95N	DLPH	Sup. by ADAM 96D
$<$ 8.1	90	[379] AKERS	94L	OPAL	$e^+e^- \to Z$
$<$ 2.6	90	[380] BATTLE	93	CLE2	$e^+e^- \to \Upsilon(4S)$
$<$18	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$
$<$ 9	90	[381] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
$<$32	90	AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[374] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[375] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.
[376] 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.
[377] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.
[378] 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.
[379] Assumes B($Z \to b\overline{b}$) = 0.217 and B^0_d (B^0_s) fraction 39.5% (12%).
[380] BATTLE 93 assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.
[381] Assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$.

$\Gamma(K^+\pi^-)/\Gamma(K^0\pi^0)$ $\Gamma_{168}/\Gamma_{169}$

VALUE	DOCUMENT ID		TECN	COMMENT
$1.20^{+0.50+0.22}_{-0.58-0.32}$	[382] ABE	01H	BELL	$e^+e^- \to \Upsilon(4S)$

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

$[\Gamma(K^+\pi^-)+\Gamma(\pi^+\pi^-)]/\Gamma_{total}$ $(\Gamma_{168}+\Gamma_{229})/\Gamma$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.6 OUR AVERAGE					
$2.8^{+1.5}_{-1.0}\pm2.0$		[383] ADAM	96D	DLPH	$e^+e^- \to Z$
$1.8^{+0.6+0.3}_{-0.5-0.4}$	17.2	ASNER	96	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.4^{+0.8}_{-0.7}\pm0.2$		[384] BATTLE	93	CLE2	$e^+e^- \to \Upsilon(4S)$

[383] 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.
[384] BATTLE 93 assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.

$\Gamma(K^0\pi^0)/\Gamma_{total}$ Γ_{169}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.15±0.10 OUR AVERAGE					
$1.14\pm0.09\pm0.06$		[385] AUBERT	05Y	BABR	$e^+e^- \to \Upsilon(4S)$
$1.17\pm0.23^{+0.12}_{-0.13}$		[385] CHAO	04	BELL	$e^+e^- \to \Upsilon(4S)$
$1.28^{+0.40+0.17}_{-0.33-0.14}$		[385] BORNHEIM	03	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$1.14 \pm 0.17 \pm 0.08$		[385] AUBERT	04M	BABR	Repl. by AUBERT 05Y
$0.80^{+0.33}_{-0.31} \pm 0.16$		[385] CASEY	02	BELL	Repl. by CHAO 04
$1.60^{+0.72}_{-0.59}{}^{+0.25}_{-0.27}$		[385] ABE	01H	BELL	Repl. by CASEY 02
$0.82^{+0.31}_{-0.27} \pm 0.12$		[385] AUBERT	01E	BABR	Repl. by AUBERT 04M
$1.46^{+0.59}_{-0.51}{}^{+0.24}_{-0.33}$		[385] CRONIN-HEN...00		CLE2	Repl. by BORNHEIM 03
<4.1	90	GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
<4.0	90	ASNER	96	CLE2	Rep. by GODANG 98

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

$\Gamma(\eta' K^0)/\Gamma_{\text{total}}$ Γ_{170}/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
6.8 ±0.4 OUR AVERAGE			
$6.74 \pm 0.33 \pm 0.32$	[386] AUBERT 05M	BABR	$e^+e^- \to \Upsilon(4S)$
$5.5\ ^{+1.9}_{-1.6} \pm 0.8$	[386] ABE 01M	BELL	$e^+e^- \to \Upsilon(4S)$
$8.9\ ^{+1.8}_{-1.6} \pm 0.9$	[386] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$6.06 \pm 0.56 \pm 0.46$	[386] AUBERT 03W	BABR	Repl. by AUBERT 05M
$4.2\ ^{+1.3}_{-1.1} \pm 0.4$	[386] AUBERT 01G	BABR	Repl. by AUBERT 03W
$4.7\ ^{+2.7}_{-2.0} \pm 0.9$	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\eta' K^*(892)^0)/\Gamma_{\text{total}}$ Γ_{171}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<0.76	90	[387] AUBERT,B 04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2.4	90	[387] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
<3.9	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\eta K^*(892)^0)/\Gamma_{\text{total}}$ Γ_{172}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
1.77±0.23 OUR AVERAGE				
$1.86 \pm 0.23 \pm 0.12$		[388] AUBERT,B 04D	BABR	$e^+e^- \to \Upsilon(4S)$
$1.38^{+0.55}_{-0.46} \pm 0.16$		[388] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<3.0	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\eta K^0)/\Gamma_{total}$ — Γ_{173}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
< 2.0	90	[389] CHANG 05A	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 2.5	90	[389] AUBERT,B 05K	BABR	$e^+e^- \to \Upsilon(4S)$
< 5.2	90	[389] AUBERT 04H	BABR	Repl. by AUBERT,B 05K
< 9.3	90	[389] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
<33	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\omega K^0)/\Gamma_{total}$ — Γ_{174}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
$0.55^{+0.12}_{-0.10}$ OUR AVERAGE				
$0.59^{+0.16}_{-0.13}\pm0.05$		[390] AUBERT 04H	BABR	$e^+e^- \to \Upsilon(4S)$
$0.40^{+0.19}_{-0.16}\pm0.05$		[390] WANG 04A	BELL	$e^+e^- \to \Upsilon(4S)$
$1.00^{+0.54}_{-0.42}\pm0.14$		[390] JESSOP 00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.3	90	[390] AUBERT 01G	BABR	Repl. by AUBERT 04H
<5.7	90	[390] BERGFELD 98	CLE2	Repl. by JESSOP 00

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

$\Gamma(a_0^- K^+)/\Gamma_{total}$ — Γ_{176}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<2.1	90	[391] AUBERT,BE 04	BABR	$e^+e^- \to \Upsilon(4S)$

[391] Assumes equal production of charged and neutral B mesons from $\Upsilon(4S)$ decays.

$\Gamma(a_0^0 K^0)/\Gamma_{total}$ — Γ_{175}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<7.8	90	[392] AUBERT,BE 04	BABR	$e^+e^- \to \Upsilon(4S)$

[392] Assumes equal production of charged and neutral B mesons from $\Upsilon(4S)$ decays.

$\Gamma(K_S^0 X^0 \text{(Familon)})/\Gamma_{total}$ — Γ_{177}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<5.3	90	[393] AMMAR 01B	CLE2	$e^+e^- \to \Upsilon(4S)$

[393] AMMAR 01B searched for the two-body decay of the B meson to a massless neutral feebly-interacting particle X^0 such as the familon, the Nambu-Goldstone boson associated with a spontaneously broken global family symmetry.

$\Gamma(\omega K^*(892)^0)/\Gamma_{total}$ — Γ_{178}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
< 6.0	90	[394] AUBERT 05O	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<23	90	[394] BERGFELD 98	CLE2	

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

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{179}/Γ

VALUE (units 10^{-6})	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
< 0.37	90	ABE 05G	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 0.7	90	CHAO 04	BELL	$e^+e^- \to \Upsilon(4S)$
< 0.8	90	[395] BORNHEIM 03	CLE2	$e^+e^- \to \Upsilon(4S)$
< 0.6	90	[395] AUBERT 02Q	BABR	$e^+e^- \to \Upsilon(4S)$
< 0.9	90	[395] CASEY 02	BELL	$e^+e^- \to \Upsilon(4S)$
< 2.7	90	[395] ABE 01H	BELL	$e^+e^- \to \Upsilon(4S)$
< 2.5	90	[395] AUBERT 01E	BABR	$e^+e^- \to \Upsilon(4S)$
< 66	90	[396] ABE 00C	SLD	$e^+e^- \to Z$
< 1.9	90	[395] CRONIN-HEN...00	CLE2	$e^+e^- \to \Upsilon(4S)$
< 4.3	90	GODANG 98	CLE2	Repl. by CRONIN-HENNESSY 00
< 46		[397] ADAM 96D	DLPH	$e^+e^- \to Z$
< 4	90	ASNER 96	CLE2	Repl. by GODANG 98
< 18	90	[398] BUSKULIC 96V	ALEP	$e^+e^- \to Z$
<120	90	[399] ABREU 95N	DLPH	Sup. by ADAM 96D
< 7	90	[400] BATTLE 93	CLE2	$e^+e^- \to \Upsilon(4S)$

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

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

[397] 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.

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

[399] 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.

[400] 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_{180}/Γ

VALUE (units 10^{-6})	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
$1.13^{+0.38}_{-0.35}$ OUR AVERAGE				
$0.8 \pm 0.3 \pm 0.9$		[401] ABE 05G	BELL	$e^+e^- \to \Upsilon(4S)$
$1.19^{+0.40}_{-0.35} \pm 0.13$		[401] AUBERT,BE 05E	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 1.8	90	[401] AUBERT 04M	BABR	$e^+e^- \to \Upsilon(4S)$
< 1.5	90	[401] CHAO 04	BELL	Repl. by ABE 05G
< 3.3	90	[401] BORNHEIM 03	CLE2	$e^+e^- \to \Upsilon(4S)$
< 4.1	90	[401] CASEY 02	BELL	$e^+e^- \to \Upsilon(4S)$
<17	90	GODANG 98	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^0_S K^0_S K^0_S)/\Gamma_{total}$ — Γ_{181}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$6.2^{+1.2}_{-1.1}$ OUR AVERAGE Error includes scale factor of 1.3.				
$6.9^{+0.9}_{-0.8}\pm0.6$	[402] AUBERT,B	05	BABR	$e^+e^- \to \Upsilon(4S)$
$4.2^{+1.6}_{-1.3}\pm0.8$	[402] GARMASH	04	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{182}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$36.6^{+4.2}_{-4.3}\pm3.0$		[403] CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<40	90	[403] ECKHART	02	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^+\rho^-)/\Gamma_{total}$ — Γ_{183}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
8.5 ± 2.8 OUR AVERAGE Error includes scale factor of 1.7.					
$15.1^{+3.4+2.4}_{-3.3-2.6}$		[404] CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$
$7.3^{+1.3}_{-1.2}\pm1.3$		[404] AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<32	90	[404] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
<35	90	ASNER	96	CLE2	Repl. by JESSOP 00

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

$\Gamma((K^+\pi^-\pi^0)$ non-resonant$)/\Gamma_{total}$ — Γ_{184}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<9.4	90	[405] CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^{*0}_x\pi^0)/\Gamma_{total}$ — Γ_{185}/Γ

K^{*0}_x stands for the possible candidates of $K^*(1410)$, $K^*_0(1430)$ and $K^*_2(1430)$.

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$6.1^{+1.6+0.5}_{-1.5-0.6}$	[406] CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{186}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
43.8± 2.9 OUR AVERAGE				
43.0± 2.3±2.3		[407] AUBERT 06I	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
45.4± 5.2±5.9		[407] GARMASH 04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$50\ ^{+10}_{-\ 9}\ \pm 7$		[407] ECKHART 02	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
43.7± 3.8±3.4		[407] AUBERT,B 04O	BABR	Repl. by AUBERT 06I
<440	90	ALBRECHT 91E	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K^0\rho^0)/\Gamma_{total}$ — Γ_{187}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<3.9 × 10^{-5}	90	ASNER 96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<3.2 × 10^{-4}	90	ALBRECHT 91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<5.0 × 10^{-4}	90	[408] AVERY 89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<0.064	90	[409] AVERY 87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

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

[409] 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_{188}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
5.5±0.7±0.6		[410] AUBERT 06I	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<360	90	[411] AVERY 89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

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

[411] 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_{189}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
11.8±1.5 OUR AVERAGE				
11.0±1.5±0.71		[412] AUBERT 06I	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$14.8^{+4.6}_{-4.4}{}^{+2.8}_{-1.3}$		[412] CHANG 04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$16\ ^{+6}_{-5}\ \pm 2$		[412] ECKHART 02	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
12.9±2.4±1.4		[412] AUBERT,B 04O	BABR	Repl. by AUBERT 06I
< 72	90	ASNER 96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<620	90	ALBRECHT 91B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<380	90	[413] AVERY 89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<560	90	[414] AVERY 87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[412] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[413] AVERY 89B reports $< 4.4 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[414] AVERY 87 reports $< 7 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K_x^{*+}\pi^-)/\Gamma_{total}$ Γ_{190}/Γ

K_x^{*+} stands for the possible candidates of $K^*(1410)$, $K_0^*(1430)$ and $K_2^*(1430)$.

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$5.1\pm1.5^{+0.6}_{-0.7}$	[415] CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^*(892)^0\pi^0)/\Gamma_{total}$ Γ_{191}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.5 \times 10^{-6}$	90	[416] CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.6 \times 10^{-6}$	90	[293] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
$<2.8 \times 10^{-5}$	90	ASNER	96	CLE2	Repl. by JESSOP 00

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

$\Gamma(K_2^*(1430)^+\pi^-)/\Gamma_{total}$ Γ_{192}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.8 \times 10^{-5}$	90	[417] GARMASH	04	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.6 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^0K^-\pi^+)/\Gamma_{total}$ Γ_{193}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<21 \times 10^{-6}$	90	[418] ECKHART	02	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{194}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<19 \times 10^{-6}$	90	[419] ECKHART	02	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^0K^+K^-)/\Gamma_{total}$ Γ_{195}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
24.7±2.3 OUR AVERAGE					
23.8±2.0±1.6		[420] AUBERT,B	04V	BABR	$e^+e^- \to \Upsilon(4S)$
28.3±3.3±4.0		[420] GARMASH	04	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1300	90	ALBRECHT	91E	ARG	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^0\phi)/\Gamma_{total}$ — Γ_{196}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$8.6^{+1.3}_{-1.1}$ OUR AVERAGE					
$8.4^{+1.5}_{-1.3}\pm0.5$		[421] AUBERT	04A	BABR	$e^+e^- \to \Upsilon(4S)$
$9.0^{+2.2}_{-1.8}\pm0.7$		[421] CHEN	03B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$8.1^{+3.1}_{-2.5}\pm0.8$		[421] AUBERT	01D	BABR	$e^+e^- \to \Upsilon(4S)$
$<$ 12.3	90	[421] BRIERE	01	CLE2	$e^+e^- \to \Upsilon(4S)$
$<$ 31	90	[421] BERGFELD	98	CLE2	
$<$ 88	90	ASNER	96	CLE2	$e^+e^- \to \Upsilon(4S)$
$<$ 720	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$
$<$ 420	90	[422] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
$<$1000	90	[423] AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[421] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[422] AVERY 89B reports $< 4.9\times10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[423] AVERY 87 reports $< 1.3\times10^{-3}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(K^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_{197}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3\times10^{-4}$	90	[424] ADAM	96D	DLPH	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.1\times10^{-4}$	90	[425] ABREU	95N	DLPH	Sup. by ADAM 96D

[424] 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.
[425] 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_{198}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.4\times10^{-3}$	90	ALBRECHT	91E	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^*(892)^0\rho^0)/\Gamma_{total}$ — Γ_{199}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.4\times10^{-5}$	90	[426] GODANG	02	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.86\times10^{-4}$	90	[427] ABE	00C	SLD	$e^+e^- \to Z$
$<4.6\times10^{-4}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$
$<5.8\times10^{-4}$	90	[428] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
$<9.6\times10^{-4}$	90	[429] AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[426] Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to 2.4×10^{-5}.
[427] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.
[428] AVERY 89B reports $< 6.7 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[429] 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_{200}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.7 × 10⁻⁴	90	[430] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$

[430] 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_{201}/Γ

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

$\Gamma(K^+ a_1(1260)^-)/\Gamma_{total}$ — Γ_{202}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3 \times 10^{-4}$	90	[431] ADAM	96D	DLPH	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.9 \times 10^{-4}$	90	[432] ABREU	95N	DLPH	Sup. by ADAM 96D

[431] 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.
[432] 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.

$\Gamma(K^*(892)^0 K^+ K^-)/\Gamma_{total}$ — Γ_{203}/Γ

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

$\Gamma(K^*(892)^0 \phi)/\Gamma_{total}$ — Γ_{204}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
9.5±0.9 OUR AVERAGE					
9.2±0.9±0.5		[433] AUBERT,B	04W	BABR	$e^+e^- \to \Upsilon(4S)$
$10.0^{+1.6}_{-1.5}{}^{+0.7}_{-0.8}$		[433] CHEN	03B	BELL	$e^+e^- \to \Upsilon(4S)$
$11.5^{+4.5}_{-3.7}{}^{+1.8}_{-1.7}$		[433] BRIERE	01	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
11.2±1.3±0.8		[433] AUBERT	03V	BABR	Repl. by AUBERT,B 04W
$8.7^{+2.5}_{-2.1}\pm1.1$		[433] AUBERT	01D	BABR	Repl. by AUBERT 03V
<384	90	[434] ABE	00C	SLD	$e^+e^- \to Z$
< 21	90	[433] BERGFELD	98	CLE2	

$<$ 43	90		ASNER	96 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<$320	90		ALBRECHT	91B ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<$380	90	435	AVERY	89B CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<$380	90	436	AVERY	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

433 Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
434 ABE 00C assumes B($Z \rightarrow b\overline{b}$)=(21.7 ± 0.1)% and the B fractions f_{B^0}=f_{B^+}=$(39.7^{+1.8}_{-2.2})$% and f_{B_s}=$(10.5^{+1.8}_{-2.2})$%.
435 AVERY 89B reports $< 4.4 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
436 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_{205}/Γ

VALUE	CL%		DOCUMENT ID	TECN	COMMENT
$<2.2 \times 10^{-5}$	90	437	GODANG	02 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.69 \times 10^{-4}$	90	438	ABE	00C SLD	$e^+e^- \rightarrow Z$

437 Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to 1.9×10^{-5}.
438 ABE 00C assumes B($Z \rightarrow b\overline{b}$)=(21.7 ± 0.1)% and the B fractions f_{B^0}=f_{B^+}=$(39.7^{+1.8}_{-2.2})$% and f_{B_s}=$(10.5^{+1.8}_{-2.2})$%.

$\Gamma(K^*(892)^0 K^*(892)^0)/\Gamma_{total}$ Γ_{206}/Γ

VALUE	CL%		DOCUMENT ID	TECN	COMMENT
$<3.7 \times 10^{-5}$	90	439	GODANG	02 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

439 Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to 2.9×10^{-5}.

$\Gamma(K^*(892)^+ K^*(892)^-)/\Gamma_{total}$ Γ_{207}/Γ

VALUE	CL%		DOCUMENT ID	TECN	COMMENT
$<1.41 \times 10^{-4}$	90	440	GODANG	02 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

440 Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to 8.9×10^{-5}.

$\Gamma(K_1(1400)^0 \rho^0)/\Gamma_{total}$ Γ_{208}/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_{209}/Γ

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

$\Gamma(K_0^*(1430)^0 \phi)/\Gamma_{total}$ Γ_{210}/Γ

VALUE		DOCUMENT ID	TECN	COMMENT
seen	441	AUBERT,B	04W BABR	$e^+e^- \rightarrow \Upsilon(4S)$

441 Observed 181 ± 17 events with statistical significance greater than 10 σ.

$\Gamma(K_2^*(1430)^0\rho^0)/\Gamma_{total}$ — Γ_{211}/Γ

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

$\Gamma(K_2^*(1430)^0\phi)/\Gamma_{total}$ — Γ_{212}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
seen		[442] AUBERT,B	04W	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.4 \times 10^{-3}$	90	ALBRECHT	91B	ARG	$e^+e^- \to \Upsilon(4S)$

[442] The angular distribution of $B \to \phi K^*(1430)$ provides evidence with statistical significance of 3.2 σ.

$\Gamma(K^*(892)^0\gamma)/\Gamma_{total}$ — Γ_{213}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
4.01±0.20 OUR AVERAGE					
3.92±0.20±0.24		[443] AUBERT,BE	04A	BABR	$e^+e^- \to \Upsilon(4S)$
4.01±0.21±0.17		[444] NAKAO	04	BELL	$e^+e^- \to \Upsilon(4S)$
$4.55^{+0.72}_{-0.68}\pm0.34$		[445] COAN	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 11	90	ACOSTA	02G	CDF	$p\overline{p}$ at 1.8 TeV
4.23±0.40±0.22		[444] AUBERT	02C	BABR	Repl. by AUBERT,BE 04A
< 21	90	[446] ADAM	96D	DLPH	$e^+e^- \to Z$
4.0 ±1.7 ±0.8		[447] AMMAR	93	CLE2	Repl. by COAN 00
< 42	90	ALBRECHT	89G	ARG	$e^+e^- \to \Upsilon(4S)$
< 24	90	[448] AVERY	89B	CLEO	$e^+e^- \to \Upsilon(4S)$
<210	90	AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[443] Uses the production ratio of charged and neutral B from $\Upsilon(4S)$ decays $R^{+/0} = 1.006 \pm 0.048$.
[444] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[445] 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.
[446] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.
[447] AMMAR 93 observed 6.6 ± 2.8 events above background.
[448] AVERY 89B reports $< 2.8 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\eta K^0\gamma)/\Gamma_{total}$ — Γ_{214}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$\mathbf{8.7^{+3.1+1.9}_{-2.7-1.6}}$	[449,450] NISHIDA	05	BELL	$e^+e^- \to \Upsilon(4S)$

[449] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[450] $m_{\eta K} < 2.4$ GeV/c^2

$\Gamma(K^0\phi\gamma)/\Gamma_{total}$ — Γ_{215}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<8.3	90	[451] DRUTSKOY	04	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^+\pi^-\gamma)/\Gamma_{total}$ Γ_{216}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(4.6^{+1.3+0.5}_{-1.2-0.7}) \times 10^{-6}$	[452,453] NISHIDA	02	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[452] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[453] 1.25 GeV/c^2 $< M_{K\pi} <$ 1.6 GeV/c^2

$\Gamma(K^*(1410)\gamma)/\Gamma_{total}$ Γ_{217}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-4}$	90	[454] NISHIDA	02	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K^+\pi^-\gamma \text{ nonresonant})/\Gamma_{total}$ Γ_{218}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.6 \times 10^{-6}$	90	[455,456] NISHIDA	02	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[455] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[456] 1.25 GeV/c^2 $< M_{K\pi} <$ 1.6 GeV/c^2

$\Gamma(K^0\pi^+\pi^-\gamma)/\Gamma_{total}$ Γ_{219}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.40±0.4±0.3	[457] YANG	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K_1(1270)^0\gamma)/\Gamma_{total}$ Γ_{220}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<5.8 \times 10^{-5}$	90		[458] YANG	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.0070	90		[459] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[458] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[459] 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_{221}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.5 \times 10^{-5}$	90		[460] YANG	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.0043	90		[461] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[460] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[461] 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_{222}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.24±0.24 OUR AVERAGE					
1.22±0.25±0.10		[462] AUBERT,B	04U	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.3 ±0.5 ±0.1		[462] NISHIDA	02	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<40	90	[463] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

[463] 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_{223}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0020	90	[464] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[464] 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_{224}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.3 × 10^{-5}	90	[465,466] NISHIDA	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.010	90	[467] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

[466] Uses B($K_3^*(1780) \rightarrow \eta K$) = $0.11^{+0.05}_{-0.04}$.

[467] 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_{225}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0043	90	[468] ALBRECHT	89G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[468] 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_{226}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.4 × 10^{-6}	90	[469] AUBERT	05	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<0.8 \times 10^{-6}$	90	[469] MOHAPATRA	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.2 \times 10^{-6}$	90	[469] AUBERT	04C	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.7 \times 10^{-5}$	90	[469] COAN	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\omega\gamma)/\Gamma_{total}$ Γ_{227}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.8 × 10^{-6}	90	[470] MOHAPATRA 05	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.0 × 10^{-6}	90	[470] AUBERT 05	BABR	$e^+e^- \to \Upsilon(4S)$
<1.0 × 10^{-6}	90	[470] AUBERT 04C	BABR	$e^+e^- \to \Upsilon(4S)$
<0.92 × 10^{-5}	90	[470] COAN 00	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\phi\gamma)/\Gamma_{total}$ Γ_{228}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<8.5 × 10^{-7}	90	[471] AUBERT,BE 05C	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.33 × 10^{-5}	90	[471] COAN 00	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{229}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
4.6±0.4 OUR AVERAGE					
4.4±0.6±0.3			[472] CHAO 04	BELL	$e^+e^- \to \Upsilon(4S)$
$4.5^{+1.4}_{-1.2}{}^{+0.5}_{-0.4}$			[472] BORNHEIM 03	CLE2	$e^+e^- \to \Upsilon(4S)$
4.7±0.6±0.2			[472] AUBERT 02Q	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.4±1.2±0.5			[472] CASEY 02	BELL	Repl. by CHAO 04
$5.6^{+2.3}_{-2.0}{}^{+0.4}_{-0.5}$			[472] ABE 01H	BELL	Repl. by CASEY 02
4.1±1.0±0.7			[472] AUBERT 01E	BABR	Repl. by AUBERT 02Q
< 67	90		[473] ABE 00C	SLD	$e^+e^- \to Z$
$4.3^{+1.6}_{-1.4}$±0.5			[472] CRONIN-HEN...00	CLE2	Repl. by BORNHEIM 03
< 15	90		GODANG 98	CLE2	Repl. by CRONIN-HENNESSY 00
< 45	90		[474] ADAM 96D	DLPH	$e^+e^- \to Z$
< 20	90		ASNER 96	CLE2	Repl. by GODANG 98
< 41	90		[475] BUSKULIC 96V	ALEP	$e^+e^- \to Z$
< 55	90		[476] ABREU 95N	DLPH	Sup. by ADAM 96D
< 47	90		[477] AKERS 94L	OPAL	$e^+e^- \to Z$
< 29	90		[478] BATTLE 93	CLE2	$e^+e^- \to \Upsilon(4S)$
<130	90		[478] ALBRECHT 90B	ARG	$e^+e^- \to \Upsilon(4S)$
< 77	90		[479] BORTOLETTO 89	CLEO	$e^+e^- \to \Upsilon(4S)$
<260	90		[479] BEBEK 87	CLEO	$e^+e^- \to \Upsilon(4S)$
<500	90	4	GILES 84	CLEO	$e^+e^- \to \Upsilon(4S)$

[472] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[473] 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 $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.
[474] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.
[475] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.
[476] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.
[477] Assumes B($Z \to b\overline{b}$) = 0.217 and B^0_d (B^0_s) fraction 39.5% (12%).
[478] Assumes equal production of $B^0\overline{B}^0$ and B^+B^- at $\Upsilon(4S)$.
[479] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(\pi^+\pi^-)/\Gamma(K^+\pi^-)$ — $\Gamma_{229}/\Gamma_{168}$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.29^{+0.13+0.01}_{-0.12-0.02}$	ABE	01H	BELL	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ — Γ_{230}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
1.5 ±0.5 OUR AVERAGE		Error includes scale factor of 1.7.			
1.17±0.32±0.10		[480] AUBERT	05L	BABR	$e^+e^- \to \Upsilon(4S)$
$2.3\ ^{+0.4}_{-0.5}\ ^{+0.2}_{-0.3}$		[480] CHAO	05	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 3.6	90	[480] AUBERT	03L	BABR	$e^+e^- \to \Upsilon(4S)$
2.1 ±0.6 ±0.3		[480] AUBERT	03S	BABR	Repl. by AUBERT 05L
< 4.4	90	[480] BORNHEIM	03	CLE2	$e^+e^- \to \Upsilon(4S)$
1.7 ±0.6 ±0.2		[480] LEE	03	BELL	Repl. by CHAO 05
< 5.7	90	[480] ASNER	02	CLE2	$e^+e^- \to \Upsilon(4S)$
< 6.4	90	[480] CASEY	02	BELL	$e^+e^- \to \Upsilon(4S)$
< 9.3	90	GODANG	98	CLE2	Repl. by ASNER 02
< 9.1	90	ASNER	96	CLE2	Repl. by GODANG 98
<60	90	[481] ACCIARRI	95H	L3	$e^+e^- \to Z$

[480] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[481] 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_{231}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.5 \times 10^{-6}$	90	[482] AUBERT,B	04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.5 \times 10^{-6}$	90	[482] CHANG	05A	BELL	$e^+e^- \to \Upsilon(4S)$
$<2.9 \times 10^{-6}$	90	[482] RICHICHI	00	CLE2	$e^+e^- \to \Upsilon(4S)$
$<8 \times 10^{-6}$	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00
$<2.5 \times 10^{-4}$	90	[483] ACCIARRI	95H	L3	$e^+e^- \to Z$
$<1.8 \times 10^{-3}$	90	[482] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[482] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[483] ACCIARRI 95H assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = 12.0 \pm 3.0$%.

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_{232}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.0 \times 10^{-6}$	90	[484] CHANG 05A	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<2.8 \times 10^{-6}$	90	[484] AUBERT,B 04X	BABR	$e^+e^- \to \Upsilon(4S)$
$<1.8 \times 10^{-5}$	90	BEHRENS 98	CLE2	$e^+e^- \to \Upsilon(4S)$
$<4.1 \times 10^{-4}$	90	[485] ACCIARRI 95H	L3	$e^+e^- \to Z$

[484] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[485] 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_{233}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.7 \times 10^{-6}$	90	[486] AUBERT,B 04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<5.7 \times 10^{-6}$	90	[486] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
$<1.1 \times 10^{-5}$	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\eta'\eta')/\Gamma_{total}$ Γ_{234}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<10 \times 10^{-6}$	90	[487] AUBERT,B 04X	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 4.7 \times 10^{-5}$	90	BEHRENS 98	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\eta'\eta)/\Gamma_{total}$ Γ_{235}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<4.6 \times 10^{-6}$	90	[488] AUBERT,B 04X	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<2.7 \times 10^{-5}$	90	BEHRENS 98	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\eta'\rho^0)/\Gamma_{total}$ Γ_{236}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<4.3 \times 10^{-6}$	90	[489] AUBERT,B 04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.2 \times 10^{-5}$	90	[489] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
$<2.3 \times 10^{-5}$	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\eta\rho^0)/\Gamma_{total}$ Γ_{237}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.5 \times 10^{-6}$	90	[490] AUBERT,B 04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.0 \times 10^{-5}$	90	[490] RICHICHI 00	CLE2	$e^+e^- \to \Upsilon(4S)$
$<1.3 \times 10^{-5}$	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

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

$\Gamma(\omega\eta)/\Gamma_{total}$ Γ_{238}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.9	90	[491] AUBERT,B	05K	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.0^{+1.3}_{-1.2}\pm0.4$		[491] AUBERT,B	04X	BABR	Repl. by AUBERT,B 05K
<12	90	[491] BERGFELD	98	CLE2	

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

$\Gamma(\omega\eta')/\Gamma_{total}$ Γ_{239}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8\times10^{-6}$	90	[492] AUBERT,B	04X	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.0\times10^{-5}$	90	[492] BERGFELD	98	CLE2	

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

$\Gamma(\omega\rho^0)/\Gamma_{total}$ Γ_{240}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.3	90	[493] AUBERT	05O	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	[493] BERGFELD	98	CLE2	

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

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_{241}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<1.9\times10^{-5}$	90	[494] BERGFELD	98	CLE2

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

$\Gamma(\phi\pi^0)/\Gamma_{total}$ Γ_{242}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0\times10^{-6}$	90	[495] AUBERT,B	04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<0.5\times10^{-5}$	90	[495] BERGFELD	98	CLE2	

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

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{243}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0\times10^{-6}$	90	[496] AUBERT,B	04X	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<0.9\times10^{-5}$	90	[496] BERGFELD	98	CLE2	

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

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{244}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.5\times10^{-6}$	90	[497] AUBERT,B	04X	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.1\times10^{-5}$	90	[497] BERGFELD	98	CLE2	

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

$\Gamma(\phi\rho^0)/\Gamma_{total}$ Γ_{245}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10^{-5}	90	[498] BERGFELD	98	CLE2	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.56 \times 10^{-4}$	90	[499] ABE	00C	SLD	$e^+e^- \rightarrow Z$

[498] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[499] ABE 00C assumes B($Z \rightarrow b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(\phi\omega)/\Gamma_{total}$ Γ_{246}/Γ

VALUE	CL%	DOCUMENT ID		TECN
<2.1 × 10^{-5}	90	[500] BERGFELD	98	CLE2

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

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_{247}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.5 × 10^{-6}	90	[501] AUBERT,B	04X	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.21 \times 10^{-4}$	90	[502] ABE	00C	SLD	$e^+e^- \rightarrow Z$
$<1.2 \times 10^{-5}$	90	[501] BERGFELD	98	CLE2	
$<3.9 \times 10^{-5}$	90	ASNER	96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[501] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[502] ABE 00C assumes B($Z \rightarrow b\overline{b}$)=(21.7 ± 0.1)% and the B fractions $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})$% and $f_{B_s}=(10.5^{+1.8}_{-2.2})$%.

$\Gamma(a_0^\mp\pi^\pm)/\Gamma_{total}$ Γ_{248}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<5.1	90	[503] AUBERT,BE	04	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[503] Assumes equal production of charged and neutral B mesons from $\Upsilon(4S)$ decays.

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{249}/Γ

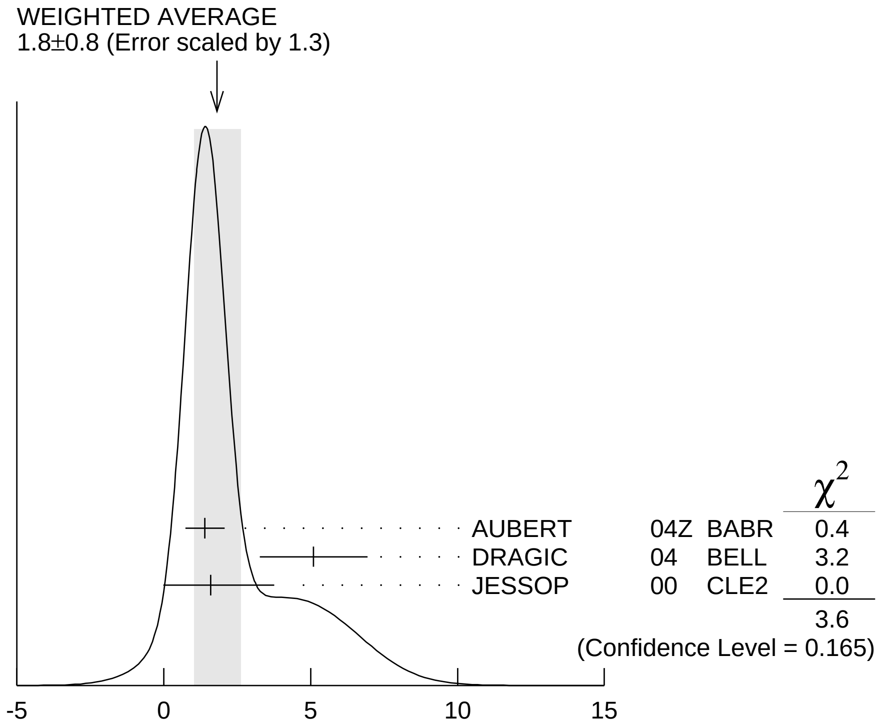
VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.2 × 10^{-4}	90	[504] ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(\rho^0\pi^0)/\Gamma_{total}$ Γ_{250}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
1.8±0.8 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
1.4±0.6±0.3		[505] AUBERT	04Z	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
5.1±1.6±0.9		DRAGIC	04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$1.6^{+2.0}_{-1.4}\pm0.8$		[285] JESSOP	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.3	90	[505] GORDON	02	BELL	Repl. by DRAGIC 04
< 24	90	ASNER	96	CLE2	Repl. by JESSOP 00
<400	90	[506] ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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



$\Gamma(\rho^0\pi^0)/\Gamma_{total}$ Γ_{250}/Γ

$\Gamma(\rho^\mp\pi^\pm)/\Gamma_{total}$ Γ_{251}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
2.28±0.25 OUR AVERAGE					
$2.26\pm0.18\pm0.22$		[507] AUBERT	03T	BABR	$e^+e^-\to\Upsilon(4S)$
$2.08^{+0.60}_{-0.63}{}^{+0.28}_{-0.31}$		[507] GORDON	02	BELL	$e^+e^-\to\Upsilon(\text{rS})$
$2.76^{+0.84}_{-0.74}\pm0.42$		[507] 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	[508] ALBRECHT	90B	ARG	$e^+e^-\to\Upsilon(4S)$
$<$520	90	[509] BEBEK	87	CLEO	$e^+e^-\to\Upsilon(4S)$

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

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{252}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3\times10^{-4}$	90	[510] ADAM	96D	DLPH	$e^+e^-\to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.8\times10^{-4}$	90	[511] ABREU	95N	DLPH	Sup. by ADAM 96D
$<6.7\times10^{-4}$	90	[512] ALBRECHT	90B	ARG	$e^+e^-\to\Upsilon(4S)$

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

511 Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.

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

$\Gamma(\rho^0\rho^0)/\Gamma_{total}$ — Γ_{253}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.1 × 10^{-6}	90	[513] AUBERT	05I	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.1 × 10^{-6}	90	[513] AUBERT	03V	BABR	Repl. by AUBERT 05I
<1.8 × 10^{-5}	90	[514] GODANG	02	CLE2	$e^+e^- \to \Upsilon(4S)$
<1.36 × 10^{-4}	90	[515] ABE	00C	SLD	$e^+e^- \to Z$
<2.8 × 10^{-4}	90	[513] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$
<2.9 × 10^{-4}	90	[516] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
<4.3 × 10^{-4}	90	[516] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

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

514 Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to 1.4×10^{-5}.

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

516 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_{254}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.9 × 10^{-4}	90	[517] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.3 × 10^{-4}	90	[518] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$
<1.0 × 10^{-3}	90	[517] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

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

518 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_{255}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.0 × 10^{-4}	90	[519] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.4 × 10^{-3}	90	[519] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$

519 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_{256}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.1 × 10^{-3}	90	[520] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\rho^+\rho^-)/\Gamma_{total}$ — Γ_{257}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
25 ±4 OUR AVERAGE					
$22.8\pm3.8^{+2.3}_{-2.6}$		[521] SOMOV	06	BELL	$e^+e^- \to \Upsilon(4S)$
$30 \pm4 \pm5$		[521,522] AUBERT,B	04R	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$25 \ ^{+7}_{-6} \ ^{+5}_{-6}$		[521] AUBERT	04G	BABR	Repl. by AUBERT,B 04R
<2200	90	[521] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[521] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[522] The quoted result is obtained after combining with AUBERT 04G result by AUBERT 04R alone gives $(33 \pm 4 \pm 5) \times 10^{-6}$.

$\Gamma(a_1(1260)^0\pi^0)/\Gamma_{total}$ — Γ_{258}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-3}$	90	[523] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[523] 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_{259}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-6}$	90	[524] AUBERT,B	04D	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.9 \times 10^{-6}$	90	[524] WANG	04A	BELL	$e^+e^- \to \Upsilon(4S)$
$<3 \times 10^{-6}$	90	[524] AUBERT	01G	BABR	$e^+e^- \to \Upsilon(4S)$
$<5.5 \times 10^{-6}$	90	[524] JESSOP	00	CLE2	$e^+e^- \to \Upsilon(4S)$
$<1.4 \times 10^{-5}$	90	[524] BERGFELD	98	CLE2	Repl. by JESSOP 00
$<4.6 \times 10^{-4}$	90	[525] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[524] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[525] 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_{260}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9.0 \times 10^{-3}$	90	[526] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[526] 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_{261}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.4 \times 10^{-3}$	90	[527] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[527] 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_{262}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.4 \times 10^{-3}$	90	[528] ALBRECHT	90B	ARG	$e^+e^- \to \Upsilon(4S)$

[528] 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_{263}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.0 \times 10^{-3}$	90	[529] ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[529] 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_{264}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8 \times 10^{-3}$	90	[530] BORTOLETTO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.0 \times 10^{-3}$	90	[531] ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[530] BORTOLETTO 89 reports $< 3.2 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[531] 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_{265}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-2}$	90	[532] ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[532] 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_{266}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7 \times 10^{-7}$	90	[533] AUBERT	04U	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.1 \times 10^{-7}$	90	[533] CHANG	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.4 \times 10^{-6}$	90	[533] BORNHEIM	03	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.2 \times 10^{-6}$	90	[533] ABE	02O	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$<7.0 \times 10^{-6}$	90	[533] COAN	99	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.8 \times 10^{-5}$	90	[534] BUSKULIC	96V	ALEP	$e^+e^- \rightarrow Z$
$<3.5 \times 10^{-4}$	90	[535] ABREU	95N	DLPH	Sup. by ADAM 96D
$<3.4 \times 10^{-5}$	90	[536] BORTOLETTO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.2 \times 10^{-4}$	90	[537] ALBRECHT	88F	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.7 \times 10^{-4}$	90	[536] BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[533] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[534] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.
[535] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.
[536] Paper assumes the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[537] 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_{267}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[538] BEBEK	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.5	90	[539] ABREU	95N	DLPH	Sup. by ADAM 96D
$5.4 \pm 1.8 \pm 2.0$		[540] ALBRECHT	88F	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[538] BEBEK 89 reports $< 2.9 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.
[539] Assumes a B^0, B^- production fraction of 0.39 and a B_s production fraction of 0.12.
[540] 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%.

$\Gamma(p\overline{p}K^0)/\Gamma_{total}$ — Γ_{268}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.08^{+0.52}_{-0.38}\pm0.24}$		[541,542] WANG	05A	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.88^{+0.77}_{-0.60}\pm0.23$		[541,543] WANG	04	BELL	Repl. by WANG 05A
<7.2	90	[541,544] ABE	02K	BELL	Repl. by WANG 04

[541] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[542] Provides also results with $M_{p\overline{p}} < 2.85$ GeV/c^2 and angular asymmetry of $p\overline{p}$ system.
[543] The branching fraction for $M_{p\overline{p}} < 2.85$ is also reported.
[544] Explicitly vetoes resonant production of $p\overline{p}$ from Charmonium states.

$\Gamma(\Theta(1540)^+\overline{p}\times B(\Theta(1540)^+ \to pK^0_S))/\Gamma_{total}$ — Γ_{269}/Γ

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	[545] WANG	05A	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(p\overline{p}K^*(892)^0)/\Gamma_{total}$ — Γ_{270}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<7.6	90	[546] WANG	04	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(p\overline{\Lambda}\pi^-)/\Gamma_{total}$ — Γ_{271}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.62^{+0.44}_{-0.40}\pm0.31}$		[547,548] WANG	05A	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.97^{+1.00}_{-0.80}\pm0.56$		[547] WANG	03	BELL	Repl. by WANG 05A
<13	90	[547] COAN	99	CLE2	$e^+e^- \to \Upsilon(4S)$
<180	90	[549] ALBRECHT	88F	ARG	$e^+e^- \to \Upsilon(4S)$

[547] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[548] Provides also results with $M_{p\overline{p}} < 2.85$ GeV/c^2 and angular asymmetry of $p\overline{p}$ system.
[549] ALBRECHT 88F reports $< 2.0\times10^{-4}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

$\Gamma(p\overline{\Lambda}K^-)/\Gamma_{total}$ — Γ_{272}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<8.2\times10^{-7}}$	90	[550] WANG	03	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(p\overline{\Sigma}^0\pi^-)/\Gamma_{total}$ — Γ_{273}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<3.8\times10^{-6}}$	90	[551] WANG	03	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{\Lambda}\Lambda)/\Gamma_{total}$ — Γ_{274}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.9 \times 10^{-7}$	90	[552] CHANG	05	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2 \times 10^{-6}$	90	[552] BORNHEIM	03	CLE2	$e^+e^- \to \Upsilon(4S)$
$<1.0 \times 10^{-6}$	90	[552] ABE	02O	BELL	Repl. by CHANG 05
$<3.9 \times 10^{-6}$	90	[552] COAN	99	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\Delta^0\overline{\Delta}^0)/\Gamma_{total}$ — Γ_{275}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0015	90	[553] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\Delta^{++}\overline{\Delta}^{--})/\Gamma_{total}$ — Γ_{276}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-4}$	90	[554] BORTOLETTO	89	CLEO	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}^0 p\overline{p})/\Gamma_{total}$ — Γ_{277}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(1.18\pm0.15\pm0.16) \times 10^{-4}$	[555] ABE	02W	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}^*(2007)^0 p\overline{p})/\Gamma_{total}$ — Γ_{278}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(1.20^{+0.33}_{-0.29}\pm0.21) \times 10^{-4}$	[556] ABE	02W	BELL	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{\Sigma}_c^{--}\Delta^{++})/\Gamma_{total}$ — Γ_{279}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0010	90	[557] PROCARIO	94	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{\Lambda}_c^- p\pi^+\pi^-)/\Gamma_{total}$ — Γ_{280}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.3 ±0.4 OUR AVERAGE				
$1.7\ ^{+0.3}_{-0.2}\ \pm0.4$	[558] DYTMAN	02	CLE2	$e^+e^- \to \Upsilon(4S)$
$1.10\pm0.20\pm0.29$	[559] GABYSHEV	02	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.33^{+0.46}_{-0.42}\pm0.37$	[560] FU	97	CLE2	Repl. by DYTMAN 02

[558] DYTMAN 02 reports $(1.67^{+0.27}_{-0.25}) \times 10^{-3}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[559] GABYSHEV 02 reports $(1.1 \pm 0.2) \times 10^{-3}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(\overline{\Lambda}_c^- p)/\Gamma_{total}$ — Γ_{281}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.19^{+0.56}_{-0.49} \pm 0.65}$		[561,562] GABYSHEV	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9	90	[561,563] DYTMAN	02	CLE2	$e^+e^- \to \Upsilon(4S)$
<3.1	90	[561,564] GABYSHEV	02	BELL	$e^+e^- \to \Upsilon(4S)$
<21	90	[565] FU	97	CLE2	$e^+e^- \to \Upsilon(4S)$

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

[562] The second error for GABYSHEV 03 includes the systematic and the error of $\Lambda_c \to \overline{p}K^+\pi^-$ decay branching fraction.

[563] DYTMAN 02 measurement uses $B(\Lambda_c^- \to \overline{p}K^+\pi^-) = 5.0 \pm 1.3\%$. The second error includes the systematic and the uncertainty of the branching ratio.

[564] Uses the value for $\Lambda_c \to pK^-\pi^+$ branching ratio $(5.0 \pm 1.3)\%$.

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

$\Gamma(\overline{\Lambda}_c^- p\pi^0)/\Gamma_{total}$ — Γ_{282}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<5.9 \times 10^{-4}}$	90	[566] FU	97	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{\Lambda}_c^- p\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{283}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<5.07 \times 10^{-3}}$	90	[567] FU	97	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{\Lambda}_c^- p\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_{284}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<2.74 \times 10^{-3}}$	90	[568] FU	97	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{\Sigma}_c(2520)^{--} p\pi^+)/\Gamma_{total}$ — Γ_{285}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.6 \pm 0.6 \pm 0.4}$	[569] GABYSHEV	02	BELL	$e^+e^- \to \Upsilon(4S)$

[569] GABYSHEV 02 reports $(1.63^{+0.64}_{-0.58}) \times 10^{-4}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma\big(\overline{\Sigma}_c(2520)^0 p\pi^-\big)/\Gamma_{\rm total}$ — Γ_{286}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.21 \times 10^{-4}$	90	[570,571] GABYSHEV 02	BELL	$e^+e^- \to \Upsilon(4S)$

[570] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[571] Uses the value for $\Lambda_c \to pK^-\pi^+$ branching ratio (5.0 ± 1.3)%.

$\Gamma\big(\overline{\Sigma}_c(2455)^0 p\pi^-\big)/\Gamma_{\rm total}$ — Γ_{287}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
1.0±0.8 OUR AVERAGE		Error includes scale factor of 1.7.		
$2.2\pm0.7\pm0.6$		[572] DYTMAN 02	CLE2	$e^+e^- \to \Upsilon(4S)$
$0.5^{+0.5}_{-0.4}\pm0.1$	90	[573] GABYSHEV 02	BELL	$e^+e^- \to \Upsilon(4S)$

[572] DYTMAN 02 reports $(2.2 \pm 0.7) \times 10^{-4}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[573] GABYSHEV 02 reports $(0.48^{+0.46}_{-0.41}) \times 10^{-4}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma\big(\overline{\Sigma}_c(2455)^{--} p\pi^+\big)/\Gamma_{\rm total}$ — Γ_{288}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
2.8±0.9 OUR AVERAGE			
$3.7\pm1.1\pm1.0$	[574] DYTMAN 02	CLE2	$e^+e^- \to \Upsilon(4S)$
$2.4\pm0.7\pm0.6$	[575] GABYSHEV 02	BELL	$e^+e^- \to \Upsilon(4S)$

[574] DYTMAN 02 reports $(3.7 \pm 1.1) \times 10^{-4}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[575] GABYSHEV 02 reports $(2.38^{+0.75}_{-0.69}) \times 10^{-4}$ for $B(\Lambda_c^+ \to pK^-\pi^+) = 0.05$. We rescale to our best value $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma\big(\overline{\Lambda}_c(2593)^- / \overline{\Lambda}_c(2625)^- p\big)/\Gamma_{\rm total}$ — Γ_{289}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.1 \times 10^{-4}$	90	[576,577] DYTMAN 02	CLE2	$e^+e^- \to \Upsilon(4S)$

[576] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[577] DYTMAN 02 measurement uses $B(\Lambda_c^- \to \overline{p}K^+\pi^-) = 5.0 \pm 1.3\%$. The second error includes the systematic and the uncertainty of the branching ratio.

$\Gamma(\gamma\gamma)/\Gamma_{\rm total}$ — Γ_{290}/Γ

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.2 \times 10^{-7}$	90	[578] VILLA 06	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.7 \times 10^{-6}$	90	[578] AUBERT 01I	BABR	$e^+e^- \to \Upsilon(4S)$
$<3.9 \times 10^{-5}$	90	[579] ACCIARRI 95I	L3	$e^+e^- \to Z$

[578] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[579] 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_{291}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.1 \times 10^{-8}$	90	[580] AUBERT	05W	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.9 \times 10^{-7}$	90	[580] CHANG	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$<8.3 \times 10^{-7}$	90	[580] BERGFELD	00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.4 \times 10^{-5}$	90	[581] ACCIARRI	97B	L3	$e^+e^- \rightarrow Z$
$<5.9 \times 10^{-6}$	90	AMMAR	94	CLE2	Repl. by BERGFELD 00B
$<2.6 \times 10^{-5}$	90	[582] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<7.6 \times 10^{-5}$	90	[583] ALBRECHT	87D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<6.4 \times 10^{-5}$	90	[584] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<3 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

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

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

[582] AVERY 89B reports $< 3 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0\overline{B}^0$. We rescale to 50%.

[583] ALBRECHT 87D reports $< 8.5 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0\overline{B}^0$. We rescale to 50%.

[584] 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_{292}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.9 \times 10^{-8}$	90	[585] ABULENCIA	05	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<8.3 \times 10^{-8}$	90	[586] AUBERT	05W	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.5 \times 10^{-7}$	90	[587] ACOSTA	04D	CDF	$p\overline{p}$ at 1.96 TeV
$<1.6 \times 10^{-7}$	90	[586] CHANG	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$<6.1 \times 10^{-7}$	90	[586] BERGFELD	00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$<4.0 \times 10^{-5}$	90	ABBOTT	98B	D0	$p\overline{p}$ 1.8 TeV
$<6.8 \times 10^{-7}$	90	[588] ABE	98	CDF	$p\overline{p}$ at 1.8 TeV
$<1.0 \times 10^{-5}$	90	[589] ACCIARRI	97B	L3	$e^+e^- \rightarrow Z$
$<1.6 \times 10^{-6}$	90	[590] 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	[591] ALBAJAR	91C	UA1	$E^{p\overline{p}}_{cm}$= 630 GeV
$<1.2 \times 10^{-5}$	90	[592] ALBAJAR	91C	UA1	$E^{p\overline{p}}_{cm}$= 630 GeV
$<4.3 \times 10^{-5}$	90	[593] AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<4.5 \times 10^{-5}$	90	[594] ALBRECHT	87D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<7.7 \times 10^{-5}$	90	[595] AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<2 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

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

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

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

[588] 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.

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

[590] ABE 96L assumes equal B^0 and B^+ production. They normalize to their measured $\sigma(B^+,\ p_T(B) > 6$ GeV/c, $|y| < 1) = 2.39 \pm 0.54\ \mu$b.

[591] B^0 and B^0_s are not separated.

[592] Obtained from unseparated B^0 and B^0_s measurement by assuming a B^0:B^0_s ratio 2:1.

[593] AVERY 89B reports $< 5 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \overline{B}^0$. We rescale to 50%.

[594] ALBRECHT 87D reports $< 5 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0 \overline{B}^0$. We rescale to 50%.

[595] 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_{293}/Γ

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

VALUE (units 10^{-7})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 5.4	90	[596] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.1^{+2.3}_{-1.6} \pm 0.8$		[597] AUBERT	03U	BABR	$e^+e^- \to \Upsilon(4S)$
< 27	90	[597] ABE	02	BELL	Repl. by ISHIKAWA 03
< 38	90	[597] AUBERT	02L	BABR	$e^+e^- \to \Upsilon(4S)$
< 84.5	90	[598] ANDERSON	01B	CLE2	$e^+e^- \to \Upsilon(4S)$
< 3000	90	ALBRECHT	91E	ARG	$e^+e^- \to \Upsilon(4S)$
< 5200	90	[599] AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

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

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

[598] The result is for di-lepton masses above 0.5 GeV.

[599] 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_{294}/Γ

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

VALUE (units 10^{-7})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{2.0^{+1.3}_{-1.0}}$ **OUR AVERAGE** Error includes scale factor of 1.6.					
$1.63^{+0.82}_{-0.63} \pm 0.14$		[600] AUBERT	03U	BABR	$e^+e^- \to \Upsilon(4S)$
$5.6^{+2.9}_{-2.3} \pm 0.5$		[601] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 33	90	[600] ABE	02	BELL	Repl. by ISHIKAWA 03
< 36	90	AUBERT	02L	BABR	$e^+e^- \to \Upsilon(4S)$
< 66.4	90	[602] ANDERSON	01B	CLE2	$e^+e^- \to \Upsilon(4S)$
<5200	90	ALBRECHT	91E	ARG	$e^+e^- \to \Upsilon(4S)$
<3600	90	[603] AVERY	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[600] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[601] Assumes equal production of B^0 and B^+ at $\Upsilon(4S)$. The second error is a total of systematic uncertainties including model dependence.
[602] The result is for di-lepton masses above 0.5 GeV.
[603] AVERY 87 reports $< 4.5 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K^0 \ell^+ \ell^-)/\Gamma_{total}$ — Γ_{295}/Γ

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
<6.8	90	[604] ISHIKAWA	03	BELL	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(K^*(892)^0 e^+ e^-)/\Gamma_{total}$ — Γ_{296}/Γ

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.4	90	[605] ISHIKAWA	03	BELL	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.11^{+0.56}_{-0.47} \pm 0.11$		[606] AUBERT	03U	BABR	$e^+ e^- \to \Upsilon(4S)$
< 6.4	90	[606] ABE	02	BELL	Repl. by ISHIKAWA 03
< 6.7	90	[606] AUBERT	02L	BABR	$e^+ e^- \to \Upsilon(4S)$
<290	90	ALBRECHT	91E	ARG	$e^+ e^- \to \Upsilon(4S)$

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

$\Gamma(K^*(892)^0 \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{297}/Γ

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$1.22^{+0.38}_{-0.32}$ OUR AVERAGE					
$0.86^{+0.79}_{-0.58} \pm 0.11$		[607] AUBERT	03U	BABR	$e^+ e^- \to \Upsilon(4S)$
$1.33^{+0.42}_{-0.37} \pm 0.11$		[608] ISHIKAWA	03	BELL	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 4.2	90	[607] ABE	02	BELL	$e^+ e^- \to \Upsilon(4S)$
< 3.3	90	AUBERT	02L	BABR	$e^+ e^- \to \Upsilon(4S)$
< 4.0	90	[609] AFFOLDER	99B	CDF	$p\overline{p}$ at 1.8 TeV
< 25	90	[610] ABE	96L	CDF	Repl. by AFFOLDER 99B
< 23	90	[611] ALBAJAR	91C	UA1	$E^{p\overline{p}}_{cm}$= 630 GeV
<340	90	ALBRECHT	91E	ARG	$e^+ e^- \to \Upsilon(4S)$

[607] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[608] Assumes equal production of B^0 and B^+ at $\Upsilon(4S)$. The second error is a total of systematic uncertainties including model dependence.
[609] AFFOLDER 99B measured relative to $B^0 \to J/\psi(1S) K^*(892)^0$.
[610] ABE 96L measured relative to $B^0 \to J/\psi(1S) K^*(892)^0$ using PDG 94 branching ratios.
[611] ALBAJAR 91C assumes 36% of $\overline{b}$ quarks give B^0 mesons.

$\Gamma(K^*(892)^0 \ell^+ \ell^-)/\Gamma_{total}$ Γ_{299}/Γ

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

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
$\mathbf{11.7^{+3.0}_{-2.7} \pm 0.9}$	[612] ISHIKAWA	03	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K^*(892)^0 \nu \overline{\nu})/\Gamma_{total}$ Γ_{298}/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<1.0 \times 10^{-3}}$	90	[613] ADAM	96D	DLPH	$e^+ e^- \rightarrow Z$

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

$\Gamma(e^\pm \mu^\mp)/\Gamma_{total}$ Γ_{300}/Γ

Test of lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{< 1.7 \times 10^{-7}}$	90	[614] CHANG	03	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 1.8 \times 10^{-7}$	90	[614] AUBERT	05W	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$<15 \times 10^{-7}$	90	[614] BERGFELD	00B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 3.5 \times 10^{-6}$	90	ABE	98V	CDF	$p \overline{p}$ at 1.8 TeV
$< 1.6 \times 10^{-5}$	90	[615] 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	[616] AVERY	89B	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 4.5 \times 10^{-5}$	90	[617] ALBRECHT	87D	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 7.7 \times 10^{-5}$	90	[618] AVERY	87	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 3 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

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

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

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

[617] ALBRECHT 87D reports $< 5 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 45% to $B^0 \overline{B}^0$. We rescale to 50%.

[618] AVERY 87 reports $< 9 \times 10^{-5}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \overline{B}^0$. We rescale to 50%.

$\Gamma(K^0 e^\pm \mu^\mp)/\Gamma_{total}$ Γ_{301}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<4.0 \times 10^{-6}}$	90	[619] AUBERT	02L	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K^*(892)^0 e^\pm \mu^\mp)/\Gamma_{total}$ Γ_{302}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<3.4 \times 10^{-6}}$	90	[620] AUBERT	02L	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(e^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{303}/Γ

Test of lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-4}$	90	BORNHEIM	04	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.3 \times 10^{-4}$	90	AMMAR	94	CLE2	Repl. by BORNHEIM 04

$\Gamma(\mu^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{304}/Γ

Test of lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.8 \times 10^{-5}$	90	BORNHEIM	04	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<8.3 \times 10^{-4}$	90	AMMAR	94	CLE2	Repl. by BORNHEIM 04

$\Gamma(\text{invisible})/\Gamma_{total}$ — Γ_{305}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<22	90	[621] AUBERT,B	04J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[621] Uses the fully reconstructed $B^0 \rightarrow D^{(*)-}\ell^+\nu_\ell$ events as a tag.

$\Gamma(\nu\overline{\nu}\gamma)/\Gamma_{total}$ — Γ_{306}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<4.7	90	[622] AUBERT,B	04J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[622] Uses the fully reconstructed $B^0 \rightarrow D^{(*)-}\ell^+\nu_\ell$ events as a tag.

POLARIZATION IN B DECAYS

Written March 2006 by A.V. Gritsan (Johns Hopkins University) and J.G. Smith (University of Colorado at Boulder)

We review the notation used in polarization measurements of B decays and discuss CP-violating observables in polarization measurements. We look at several examples of vector-vector B meson decays, while more details about the theory and experimental results in B decays can be found in a separate mini-review [1] in this *Review*.

The angular distribution of the B meson decay to two vector mesons with the sequential decay of each vector meson is of special interest because it reflects both weak- and strong-interaction dynamics. Using the helicity formalism [2], this distribution can be expressed as a function of three helicity angles which describe the flight direction of the vector meson daughters in the decay chain. An equivalent set of transversity angles can be used to reparameterize the angular distribution [3]. While the function of the angles depends on the quantum numbers of the vector mesons daughters, the differential decay width has three complex amplitudes A_λ corresponding to the vector meson helicity $\lambda = 0$ or ± 1 [4], where the last two can be expressed in terms of parity-even and parity-odd amplitudes $A_{\parallel,\perp} = (A_{+1} \pm A_{-1})/\sqrt{2}$. The angular distribution involves the terms proportional to the absolute values squared of the three amplitudes, plus the interference terms $\mathcal{I}m(A_\perp A_\parallel^*)$, $\mathcal{R}e(A_\parallel A_0^*)$, and $\mathcal{I}m(A_\perp A_0^*)$. Therefore, spin alignment in the vector-vector decay can be expressed with the parameters $f_L = |A_0|^2/\Sigma|A_\lambda|^2$, $f_\perp = |A_\perp|^2/\Sigma|A_\lambda|^2$, and the relative phases $\phi_\parallel = \arg(A_\parallel/A_0)$, $\phi_\perp = \arg(A_\perp/A_0)$.

Moreover, *CP*-violation can be tested in the angular distribution of the decay as the difference between the B and $\bar{B}$. This includes the vector triple-product asymmetries, direct-*CP* asymmetries in the amplitudes, and mixing-induced *CP* asymmetries in the time evolution. Overall, six non-trivial *CP*-violating parameters can be constructed from the $\bar{A}_\lambda$ and A_λ amplitudes [4]. Three parameters are equivalent to the three direct *CP* violating quantities, and in Ref. 5 they are chosen as the asymmetries in the overall decay rate $\mathcal{A}_{CP}$, in the f_L fraction $\mathcal{A}^0_{CP}$, and in the $f_\perp$ fraction $\mathcal{A}^\perp_{CP}$. Two other *CP* violating parameters are the weak phase differences:

$$\Delta\phi_\parallel = \frac{1}{2}\arg(\bar{A}_\parallel A_0/A_\parallel \bar{A}_0) \tag{1}$$

$$\Delta\phi_\perp = \frac{1}{2}\arg(\bar{A}_\perp A_0/A_\perp \bar{A}_0) - \frac{\pi}{2} \tag{2}$$

The $\frac{\pi}{2}$ term in Eq. (2) reflects the fact that $A_\perp$ and $\bar{A}_\perp$ differ in phase by π if *CP* is conserved. The two parameters

$\Delta\phi_{\parallel}$ and $\Delta\phi_{\perp}$ are equivalent to triple-product asymmetries constructed from the vectors describing the decay angular distribution [4]. Finally, one *CP*-violating asymmetry is equivalent to the mixing-induced asymmetries studied in other decays [1].

B meson decays to heavy vector particles with charm, such as $B \to J/\psi K^*$, $D^*\rho$, D^*K^*, D^*D^*, $D^*D_s^*$, show substantial fraction of the amplitudes corresponding to transverse polarization of the vector mesons ($A_{\pm 1}$), in agreement with the factorization prediction. Most of these decays arise from tree-level $b \to c$ transitions and the amplitude hierarchy $|A_0| > |A_+| > |A_-|$ is expected from analyses based on quark-helicity conservation [6]. The larger the mass of the vector meson daughters, the weaker the inequality. The detailed amplitude analysis of the $B \to J/\psi K^*$ decays has been performed by the BABAR [7], Belle [8], CDF [9], and CLEO [10] collaborations. Most analyses are performed under the assumption of the absence of direct *CP* violation. The parameter values are given in the particle listing of this *Review*. The difference of the strong phases $\phi_{\parallel}$ and $\phi_{\perp}$ deviates significantly from zero. The most recent measurements [8] of *CP*-violating terms similar to those in $B \to \phi K^*$ [5] are consistent with zero.

In addition, the mixing-induced *CP*-violating asymmetry is measured in the *CP*-eigenstate mode $B^0 \to J/\psi K^{*0}$ [1,7,8]. This allows one to resolve the sign ambiguity of the $\cos 2\beta = \cos 2\phi_1$ term which appears in the time-dependent angular distribution due to interference of parity-even and parity-odd terms. This analysis relies on the knowledge of discrete ambiguities in the strong phases $\phi_{\parallel}$ and $\phi_{\perp}$ as discussed below. The BABAR experiment used a novel method based on the dependence on the $K\pi$ invariant mass of the interference between the S- and P-waves to resolve the discrete ambiguity in the determination of the strong phases $(\phi_\parallel, \phi_\perp)$ in $B \to J/\psi K^*$ decays [7]. The result is in agreement with the amplitude hierarchy expectation [6]. The CDF [9] and D0 [11] experiments have studied the $B_s^0 \to J/\psi\phi$ decay and provided new lifetime measurements in addition to polarization results.

The interest in the polarization and CP asymmetry measurements in $B \to \phi K^*$ decays is mainly motivated by their potential sensitivity to physics beyond the Standard Model. In the Standard Model these decays are expected to arise only from the virtual loop effects in $b \to s$ penguin transitions. The amplitude hierarchy $|A_0| \gg |A_+| \gg |A_-|$ was expected in the B decays to light vector particles in penguin transitions [12,13] similarly to the tree-level transition analysis [6]. The decay amplitudes for $B \to \phi K^*$ have been measured by the BABAR and Belle experiments [5,14–16]. The fractions of longitudinal polarization $f_L = 0.50 \pm 0.07$ for the $B^+ \to \phi K^{*+}$ decay and $f_L = 0.48 \pm 0.04$ for the $B^0 \to \phi K^{*0}$ decay indicate significant departure from the naive expectation of predominant longitudinal polarization and suggests other contributions to the decay amplitude, previously neglected, either within or beyond the Standard Model [13,17]. The complete set of ten amplitude parameters measured in the $B^0 \to \phi K^{*0}$ decay are given in Table 1. Several other parameters could be constructed from the above ten parameters, as suggested in Ref. 18.

There is a discrete ambiguity in the phase $(\phi_\parallel, \phi_\perp, \Delta\phi_\parallel, \Delta\phi_\perp)$ measurements and simple transformation of phases, for example, $(-\phi_\parallel, \pi - \phi_\perp, -\Delta\phi_\parallel, -\Delta\phi_\perp)$, give rise to another set of values which produce the same angular distribution. The values closest to $(\pi, \pi, 0, 0)$ are given in Table 1, which is the preferred solution from s-quark helicity conservation [6,12,13]. However, this assumption is violated in the

Table 1: Polarization and CP-violation parameters [5,16], along with the branching fraction $\mathcal{B}$ [5,15,19] measured in the $B^0 \to \phi K^{*0}$ decay.

parameter	average
$\mathcal{B}$	$(9.5 \pm 0.9) \times 10^{-6}$
f_L	0.48 ± 0.04
$f_\perp$	0.26 ± 0.05
$\phi_\parallel$	$2.36^{+0.18}_{-0.16}$
$\phi_\perp$	2.49 ± 0.18
A_{CP}	0.01 ± 0.07
A^0_{CP}	0.01 ± 0.09
$A^\perp_{CP}$	-0.16 ± 0.15
$\Delta\phi_\parallel$	0.02 ± 0.28
$\Delta\phi_\perp$	0.03 ± 0.33

measurement of f_L and in the departure of $\phi_\parallel$ and $\phi_\perp$ from π, and needs experimental confirmation.

Like $B \to \phi K^*$, the decays $B \to \rho K^*$ and $B \to \omega K^*$ may be sensitive to New Physics. First measurements of the longitudinal polarization fraction in $B^+ \to \rho^0 K^{*+}$ [14] and $B^+ \to \rho^+ K^{*0}$ [20] have larger uncertainties due to lower yields and larger backgrounds. Only limits have been reported for the other $B \to \rho K^*$ and $B \to \omega K^*$ decays [21,22] and further improved measurements in all $B \to \rho K^*$ and $B \to \omega K^*$ decays are necessary to distinguish different interpretations [17].

The other class of vector-vector B meson decays is expected to arise from tree-level $b \to u$ transition. There is experimental confirmation of predominantly longitudinal polarization in the decays $B^0 \to \rho^+\rho^-$ [23], $B^+ \to \rho^0\rho^+$ [14,24], and $B^+ \to \omega\rho^+$ [21], which is consistent with the analysis of the quark helicity conservation [6]. Because the longitudinal amplitude dominates the decay, a detailed amplitude analysis is not possible with current B samples. Only limits have been set on the $B^0 \to \rho^0\rho^0$ [14,22,25] and $B^0 \to \omega\rho^0$ [21,26] decays, indicating that $b \to d$ penguin pollution is small in the charmless, strangeless vector-vector B decays.

In summary, there has been considerable recent interest in the polarization measurements of B meson decays because they reveal both weak- and strong-interaction dynamics [17,27]. New measurements will further elucidate the pattern of spin alignment measurements in rare B decays and further test the Standard Model and strong interaction dynamics, including the non-factorizable contributions to the B decay amplitudes.

References

1. Y. Kwon and G. Punzi, Production and Decay of b-Flavored Hadrons. Mini-review in this *Review*.
2. M. Jacob and G. C. Wick, Ann. Phys. 7, 404 (1959).
3. I. Dunietz, H. R. Quinn, A. Snyder, W. Toki and H. J. Lipkin, Phys. Rev. **D43**, 2193 (1991).
4. G. Kramer and W. F. Palmer, Phys. Rev. **D45**, 193 (1992);
   G. Valencia, Phys. Rev. **D39**, 3339 (1998);
   A. Datta and D. London, Int. J. Mod. Phys. **A19**, 2505 (2004).
5. BABAR Collaboration, B. Aubert *et al.*, Phys. Rev. Lett. **93**, 231804 (2004).
6. A. Ali *et al.*, Z. Physik **C1**, 269 (1979);
   M. Suzuki, Phys. Rev. **D64**, 117503 (2001).
7. BABAR Collaboration, B. Aubert *et al.*, Phys. Rev. **D71**, 032005 (2005).
8. Belle Collaboration, R. Itoh *et al.*, Phys. Rev. Lett. **95**, 091601 (2005).

9. CDF Collaboration, D. Acosta *et al.*, Phys. Rev. Lett. **94**, 101803 (2005).
10. CLEO Collaboration, C. P. Jessop, Phys. Rev. Lett. **79**, 4533 (1997).
11. D0 Collaboration, V. M. Abazov *et al.*, Phys. Rev. Lett. **94**, 042001 (2005);
Phys. Rev. Lett. **95**, 171801 (2005).
12. H. Y. Cheng, K. C. Yang, Phys. Lett. **B511**, 40 (2001);
C. H. Chen, Y. Y. Keum, H. n. Li, Phys. Rev. **D66**, 054013 (2002).
13. A. L. Kagan, Phys. Lett. **B601**, 151 (2004);
Y. Grossman, Int. J. Mod. Phys. **A19**, 907 (2004).
14. BABAR Collaboration, B. Aubert *et al.*, Phys. Rev. Lett. **91**, 171802 (2003).
15. Belle Collaboration, K. F. Chen *et al.*, Phys. Rev. Lett. **91**, 201801 (2003).
16. Belle Collaboration, K. F. Chen *et al.*, Phys. Rev. Lett. **94**, 221804 (2005).
17. C. W. Bauer *et al.*, Phys. Rev. **D70**, 054015 (2004);
P. Colangelo *et al.*, Phys. Lett. **B597**, 291 (2004);
M. Ladisa *et al.*, Phys. Rev. **D70**, 114025 (2004);
H. Y. Cheng *et al.*, Phys. Rev. **D71**, 014030 (2005);
E. Alvarez *et al.*, Phys. Rev. **D70**, 115014 (2004);
H. n. Li and S. Mishima, Phys. Rev. **D71**, 054025 (2005);
H. n. Li, Phys. Lett. **B622**, 63 (2005);
Y. D. Yang *et al.*, Phys. Rev. **D72**, 015009 (2005);
P. K. Das and K. C. Yang, Phys. Rev. **D71**, 094002 (2005);
C. H. Chen and C. Q. Geng, Phys. Rev. **D71**, 115004 (2005).
18. D. London, N. Sinha, and R. Sinha, Phys. Rev. **D69**, 114013 (2004).
19. CLEO Collaboration, R. A. Briere *et al.*, Phys. Rev. Lett. **86**, 3718 (2001).
20. Belle Collaboration, J. Zhang *et al.*, Phys. Rev. Lett. **95**, 141801 (2005).

21. BABAR Collaboration, B. Aubert *et al.*, Phys. Rev. **D71**, 031103 (2005).
22. CLEO Collaboration, R. Godang *et al.*, Phys. Rev. Lett. **88**, 021802 (2002).
23. BABAR Collaboration, B. Aubert *et al.*, Phys. Rev. **D69**, 031102 (2004);
    Phys. Rev. Lett. **93**, 231801 (2004);
    Phys. Rev. Lett. **95**, 041805 (2005).
24. Belle Collaboration, J. Zhang *et al.*, Phys. Rev. Lett. **91**, 221801 (2003).
25. BABAR Collaboration, B. Aubert *et al.*, Phys. Rev. Lett. **94**, 131801 (2005).
26. CLEO Collaboration, T. Bergfeld *et al.*, Phys. Rev. Lett. **81**, 272 (1998).
27. C. H. Chen and H. n. Li, Phys. Rev. **D71**, 114008 (2005).

POLARIZATION IN B^0 DECAY

In decays involving two vector mesons, one can distinguish among the states in which meson polarizations are both longitudinal (L) or both are transverse and parallel ($\|$) or perpendicular ($\perp$) to each other with the parameters Γ_L/Γ, $\Gamma_\perp/\Gamma$, and the relative phases $\phi_\|$ and $\phi_\perp$. See the definitions in the note on "Polarization in B Decays" review in the B^0 Particle Listings.

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.572±0.009 OUR AVERAGE					
0.566±0.012±0.005		[623] AUBERT	05P	BABR	$e^+e^- \to \Upsilon(4S)$
0.574±0.012±0.009		ITOH	05	BELL	$e^+e^- \to \Upsilon(4S)$
0.597±0.028±0.024		[624] AUBERT	01H	BABR	$e^+e^- \to \Upsilon(4S)$
0.59 ±0.06 ±0.01		[625] AFFOLDER	00N	CDF	$p\overline{p}$ at 1.8 TeV
0.52 ±0.07 ±0.04		[626] JESSOP	97	CLE2	$e^+e^- \to \Upsilon(4S)$
0.65 ±0.10 ±0.04	65	ABE	95Z	CDF	$p\overline{p}$ at 1.8 TeV
0.97 ±0.16 ±0.15	13	[627] ALBRECHT	94G	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.62 ±0.02 ±0.03		[628] ABE	02N	BELL	Repl. by ITOH 05
0.80 ±0.08 ±0.05	42	[627] ALAM	94	CLE2	Sup. by JESSOP 97

[623] Obtained by combining the B^0 and B^+ modes.

[624] Averaged over an admixture of B^0 and B^- decays and the P wave fraction is $(16.0 \pm 3.2 \pm 1.4) \times 10^{-2}$.

[625] 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 $0.13^{+0.12}_{-0.09} \pm 0.06$.

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

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

[628] Averaged over an admixture of B^0 and B^+ decays and the P wave fraction is $(19 \pm 2 \pm 3)\%$.

Γ_L/Γ in $B^0 \to \psi(2S) K^*(892)^0$

VALUE	DOCUMENT ID		TECN	COMMENT
0.45±0.11±0.04	[629] RICHICHI	01	CLE2	$e^+e^- \to \Upsilon(4S)$

[629] Averages between charged and neutral B mesons.

Γ_L/Γ in $B^0 \to D_s^{*+} D^{*-}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.52 ±0.05 OUR AVERAGE				
0.519±0.050±0.028	[630] AUBERT	03I	BABR	$e^+e^- \to \Upsilon(4S)$
0.506±0.139±0.036	AHMED	00B	CLE2	$e^+e^- \to \Upsilon(4S)$

[630] Measurement performed using partial reconstruction of D^{*-} decay.

Γ_L/Γ in $B^0 \to D^{*-} \rho^+$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.885±0.016±0.012		CSORNA	03	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.93 ±0.05 ±0.05	76	ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$

Γ_L/Γ in $B^0 \to D^{*+} D^{*-}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.57±0.08±0.02	MIYAKE	05	BELL	$e^+e^- \to \Upsilon(4S)$

$\Gamma_\perp/\Gamma$ in $B^0 \to D^{*+} D^{*-}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.14 ±0.04 OUR AVERAGE				
0.125±0.044±0.007	AUBERT,BE	05A	BABR	$e^+e^- \to \Upsilon(4S)$
0.19 ±0.08 ±0.01	MIYAKE	05	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.063±0.055±0.009	AUBERT	03Q	BABR	Repl. by AUBERT,BE 05A

$\Gamma_\perp/\Gamma$ in $B^0 \to J/\psi K^{*0}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.195±0.012±0.008	ITOH	05	BELL	$e^+e^- \to \Upsilon(4S)$

Γ_L/Γ in $B^0 \to \phi K^*(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
0.48±0.04 OUR AVERAGE			
0.45±0.05±0.02	CHEN 05A	BELL	$e^+e^- \to \Upsilon(4S)$
0.52±0.05±0.02	[631] AUBERT,B 04W	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.65±0.07±0.02	AUBERT 03V	BABR	Repl. by AUBERT,B 04W
0.41±0.10±0.04	CHEN 03B	BELL	Repl. by CHEN 05A

[631] AUBERT,B 04W also measures the fraction of parity-odd transverse contribution $f_\perp = 0.22 \pm 0.05 \pm 0.02$ and the phases of the parity-even and parity-odd transverse amplitudes relative to the longitudinal amplitude.

$\Gamma_\perp/\Gamma$ in $B^0 \to \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.26±0.05 OUR AVERAGE Error includes scale factor of 1.2.			
$0.31^{+0.06}_{-0.05}\pm0.02$	[632] CHEN 05A	BELL	$e^+e^- \to \Upsilon(4S)$
0.22±0.05±0.02	AUBERT,B 04W	BABR	$e^+e^- \to \Upsilon(4S)$

[632] This quantity was recalculated by the BELLE authors from numbers in the original paper.

$\phi_\parallel$ in $B^0 \to \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
$2.36^{+0.18}_{-0.16}$ OUR AVERAGE			
$2.40^{+0.28}_{-0.24}\pm0.07$	[633] CHEN 05A	BELL	$e^+e^- \to \Upsilon(4S)$
$2.34^{+0.23}_{-0.20}\pm0.05$	AUBERT,B 04W	BABR	$e^+e^- \to \Upsilon(4S)$

[633] This quantity was recalculated by the BELLE authors from numbers in the original paper.

$\phi_\perp$ in $B^0 \to \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
2.49±0.18 OUR AVERAGE			
2.51±0.25±0.06	[634] CHEN 05A	BELL	$e^+e^- \to \Upsilon(4S)$
2.47±0.25±0.05	AUBERT,B 04W	BABR	$e^+e^- \to \Upsilon(4S)$

[634] This quantity was recalculated by the BELLE authors from numbers in the original paper.

A^0_{CP} in $B^0 \to \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.01±0.09 OUR AVERAGE Error includes scale factor of 1.2.			
0.13±0.12±0.04	[635] CHEN 05A	BELL	$e^+e^- \to \Upsilon(4S)$
−0.06±0.10±0.01	AUBERT,B 04W	BABR	$e^+e^- \to \Upsilon(4S)$

[635] This quantity was recalculated by the BELLE authors from numbers in the original paper.

$A^\perp_{CP}$ in $B^0 \to \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
−0.16±0.15 OUR AVERAGE			
−0.20±0.18±0.04	[636] CHEN 05A	BELL	$e^+e^- \to \Upsilon(4S)$
−0.10±0.24±0.05	AUBERT,B 04W	BABR	$e^+e^- \to \Upsilon(4S)$

[636] This quantity was recalculated by the BELLE authors from numbers in the original paper.

$\Delta\phi_{\parallel}$ in $B^0 \rightarrow \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.02±0.28 OUR AVERAGE	Error includes scale factor of 1.6.		
$-0.32 \pm 0.27 \pm 0.07$	[637] CHEN 05A	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.27^{+0.20}_{-0.23} \pm 0.05$	AUBERT,B 04W	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[637] This quantity was recalculated by the BELLE authors from numbers in the original paper.

$\Delta\phi_{\perp}$ in $B^0 \rightarrow \phi K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.03±0.33 OUR AVERAGE	Error includes scale factor of 1.8.		
$-0.30 \pm 0.25 \pm 0.06$	[638] CHEN 05A	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.36 \pm 0.25 \pm 0.05$	AUBERT,B 04W	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[638] This quantity was recalculated by the BELLE authors from numbers in the original paper.

Γ_L/Γ in $B^0 \rightarrow \rho^+ \rho^-$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.967^{+0.022}_{-0.027}$ OUR AVERAGE			
$0.941^{+0.034}_{-0.040} \pm 0.030$	SOMOV 06	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.978 \pm 0.014^{+0.021}_{-0.029}$	AUBERT,B 05C	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.98\ ^{+0.02}_{-0.08} \pm 0.03$	AUBERT 04G	BABR	Repl. by AUBERT,B 04R
$0.99 \pm 0.03\ ^{+0.04}_{-0.03}$	AUBERT,B 04R	BABR	Repl. by AUBERT,B 05C

B^0–$\overline{B}^0$ MIXING

Updated April 2006 by O. Schneider (Ecole Polytechnique Fédérale de Lausanne).

There are two neutral B^0–$\overline{B}^0$ meson systems, B^0_d–$\overline{B}^0_d$ and B^0_s–$\overline{B}^0_s$ (generically denoted B^0_q–$\overline{B}^0_q$, $q = s, d$), which exhibit particle-antiparticle mixing [1]. This mixing phenomenon is described in Ref. 2. In the following, we adopt the notation introduced in Ref. 2, and assume CPT conservation throughout. In each system, the light (L) and heavy (H) mass eigenstates,

$$|B_{\rm L,H}\rangle = p|B^0_q\rangle \pm q|\overline{B}^0_q\rangle\,, \qquad (1)$$

have a mass difference $\Delta m_q = m_{\rm H} - m_{\rm L} > 0$, and a total decay width difference $\Delta\Gamma_q = \Gamma_{\rm L} - \Gamma_{\rm H}$. In the absence of CP

violation in the mixing, $|q/p| = 1$, these differences are given by $\Delta m_q = 2|M_{12}|$ and $|\Delta\Gamma_q| = 2|\Gamma_{12}|$, where M_{12} and Γ_{12} are the off-diagonal elements of the mass and decay matrices [2]. The evolution of a pure $|B_q^0\rangle$ or $|\overline{B}_q^0\rangle$ state at $t = 0$ is given by

$$|B_q^0(t)\rangle = g_+(t)\,|B_q^0\rangle + \frac{q}{p}\,g_-(t)\,|\overline{B}_q^0\rangle\,, \tag{2}$$

$$|\overline{B}_q^0(t)\rangle = g_+(t)\,|\overline{B}_q^0\rangle + \frac{p}{q}g_-(t)\,|B_q^0\rangle\,, \tag{3}$$

which means that the flavor states remain unchanged (+) or oscillate into each other (−) with time-dependent probabilities proportional to

$$|g_\pm(t)|^2 = \frac{e^{-\Gamma_q t}}{2}\left[\cosh\left(\frac{\Delta\Gamma_q}{2}\,t\right) \pm \cos(\Delta m_q\,t)\right]\,, \tag{4}$$

where $\Gamma_q = (\Gamma_{\rm H} + \Gamma_{\rm L})/2$. In the absence of CP violation, the time-integrated mixing probability $\int |g_-(t)|^2\,dt/(\int |g_-(t)|^2\,dt + \int |g_+(t)|^2\,dt)$ is given by

$$\chi_q = \frac{x_q^2 + y_q^2}{2(x_q^2+1)}\,, \qquad \text{where} \qquad x_q = \frac{\Delta m_q}{\Gamma_q}\,, \qquad y_q = \frac{\Delta\Gamma_q}{2\Gamma_q}\,. \tag{5}$$

Standard Model predictions and phenomenology

In the Standard Model, the transitions $B_q^0 \to \overline{B}_q^0$ and $\overline{B}_q^0 \to B_q^0$ are due to the weak interaction. They are described, at the lowest order, by box diagrams involving two W bosons and two up-type quarks (see Fig. 1), as is the case for K^0–$\overline{K}^0$ mixing. However, the long range interactions arising from intermediate virtual states are negligible for the neutral B meson systems, because the large B mass is off the region of hadronic resonances. The calculation of the dispersive and absorptive parts of the box diagrams yields the following predictions for the off-diagonal element of the mass and decay matrices [3],

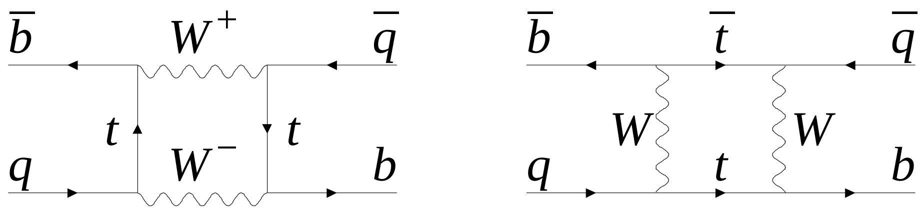


Figure 1: Dominant box diagrams for the $B^0_q \rightarrow \overline{B}^0_q$ transitions ($q = d$ or s). Similar diagrams exist where one or both t quarks are replaced with c or u quarks.

$$M_{12} = -\frac{G_F^2 m_W^2 \eta_B m_{B_q} B_{B_q} f_{B_q}^2}{12\pi^2} S_0(m_t^2/m_W^2)\,(V_{tq}^* V_{tb})^2 \,, \qquad (6)$$

$$\Gamma_{12} = \frac{G_F^2 m_b^2 \eta'_B m_{B_q} B_{B_q} f_{B_q}^2}{8\pi} \times \left[(V_{tq}^* V_{tb})^2 + V_{tq}^* V_{tb} V_{cq}^* V_{cb}\, \mathcal{O}\left(\frac{m_c^2}{m_b^2}\right) + (V_{cq}^* V_{cb})^2\, \mathcal{O}\left(\frac{m_c^4}{m_b^4}\right) \right] , \qquad (7)$$

where G_F is the Fermi constant, m_W the W boson mass, and m_i the mass of quark i; m_{B_q}, f_{B_q} and B_{B_q} are the B^0_q mass, weak decay constant and bag parameter, respectively. The known function $S_0(x_t)$ can be approximated very well by $0.784\, x_t^{0.76}$ [4], and V_{ij} are the elements of the CKM matrix [5]. The QCD corrections η_B and η'_B are of order unity. The only non-negligible contributions to M_{12} are from box diagrams involving two top quarks. The phases of M_{12} and Γ_{12} satisfy

$$\phi_M - \phi_\Gamma = \pi + \mathcal{O}\left(\frac{m_c^2}{m_b^2}\right) , \qquad (8)$$

implying that the mass eigenstates have mass and width differences of opposite signs. This means that, like in the K^0–$\overline{K}^0$ system, the heavy state is expected to have a smaller decay width than that of the light state: $\Gamma_{\rm H} < \Gamma_{\rm L}$. Hence, $\Delta\Gamma = \Gamma_{\rm L} - \Gamma_{\rm H}$ is expected to be positive in the Standard Model.

Furthermore, the quantity

$$\left|\frac{\Gamma_{12}}{M_{12}}\right| \simeq \frac{3\pi}{2}\frac{m_b^2}{m_W^2}\frac{1}{S_0(m_t^2/m_W^2)} \sim \mathcal{O}\left(\frac{m_b^2}{m_t^2}\right) \tag{9}$$

is small, and a power expansion of $|q/p|^2$ yields

$$\left|\frac{q}{p}\right|^2 = 1 + \left|\frac{\Gamma_{12}}{M_{12}}\right| \sin(\phi_M - \phi_\Gamma) + \mathcal{O}\left(\left|\frac{\Gamma_{12}}{M_{12}}\right|^2\right) . \tag{10}$$

Therefore, considering both Eqs. (8) and (9), the CP-violating parameter

$$1 - \left|\frac{q}{p}\right|^2 \simeq \mathrm{Im}\left(\frac{\Gamma_{12}}{M_{12}}\right) \tag{11}$$

is expected to be very small: $\sim \mathcal{O}(10^{-3})$ for the B_d^0–$\overline{B}_d^0$ system and $\lesssim \mathcal{O}(10^{-4})$ for the B_s^0–$\overline{B}_s^0$ system [6].

In the approximation of negligible CP violation in mixing, the ratio $\Delta\Gamma_q/\Delta m_q$ is equal to the small quantity $|\Gamma_{12}/M_{12}|$ of Eq. (9); it is hence independent of CKM matrix elements, *i.e.*, the same for the B_d^0–$\overline{B}_d^0$ and B_s^0–$\overline{B}_s^0$ systems. It can be calculated with lattice QCD techniques; typical results are $\sim 5 \times 10^{-3}$ with quoted uncertainties of $\sim 30\%$. Given the current experimental knowledge on the mixing parameter x_q (obtained from published results only),

$$\begin{cases} x_d = 0.776 \pm 0.008 & (B_d^0\text{–}\overline{B}_d^0 \text{ system}) \\ x_s > 19.9 \text{ at } 95\% \text{ CL} & (B_s^0\text{–}\overline{B}_s^0 \text{ system}) \end{cases} , \tag{12}$$

the Standard Model thus predicts that $\Delta\Gamma_d/\Gamma_d$ is very small (below 1%), but $\Delta\Gamma_s/\Gamma_s$ considerably larger ($\sim 10\%$). These width differences are caused by the existence of final states to which both the B_q^0 and $\overline{B}_q^0$ mesons can decay. Such decays involve $b \to c\bar{c}q$ quark-level transitions, which are Cabibbo-suppressed if $q = d$ and Cabibbo-allowed if $q = s$.

Experimental issues and methods for oscillation analyses

Time-integrated measurements of B^0–$\overline{B}^0$ mixing were published for the first time in 1987 by UA1 [7] and ARGUS [8], and since then by many other experiments. These measurements are typically based on counting same-sign and opposite-sign lepton pairs from the semileptonic decay of the produced $b\overline{b}$ pairs. Such analyses cannot easily separate the contributions from the different b-hadron species, therefore, the clean environment of $\Upsilon(4S)$ machines (where only B^0_d and charged B_u mesons are produced) is in principle best suited to measure χ_d.

However, better sensitivity is obtained from time-dependent analyses aiming at the direct measurement of the oscillation frequencies Δm_d and Δm_s, from the proper time distributions of B^0_d or B^0_s candidates identified through their decay in (mostly) flavor-specific modes, and suitably tagged as mixed or unmixed. This is particularly true for the B^0_s–$\overline{B}^0_s$ system, where the large value of x_s implies maximal mixing, *i.e.*, $\chi_s \simeq 1/2$. In such analyses, the B^0_d or B^0_s mesons are either fully reconstructed, partially reconstructed from a charm meson, selected from a lepton with the characteristics of a $b \to \ell^-$ decay, or selected from a reconstructed displaced vertex. At high-energy colliders (LEP, SLC, Tevatron), the proper time $t = \dfrac{m_B}{p} L$ is measured from the distance L between the production vertex and the B decay vertex, and from an estimate of the B momentum p. At asymmetric B factories (KEKB, PEP-II), producing $e^+e^- \to \Upsilon(4S) \to B^0_d \overline{B}^0_d$ events with a boost $\beta\gamma$ (= 0.425, 0.55), the proper time difference between the two B candidates is estimated as $\Delta t \simeq \dfrac{\Delta z}{\beta\gamma c}$, where Δz is the spatial separation between the two B decay vertices along the boost direction. In all cases, the good resolution needed on the vertex positions is obtained with silicon detectors.

The average statistical significance $\mathcal{S}$ of a B^0_d or B^0_s oscillation signal can be approximated as [9]

$$\mathcal{S} \approx \sqrt{N/2}\, f_{\rm sig}\, (1-2\eta)\, e^{-(\Delta m\, \sigma_t)^2/2}\,, \tag{13}$$

where N is the number of selected and tagged candidates, $f_{\rm sig}$ is the fraction of signal in that sample, η is the total mistag probability, and σ_t is the resolution on proper time (or proper time difference). The quantity $\mathcal{S}$ decreases very quickly as Δm increases; this dependence is controlled by σ_t, which is therefore a critical parameter for Δm_s analyses. At high-energy colliders, the proper time resolution $\sigma_t \sim \frac{m_B}{\langle p \rangle}\sigma_L \oplus t\frac{\sigma_p}{p}$ includes a constant contribution due to the decay length resolution σ_L (typically 0.05–0.3 ps), and a term due to the relative momentum resolution σ_p/p (typically 10–20% for partially reconstructed decays), which increases with proper time. At B factories, the boost of the B mesons is estimated from the known beam energies, and the term due to the spatial resolution dominates (typically 1–1.5 ps because of the much smaller B boost).

In order to tag a B candidate as mixed or unmixed, it is necessary to determine its flavor both in the initial state and in the final state. The initial and final state mistag probabilities, η_i and η_f, degrade $\mathcal{S}$ by a total factor $(1-2\eta) = (1-2\eta_i)(1-2\eta_f)$. In lepton-based analyses, the final state is tagged by the charge of the lepton from $b \to \ell^-$ decays; the largest contribution to η_f is then due to $\overline{b} \to \overline{c} \to \ell^-$ decays. Alternatively, the charge of a reconstructed charm meson (D^{*-} from B^0_d or D^-_s from B^0_s), or that of a kaon hypothesized to come from a $b \to c \to s$ decay [10], can be used. For fully inclusive analyses based on topological vertexing, final state tagging techniques include jet charge [11] and charge dipole [12,13] methods.

At high-energy colliders, the methods to tag the initial state (*i.e.*, the state at production), can be divided into two groups: the ones that tag the initial charge of the $\overline{b}$ quark contained in the B candidate itself (same-side tag), and the ones that tag the initial charge of the other b quark produced in the event (opposite-side tag). On the same side, the charge of a track from the primary vertex is correlated with the production state of the B if that track is a decay product of a B^{**} state or the first particle in the fragmentation chain [14,15]. Jet- and vertex-charge techniques work on both sides and on the opposite side, respectively. Finally, the charge of a lepton from $b \to \ell^-$ or of a kaon from $b \to c \to s$ can be used as opposite side tags, keeping in mind that their performance is degraded due to integrated mixing. At SLC, the beam polarization produced a sizeable forward-backward asymmetry in the $Z \to b\overline{b}$ decays, and provided another very interesting and effective initial state tag based on the polar angle of the B candidate [12]. Initial state tags have also been combined to reach $\eta_i \sim 26\%$ at LEP [15,16], or even 22% at SLD [12] with full efficiency. In the case $\eta_f = 0$, this corresponds to an effective tagging efficiency $Q = \epsilon D^2 = \epsilon(1-2\eta)^2$, where ϵ is the tagging efficiency, in the range $23-31\%$. The equivalent figure achieved by CDF during Tevatron Run I was $\sim 3.5\%$ [17] reflecting the fact that tagging is more difficult at hadron colliders. The current CDF and DØ analyses of Tevatron Run II data reach $\epsilon D^2 = (1.5 \pm 0.1)\%$ [18] and $(2.5 \pm 0.2)\%$ [19] for opposite-side tagging, while same-side kaon tagging (for B^0_s oscillation analyses) is contributing an additional $(3.4 \pm 1.0)\%$ at CDF [18].

At B factories, the flavor of a B^0_d meson at production cannot be determined, since the two neutral B mesons produced in a $\Upsilon(4S)$ decay evolve in a coherent P-wave state where they keep opposite flavors at any time. However, as soon as one of them decays, the other follows a time-evolution given by Eqs. (2) or (3), where t is replaced with Δt (which will take negative values half of the time). Hence, the "initial state" tag of a B can be taken as the final state tag of the other B. Effective tagging efficiencies Q of 30% are achieved by BABAR and Belle [20], using different techniques including $b \to \ell^-$ and $b \to c \to s$ tags. It is worth noting that, in this case, mixing of the other B (*i.e.*, the coherent mixing occurring before the first B decay) does not contribute to the mistag probability.

In the absence of experimental observation of a decay-width difference, oscillation analyses typically neglect $\Delta\Gamma$ in Eq. (4), and describe the data with the physics functions $\Gamma e^{-\Gamma t}(1 \pm \cos(\Delta m t))/2$ (high-energy colliders) or $\Gamma e^{-\Gamma|\Delta t|}(1 \pm \cos(\Delta m \Delta t))/4$ (asymmetric $\Upsilon(4S)$ machines). As can be seen from Eq. (4), a non-zero value of $\Delta\Gamma$ would effectively reduce the oscillation amplitude with a small time-dependent factor that would be very difficult to distinguish from time resolution effects. Measurements of Δm_d are usually extracted from the data using a maximum likelihood fit. To extract information useful for the interpretation of B^0_s oscillation searches and for the combination of their results, a method [9] is followed in which a B^0_s oscillation amplitude $\mathcal{A}$ is measured as a function of a fixed test value of Δm_s, using a maximum likelihood fit based on the functions $\Gamma_s e^{-\Gamma_s t}(1 \pm \mathcal{A}\cos(\Delta m_s t))/2$. To a good approximation, the statistical uncertainty on $\mathcal{A}$ is Gaussian and equal to $1/\mathcal{S}$ from Eq. (13). If Δm_s is equal to its true value, one expects $\mathcal{A} = 1$ within the total uncertainty $\sigma_{\mathcal{A}}$; in case a signal is seen, its observed (or expected) significance will be defined as $\mathcal{A}/\sigma_{\mathcal{A}}$ (or $1/\sigma_{\mathcal{A}}$). However, if Δm_s is (far) below its true value, a measurement consistent with $\mathcal{A} = 0$ is expected. A value of Δm_s can be excluded at 95% CL if $\mathcal{A} + 1.645\,\sigma_{\mathcal{A}} \leq 1$ (since the integral of a normal distribution from $-\infty$ to 1.645 is equal to 0.95). Because of the proper time resolution, the quantity $\sigma_{\mathcal{A}}(\Delta m_s)$ is a steadily increasing function of Δm_s. We define the sensitivity for 95% CL exclusion of Δm_s values (or for a $3\,\sigma$ or $5\,\sigma$ observation of B_s^0 oscillations) as the value of Δm_s for which $1/\sigma_{\mathcal{A}} = 1.645$ (or $1/\sigma_{\mathcal{A}} = 3$ or 5).

B_d^0 *mixing studies*

Many B_d^0–$\overline{B}_d^0$ oscillations analyses have been published [21] by the ALEPH [22], BABAR [23], Belle [24], CDF [14], DELPHI [13,25], L3 [26], and OPAL [27] collaborations. Although a variety of different techniques have been used, the individual Δm_d results obtained at high-energy colliders have remarkably similar precision. Their average is compatible with the recent and more precise measurements from asymmetric B factories. The systematic uncertainties are not negligible; they are often dominated by sample composition, mistag probability, or b-hadron lifetime contributions. Before being combined, the measurements are adjusted on the basis of a common set of input values, including the b-hadron lifetimes and fractions published in this *Review*. Some measurements are statistically correlated. Systematic correlations arise both from common physics sources (fragmentation fractions, lifetimes, branching ratios of b hadrons), and from purely experimental or algorithmic effects (efficiency, resolution, tagging, background description). Combining all published measurements [13,14,22–27] and accounting for all identified correlations yields $\Delta m_d = 0.507 \pm 0.003(\text{stat}) \pm 0.003(\text{syst})\ \text{ps}^{-1}$ [28], a result now dominated by the B factories.

On the other hand, ARGUS and CLEO have published time-integrated measurements [29–31], which average to $\chi_d = 0.182 \pm 0.015$. Following Ref. 31, the width difference $\Delta\Gamma_d$ could in principle be extracted from the measured value of Γ_d and the above averages for Δm_d and χ_d (see Eq. (5)), provided that $\Delta\Gamma_d$ has a negligible impact on the Δm_d measurements. However, direct time-dependent studies published by DELPHI [13] and BABAR [32] yield stronger constraints, which can be combined to yield $\mathrm{sign}(\mathrm{Re}\lambda_{\mathrm{CP}})\Delta\Gamma_{\mathrm{d}}/\Gamma_{\mathrm{d}} = 0.009 \pm 0.037$ [28].

Assuming $\Delta\Gamma_d = 0$ and no CP violation in mixing, and using the measured B^0_d lifetime of $1.530 \pm 0.009\ \mathrm{ps}^{-1}$, the Δm_d and χ_d results are combined to yield the world average

$$\Delta m_d = 0.507 \pm 0.005\ \mathrm{ps}^{-1} \tag{14}$$

or, equivalently,

$$\chi_d = 0.188 \pm 0.003\,. \tag{15}$$

Evidence for CP violation in B^0_d mixing has been searched for, both with flavor-specific and inclusive B^0_d decays, in samples where the initial flavor state is tagged. In the case of semileptonic (or other flavor-specific) decays, where the final state tag is also available, the following asymmetry [2]

$$\mathcal{A}_{\mathrm{SL}} = \frac{N(\overline{B}{}^0_d(t) \to \ell^+\nu_\ell X) - N(B^0_d(t) \to \ell^-\overline{\nu}_\ell X)}{N(\overline{B}{}^0_d(t) \to \ell^+\nu_\ell X) + N(B^0_d(t) \to \ell^-\overline{\nu}_\ell X)} \simeq 1 - |q/p|^2_d \tag{16}$$

has been measured, either in time-integrated analyses at CLEO [31,33], CDF [34] and DØ [35], or in time-dependent analyses at LEP [36–38], BABAR [32,39] and Belle [40]. In the inclusive case, also investigated at LEP [37,38,41], no final state tag is used, and the asymmetry [42]

$$\frac{N(B^0_d(t) \to \text{all}) - N(\overline{B}^0_d(t) \to \text{all})}{N(B^0_d(t) \to \text{all}) + N(\overline{B}^0_d(t) \to \text{all})} \simeq \mathcal{A}_{\text{SL}} \left[\frac{x_d}{2} \sin(\Delta m_d\, t) - \sin^2 \left(\frac{\Delta m_d\, t}{2} \right) \right] \quad (17)$$

must be measured as a function of the proper time to extract information on CP violation. In all cases, asymmetries compatible with zero have been found, with a precision limited by the available statistics. A simple average of all published results for the B^0_d meson [31–33,36,38,39,41] yields $\mathcal{A}_{\text{SL}} = -0.005 \pm 0.012$, or $|q/p|_d = 1.0026 \pm 0.0059$, a result which does not yet constrain the Standard Model.

The Δm_d result of Eq. (14) provides an estimate of $2|M_{12}|$, and can be used, together with Eq. (6), to extract the magnitude of the CKM matrix element V_{td} within the Standard Model [43]. The main experimental uncertainties on the resulting estimate of $|V_{td}|$ come from m_t and Δm_d; however, the extraction is at present completely dominated by the uncertainty on the hadronic matrix element $f_{B_d}\sqrt{B_{B_d}} = 244 \pm 26$ MeV obtained from lattice QCD calculations [44].

B^0_s *mixing studies*

B^0_s–$\overline{B}^0_s$ oscillations have been the subject of many studies from ALEPH [45], DELPHI [13,16,46], OPAL [47], SLD [12,48, 49], CDF [18,50] and DØ [19,51]. The most sensitive analyses at LEP appear to be the ones based on inclusive lepton samples. Because of their better proper time resolution, the small data samples analyzed inclusively at SLD, as well as the fully reconstructed B_s decays at LEP and at the Tevatron, are also very useful to explore the high Δm_s region.

All results are limited by the available statistics. They can easily be combined, since all experiments provide measurements of the B_s^0 oscillation amplitude. All published results [12,13,16,45–48,50] are averaged [28] to yield the combined amplitudes $\mathcal{A}$ shown in Fig. 2 (top) as a function of Δm_s. The individual results have been adjusted to common physics inputs, and all known correlations have been accounted for; the sensitivities of the inclusive analyses, which depend directly through Eq. (13) on the assumed fraction f_s of B_s^0 mesons in an unbiased sample of weakly-decaying b hadrons, have also been rescaled to a common average of $f_s = 0.102 \pm 0.009$. The combined sensitivity for 95% CL exclusion of Δm_s values is found to be 18.2 ps^{-1}. All values of Δm_s below 14.4 ps^{-1} are excluded at 95% CL, which we express as

$$\Delta m_s > 14.4 \ \text{ps}^{-1} \quad \text{at 95\% CL}\,. \tag{18}$$

The values between 14.4 and 21.8 ps^{-1} cannot be excluded, because the data is compatible with a signal in this region. However, the largest deviation from $\mathcal{A} = 0$ in this range is a $1.9\,\sigma$ effect only, so no signal can be claimed.

The above average does not include the very recent results from Tevatron Run II, based on 1 fb^{-1} of data. In a paper submitted for publication [19], DØ reports the first direct two-sided bound established by a single experiment of $17 < \Delta m_s < 21$ ps^{-1} (90% CL) and a most probable value of 19 ps^{-1} with an observed (expected) significance of $2.5\,\sigma$ ($0.9\,\sigma$). A preliminary and subsequent analysis from CDF [18] is more sensitive and leads to the first direct evidence of B_s^0 oscillations and the following measurement:

$$\Delta m_s = 17.33^{+0.42}_{-0.21}(\text{stat}) \pm 0.07(\text{syst}) \ \text{ps}^{-1}\,. \tag{19}$$

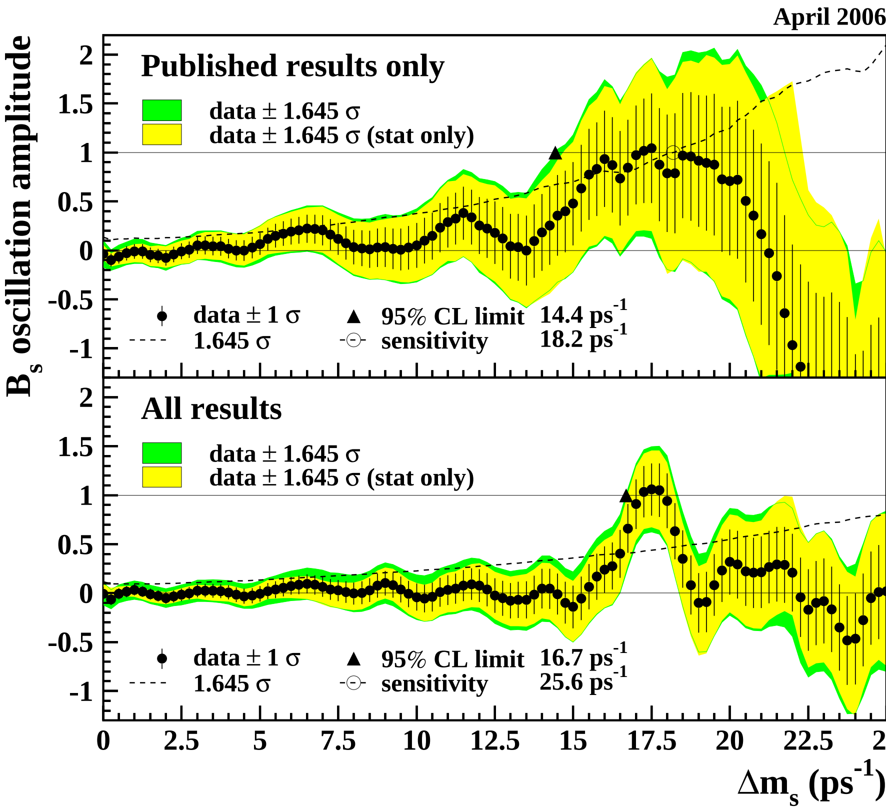


Figure 2: Combined measurements of the B_s^0 oscillation amplitude as a function of Δm_s, based on published results only (top) or on all published and unpublished results (bottom) available at the end of April 2006. The measurements are dominated by statistical uncertainties. Neighboring points are statistically correlated. See full-color version on color pages at end of book.

Both the observed significance and the expected significance of this signal are equal to 3.1 σ. The CDF collaboration is quoting a 0.5% probability that their data would fluctuate to produce, at any value of Δm_s, a fake signal as significant as the observed one, corresponding to a 2.6 σ effect. Both DØ and CDF quote their Δm_s results assuming that they see the oscillation signal.

Including all unpublished analyses [18,19,49] in the average leads to the combined amplitude spectrum of Fig. 2 (bottom), which is dominated by the new CDF result, and where a consolidated signal is seen with a significance of $4.0\,\sigma$. A preliminary world average is

$$\Delta m_s = 17.4\,^{+0.3}_{-0.2}\ \text{ps}^{-1}\,. \tag{20}$$

The information on $|V_{ts}|$ obtained, in the framework of the Standard Model, from the combined amplitude spectrum, is hampered by the hadronic uncertainty, as in the B^0_d case. However, several uncertainties cancel in the frequency ratio

$$\frac{\Delta m_s}{\Delta m_d} = \frac{m_{B_s}}{m_{B_d}}\,\xi^2 \left|\frac{V_{ts}}{V_{td}}\right|^2 , \tag{21}$$

where $\xi = (f_{B_s}\sqrt{B_{B_s}})/(f_{B_d}\sqrt{B_{B_d}}) = 1.210\,^{+0.047}_{-0.035}$ is an SU(3) flavor-symmetry breaking factor obtained from lattice QCD calculations [44]. Using the averages of Eqs. (14) and (20), one can extract

$$\left|\frac{V_{td}}{V_{ts}}\right| = 0.208 \pm 0.002(\text{exp})\,^{+0.008}_{-0.006}(\text{lattice})\,, \tag{22}$$

in good agreement with (but more precise than) the recent result obtained by the Belle collaboration based on the observation of the $b \to d\gamma$ transition [52]. The CKM matrix can be constrained using experimental results on observables such as Δm_d, Δm_s, $|V_{ub}/V_{cb}|$, ϵ_K, and $\sin(2\beta)$ together with theoretical inputs and unitarity conditions [43,53,54]. The constraint from our knowledge on the ratio $\Delta m_s/\Delta m_d$ is presently more effective in limiting the position of the apex of the CKM unitarity triangle than the one obtained from the Δm_d measurements alone, due to the reduced hadronic uncertainty in Eq. (21). We also note that the measured value of Δm_s is consistent with the Standard Model prediction obtained from

CKM fits where no experimental information on Δm_s is used, *e.g.* $21.2 \pm 3.2\ \text{ps}^{-1}$ [53] or $16.5\,^{+10.5}_{-3.4}\ \text{ps}^{-1}$ [54].

Information on $\Delta\Gamma_s$ can be obtained by studying the proper time distribution of untagged B_s^0 samples [55]. In the case of an inclusive B_s^0 selection [56], or a semileptonic (or flavour-specific) B_s^0 decay selection [16,57,58], both the short- and long-lived components are present, and the proper time distribution is a superposition of two exponentials with decay constants $\Gamma_{\mathrm{L,H}} = \Gamma_s \pm \Delta\Gamma_s/2$. In principle, this provides sensitivity to both Γ_s and $(\Delta\Gamma_s/\Gamma_s)^2$. Ignoring $\Delta\Gamma_s$ and fitting for a single exponential leads to an estimate of Γ_s with a relative bias proportional to $(\Delta\Gamma_s/\Gamma_s)^2$. An alternative approach, which is directly sensitive to first order in $\Delta\Gamma_s/\Gamma_s$, is to determine the lifetime of B_s^0 candidates decaying to CP eigenstates; measurements exist for $B_s^0 \to J/\psi\phi$ [59,60] and $B_s^0 \to D_s^{(*)+} D_s^{(*)-}$ [61], which are mostly CP-even states [62]. However, in the case of $B_s^0 \to J/\psi\phi$ this technique has now been replaced by more sensitive time-dependent angular analyses that allow the simultaneous extraction of $\Delta\Gamma_s/\Gamma_s$ and the CP-even and CP-odd amplitudes [63]. An estimate of $\Delta\Gamma_s/\Gamma_s$ has also been obtained directly from a measurement of the $B_s^0 \to D_s^{(*)+} D_s^{(*)-}$ branching ratio [61], under the assumption that these decays account for all the CP-even final states (however, no systematic uncertainty due to this assumption is given, so the average quoted below will not include this estimate).

Applying the combination procedure of Ref. 28 (including the constraint from the flavour-specific lifetime measurements) on the published results [16,57,59,61,63] yields

$$\Delta\Gamma_s/\Gamma_s = +0.31\,^{+0.11}_{-0.13} \qquad \text{and} \qquad 1/\Gamma_s = 1.398\,^{+0.049}_{-0.050}\ \text{ps}\,, \quad (23)$$

or equivalently

$$1/\Gamma_{\rm L} = 1.21 \pm 0.09 \text{ ps} \qquad \text{and} \qquad 1/\Gamma_{\rm H} = 1.66\,^{+0.11}_{-0.12} \text{ ps}. \quad (24)$$

This result can be compared with the theoretical prediction $\Delta\Gamma_s/\Gamma_s = +0.12 \pm 0.05$ [64] within the Standard Model.

Average b-hadron mixing probability and b-hadron production fractions in Z decays and at high energy

Mixing measurements can significantly improve our knowledge on the fractions f_u, f_d, f_s and $f_{\rm baryon}$, defined as the fractions of B_u, B_d^0, B_s^0 and b-baryon in an unbiased sample of weakly decaying b hadrons produced in high-energy collisions. Indeed, time-integrated mixing analyses performed with lepton pairs from $b\overline{b}$ events at high energy measure the quantity

$$\overline{\chi} = f'_d\,\chi_d + f'_s\,\chi_s\,, \quad (25)$$

where f'_d and f'_s are the fractions of B_d^0 and B_s^0 hadrons in a sample of semileptonic b-hadron decays. Assuming that all b hadrons have the same semileptonic decay width implies $f'_q = f_q/(\Gamma_q\tau_b)$ $(q = s, d)$, where τ_b is the average b-hadron lifetime. Hence $\overline{\chi}$ measurements, together with the χ_d average of Eq. (15) and the very good approximation $\chi_s = 1/2$ (in fact $\chi_s > 0.4988$ at 95% CL from Eqs. (5), (18) and (23)), provide constraints on the fractions f_d and f_s.

The LEP experiments have measured $f_s \times {\rm BR}(B_s^0 \to D_s^-\ell^+\nu_\ell X)$ [65], ${\rm BR}(b \to \Lambda_b^0) \times {\rm BR}(\Lambda_b^0 \to \Lambda_c^+\ell^-\overline{\nu}_\ell X)$ [66], and ${\rm BR}(b \to \Xi_b^-) \times {\rm BR}(\Xi_b^- \to \Xi^-\ell^-\overline{\nu}_\ell X)$ [67] from partially reconstructed final states, including a lepton, $f_{\rm baryon}$ from protons identified in b events [68], and the production rate of charged b hadrons [69]. The b-hadron fractions measured at CDF with electron-charm final states [70] are at slight discrepancy with the ones measured at LEP. Furthermore the values of $\overline{\chi}$ measured at LEP, 0.1259 ± 0.0042 [71], and at CDF, 0.152 ± 0.013 [72], show a $1.9\,\sigma$ deviation with respect to each other. This may be a hint that the fractions at the Tevatron might be different from the ones in Z decays. Combining [28] all the available information under the constraints $f_u = f_d$ and $f_u + f_d + f_s + f_{\rm baryon} = 1$ yields the two set of averages shown in Table 1. The second set, obtained using both LEP and Tevatron results, has larger errors than the first set, obtained using LEP results only, because we have applied scale factors as advocated by the PDG for the treatment of marginally consistent data.

Table 1: $\overline{\chi}$ and b-hadron fractions (see text).

	in Z decays	at high energy
$\overline{\chi}$	0.1259 ± 0.0042	0.1283 ± 0.0076
$f_u = f_d$	0.399 ± 0.010	0.398 ± 0.012
f_s	0.102 ± 0.009	0.103 ± 0.014
$f_{\rm baryon}$	0.100 ± 0.017	0.100 ± 0.020

Summary and prospects

B^0–$\overline{B}^0$ mixing has been and still is a field of intense study. The mass difference in the B^0_d–$\overline{B}^0_d$ system is now very precisely known (with an experimental error of 0.9%) but, despite an impressive theoretical effort, the hadronic uncertainty keeps limiting the precision of the extracted estimate of $|V_{td}|$ within the Standard Model (SM). On the other hand measurements of $\Delta\Gamma_d$ and of CP violation in B^0_d–$\overline{B}^0_d$ mixing are consistent with zero, with an uncertainty still large compared to the SM predictions. Impressive new B^0_s results are becoming available from Run II of the Tevatron: preliminary direct evidence for B^0_s–$\overline{B}^0_s$ oscillations has been reported, with a frequency in agreement with the SM. New time-dependent angular analyses of $B^0_s \to J/\psi\phi$ decays at CDF and DØ have improved our knowledge of $\Delta\Gamma_s/\Gamma_s$ to an absolute uncertainty of $\sim 10\%$, of the same size as the central value of the SM prediction. The data clearly prefer $\Gamma_{\rm L} > \Gamma_{\rm H}$ as predicted in the SM.

Improved results on B^0_s–$\overline{B}^0_s$ mixing are still to come from the Tevatron, with very promising prospects in the next couple of years, both for Δm_s and $\Delta\Gamma_s$. With a few fb^{-1} of data, the CDF and DØ collaborations will have the potential to confirm their Δm_s signals and make $> 5\,\sigma$ observations of B^0_s oscillations. Further studies with $B^0_s \to J/\psi\phi$ decays will not only improve on $\Delta\Gamma_s$, but perhaps also allow a very first investigation of the CP-violating phase ϕ_s induced by B^0_s–$\overline{B}^0_s$ mixing, about which nothing is known experimentally at present. However, the SM value of ϕ_s is very small ($\phi_s = -2\beta_s$ where $\beta_s \equiv \arg(-V_{ts}V^*_{tb}/(V_{cs}V^*_{cb}))$ is about one degree), and a full search for new physics effects in this observable will require much larger statistics. These will become available at CERN's Large Hadron Collider scheduled to start operation in 2007, where the LHCb collaboration expects to be able to measure ϕ_s down to the SM value after several years of operations [73].

B mixing may not have delivered all its secrets yet, because it is one of the phenomena where new physics might still reveal itself (although a dominant contribution is becoming unlikely). Theoretical calculations in lattice QCD have become more reliable, and further progress in reducing hadronic uncertainties is expected. In the long term, a stringent check of the consistency, within the SM, of the B^0_d and B^0_s mixing amplitudes (magnitudes and phases) with all other measured flavour-physics observables (including CP asymmetries in B decays) will be possible, leading to further limits on new physics or, better, new physics discovery.

References

1. T.D. Lee and C.S. Wu, Ann. Rev. Nucl. Sci. **16**, 511 (1966);
   I.I. Bigi and A.I. Sanda, "CP violation," Cambridge Univ. Press, 2000;
   G.C. Branco, L. Lavoura, and J.P. Silva, "CP violation," Clarendon Press Oxford, 1999.
2. See the review on CP violation in meson decays by D. Kirkby and Y. Nir in this publication.
3. A.J. Buras, W. Slominski, and H. Steger, Nucl. Phys. **B245**, 369 (1984).
4. T. Inami and C.S. Lim, Prog. Theor. Phys. **65**, 297 (1981); for the power-like approximation, see A.J. Buras and R. Fleischer, page 91 in "Heavy Flavours II," eds. A.J. Buras and M. Lindner, Singapore World Scientific (1998).
5. M. Kobayashi and K. Maskawa, Prog. Theor. Phys. **49**, 652 (1973).
6. I.I. Bigi *et al.*, in "CP violation," ed. C. Jarlskog, Singapore World Scientific, 1989.
7. C. Albajar *et al.* (**UA1**), Phys. Lett. **B186**, 247 (1987).
8. H. Albrecht *et al.* (**ARGUS**), Phys. Lett. **B192**, 245 (1987).
9. H.-G. Moser and A. Roussarie, Nucl. Instrum. Methods **384**, 491 (1997).
10. **SLD** collab., SLAC-PUB-7228, SLAC-PUB-7229 and SLAC-PUB-7230, contrib. to 28th Int. Conf. on High Energy Physics, Warsaw, 1996;
    J. Wittlin, PhD thesis, SLAC-R-582, 2001.
11. **ALEPH** collab., contrib. 596 to Int. Europhysics Conf. on High Energy Physics, Jerusalem, 1997.
12. K. Abe *et al.* (**SLD**), Phys. Rev. **D67**, 012006 (2003).
13. J. Abdallah *et al.* (**DELPHI**), Eur. Phys. J. **C28**, 155 (2003).
14. F. Abe *et al.* (**CDF**), Phys. Rev. Lett. **80**, 2057 (1998) and Phys. Rev. **D59**, 032001 (1999); Phys. Rev. **D60**, 051101

(1999); Phys. Rev. **D60**, 072003 (1999);
T. Affolder *et al.* (**CDF**), Phys. Rev. **D60**, 112004 (1999).

15. R. Barate *et al.* (**ALEPH**), Eur. Phys. J. **C4**, 367 (1998); Eur. Phys. J. **C7**, 553 (1999).
16. P. Abreu *et al.* (**DELPHI**), Eur. Phys. J. **C16**, 555 (2000); Eur. Phys. J. **C18**, 229 (2000).
17. See tagging summary on page 160 of K. Anikeev *et al.*, "B physics at the Tevatron: Run II and beyond," FERMILAB-PUB-01/97, `hep-ph/0201071`, and references therein.
18. I.K. Furić (**CDF**), "Measurement of the B^0_s–$\overline{B}^0_s$ oscillation frequency and the ratio $|V_{td}/V_{ts}|$ at CDF," Fermilab seminar, April 2006; G. Gómez-Ceballos (**CDF**), "Measurement of the B^0_s–$\overline{B}^0_s$ oscillation frequency," procs. 4th Flavor Physics and CP Violation Conference (FPCP 2006), Vancouver, April 2006.
19. V.M. Abazov *et al.* (**DØ**), `hep-ex/0603029`, submitted to Phys. Rev. Lett.
20. B. Aubert *et al.* (**BABAR**), Phys. Rev. Lett. **94**, 161803 (2005);
    K.-F. Chen *et al.* (**Belle**), Phys. Rev. **D72**, 012004 (2005).
21. Throughout this paper, we omit references of results that have been superseded by new published measurements.
22. D. Buskulic *et al.* (**ALEPH**), Z. Phys. **C75**, 397 (1997).
23. B. Aubert *et al.* (**BABAR**), Phys. Rev. Lett. **88**, 221802 (2002) and Phys. Rev. **D66**, 032003 (2002); Phys. Rev. Lett. **88**, 221803 (2002); Phys. Rev. **D67**, 072002 (2003); Phys. Rev. **D73**, 012004 (2006).
24. N.C. Hastings *et al.* (**Belle**), Phys. Rev. **D67**, 052004 (2003);
    Y. Zheng *et al.* (**Belle**), Phys. Rev. **D67**, 092004 (2003);
    K. Abe *et al.* (**Belle**), Phys. Rev. **D71**, 072003 (2005).
25. P. Abreu *et al.* (**DELPHI**), Z. Phys. **C76**, 579 (1997).
26. M. Acciarri *et al.* (**L3**), Eur. Phys. J. **C5**, 195 (1998).
27. G. Alexander *et al.* (**OPAL**), Z. Phys. **C72**, 377 (1996);
    K. Ackerstaff *et al.* (**OPAL**), Z. Phys. **C76**, 401 (1997);

Z. Phys. **C76**, 417 (1997);
G. Abbiendi *et al.* (**OPAL**), Phys. Lett. **B493**, 266 (2000).

28. E. Barberio *et al.* (**HFAG**), "Averages of *b*-hadron properties at the end of 2005," `hep-ex/0603003`, March 2006; the combined results on *b*-hadron fractions, lifetimes and mixing parameters published in this *Review* have been obtained by the *B* oscillations working group of the Heavy Flavour Averaging Group (HFAG), using the methods and procedures described in Chapter 3 of the above paper, but removing any unpublished result; for more information, see `http://www.slac.stanford.edu/xorg/hfag/osc/`.
29. H. Albrecht *et al.* (**ARGUS**), Z. Phys. **C55**, 357 (1992); Phys. Lett. **B324**, 249 (1994).
30. J. Bartelt *et al.* (**CLEO**), Phys. Rev. Lett. **71**, 1680 (1993).
31. B.H. Behrens *et al.* (**CLEO**), Phys. Lett. **B490**, 36 (2000).
32. B. Aubert *et al.* (**BABAR**), Phys. Rev. Lett. **92**, 181801 (2004) and Phys. Rev. **D70**, 012007 (2004).
33. D.E. Jaffe *et al.* (**CLEO**), Phys. Rev. Lett. **86**, 5000 (2001).
34. F. Abe *et al.* (**CDF**), Phys. Rev. **D55**, 2546 (1997).
35. **DØ** collab., DØ note 5042-CONF v1.4, March 2006.
36. K. Ackerstaff *et al.* (**OPAL**), Z. Phys. **C76**, 401 (1997).
37. **DELPHI** collab., contrib. 449 to Int. Europhysics Conf. on High Energy Physics, Jerusalem, 1997.
38. R. Barate *et al.* (**ALEPH**), Eur. Phys. J. **C20**, 431 (2001).
39. B. Aubert *et al.* (**BABAR**), Phys. Rev. Lett. **88**, 231801 (2002).
40. E. Nakano *et al.* (**Belle**), `hep-ex/0505017`, submitted to Phys. Rev. D.
41. G. Abbiendi *et al.* (**OPAL**), Eur. Phys. J. **C12**, 609 (2000).
42. M. Beneke, G. Buchalla, and I. Dunietz, Phys. Lett. **B393**, 132 (1997);
I. Dunietz, Eur. Phys. J. **C7**, 197 (1999).
43. See the review on the CKM quark-mixing matrix by A. Ceccucci, Z. Ligeti, and Y. Sakai in this publication.

44. M. Okamoto, plenary talk at the XXIIIth International Symposium on Lattice Field Theory, Dublin, July 2005, `hep-lat/0510113`; these estimates are obtained by combining the unquenched lattice QCD calculations from A. Gray *et al.* (**HPQCD**), Phys. Rev. Lett. **95**, 212001 (2005) and S. Aoki *et al.* (**JLQCD**), Phys. Rev. Lett. **91**, 212001 (2003).

45. A. Heister *et al.* (**ALEPH**), Eur. Phys. J. **C29**, 143 (2003).

46. J. Abdallah *et al.* (**DELPHI**), Eur. Phys. J. **C35**, 35 (2004).

47. G. Abbiendi *et al.* (**OPAL**), Eur. Phys. J. **C11**, 587 (1999); Eur. Phys. J. **C19**, 241 (2001).

48. K. Abe *et al.* (**SLD**), Phys. Rev. **D66**, 032009 (2002).

49. **SLD** collab., SLAC-PUB-8568, contrib. to 30th Int. Conf. on High Energy Physics, Osaka, 2000.

50. F. Abe *et al.* (**CDF**), Phys. Rev. Lett. **82**, 3576 (1999).

51. **DØ** collab., DØ note 4878-CONF v2.1, July 2005.

52. D. Mohapatra *et al.* (**Belle**), `hep-ph/0506079`, submitted to Phys. Rev. Lett.

53. M. Bona *et al.* (**UTfit**), `hep-ph/0501199`, `hep-ph/0509219`, and updated results at `http://utfit.roma1.infn.it/`.

54. J. Charles *et al.* (**CKMfitter**), Eur. Phys. J. **C41**, 1 (2005) and updated results at `http://ckmfitter.in2p3.fr/`.

55. K. Hartkorn and H.-G. Moser, Eur. Phys. J. **C8**, 381 (1999).

56. M. Acciarri *et al.* (**L3**), Phys. Lett. **B438**, 417 (1998).

57. D. Buskulic *et al.* (**ALEPH**), Phys. Lett. **B377**, 205 (1996);
K. Ackerstaff *et al.* (**OPAL**), Phys. Lett. **B426**, 161 (1998);
F. Abe *et al.* (**CDF**), Phys. Rev. **D59**, 032004 (1999).

58. **CDF** collab., CDF note 7386, March 2005; CDF note 7757, August 2005;
DØ collab., DØ note 4729-CONF v1.6, March 2005.

59. F. Abe *et al.* (**CDF**), Phys. Rev. **D57**, 5382 (1998).

60. V.M. Abazov *et al.* (**DØ**), Phys. Rev. Lett. **94**, 041001 (2005);
CDF collab., CDF note 7409, May 2004.

61. R. Barate *et al.* (**ALEPH**), Phys. Lett. **B486**, 286 (2000).

62. R. Aleksan *et al.*, Phys. Lett. **B316**, 567 (1993).

63. D. Acosta *et al.* (**CDF**), Phys. Rev. Lett. **94**, 101803 (2005);
V.M. Abazov *et al.* (**DØ**), Phys. Rev. Lett. **95**, 171801 (2005).

64. A. Lenz, `hep-ph/0412007`;
M. Beneke *et al.*, Phys. Lett. **B459**, 631 (1999).

65. P. Abreu *et al.* (**DELPHI**), Phys. Lett. **B289**, 199 (1992);
P.D. Acton *et al.* (**OPAL**), Phys. Lett. **B295**, 357 (1992);
D. Buskulic *et al.* (**ALEPH**), Phys. Lett. **B361**, 221 (1995).

66. P. Abreu *et al.* (**DELPHI**), Z. Phys. **C68**, 375 (1995);
R. Barate *et al.* (**ALEPH**), Eur. Phys. J. **C2**, 197 (1998).

67. P. Abreu *et al.* (**DELPHI**), Z. Phys. **C68**, 541 (1995);
D. Buskulic *et al.* (**ALEPH**), Phys. Lett. **B384**, 449 (1996).

68. R. Barate *et al.* (**ALEPH**), Eur. Phys. J. **C5**, 205 (1998).

69. J. Abdallah *et al.* (**DELPHI**), Phys. Lett. **B576**, 29 (2003).

70. F. Abe *et al.* (**CDF**), Phys. Rev. **D60**, 092005 (1999);
T. Affolder *et al.* (**CDF**), Phys. Rev. Lett. **84**, 1663 (2000).

71. **ALEPH**, **DELPHI**, **L3**, **OPAL**, and **SLD** collab., "Precision electroweak measurements on the Z resonance," `hep-ex/0509008`, to appear in Physics Reports; we use the $\overline{\chi}$ average given in Eq. (5.39).

72. D. Acosta *et al.* (**CDF**), Phys. Rev. **D69**, 012002 (2004).

73. R. Antunes Nobrega *et al.* (**LHCb**), "LHCb reoptimized detector and performance," Technical Design Report, CERN/LHCC 2003-030, September 2003; for an update

of the ϕ_s sensitivity see L. Fernández, "B_s^0 mass difference Δm_s and mixing phase ϕ_s at LHCb," talk given at the workshop "Flavour in the era of the LHC," CERN, November 2005.

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.

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

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

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

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

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

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 $B_s^0(\overline{b}s)$. They are listed in the $B^\pm/B^0/B_s^0/b$-baryon ADMIXTURE 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" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account corrections between the measurements, includes χ_d calculated from Δm_{B^0} and τ_{B^0}.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.188±0.003 OUR EVALUATION					
0.182±0.015 OUR AVERAGE					
0.198±0.013±0.014		[639] BEHRENS	00B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.16 ±0.04 ±0.04		[640] ALBRECHT	94	ARG	$e^+e^- \to \Upsilon(4S)$
0.149±0.023±0.022		[641] BARTELT	93	CLE2	$e^+e^- \to \Upsilon(4S)$
0.171±0.048		[642] ALBRECHT	92L	ARG	$e^+e^- \to \Upsilon(4S)$

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

0.20 $\pm$0.13 $\pm$0.12		[643] ALBRECHT	96D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.19 $\pm$0.07 $\pm$0.09		[644] ALBRECHT	96D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.24 $\pm$0.12		[645] ELSEN	90	JADE	e^+e^- 35–44 GeV
$0.158^{+0.052}_{-0.059}$		ARTUSO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.17 $\pm$0.05		[646] ALBRECHT	87I	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$<$0.19	90	[647] BEAN	87B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$<$0.27	90	[648] AVERY	84	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[639] 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.

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

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

[642] 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 $r = 20.6 \pm 7.0\%$ 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 $\tau_{B^\pm}/\tau_{B^0} = (0.95 \pm 0.14)\ (f_{+-}/f_0)$.

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

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

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

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

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

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

The first "OUR EVALUATION", also provided by the HFAG, includes Δm_d calculated from χ_d measured at $\Upsilon(4S)$.

VALUE ($10^{12}\ \hbar\ s^{-1}$)	EVTS	DOCUMENT ID		TECN	COMMENT
0.507$\pm$0.005 OUR EVALUATION	First				
0.507$\pm$0.005 OUR EVALUATION	Second				
$0.511\pm0.007^{+0.007}_{-0.006}$		[649] AUBERT	06G	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

$0.511\pm0.005\pm0.006$	[650] ABE	05B	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.531\pm0.025\pm0.007$	[651] ABDALLAH	03B	DLPH	$e^+e^- \rightarrow Z$
$0.503\pm0.008\pm0.010$	[652] HASTINGS	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.509\pm0.017\pm0.020$	[653] ZHENG	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.516\pm0.016\pm0.010$	[654] AUBERT	02I	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.493\pm0.012\pm0.009$	[655] AUBERT	02J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.497\pm0.024\pm0.025$	[656] ABBIENDI,G	00B	OPAL	$e^+e^- \rightarrow Z$
$0.503\pm0.064\pm0.071$	[657] ABE	99K	CDF	$p\overline{p}$ at 1.8 TeV
$0.500\pm0.052\pm0.043$	[658] ABE	99Q	CDF	$p\overline{p}$ at 1.8 TeV
$0.516\pm0.099^{+0.029}_{-0.035}$	[659] AFFOLDER	99C	CDF	$p\overline{p}$ at 1.8 TeV
$0.471^{+0.078}_{-0.068}{}^{+0.033}_{-0.034}$	[660] ABE	98C	CDF	$p\overline{p}$ at 1.8 TeV
$0.458\pm0.046\pm0.032$	[661] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
$0.437\pm0.043\pm0.044$	[662] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
$0.472\pm0.049\pm0.053$	[663] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
$0.523\pm0.072\pm0.043$	[664] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.493\pm0.042\pm0.027$	[662] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.499\pm0.053\pm0.015$	[665] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.480\pm0.040\pm0.051$	[661] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.444\pm0.029^{+0.020}_{-0.017}$	[662] ACKERSTAFF	97U	OPAL	$e^+e^- \rightarrow Z$
$0.430\pm0.043^{+0.028}_{-0.030}$	[661] ACKERSTAFF	97V	OPAL	$e^+e^- \rightarrow Z$
$0.482\pm0.044\pm0.024$	[666] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.404\pm0.045\pm0.027$	[662] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.452\pm0.039\pm0.044$	[661] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.539\pm0.060\pm0.024$	[667] ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
$0.567\pm0.089^{+0.029}_{-0.023}$	[668] ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$

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

$0.492\pm0.018\pm0.013$	[669] AUBERT	03C	BABR	Repl. by AUBERT 06G
$0.516\pm0.016\pm0.010$	[670] AUBERT	02N	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.494\pm0.012\pm0.015$	[671] HARA	02	BELL	Repl. by ABE 05B
$0.528\pm0.017\pm0.011$	[672] TOMURA	02	BELL	Repl. by ABE 05B
$0.463\pm0.008\pm0.016$	[655] ABE	01D	BELL	Repl. by HASTINGS 03
$0.444\pm0.028\pm0.028$	[673] ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
0.497 ± 0.035	[674] ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
$0.467\pm0.022^{+0.017}_{-0.015}$	[675] ACKERSTAFF	97V	OPAL	$e^+e^- \rightarrow Z$
0.446 ± 0.032	[676] BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
$0.531^{+0.050}_{-0.046}\pm0.078$	[677] ABREU	96Q	DLPH	Sup. by ABREU 97N
$0.496^{+0.055}_{-0.051}\pm0.043$	[661] ACCIARRI	96E	L3	Repl. by ACCIARRI 98D
$0.548\pm0.050^{+0.023}_{-0.019}$	[678] ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
0.496 ± 0.046	[679] AKERS	95J	OPAL	Repl. by ACKERSTAFF 97V
$0.462^{+0.040}_{-0.053}{}^{+0.052}_{-0.035}$	[661] AKERS	95J	OPAL	Repl. by ACKERSTAFF 97V

$0.50 \pm 0.12 \pm 0.06$		[664] ABREU	94M	DLPH	Sup. by ABREU 97N
$0.508 \pm 0.075 \pm 0.025$		[667] AKERS	94C	OPAL	Repl. by ALEXANDER 96V
$0.57 \pm 0.11 \pm 0.02$	153	[668] AKERS	94H	OPAL	Repl. by ALEXANDER 96V
$0.50 \ {}^{+0.07}_{-0.06} \ {}^{+0.11}_{-0.10}$		[661] BUSKULIC	94B	ALEP	Sup. by BUSKULIC 97D
$0.52 \ {}^{+0.10}_{-0.11} \ {}^{+0.04}_{-0.03}$		[668] BUSKULIC	93K	ALEP	Sup. by BUSKULIC 97D

[649] Measured using a simultaneous fit of the B^0 lifetime and $\overline{B}^0 B^0$ oscillation frequency Δm_d in the partially reconstructed $B^0 \to D^{*-} \ell \nu$ decays.

[650] Measurement performed using a combined fit of CP-violation, mixing and lifetimes.

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

[652] HASTINGS 03 measurement based on the time evolution of dilepton events. It also reports $f_+/f_0 = 1.01 \pm 0.03 \pm 0.09$ and CPT violation parameters in B^0-$\overline{B}^0$ mixing.

[653] ZHENG 03 data analyzed using partially reconstructed $\overline{B}^0 \to D^{*-} \pi^+$ decay and a flavor tag based on the charge of the lepton from the accompanying B decay.

[654] Uses a tagged sample of fully-reconstructed neutral B decays at $\Upsilon(4S)$.

[655] Measured based on the time evolution of dilepton events in $\Upsilon(4S)$ decays.

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

[657] Uses di-muon events.

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

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

[660] Uses π-B in the same side.

[661] Uses ℓ-ℓ.

[662] Uses ℓ-Q_{hem}.

[663] Uses ℓ-ℓ with impact parameters.

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

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

[666] Uses $D^{*\pm}$-ℓ/Q_{hem}.

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

[668] Uses $D^{*\pm}$-ℓ.

[669] AUBERT 03C uses a sample of approximately 14,000 exclusively reconstructed $B^0 \to D^*(2010)^- \ell \nu$ and simultaneously measures the lifetime and oscillation frequency.

[670] AUBERT 02N result based on the same analysis and data sample reported in AUBERT 02I.

[671] Uses a tagged sample of B^0 decays reconstructed in the mode $B^0 \to D^* \ell \nu$.

[672] Uses a tagged sample of fully-reconstructed hadronic B^0 decays at $\Upsilon(4S)$.

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

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

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

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

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

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

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

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

The second "OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account corrections between the measurements.

The first "OUR EVALUATION", also provided by the HFAG, includes χ_d measured at $\Upsilon(4S)$.

VALUE	*DOCUMENT ID*
0.776±0.008 OUR EVALUATION	First
0.776±0.008 OUR EVALUATION	Second

Re(λ_{CP} / $|\lambda_{CP}|$) Re(z)

The λ_{CP} characterizes B^0 and $\overline{B}^0$ decays to states of charmonium plus K^0_L. Parameter z is used to describe *CPT* violation in mixing, see the review on "*CP* Violation" in the reviews section.

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.014±0.035±0.034	[680] AUBERT,B	04C	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[680] Corresponds to 90% confidence range [−0.072, 0.101].

Re(z)

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.00±0.12±0.01	[681] HASTINGS	03	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[681] Measured using inclusive dilepton events from B^0 decay.

Im(z)

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.002±0.033 OUR AVERAGE	Error includes scale factor of 1.4.			
0.038±0.029±0.025	[682] AUBERT,B	04C	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
−0.03 ±0.01 ±0.03	[683] HASTINGS	03	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[682] Corresponds to 90% confidence range [−0.028, 0.104].
[683] Measured using inclusive dilepton events from B^0 decay.

CP VIOLATION PARAMETERS

Re(ϵ_{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.

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
− 1.3± 2.9 OUR EVALUATION			
− 1.2± 3.0 OUR AVERAGE			
−14.7± 6.7±5.7	[684] AUBERT,B 04C	BABR	$e^+e^- \to \Upsilon(4S)$
1.2± 2.9±3.6	[685] AUBERT 02K	BABR	$e^+e^- \to \Upsilon(4S)$
− 3.2± 6.5	[686] BARATE 01D	ALEP	$e^+e^- \to Z$
3.5±10.3±1.5	[687] JAFFE 01	CLE2	$e^+e^- \to \Upsilon(4S)$
1.2±13.8±3.2	[688] ABBIENDI 99J	OPAL	$e^+e^- \to Z$
2 ± 7 ±3	[689] ACKERSTAFF 97U	OPAL	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4 ±18 ±3	[690] BEHRENS 00B	CLE2	Repl. by JAFFE 01
< 45	[691] BARTELT 93	CLE2	$e^+e^- \to \Upsilon(4S)$

[684] AUBERT 04C reports $|q/p| = 1.029 \pm 0.013 \pm 0.011$ and we converted it to $(1- |q/p|^2)/4$.

[685] AUBERT 02K uses the charge asymmetry in like-sign dilepton events.

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

[687] JAFFE 01 finds $a_{\ell\ell} = 0.013 \pm 0.050 \pm 0.005$ and combines with the previous BEHRENS 00B independent measurement.

[688] 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.

[689] 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 $\mathrm{Im}(\delta B) = -0.020 \pm 0.016 \pm 0.006$.

[690] 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.

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

$A_{T/CP}$

$A_{T/CP}$ is defined as

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

the *CPT* invariant asymmetry between the oscillation probabilities $\mathrm{P}(\overline{B}^0 \to B^0)$ and $\mathrm{P}(B^0 \to \overline{B}^0)$.

VALUE	DOCUMENT ID	TECN	COMMENT
0.005±0.012±0.014	[692] AUBERT 02K	BABR	$e^+e^- \to \Upsilon(4S)$

[692] AUBERT 02K uses the charge asymmetry in like-sign dilepton events.

$A_{CP}(B^0 \to D^*(2010)^+ D^-)$

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 exclusive B^0 and $\overline{B}^0$ decay.

VALUE	DOCUMENT ID		TECN	COMMENT
0.03±0.07 OUR AVERAGE				
0.07±0.08±0.04	[693] AUSHEV	04	BELL	$e^+ e^- \to \Upsilon(4S)$
−0.03±0.11±0.05	AUBERT	03J	BABR	$e^+ e^- \to \Upsilon(4S)$

[693] Combines results from fully and partially reconstructed $B^0 \to D^{*\pm} D^{\mp}$ decays.

$A_{CP}(B^0 \to K^*(892)^0 \phi)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.01±0.07 OUR AVERAGE				
0.02±0.09±0.02	[694] CHEN	05A	BELL	$e^+ e^- \to \Upsilon(4S)$
−0.01±0.09±0.02	AUBERT,B	04W	BABR	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.04±0.12±0.02	AUBERT	03V	BABR	Repl. by AUBERT 04W
$0.07\pm0.15^{+0.05}_{-0.03}$	[695] CHEN	03B	BELL	Repl. by CHEN 05A
0.00±0.27±0.03	[696] AUBERT	02E	BABR	Repl. by AUBERT 03V

[694] Corresponds to 90% confidence range $-0.14 < A_{CP} < 0.17$.
[695] Corresponds to 90% confidence range $-0.18 < A_{CP} < 0.33$.
[696] Corresponds to 90% confidence range $-0.44 < A_{CP} < 0.44$.

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

VALUE	DOCUMENT ID		TECN	COMMENT
−0.113±0.020 OUR AVERAGE				
−0.133±0.030±0.009	[697] AUBERT,B	04K	BABR	$e^+ e^- \to \Upsilon(4S)$
−0.101±0.025±0.005	[698] CHAO	04B	BELL	$e^+ e^- \to \Upsilon(4S)$
−0.04 ±0.16	[699] CHEN	00	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.088±0.035±0.013	[700] CHAO	05A	BELL	Repl. by CHAO 04B
−0.07 ±0.08 ±0.02	[701] AUBERT	02D	BABR	Repl. by AUBERT 02Q
−0.102±0.050±0.016	[702] AUBERT	02Q	BABR	Repl. by AUBERT,B 04K
$-0.06\ \pm0.09\ ^{+0.01}_{-0.02}$	[703] CASEY	02	BELL	Repl. by CHAO 04B
$0.044^{+0.186}_{-0.167}{}^{+0.018}_{-0.021}$	[704] ABE	01K	BELL	Repl. by CASEY 02
−0.19 ±0.10 ±0.03	[705] AUBERT	01E	BABR	Repl. by AUBERT 02Q

[697] Based on a total signal yield of $N(K^-\pi^+) + N(K^+\pi^-) = 1606 \pm 51$ events.
[698] CHAO 04B reports significance of 3.9 standard deviation for deviation of A_{CP} from zero.
[699] Corresponds to 90% confidence range $-0.30 < A_{CP} < 0.22$.
[700] Corresponds to a 90% CL interval of $-0.15 < A_{CP} < -0.03$.
[701] Corresponds to 90% confidence range $-0.21 < A_{CP} < 0.07$.
[702] Corresponds to 90% confidence range $-0.188 < A_{CP} < -0.016$.
[703] Corresponds to 90% confidence range $-0.21 < A_{CP} < +0.09$.
[704] Corresponds to 90% confidence range $-0.25 < A_{CP} < 0.37$.
[705] Corresponds to 90% confidence range $-0.35 < A_{CP} < -0.03$.

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

VALUE		DOCUMENT ID		TECN	COMMENT
0.16±0.29±0.05	[706]	CHAO	05A	BELL	$e^+e^- \to \Upsilon(4S)$

[706] Corresponds to a 90% CL interval of $-0.33 < A_{CP} < 0.64$.

$A_{CP}(B^0 \to \eta K^*(892)^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.02±0.11±0.02	AUBERT,B	04D	BABR	$e^+e^- \to \Upsilon(4S)$

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

VALUE		DOCUMENT ID		TECN	COMMENT
0.26±0.15 OUR AVERAGE					
$0.22^{+0.22}_{-0.23}{}^{+0.06}_{-0.02}$	[707]	CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$
$0.28 \pm 0.17 \pm 0.08$		AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$

[707] Corresponds to 90% confidence range $-0.18 < A^{CP} < 0.64$.

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

VALUE		DOCUMENT ID		TECN	COMMENT
0.07±0.11±0.01	[708]	CHANG	04	BELL	$e^+e^- \to \Upsilon(4S)$

[708] Corresponds to 90% confidence range $-0.12 < A^{CP} < 0.26$.

$A_{CP}(B^0 \to K^*(892)^+ \pi^-)$

VALUE		DOCUMENT ID		TECN	COMMENT
−0.05±0.14 OUR AVERAGE					
$-0.11 \pm 0.14 \pm 0.05$		AUBERT	06I	BABR	$e^+e^- \to \Upsilon(4S)$
$0.26^{+0.33}_{-0.34}{}^{+0.10}_{-0.08}$	[709]	EISENSTEIN	03	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.23 \pm 0.18^{+0.09}_{-0.06}$		AUBERT,B	04O	BABR	Repl. by AUBERT 06I

[709] Corresponds to 90% confidence range $-0.31 < A_{CP} < 0.78$.

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

VALUE	DOCUMENT ID		TECN	COMMENT
−0.15±0.08 OUR AVERAGE				
$-0.02 \pm 0.16^{+0.05}_{-0.02}$	WANG	05	BELL	$e^+e^- \to \Upsilon(4S)$
$-0.18 \pm 0.08 \pm 0.03$	AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$

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

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{-0.53 \pm 0.29^{+0.09}_{-0.04}}$	WANG	05	BELL	$e^+e^- \to \Upsilon(4S)$

$A_{CP}(B^0 \to K^*(1430) \gamma)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.08±0.15±0.01	AUBERT,B	04U	BABR	$e^+e^- \to \Upsilon(4S)$

$C_{D^*(2010)^- D^+}$ ($B^0 \rightarrow D^*(2010)^- D^+$)

VALUE		DOCUMENT ID		TECN	COMMENT
0.20±0.18 OUR AVERAGE					
0.17±0.24±0.04		AUBERT,B	05Z	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.23±0.25±0.06	[710]	AUSHEV	04	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.22±0.37±0.10		AUBERT	03J	BABR	Repl. by AUBERT,B 05Z

[710] Combines results from fully and partially reconstructed $B^0 \rightarrow D^{*\pm} D^{\mp}$ decays.

$S_{D^*(2010)^- D^+}$ ($B^0 \rightarrow D^*(2010)^- D^+$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.53±0.32 OUR AVERAGE Error includes scale factor of 1.2.					
−0.29±0.33±0.07		AUBERT,B	05Z	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
−0.96±0.43±0.12	[711]	AUSHEV	04	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.24±0.69±0.12		AUBERT	03J	BABR	Repl. by AUBERT,B 05Z

[711] Combines results from fully and partially reconstructed $B^0 \rightarrow D^{*\pm} D^{\mp}$ decays.

$C_{D^*(2010)^+ D^-}$ ($B^0 \rightarrow D^*(2010)^+ D^-$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.17±0.23 OUR AVERAGE Error includes scale factor of 1.3.					
0.09±0.25±0.06		AUBERT,B	05Z	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
−0.37±0.22±0.06	[712]	AUSHEV	04	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.47±0.40±0.12		AUBERT	03J	BABR	Repl. by AUBERT,B 05Z

[712] Combines results from fully and partially reconstructed $B^0 \rightarrow D^{*\pm} D^{\mp}$ decays.

$S_{D^*(2010)^+ D^-}$ ($B^0 \rightarrow D^*(2010)^+ D^-$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.54±0.27 OUR AVERAGE					
−0.54±0.35±0.07		AUBERT,B	05Z	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
−0.55±0.39±0.12	[713]	AUSHEV	04	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.82±0.75±0.14		AUBERT	03J	BABR	Repl. by AUBERT,B 05Z

[713] Combines results from fully and partially reconstructed $B^0 \rightarrow D^{*\pm} D^{\mp}$ decays.

$C_{D^{*+} D^{*-}}$ ($B^0 \rightarrow D^{*+} D^{*-}$)

VALUE		DOCUMENT ID		TECN	COMMENT
0.27±0.17 OUR AVERAGE					
0.26±0.26±0.06	[714]	MIYAKE	05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.28±0.23±0.02	[715]	AUBERT	03Q	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[714] Belle Collab. quotes $A_{D^{*+} D^{*-}}$ which is equal to $-C_{D^{*+} D^{*-}}$.

[715] AUBERT 03Q reports $|\lambda|$=0.75 ± 0.19 ± 0.02 and Im(λ)=0.05 ± 0.29 ± 0.10. We convert them to S and C parameters taking into account correlations.

$S_{D^{*+}D^{*-}}$ ($B^0 \to D^{*+}D^{*-}$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.2 ±0.4 OUR AVERAGE	Error includes scale factor of 1.2.			
−0.75±0.56±0.12	MIYAKE	05	BELL	$e^+e^- \to \Upsilon(4S)$
0.06±0.37±0.13	[716] AUBERT	03Q	BABR	$e^+e^- \to \Upsilon(4S)$

[716] AUBERT 03Q reports $|\lambda|$=0.75 ± 0.19 ± 0.02 and Im(λ)=0.05 ± 0.29 ± 0.10. We convert them to S and C parameters taking into account correlations.

C_+ ($B^0 \to D^{*+}D^{*-}$)

See the note in the $C_{\pi\pi}$ datablock, but for CP even final state.

VALUE	DOCUMENT ID		TECN	COMMENT
0.06±0.17±0.03	[717] AUBERT,BE	05A	BABR	$e^+e^- \to \Upsilon(4S)$

[717] AUBERT,BE 05A reports a CP-odd fraction $R_\perp$ = 0.125 ± 0.044 ± 0.007.

S_+ ($B^0 \to D^{*+}D^{*-}$)

See the note in the $S_{\pi\pi}$ datablock, but for CP even final state.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.75±0.25±0.03	[718] AUBERT,BE	05A	BABR	$e^+e^- \to \Upsilon(4S)$

[718] AUBERT,BE 05A reports a CP-odd fraction $R_\perp$ = 0.125 ± 0.044 ± 0.007.

C_- ($B^0 \to D^{*+}D^{*-}$)

See the note in the $C_{\pi\pi}$ datablock, but for CP odd final state.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.20±0.96±0.11	[719] AUBERT,BE	05A	BABR	$e^+e^- \to \Upsilon(4S)$

[719] AUBERT,BE 05A reports a CP-odd fraction $R_\perp$ = 0.125 ± 0.044 ± 0.007.

S_- ($B^0 \to D^{*+}D^{*-}$)

See the note in the $S_{\pi\pi}$ datablock, but for CP odd final state.

VALUE	DOCUMENT ID		TECN	COMMENT
−1.75±1.78±0.22	[720] AUBERT,BE	05A	BABR	$e^+e^- \to \Upsilon(4S)$

[720] AUBERT,BE 05A reports a CP-odd fraction $R_\perp$ = 0.125 ± 0.044 ± 0.007.

$C_{D^+D^-}$ ($B^0 \to D^+D^-$)

VALUE	DOCUMENT ID		TECN	COMMENT
0.11±0.35±0.06	AUBERT,B	05Z	BABR	$e^+e^- \to \Upsilon(4S)$

$S_{D^+D^-}$ ($B^0 \to D^+D^-$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.29±0.63±0.06	AUBERT,B	05Z	BABR	$e^+e^- \to \Upsilon(4S)$

$C_{J/\psi(1S)\pi^0}$ ($B^0 \to J/\psi(1S)\pi^0$)

VALUE	DOCUMENT ID		TECN	COMMENT
0.13±0.24 OUR AVERAGE				
0.01±0.29±0.03	[721] KATAOKA	04	BELL	$e^+e^- \to \Upsilon(4S)$
0.38±0.41±0.09	AUBERT	03N	BABR	$e^+e^- \to \Upsilon(4S)$

[721] BELLE Collab. quotes $A_{J/\psi\pi^0}$ which is equal to $-C_{J/\psi\pi^0}$.

$S_{J/\psi(1S)\pi^0}$ ($B^0 \to J/\psi(1S)\pi^0$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.4 ±0.4 OUR AVERAGE	Error includes scale factor of 1.1.				
−0.72±0.42±0.09		KATAOKA	04	BELL	$e^+e^- \to \Upsilon(4S)$
0.05±0.49±0.16		AUBERT	03N	BABR	$e^+e^- \to \Upsilon(4S)$

$C_{\omega K^0_S}$ ($B^0 \to \omega K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.27±0.48±0.15	[722]	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$

[722] Belle Collab. quotes $A_{\omega K^0_S}$ which is equal to $-C_{\omega K^0_S}$.

$S_{\omega K^0_S}$ ($B^0 \to \omega K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
$+0.76\pm0.65^{+0.13}_{-0.16}$		CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$

$C_{\eta'(958)K}$ ($B^0 \to \eta'(958)K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.04±0.20 OUR AVERAGE	Error includes scale factor of 2.5.				
−0.21±0.10±0.02		AUBERT	05M	BABR	$e^+e^- \to \Upsilon(4S)$
0.19±0.11±0.05	[723]	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.26±0.22±0.03	[723]	ABE	03C	BELL	Repl. by ABE 03H
0.01±0.16±0.04	[723]	ABE	03H	BELL	Repl. by CHEN 05B
0.10±0.22±0.04		AUBERT	03W	BABR	Repl. by AUBERT 05M
$-0.13\pm0.32^{+0.06}_{-0.09}$	[723]	CHEN	02B	BELL	Repl. by ABE 03C

[723] BELLE Collab. quotes $A_{\eta'(958)K^0_S}$ which is equal to $-C_{\eta'(958)K^0_S}$.

$S_{\eta'(958)K}$ ($B^0 \to \eta'(958)K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
0.43±0.17 OUR AVERAGE	Error includes scale factor of 1.5.				
0.30±0.14±0.02		AUBERT	05M	BABR	$e^+e^- \to \Upsilon(4S)$
+0.65±0.18±0.04		CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.71\pm0.37^{+0.05}_{-0.06}$		ABE	03C	BELL	Repl. by ABE 03H
0.43±0.27±0.05		ABE	03H	BELL	Repl. by CHEN 05B
0.02±0.34±0.03		AUBERT	03W	BABR	Repl. by AUBERT 05M
$0.28\pm0.55^{+0.07}_{-0.08}$		CHEN	02B	BELL	Repl. by ABE 03C

$C_{f_0(980)K^0_S}$ ($B^0 \to f_0(980)K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
+0.39±0.27±0.09	[724]	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$

[724] Belle Collab. quotes $A_{f_0(980)K^0_S}$ which is equal to $-C_{f_0(980)K^0_S}$.

$S_{f_0(980)K^0_S}$ ($B^0 \to f_0(980)K^0_S$)

VALUE	DOCUMENT ID		TECN	COMMENT
+0.47±0.41±0.08	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$

$C_{K_S K_S K_S}(B^0 \to K_S K_S K_S)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.41±0.21 OUR AVERAGE				
$-0.34^{+0.28}_{-0.25}\pm0.05$	AUBERT,B	05	BABR	$e^+e^- \to \Upsilon(4S)$
$-0.54\pm0.34\pm0.09$	[725] SUMISAWA	05	BELL	$e^+e^- \to \Upsilon(4S)$

[725] Belle Collab. quotes $A_{K_S K_S K_S}$ which is equal to $-C_{K_S K_S K_S}$.

$S_{K_S K_S K_S}(B^0 \to K_S K_S K_S)$

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{-0.3^{+0.8}_{-0.7}}$ **OUR AVERAGE** Error includes scale factor of 2.4.				
$-0.71^{+0.38}_{-0.32}\pm0.04$	AUBERT,B	05	BABR	$e^+e^- \to \Upsilon(4S)$
$1.26\pm0.68\pm0.20$	SUMISAWA	05	BELL	$e^+e^- \to \Upsilon(4S)$

$C_{K^+K^-K^0_S}$ ($B^0 \to K^+K^-K^0_S$)

VALUE	DOCUMENT ID		TECN	COMMENT
0.09±0.10 OUR AVERAGE				
$0.10\pm0.14\pm0.04$	[726] AUBERT	05T	BABR	$e^+e^- \to \Upsilon(4S)$
$0.09\pm0.12\pm0.07$	[727] CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.10\pm0.19\pm0.10$	[726] AUBERT,B	04V	BABR	Repl. by AUBERT 05T
$0.40\pm0.33^{+0.28}_{-0.10}$	[727] ABE	03C	BELL	Repl. by ABE 03H
$0.17\pm0.16\pm0.04$	[726,727] ABE	03H	BELL	Repl. by CHEN 05B

[726] Excludes the events from $B^0 \to \phi K^0_S$ decay.

[727] BELLE Collab. quotes $A_{K^+K^-K^0_S}$ which is equal to $-C_{K^+K^-K^0_S}$.

$S_{K^+K^-K^0_S}$ ($B^0 \to K^+K^-K^0_S$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.45±0.13 OUR AVERAGE				
$-0.42\pm0.17\pm0.03$	[728,729] AUBERT	05T	BABR	$e^+e^- \to \Upsilon(4S)$
$-0.49\pm0.18\pm0.04$	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.56\pm0.25\pm0.04$	[728,730] AUBERT,B	04V	BABR	Repl. by AUBERT 05T
$-0.49\pm0.43\pm0.11$	ABE	03C	BELL	Repl. by ABE 03H
$-0.51\pm0.26\pm0.05$	[728,731] ABE	03H	BELL	Repl. by CHEN 05B

[728] Excludes events from $B^0 \to \phi K^0_S$ decay.
[729] The measured CP-even final states fraction is $0.89 \pm 0.08 \pm 0.06$.
[730] The measured CP-even final states fraction is $0.98 \pm 0.15 \pm 0.04$.
[731] The measured CP-even final states fraction is $1.03 \pm 0.15 \pm 0.05$.

$C_{\phi K^0_S}$ ($B^0 \to \phi K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
−0.04±0.17 OUR AVERAGE					
0.00±0.23±0.05	732	AUBERT	05T	BABR	$e^+e^- \to \Upsilon(4S)$
−0.08±0.22±0.09	732,733	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.01±0.33±0.10	732	AUBERT,B	04G	BABR	Repl. by AUBERT 05T
0.56±0.41±0.16	733	ABE	03C	BELL	Repl. by ABE 03H
0.15±0.29±0.07	733	ABE	03H	BELL	Repl. by CHEN 05B

[732] Measurement combines B-meson final states ϕK^0_S and ϕK^0_L by assuming $S_{\phi K^0_S} = -S_{\phi K^0_L}$

[733] BELLE Collab. quotes $A_{\phi K^0_S}$ which is equal to $-C_{\phi K^0_S}$.

$S_{\phi K^0_S}$ ($B^0 \to \phi K^0_S$)

VALUE		DOCUMENT ID		TECN	COMMENT
0.35±0.21 OUR AVERAGE					
$0.50\pm0.25^{+0.07}_{-0.04}$	734	AUBERT	05T	BABR	$e^+e^- \to \Upsilon(4S)$
0.08±0.33±0.09	734	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.47\pm0.34^{+0.08}_{-0.06}$	734	AUBERT,B	04G	BABR	Repl. by AUBERT 05T
−0.73±0.64±0.22		ABE	03C	BELL	Repl. by ABE 03H
$-0.96\pm0.50^{+0.09}_{-0.11}$		ABE	03H	BELL	Repl. by CHEN 05B

[734] Measurement combines B-meson final states ϕK^0_S and ϕK^0_L by assuming $S_{\phi K^0_S} = -S_{\phi K^0_L}$

$C_{K^0_S \pi^0}$ ($B^0 \to K^0_S \pi^0$)

VALUE		DOCUMENT ID		TECN	COMMENT
0.08±0.14 OUR AVERAGE					
0.06±0.18±0.03		AUBERT	05Y	BABR	$e^+e^- \to \Upsilon(4S)$
0.11±0.20±0.09	735	CHEN	05B	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.03±0.36±0.11	736	AUBERT	04M	BABR	Repl. by AUBERT,B 04M
$0.40^{+0.27}_{-0.28}\pm0.09$	737	AUBERT,B	04M	BABR	Repl. by AUBERT 05Y

[735] Belle Collab. quotes $A_{K^0_S \pi^0}$ which is equal to $-C_{K^0_S \pi^0}$.

[736] AUBERT 04M reported $A_{CP}(B^0 \to K^0 \pi^0)$=0.03±0.36±0.11 which equals $-C_{K^0_S \pi^0}$.

[737] Based on a total signal yield of 122 ± 16 events.

$S_{K^0_S \pi^0}$ ($B^0 \rightarrow K^0_S \pi^0$)

VALUE	DOCUMENT ID	TECN	COMMENT
0.34±0.28 OUR AVERAGE			
$0.35^{+0.30}_{-0.33}\pm0.04$	AUBERT 05Y	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$+0.32\pm0.61\pm0.13$	CHEN 05B	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.48^{+0.38}_{-0.47}\pm0.06$	[738] AUBERT,B 04M	BABR	Repl. by AUBERT 05Y

[738] Based on a total signal yield of 122 ± 16 events.

$C_{K^0_S \pi^0 \gamma}$($B^0 \rightarrow K^0_S \pi^0 \gamma$)

VALUE	DOCUMENT ID	TECN	COMMENT
−0.3 ±0.4 OUR AVERAGE	Error includes scale factor of 1.5.		
$-1.0\ \pm0.5\ \pm0.2$	[739] AUBERT,B 05P	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.03\pm0.34\pm0.11$	[740] USHIRODA 05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[739] Requires $1.1 < M_{K^0_S \pi^0} < 1.8$ GeV/c^2.

[740] USHIRODA 05 reports $A_{K^0_S \pi^0 \gamma}$, which is $-C_{K^0_S \pi^0 \gamma}$.

$S_{K^0_S \pi^0 \gamma}$($B^0 \rightarrow K^0_S \pi^0 \gamma$)

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.3^{+0.6}_{-0.5}$ OUR AVERAGE	Error includes scale factor of 1.3.		
$0.9\ \pm1.0\ \pm0.2$	[741] AUBERT,B 05P	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.58^{+0.46}_{-0.38}\pm0.11$	USHIRODA 05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[741] Requires $1.1 < M_{K^0_S \pi^0} < 1.8$ GeV/c^2.

$C_{K^*(892)^0 \gamma}$ ($B^0 \rightarrow K^*(892)^0 \gamma$)

VALUE	DOCUMENT ID	TECN	COMMENT
−0.40±0.23±0.03	AUBERT,B 05P	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.57\pm0.32\pm0.09$	[742] AUBERT,B 04Z	BABR	Repl. by AUBERT,B 05P

[742] Based on a total signal of 105 ± 14 events with $K^*(892)^0 \rightarrow K^0_S \pi^0$ only.

$S_{K^*(892)^0 \gamma}$ ($B^0 \rightarrow K^*(892)^0 \gamma$)

VALUE	DOCUMENT ID	TECN	COMMENT
−0.39±0.33 OUR AVERAGE			
$-0.21\pm0.40\pm0.05$	AUBERT,B 05P	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.79^{+0.63}_{-0.50}\pm0.10$	[743] USHIRODA 05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.25\pm0.63\pm0.14$	[744] AUBERT,B 04Z	BABR	Repl. by AUBERT,B 05P

[743] Assumes $C(B^0 \rightarrow K^*(892)^0 \gamma) = 0$.

[744] Based on a total signal of 105 ± 14 events with $K^*(892)^0 \rightarrow K^0_S \pi^0$ only.

$C_{\pi\pi}$ ($B^0 \to \pi^+\pi^-$)

$C_{\pi\pi}$ is defined as $(1-|\lambda|^2)/(1+|\lambda|^2)$, where the quantity $\lambda = q/p\, \overline{A}_f/A_f$ is a phase convention independent observable quantity for the final state f. For details, see the review on "*CP* Violation" in the Reviews section.

VALUE	DOCUMENT ID	TECN	COMMENT
−0.36±0.23 OUR AVERAGE	Error includes scale factor of 2.3.		
$-0.56\pm0.12\pm0.06$	[745] ABE 05D	BELL	$e^+e^- \to \Upsilon(4S)$
$-0.09\pm0.15\pm0.04$	AUBERT,BE 05	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.58\pm0.15\pm0.07$	[745] ABE 04E	BELL	Repl. by ABE 05D
$-0.77\pm0.27\pm0.08$	[745] ABE 03G	BELL	Repl. by ABE 04E.
$-0.94^{+0.31}_{-0.25}\pm0.09$	[745] ABE 02M	BELL	Repl. by ABE 03G
$-0.25^{+0.45}_{-0.47}\pm0.14$	[746] AUBERT 02D	BABR	Repl. by AUBERT 02Q
$-0.30\pm0.25\pm0.04$	[747] AUBERT 02Q	BABR	Repl. by AUBERT,BE 05

[745] Paper reports $A_{\pi\pi}$ which equals to $-C_{\pi\pi}$.
[746] Corresponds to 90% confidence range $-1.0 < C_{\pi\pi} < 0.47$.
[747] Corresponds to 90% confidence range $-0.72 < C_{\pi\pi} < 0.12$.

$S_{\pi\pi}$ ($B^0 \to \pi^+\pi^-$)

$S_{\pi\pi} = 2\text{Im}\lambda/(1+|\lambda|^2)$, see the note in the $C_{\pi\pi}$ datablock above.

VALUE	DOCUMENT ID	TECN	COMMENT
−0.49±0.18 OUR AVERAGE	Error includes scale factor of 1.5.		
$-0.67\pm0.16\pm0.06$	[748] ABE 05D	BELL	$e^+e^- \to \Upsilon(4S)$
$-0.30\pm0.17\pm0.03$	AUBERT,BE 05	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-1.00\pm0.21\pm0.07$	[749] ABE 04E	BELL	Repl. by ABE 05D
$-1.23\pm0.41^{+0.08}_{-0.07}$	ABE 03G	BELL	Repl. by ABE 04E.
$-1.21^{+0.38}_{-0.27}{}^{+0.16}_{-0.13}$	ABE 02M	BELL	Repl. by ABE 03G
$0.03^{+0.52}_{-0.56}\pm0.11$	[750] AUBERT 02D	BABR	Repl. by AUBERT 02Q
$0.02\pm0.34\pm0.05$	[751] AUBERT 02Q	BABR	Repl. by AUBERT,BE 05

[748] Rule out the *CP*-conserving case, $C_{\pi\pi} = S_{\pi\pi} = 0$, at the 5.4 sigma level.
[749] Rule out the *CP*-conserving case, $C_{\pi\pi} = S_{\pi\pi} = 0$, at the 5.2 sigma level.
[750] Corresponds to 90% confidence range $-0.89 < S_{\pi\pi} < 0.85$.
[751] Corresponds to 90% confidence range $-0.54 < S_{\pi\pi} < 0.58$.

$C_{\pi^0\pi^0}$($B^0 \to \pi^0\pi^0$)

VALUE	DOCUMENT ID	TECN	COMMENT
−0.3 ±0.4 OUR AVERAGE			
$-0.12\pm0.56\pm0.06$	[752] AUBERT 05L	BABR	$e^+e^- \to \Upsilon(4S)$
$-0.44^{+0.52}_{-0.53}\pm0.17$	[753] CHAO 05	BELL	$e^+e^- \to \Upsilon(4S)$

[752] Corresponds to a 90% CL interval of $-0.88 < A_{CP} < 0.64$.
[753] BELLE Collab. quotes $A_{\pi^0\pi^0}$ which is equal to $-C_{\pi^0\pi^0}$.

$C_{\rho\pi}$ ($B^0 \to \rho^+\pi^-$)

VALUE	DOCUMENT ID		TECN	COMMENT
0.30±0.13 OUR AVERAGE				
$0.25\pm0.17^{+0.02}_{-0.06}$	WANG	05	BELL	$e^+e^- \to \Upsilon(4S)$
$0.36\pm0.18\pm0.04$	AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$

$S_{\rho\pi}$ ($B^0 \to \rho^+\pi^-$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.04±0.23 OUR AVERAGE	Error includes scale factor of 1.3.			
$-0.28\pm0.23^{+0.10}_{-0.08}$	WANG	05	BELL	$e^+e^- \to \Upsilon(4S)$
$0.19\pm0.24\pm0.03$	AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$

$\Delta C_{\rho\pi}$ ($B^0 \to \rho^+\pi^-$)

$\Delta C_{\rho\pi}$ describes the asymmetry between the rates $\Gamma(B^0 \to \rho^+\pi^-) + \Gamma(\overline{B}^0 \to \rho^-\pi^+)$ and $\Gamma(B^0 \to \rho^-\pi^+) + \Gamma(\overline{B}^0 \to \rho^+\pi^-)$.

VALUE	DOCUMENT ID		TECN	COMMENT
0.33±0.13 OUR AVERAGE				
$0.38\pm0.18^{+0.02}_{-0.04}$	WANG	05	BELL	$e^+e^- \to \Upsilon(4S)$
$0.28^{+0.18}_{-0.19}\pm0.04$	AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$

$\Delta S_{\rho\pi}$ ($B^0 \to \rho^+\pi^-$)

$\Delta S_{\rho\pi}$ is related to the strong phase difference between the amplitudes contributing to $B^0 \to \rho^+\pi^-$.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.07±0.22 OUR AVERAGE	Error includes scale factor of 1.3.			
$-0.30\pm0.24\pm0.09$	WANG	05	BELL	$e^+e^- \to \Upsilon(4S)$
$0.15\pm0.25\pm0.03$	AUBERT	03T	BABR	$e^+e^- \to \Upsilon(4S)$

$C_{\rho\rho}$ ($B^0 \to \rho^+\rho^-$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.02±0.17 OUR AVERAGE				
$-0.00\pm0.30\pm0.09$	[754] SOMOV	06	BELL	$e^+e^- \to \Upsilon(4S)$
$-0.03\pm0.18\pm0.09$	AUBERT,B	05C	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.17\pm0.27\pm0.14$	AUBERT,B	04R	BABR	Repl. by AUBERT,B 05C

[754] BELLE Collab. quotes A_{CP} which is equal to $-C$.

$S_{\rho\rho}$ ($B^0 \to \rho^+\rho^-$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.22±0.22 OUR AVERAGE				
$0.08\pm0.41\pm0.09$	SOMOV	06	BELL	$e^+e^- \to \Upsilon(4S)$
$-0.33\pm0.24^{+0.08}_{-0.14}$	AUBERT,B	05C	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.42\pm0.42\pm0.14$	AUBERT,B	04R	BABR	Repl. by AUBERT,B 05C

$|\lambda|$ ($B^0 \rightarrow c\overline{c}K^0$)

The same λ quantity, defined in the $C_{\pi\pi}$ datablock above.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.969±0.028 OUR EVALUATION				
0.967±0.028 OUR AVERAGE				
$1.007 \pm 0.041 \pm 0.033$	[755] ABE	05B	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.950 \pm 0.031 \pm 0.013$	[756] AUBERT	05F	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.950 \pm 0.049 \pm 0.025$	[757] ABE	02Z	BELL	Repl. by ABE 05B
$0.948 \pm 0.051 \pm 0.030$	[758] AUBERT	02P	BABR	Repl. by AUBERT 05F

[755] Measurement based on 152×10^6 $B\overline{B}$ pairs.
[756] Measurement based on 227×10^6 $B\overline{B}$ pairs.
[757] Measured with both $\eta_f = \pm 1$ samples.
[758] Measured with the high purity of $\eta_f = -1$ samples.

$|\lambda|$ ($B^0 \rightarrow J/\psi K^*(892)^0$)

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.25	95	[759] AUBERT,B	04H	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[759] Uses the measured cosine coefficients C and $\overline{C}$ and assumes $|q/p| = 1$.

cos 2β ($B^0 \rightarrow J/\psi K^*(892)^0$)

β (ϕ_1) is one of the angles of CMK unitarity triangle, see the review on "*CP*" Violation in the Reviews section.

VALUE	DOCUMENT ID		TECN	COMMENT
$1.7^{+0.7}_{-0.9}$ OUR AVERAGE Error includes scale factor of 1.6.				
$2.72^{+0.50}_{-0.79} \pm 0.27$	[760] AUBERT	05P	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.87 \pm 0.74 \pm 0.12$	[761] ITOH	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

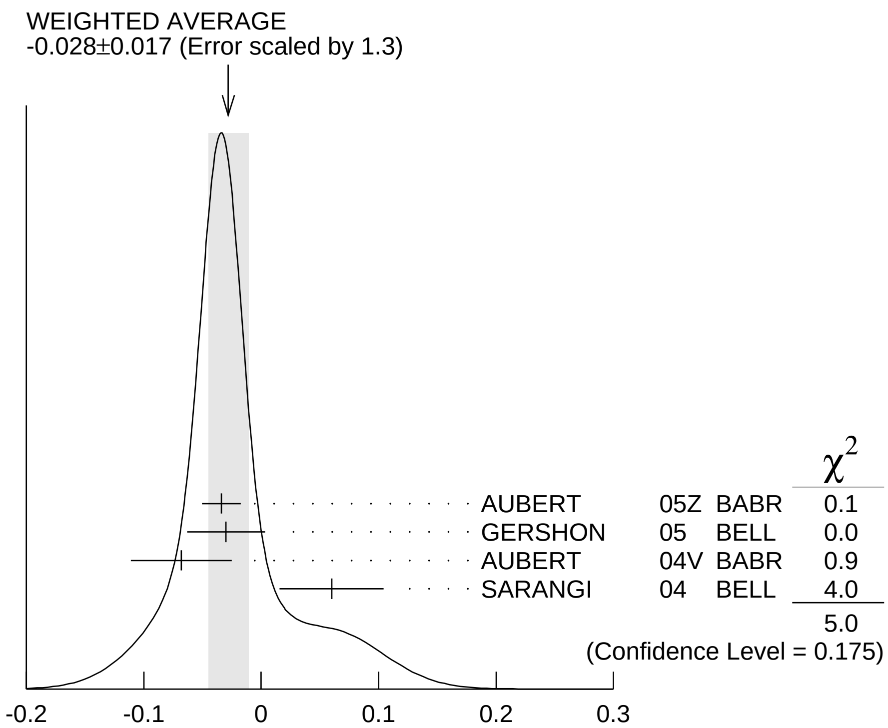
[760] The measurement is obtained when sin 2β is fixed to 0.726 and the sign of cos 2β is positive with 86% confidence level.
[761] The measurement is obtained with sin 2β fixed to 0.731.

($S_+ + S_-$)/2 ($B^0 \rightarrow D^{*-}\pi^+$)

$S_\pm = -\frac{2Im(\lambda_\pm)}{1+|\lambda_\pm|^2}$ where λ_+ and λ_- are defined in the $C_{\pi\pi}$ datablock above for $B^0 \rightarrow D^{*-}\pi^+$ and $\overline{B}^0 \rightarrow D^{*+}\pi^-$.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.028±0.017 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.				
$-0.034 \pm 0.014 \pm 0.009$	[762] AUBERT	05Z	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.030 \pm 0.028 \pm 0.018$	[762] GERSHON	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.068 \pm 0.038 \pm 0.020$	[763] AUBERT	04V	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.060 \pm 0.040 \pm 0.019$	[763] SARANGI	04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.063 \pm 0.024 \pm 0.014$	[762] AUBERT	04W	BABR	Repl. by AUBERT 05Z

[762] Uses partially reconstructed $B^0 \rightarrow D^{*\pm}\pi^{\mp}$ decays.
[763] Uses fully reconstructed $B^0 \rightarrow D^{*\pm}\pi^{\mp}$ decays.



$(S_+ + S_-)/2\ (B^0 \rightarrow D^{*-}\pi^+)$

$(S_- - S_+)/2\ (B^0 \rightarrow D^{*-}\pi^+)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.001±0.018 OUR AVERAGE				
−0.019±0.022±0.013	[764] AUBERT	05Z	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
−0.005±0.028±0.018	[764] GERSHON	05	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.031±0.070±0.033	[765] AUBERT	04V	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.049±0.040±0.019	[765] SARANGI	04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.004±0.037±0.014	[764] AUBERT	04W	BABR	Repl. by AUBERT 05Z

[764] Uses partially reconstructed $B^0 \rightarrow D^{*\pm}\pi^{\mp}$ decays.
[765] Uses fully reconstructed $B^0 \rightarrow D^{*\pm}\pi^{\mp}$ decays.

$(S_+ + S_-)/2\ (B^0 \rightarrow D^-\pi^+)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.043±0.030 OUR AVERAGE				
−0.022±0.038±0.020	[766] AUBERT	04V	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
−0.062±0.037±0.018	[766] SARANGI	04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[766] Uses fully reconstructed $B^0 \rightarrow D^{\pm}\pi^{\mp}$ decays.

$(S_- - S_+)/2$ ($B^0 \to D^- \pi^+$)

VALUE	DOCUMENT ID		TECN	COMMENT
−0.01 ±0.04 OUR AVERAGE				
$0.025 \pm 0.068 \pm 0.033$	[767] AUBERT	04V	BABR	$e^+ e^- \to \Upsilon(4S)$
$-0.025 \pm 0.037 \pm 0.018$	[767] SARANGI	04	BELL	$e^+ e^- \to \Upsilon(4S)$

[767] Uses fully reconstructed $B^0 \to D^{\pm} \pi^{\mp}$ decays.

sin(2β)

For a discussion of *CP* violation, see the review on "*CP* Violation" in the Reviews section. $\sin(2\beta)$ is a measure of the *CP*-violating amplitude in the $B^0_d \to J/\psi(1S) K^0_S$.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.725±0.037 OUR EVALUATION				
0.73 ±0.04 OUR AVERAGE				
$0.728 \pm 0.056 \pm 0.023$	[768] ABE	05B	BELL	$e^+ e^- \to \Upsilon(4S)$
$0.722 \pm 0.040 \pm 0.023$	[769] AUBERT	05F	BABR	$e^+ e^- \to \Upsilon(4S)$
$1.56 \pm 0.42 \pm 0.21$	[770] AUBERT	04R	BABR	$e^+ e^- \to \Upsilon(4S)$
$0.79\ ^{+0.41}_{-0.44}$	[771] AFFOLDER	00C	CDF	$p\overline{p}$ at 1.8 TeV
$0.84\ ^{+0.82}_{-1.04} \pm 0.16$	[772] BARATE	00Q	ALEP	$e^+ e^- \to Z$
$3.2\ ^{+1.8}_{-2.0} \pm 0.5$	[773] ACKERSTAFF	98Z	OPAL	$e^+ e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.99 \pm 0.14 \pm 0.06$	[774] ABE	02U	BELL	$e^+ e^- \to \Upsilon(4S)$
$0.719 \pm 0.074 \pm 0.035$	[775] ABE	02Z	BELL	Repl. by ABE 05B
$0.59 \pm 0.14 \pm 0.05$	[776] AUBERT	02N	BABR	$e^+ e^- \to \Upsilon(4S)$
$0.741 \pm 0.067 \pm 0.034$	[777] AUBERT	02P	BABR	Repl. by AUBERT 05F
$0.58\ ^{+0.32}_{-0.34}\ ^{+0.09}_{-0.10}$	ABASHIAN	01	BELL	Repl. by ABE 01G
$0.99 \pm 0.14 \pm 0.06$	[778] ABE	01G	BELL	Repl by ABE 02Z
$0.34 \pm 0.20 \pm 0.05$	AUBERT	01	BABR	Repl. by AUBERT 01B
$0.59 \pm 0.14 \pm 0.05$	[778] AUBERT	01B	BABR	Repl. by AUBERT 02P
$1.8 \pm 1.1 \pm 0.3$	[779] ABE	98U	CDF	Repl. by AFFOLDER 00C

[768] Measurement based on 152×10^6 $B\overline{B}$ pairs.
[769] Measurement based on 227×10^6 $B\overline{B}$ pairs.
[770] Measurement in which the J/ψ decays to hadrons or to muons that do not satisfy the standard identification criteria.
[771] AFFOLDER 00C uses about 400 $B^0 \to J/\psi(1S) K^0_S$ 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.
[772] BARATE 00Q uses 23 candidates for $B^0 \to J/\psi(1S) K^0_S$ decays. A combination of jet-charge, vertex-charge, and same-side tagging techniques were used to determine the B^0 production flavor.
[773] ACKERSTAFF 98Z uses 24 candidates for $B^0_d \to J/\psi(1S) K^0_S$ decay. A combination of jet-charge and vertex-charge techniques were used to tag the B^0_d production flavor.
[774] ABE 02U result is based on the same analysis and data sample reported in ABE 01G.

[775] ABE 02Z result is based on 85×10^6 $B\overline{B}$ pairs.
[776] AUBERT 02N result based on the same analysis and data sample reported in AUBERT 01B.
[777] AUBERT 02P result is based on 88×10^6 $B\overline{B}$ pairs.
[778] First observation of *CP* violation in B^0 meson system.
[779] ABE 98U uses 198 ± 17 $B_d^0 \rightarrow J/\psi(1S)K^0$ events. The production flavor of B^0 was determined using the same side tagging technique.

$\sin(2\beta_{\rm eff})(B^0 \rightarrow \phi K^0)$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.50 \pm 0.25^{+0.07}_{-0.04}$	[780] AUBERT	05T	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[780] Obtained by constraining $C = 0$.

$\sin(2\beta_{\rm eff})(B^0 \rightarrow K^+K^-K^0_S)$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.55 \pm 0.22 \pm 0.12$	[781] AUBERT	05T	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[781] Obtained by constraining $C = 0$.

$|\sin(2\beta + \gamma)|$

β (ϕ_1) and γ (ϕ_3) are angles of CKM unitarity triangle, see the review on "*CP* Violation" in the Reviews section.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
>0.35	90	[782] AUBERT	05Z	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.69	68	[783] AUBERT	04V	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
>0.58	95	[784] AUBERT	04W	BABR	Repl. by AUBERT 05Z

[782] Uses partially reconstructed $B^0 \rightarrow D^{*\pm}\pi^{\mp}$ decays and some theoretical assumptions.
[783] Uses fully reconstructed $B^0 \rightarrow D^{(*)\pm}\pi^{\mp}$ decays and some theoretical assumptions, such as the SU(3) symmetry relation.
[784] Combining this measurement with the results from AUBERT 04V for fully reconstructed $B^0 \rightarrow D^{(*)\pm}\pi^{\mp}$ and some theoretical assumptions, such as the SU(3) symmetry relation.

α

For angle $\alpha(\phi_2)$ of the CKM unitarity triangle, see the review on "*CP* violation" in the reviews section.

VALUE (°)	DOCUMENT ID		TECN	COMMENT
96±10 OUR AVERAGE				
88±17	[785] SOMOV	06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
100±13	[786] AUBERT,B	05C	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$102^{+16}_{-12} \pm 14$	[787] AUBERT,B	04R	BABR	Repl. by AUBERT,B 05C

[785] Obtained using isospin relation and selecting a solution closest to the CKM best fit average; the 90% CL allowed interval is $59^\circ < \phi_2$ ($\equiv \alpha$)$< 115^\circ$.
[786] Obtained using isospin relation and selecting a solution closest to the CKM best fit average; 90% CL allowed interval is $79^\circ < \alpha < 123^\circ$.
[787] Obtained from the measured *CP* parameters of the longitudinal polarization by selecting the solution closest to the CKM best fit central value of $\alpha = 95^\circ - 98^\circ$.

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
1.18±0.30±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±0.22±0.07	DUBOSCQ	96	CLE2	$e^+ e^- \to \Upsilon(4S)$

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

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

B^0 REFERENCES

AUBERT	06	PR D73 011101R	B. Aubert et al.	(BABAR Collab.)
AUBERT	06A	PRL 96 011803	B. Aubert et al.	(BABAR Collab.)
AUBERT	06E	PRL 96 052002	B. Aubert et al.	(BABAR Collab.)
AUBERT	06G	PR D73 012004	B. Aubert et al.	(BABAR Collab.)
AUBERT	06I	PR D73 031101R	B. Aubert et al.	(BABAR Collab.)
SOMOV	06	PRL (to be published)	A. Somov et al.	(BELLE Collab.)
SONI	06	PL B634 155	N. Soni et al.	(BELLE Collab.)
VILLA	06	PR D73 051107R	S. Villa et al.	(BELLE Collab.)
ABAZOV	05B	PRL 94 042001	V.M. Abazov et al.	(D0 Collab.)
ABAZOV	05C	PRL 94 102001	V.M. Abazov et al.	(D0 Collab.)
ABAZOV	05D	PRL 94 182001	V.M. Abazov et al.	(D0 Collab.)
ABAZOV	05W	PRL 95 171801	V.M. Abazov et al.	(D0 Collab.)
ABE	05A	PRL 94 221805	K. Abe et al.	(BELLE Collab.)
ABE	05B	PR D71 072003	K. Abe et al.	(BELLE Collab.)
Also		PR D71 079903(Erratum)	K. Abe et al.	(BELLE Collab.)
ABE	05D	PRL 95 101801	K. Abe et al.	(BELLE Collab.)
ABE	05G	PRL 95 231802	K. Abe et al.	(BELLE Collab.)
ABULENCIA	05	PRL 95 221805	A. Abulencia et al.	(CDF Collab.)
ACOSTA	05	PRL 94 101803	D. Acosta et al.	(CDF Collab.)
AUBERT	05	PRL 94 011801	B. Aubert et al.	(BABAR Collab.)
AUBERT	05B	PR D71 031501R	B. Aubert et al.	(BABAR Collab.)
AUBERT	05E	PR D71 051502R	B. Aubert et al.	(BABAR Collab.)
AUBERT	05F	PRL 94 161803	B. Aubert et al.	(BABAR Collab.)
AUBERT	05I	PRL 94 131801	B. Aubert et al.	(BABAR Collab.)
AUBERT	05J	PRL 94 141801	B. Aubert et al.	(BABAR Collab.)
AUBERT	05K	PRL 94 171801	B. Aubert et al.	(BABAR Collab.)
AUBERT	05L	PRL 94 181802	B. Aubert et al.	(BABAR Collab.)
AUBERT	05M	PRL 94 191802	B. Aubert et al.	(BABAR Collab.)
AUBERT	05O	PR D71 031103R	B. Aubert et al.	(BABAR Collab.)
AUBERT	05P	PR D71 032005	B. Aubert et al.	(BABAR Collab.)
AUBERT	05T	PR D71 091102R	B. Aubert et al.	(BABAR Collab.)
AUBERT	05U	PR D71 091103R	B. Aubert et al.	(BABAR Collab.)
AUBERT	05V	PR D71 091104R	B. Aubert et al.	(BABAR Collab.)
AUBERT	05W	PRL 94 221803	B. Aubert et al.	(BABAR Collab.)
AUBERT	05Y	PR D71 111102	B. Aubert et al.	(BABAR Collab.)
AUBERT	05Z	PR D71 112003	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05	PRL 95 011801	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05C	PRL 95 041805	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05K	PRL 95 131803	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05O	PR D72 051102R	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05P	PR D72 051103R	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05Q	PR D72 051106R	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	05Z	PRL 95 131802	B. Aubert et al.	(BABAR Collab.)
AUBERT,BE	05	PRL 95 151803	B. Aubert et al.	(BABAR Collab.)
AUBERT,BE	05A	PRL 95 151804	B. Aubert et al.	(BABAR Collab.)
AUBERT,BE	05B	PRL 95 171802	B. Aubert et al.	(BABAR Collab.)
AUBERT,BE	05C	PR D72 091103R	B. Aubert et al.	(BABAR Collab.)
AUBERT,BE	05E	PRL 95 221801	B. Aubert et al.	(BABAR Collab.)
AUBERT,BE	05F	PR D72 111101R	B. Aubert et al.	(BABAR Collab.)

CHANG	05	PR D71 072007	M.-C. Chang *et al.*	(BELLE Collab.)
CHANG	05A	PR D71 091106R	P. Chang *et al.*	(BELLE Collab.)
CHAO	05	PRL 94 181803	Y. Chao *et al.*	(BELLE Collab.)
CHAO	05A	PR D71 031502R	Y. Chao *et al.*	(BELLE Collab.)
CHEN	05A	PRL 94 221804	K.-F. Chen *et al.*	(BELLE Collab.)
CHEN	05B	PR D72 012004	K.-F. Chen *et al.*	(BELLE Collab.)
DRUTSKOY	05	PRL 94 061802	A. Drutskoy *et al.*	(BELLE Collab.)
GERSHON	05	PL B624 11	T. Gershon *et al.*	(BELLE Collab.)
ITOH	05	PRL 95 091601	R. Itoh *et al.*	(BELLE Collab.)
LIVENTSEV	05	PR D72 051109R	D. Liventsev *et al.*	(BELLE Collab.)
MAJUMDER	05	PRL 95 041803	G. Majumder *et al.*	(BELLE Collab.)
MIYAKE	05	PL B618 34	H. Miyake *et al.*	(BELLE Collab.)
MOHAPATRA	05	PR D72 011101R	D. Mohapatra *et al.*	(BELLE Collab.)
NISHIDA	05	PL B610 23	S. Nishida *et al.*	(BELLE Collab.)
OKABE	05	PL B614 27	T. Okabe *et al.*	(BELLE Collab.)
SCHUMANN	05	PR D72 011103R	J. Schumann *et al.*	(BELLE Collab.)
SUMISAWA	05	PRL 95 061801	K. Sumisawa *et al.*	(BELLE Collab.)
USHIRODA	05	PRL 94 231601	Y. Ushiroda *et al.*	(BELLE Collab.)
WANG	05	PRL 94 121801	C.C. Wang *et al.*	(BELLE Collab.)
WANG	05A	PL B617 141	M.-Z. Wang *et al.*	(BELLE Collab.)
XIE	05	PR D72 051105R	Q.L. Xie *et al.*	(BELLE Collab.)
YANG	05	PRL 94 111802	H. Yang *et al.*	(BELLE Collab.)
ZHANG	05B	PR D71 091107R	L.M. Zhang *et al.*	(BELLE Collab.)
ABDALLAH	04D	EPJ C33 213	J. Abdallah *et al.*	(DELPHI Collab.)
ABDALLAH	04E	EPJ C33 307	J. Abdallah *et al.*	(DELPHI Collab.)
ABE	04E	PRL 93 021601	K. Abe *et al.*	(BELLE Collab.)
ACOSTA	04D	PRL 93 032001	D. Acosta *et al.*	(CDF Collab.)
AUBERT	04A	PR D69 011102	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04B	PR D69 032004	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04C	PRL 92 111801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	04G	PR D69 031102R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04H	PRL 92 061801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04M	PRL 92 201802	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04R	PR D69 052001	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04U	PR D69 091503R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04V	PRL 92 251801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04W	PRL 92 251802	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	04Y	PRL 93 041801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	04Z	PRL 93 051802	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04B	PR D70 011101R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04C	PR D70 012007	B. Aubert *et al.*	(BABAR Collab.)
Also		PRL 92 181801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04D	PR D70 032006	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04G	PRL 93 071801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04H	PRL 93 081801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04J	PRL 93 091802	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04K	PRL 93 131801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04M	PRL 93 131805	B. Aubert	(BABAR Collab.)
AUBERT,B	04O	PR D70 091103R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04R	PRL 93 231801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04S	PRL 93 181801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04T	PR D70 091104R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04U	PR D70 091105R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04V	PRL 93 181805	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04W	PRL 93 231804	B. Aubert *et al.*	(BABAR Collab)
AUBERT,B	04X	PRL 93 181806	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,B	04Z	PRL 93 201801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	04	PR D70 111102R	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	04A	PR D70 112006	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	04B	PR D70 091106	B. Aubert *et al.*	(BABAR Collab.)
AUSHEV	04	PRL 93 201802	T. Aushev *et al.*	(BELLE Collab.)
BORNHEIM	04	PRL 93 241802	A. Bornheim *et al.*	(CLEO Collab.)
CHANG	04	PL B599 148	P. Chang *et al.*	(BELLE Collab.)
CHAO	04	PR D69 111102R	Y. Chao *et al.*	(BELLE Collab.)
CHAO	04B	PRL 93 191802	Y. Chao *et al.*	(BELLE Collab.)
DRAGIC	04	PRL 93 131802	J. Dragic	(BELLE Collab.)
DRUTSKOY	04	PRL 92 051801	A. Drutskoy *et al.*	(BELLE Collab.)
GARMASH	04	PR D69 012001	A. Garmash *et al.*	(BELLE Collab.)
KATAOKA	04	PRL 93 261801	S.U. Kataoka *et al.*	(BELLE Collab.)
MAJUMDER	04	PR D70 111103R	G. Majumder *et al.*	(BELLE Collab.)
NAKAO	04	PR D69 112001	M. Nakao *et al.*	(BELLE Collab.)

SARANGI	04	PRL 93 031802	T.R. Sarangi *et al.*	(BELLE Collab.)
WANG	04	PRL 92 131801	M.Z. Wang *et al.*	(BELLE Collab.)
WANG	04A	PR D70 012001	C.H. Wang *et al.*	(BELLE Collab.)
ABDALLAH	03B	EPJ C28 155	J. Abdallah *et al.*	(DELPHI Collab.)
ABE	03B	PR D67 032003	K. Abe *et al.*	(BELLE Collab.)
ABE	03C	PR D67 031102R	K. Abe *et al.*	(BELLE Collab.)
ABE	03G	PR D68 012001	K. Abe *et al.*	(BELLE Collab.)
ABE	03H	PRL 91 261602	K. Abe *et al.*	(BELLE Collab.)
ADAM	03	PR D67 032001	N.E. Adam *et al.*	(CLEO Collab.)
ATHAR	03	PR D68 072003	S.B. Athar *et al.*	(CLEO Collab.)
AUBERT	03B	PRL 90 091801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03C	PR D67 072002	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03D	PRL 90 181803	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03E	PRL 90 181801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03H	PR D67 091101R	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03I	PR D67 092003	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03J	PRL 90 221801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03K	PRL 90 231801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03L	PRL 91 021801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03N	PRL 91 061802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03O	PRL 91 071801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03Q	PRL 91 131801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03S	PRL 91 241801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03T	PRL 91 201802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03U	PRL 91 221802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03V	PRL 91 171802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03W	PRL 91 161801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	03X	PR D68 092001	B. Aubert *et al.*	(BaBar Collab.)
BORNHEIM	03	PR D68 052002	A. Bornheim *et al.*	(CLEO Collab.)
CHANG	03	PR D68 111101R	M.-C. Chang *et al.*	(BELLE Collab.)
CHEN	03B	PRL 91 201801	K.-F. Chen *et al.*	(BELLE Collab.)
CSORNA	03	PR D67 112002	S.E. Csorna *et al.*	(CLEO Collab.)
EISENSTEIN	03	PR D68 017101	B.I. Eisenstein *et al.*	(CLEO Collab.)
FANG	03	PRL 90 071801	F. Fang *et al.*	(BELLE Collab.)
GABYSHEV	03	PRL 90 121802	N. Gabyshev *et al.*	(BELLE Collab.)
HASTINGS	03	PR D67 052004	N.C. Hastings *et al.*	(BELLE Collab.)
ISHIKAWA	03	PRL 91 261601	A. Ishikawa *et al.*	(BELLE Collab.)
KROKOVNY	03	PRL 90 141802	P. Krokovny *et al.*	(BELLE Collab.)
KROKOVNY	03B	PRL 91 262002	P. Krokovny *et al.*	(BELLE Collab.)
LEE	03	PRL 91 261801	S.H. Lee *et al.*	(BELLE Collab.)
SATPATHY	03	PL B553 159	A. Satpathy *et al.*	(BELLE Collab.)
WANG	03	PRL 90 201802	M.-Z. Wang *et al.*	(BELLE Collab.)
ZHENG	03	PR D67 092004	Y. Zheng *et al.*	(BELLE Collab.)
ABE	02	PRL 88 021801	K. Abe *et al.*	(BELLE Collab.)
ABE	02E	PL B526 258	K. Abe *et al.*	(BELLE Collab.)
ABE	02F	PL B526 247	K. Abe *et al.*	(BELLE Collab.)
ABE	02H	PRL 88 171801	K. Abe *et al.*	(BELLE Collab.)
ABE	02J	PRL 88 052002	K. Abe *et al.*	(BELLE Collab.)
ABE	02K	PRL 88 181803	K. Abe *et al.*	(BELLE Collab.)
ABE	02M	PRL 89 071801	K. Abe *et al.*	(BELLE Collab.)
ABE	02N	PL B538 11	K. Abe *et al.*	(BELLE Collab.)
ABE	02O	PR D65 091103R	K. Abe *et al.*	(BELLE Collab.)
ABE	02Q	PRL 89 122001	K. Abe *et al.*	(BELLE Collab.)
ABE	02U	PR D66 032007	K. Abe *et al.*	(BELLE Collab.)
ABE	02W	PRL 89 151802	K. Abe *et al.*	(BELLE Collab.)
ABE	02Z	PR D66 071102R	K. Abe *et al.*	(BELLE Collab.)
ACOSTA	02C	PR D65 092009	D. Acosta *et al.*	(CDF Collab.)
ACOSTA	02G	PR D66 112002	D. Acosta *et al.*	(CDF Collab.)
AFFOLDER	02B	PRL 88 071801	T. Affolder *et al.*	(CDF Collab.)
AHMED	02B	PR D66 031101R	S. Ahmed *et al.*	(CLEO Collab.)
ASNER	02	PR D65 031103R	D.M. Asner *et al.*	(CLEO Collab.)
AUBERT	02	PR D65 032001	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02C	PRL 88 101805	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02D	PR D65 051502R	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02E	PR D65 051101R	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02H	PRL 89 011802	B. Aubert *et al.*	(BaBar Collab.)
Also		PRL 89 169903 (erratum)	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02I	PRL 88 221802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02J	PRL 88 221803	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02K	PRL 88 231801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02L	PRL 88 241801	B. Aubert *et al.*	(BaBar Collab.)

AUBERT	02M	PRL 89 061801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02N	PR D66 032003	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02P	PRL 89 201802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	02Q	PRL 89 281802	B. Aubert *et al.*	(BaBar Collab.)
BRIERE	02	PRL 89 081803	R. Briere *et al.*	(CLEO Collab.)
CASEY	02	PR D66 092002	B.C.K. Casey *et al.*	(BELLE Collab.)
CHEN	02B	PL B546 196	K.-F. Chen *et al.*	(BELLE Collab.)
COAN	02	PRL 88 062001	T.E. Coan *et al.*	(CLEO Collab.)
Also		PRL 88 069902 (erratum)	T.E. Coan *et al.*	(CLEO Collab.)
DRUTSKOY	02	PL B542 171	A. Drutskoy *et al.*	(BELLE Collab.)
DYTMAN	02	PR D66 091101R	S.A. Dytman *et al.*	(CLEO Collab.)
ECKHART	02	PRL 89 251801	E. Eckhart *et al.*	(CLEO Collab.)
EDWARDS	02	PR D65 012002	K.W. Edwards *et al.*	(CLEO Collab.)
GABYSHEV	02	PR D66 091102R	N. Gabyshev *et al.*	(BELLE Collab.)
GODANG	02	PRL 88 021802	R. Godang *et al.*	(CLEO Collab.)
GORDON	02	PL B542 183	A. Gordon *et al.*	(BELLE Collab.)
HARA	02	PRL 89 251803	K. Hara *et al.*	(BELLE Collab.)
KROKOVNY	02	PRL 89 231804	P. Korkovny *et al.*	(BELLE Collab.)
MAHAPATRA	02	PRL 88 101803	R. Mahapatra *et al.*	(CLEO Collab.)
NISHIDA	02	PRL 89 231801	S. Nishida *et al.*	(BELLE Collab.)
TOMURA	02	PL B542 207	T. Tomura *et al.*	(BELLE Collab.)
ABASHIAN	01	PRL 86 2509	A. Abashian *et al.*	(BELLE Collab.)
ABE	01D	PRL 86 3228	K. Abe *et al.*	(BELLE Collab.)
ABE	01G	PRL 87 091802	K. Abe *et al.*	(BELLE Collab.)
ABE	01H	PRL 87 101801	K. Abe *et al.*	(BELLE Collab.)
ABE	01I	PRL 87 111801	K. Abe *et al.*	(BELLE Collab.)
ABE	01K	PR D64 071101	K. Abe *et al.*	(BELLE Collab.)
ABE	01L	PRL 87 161601	K. Abe *et al.*	(BELLE Collab.)
ABE	01M	PL B517 309	K. Abe *et al.*	(BELLE Collab.)
ABREU	01H	PL B510 55	P. Abreu *et al.*	(DELPHI Collab.)
ALEXANDER	01B	PR D64 092001	J.P. Alexander *et al.*	(CLEO Collab.)
AMMAR	01B	PRL 87 271801	R. Ammar *et al.*	(CLEO Collab.)
ANDERSON	01	PRL 86 2732	S. Anderson *et al.*	(CLEO Collab.)
ANDERSON	01B	PRL 87 181803	S. Anderson *et al.*	(CLEO Collab.)
AUBERT	01	PRL 86 2515	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01B	PRL 87 091801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01D	PRL 87 151801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01E	PRL 87 151802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01F	PRL 87 201803	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01G	PRL 87 221802	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01H	PRL 87 241801	B. Aubert *et al.*	(BaBar Collab.)
AUBERT	01I	PRL 87 241803	B. Aubert *et al.*	(BaBar Collab.)
BARATE	01D	EPJ C20 431	R. Barate *et al.*	(ALEPH Collab.)
BRIERE	01	PRL 86 3718	R.A. Biere *et al.*	(CLEO Collab.)
EDWARDS	01	PRL 86 30	K.W. Edwards *et al.*	(CLEO Collab.)
JAFFE	01	PRL 86 5000	D. Jaffe *et al.*	(CLEO Collab.)
RICHICHI	01	PR D63 031103R	S.J. Richichi *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		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		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		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 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 1472 M. Procario *et al.* (CLEO Collab.)
STONE 94 HEPSY 93-11 S. Stone
Published in B Decays, 2nd Edition, World Scientific, Singapore
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 PL B325 537 (erratum) 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.)