$B^{\pm}/B^0$ ADMIXTURE

B DECAY MODES

The branching fraction measurements are for an admixture of B mesons at the $\Upsilon(4S)$. The values quoted assume that $B(\Upsilon(4S) \rightarrow B\overline{B}) = 100\%$.

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.

$\overline{B}$ modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Semileptonic and leptonic modes			
Γ_1	$B \rightarrow e^+ \nu_e$ anything	[a]	(10.24 ± 0.15) %	
Γ_2	$B \rightarrow \overline{p} e^+ \nu_e$ anything		< 5.9 $\times 10^{-4}$	CL=90%
Γ_3	$B \rightarrow \mu^+ \nu_\mu$ anything	[a]	(10.24 ± 0.15) %	
Γ_4	$B \rightarrow \ell^+ \nu_\ell$ anything	[a,b]	(10.24 ± 0.15) %	
Γ_5	$B \rightarrow D^- \ell^+ \nu_\ell$ anything	[b]	(2.7 ± 0.8) %	
Γ_6	$B \rightarrow \overline{D}^0 \ell^+ \nu_\ell$ anything	[b]	(6.9 ± 1.4) %	
Γ_7	$B \rightarrow D^{*-} \ell^+ \nu_\ell$ anything	[c]	(6.7 ± 1.3) $\times 10^{-3}$	
Γ_8	$B \rightarrow D^{*0} \ell^+ \nu_\ell$ anything			
Γ_9	$B \rightarrow \overline{D}^{**} \ell^+ \nu_\ell$	[b,d]	(2.7 ± 0.7) %	
Γ_{10}	$B \rightarrow \overline{D}_1(2420) \ell^+ \nu_\ell$ anything		(3.8 ± 1.3) $\times 10^{-3}$	S=2.4
Γ_{11}	$B \rightarrow D \pi \ell^+ \nu_\ell$ anything + $D^* \pi \ell^+ \nu_\ell$ anything		(2.6 ± 0.5) %	S=1.5
Γ_{12}	$B \rightarrow D \pi \ell^+ \nu_\ell$ anything		(1.5 ± 0.6) %	
Γ_{13}	$B \rightarrow D^* \pi \ell^+ \nu_\ell$ anything		(1.9 ± 0.4) %	
Γ_{14}	$B \rightarrow \overline{D}_2^*(2460) \ell^+ \nu_\ell$ anything		(4.4 ± 1.6) $\times 10^{-3}$	
Γ_{15}	$B \rightarrow D^{*-} \pi^+ \ell^+ \nu_\ell$ anything		(1.00 ± 0.34) %	
Γ_{16}	$B \rightarrow D_s^- \ell^+ \nu_\ell$ anything	[b]	< 7 $\times 10^{-3}$	CL=90%
Γ_{17}	$B \rightarrow D_s^- \ell^+ \nu_\ell K^+$ anything	[b]	< 5 $\times 10^{-3}$	CL=90%
Γ_{18}	$B \rightarrow D_s^- \ell^+ \nu_\ell K^0$ anything	[b]	< 7 $\times 10^{-3}$	CL=90%
Γ_{19}	$B \rightarrow \ell^+ \nu_\ell$ charm		(10.57 ± 0.15) %	
Γ_{20}	$B \rightarrow X_u \ell^+ \nu_\ell$		(2.33 ± 0.22) $\times 10^{-3}$	
Γ_{21}	$B \rightarrow \pi \ell \nu_\ell$		(1.35 ± 0.10) $\times 10^{-4}$	
Γ_{22}	$B \rightarrow K^+ \ell^+ \nu_\ell$ anything	[b]	(5.9 ± 0.5) %	
Γ_{23}	$B \rightarrow K^- \ell^+ \nu_\ell$ anything	[b]	(9 ± 4) $\times 10^{-3}$	
Γ_{24}	$B \rightarrow K^0/\overline{K}^0 \ell^+ \nu_\ell$ anything	[b]	(4.3 ± 0.5) %	

D, D^*, or D_s modes

Γ_{25}	$B \to D^{\pm}$ anything		$(22.8 \pm 1.4)\ \%$		
Γ_{26}	$B \to D^0/\overline{D}^0$ anything		$(63.7 \pm 3.0)\ \%$		S=1.2
Γ_{27}	$B \to D^*(2010)^{\pm}$ anything		$(22.5 \pm 1.5)\ \%$		
Γ_{28}	$B \to D^*(2007)^0$ anything		$(26.0 \pm 2.7)\ \%$		
Γ_{29}	$B \to D_s^{\pm}$ anything	[e]	$(8.3 \pm 0.8)\ \%$		
Γ_{30}	$B \to D_s^{*\pm}$ anything		$(6.3 \pm 1.0)\ \%$		
Γ_{31}	$B \to D_s^{*\pm}\overline{D}^{(*)}$		$(3.4 \pm 0.6)\ \%$		
Γ_{32}	$B \to \overline{D}D_{s0}(2317)$				
Γ_{33}	$B \to \overline{D}D_{sJ}(2457)$				
Γ_{34}	$B \to D^{(*)}\overline{D}^{(*)}K^0 + D^{(*)}\overline{D}^{(*)}K^{\pm}$	[e,f]	$(7.1 {}^{+2.7}_{-1.7})\ \%$		
Γ_{35}	$b \to c\overline{c}s$		$(22 \pm 4)\ \%$		
Γ_{36}	$B \to D_s{}^{(*)}\overline{D}^{(*)}$	[e,f]	$(3.9 \pm 0.4)\ \%$		
Γ_{37}	$B \to D^*D^*(2010)^{\pm}$	[e]	< 5.9	$\times 10^{-3}$	CL=90%
Γ_{38}	$B \to DD^*(2010)^{\pm} + D^*D^{\pm}$	[e]	< 5.5	$\times 10^{-3}$	CL=90%
Γ_{39}	$B \to DD^{\pm}$	[e]	< 3.1	$\times 10^{-3}$	CL=90%
Γ_{40}	$B \to D_s{}^{(*)\pm}\overline{D}^{(*)}X(n\pi^{\pm})$	[e,f]	$(9 {}^{+5}_{-4})\ \%$		
Γ_{41}	$B \to D^*(2010)\gamma$		< 1.1	$\times 10^{-3}$	CL=90%
Γ_{42}	$B \to D_s^+\pi^-,\ D_s^{*+}\pi^-,\ D_s^+\rho^-,\ D_s^{*+}\rho^-,\ D_s^+\pi^0,\ D_s^{*+}\pi^0,\ D_s^+\eta,\ D_s^{*+}\eta,\ D_s^+\rho^0,\ D_s^{*+}\rho^0,\ D_s^+\omega,\ D_s^{*+}\omega$	[e]	< 4	$\times 10^{-4}$	CL=90%
Γ_{43}	$B \to D_{s1}(2536)^+$ anything		< 9.5	$\times 10^{-3}$	CL=90%

Charmonium modes

Γ_{44}	$B \to J/\psi(1S)$ anything		$(1.094 \pm 0.032)\ \%$		S=1.1
Γ_{45}	$B \to J/\psi(1S)$(direct) anything		(7.8 ± 0.4)	$\times 10^{-3}$	S=1.1
Γ_{46}	$B \to \psi(2S)$ anything		(3.07 ± 0.21)	$\times 10^{-3}$	
Γ_{47}	$B \to \chi_{c1}(1P)$ anything		(3.86 ± 0.27)	$\times 10^{-3}$	
Γ_{48}	$B \to \chi_{c1}(1P)$(direct) anything		(3.16 ± 0.25)	$\times 10^{-3}$	
Γ_{49}	$B \to \chi_{c2}(1P)$ anything		(1.3 ± 0.4)	$\times 10^{-3}$	S=2.0
Γ_{50}	$B \to \chi_{c2}(1P)$(direct) anything		(1.65 ± 0.31)	$\times 10^{-3}$	
Γ_{51}	$B \to \eta_c(1S)$ anything		< 9	$\times 10^{-3}$	CL=90%
Γ_{52}	$B^0 \to X(3872)K \times$ B$(X \to D^0\overline{D}^0\pi^0)$		$(122 \pm 40)\ \%$		
Γ_{53}	$B \to KX(3945) \times$ B$(X(3945) \to \omega J/\psi)$	[g]	(7.1 ± 3.4)	$\times 10^{-5}$	

K or *K** modes

Γ_{54}	$B \to K^{\pm}$ anything	[e]	(78.9 ± 2.5) %		
Γ_{55}	$B \to K^{+}$ anything		(66 ± 5) %		
Γ_{56}	$B \to K^{-}$ anything		(13 ± 4) %		
Γ_{57}	$B \to K^0/\overline{K}^0$ anything	[e]	(64 ± 4) %		
Γ_{58}	$B \to K^*(892)^{\pm}$ anything		(18 ± 6) %		
Γ_{59}	$B \to K^*(892)^0/\overline{K}^*(892)^0$ anything	[e]	(14.6 ± 2.6) %		
Γ_{60}	$B \to K^*(892)\gamma$		(4.2 ± 0.6)	$\times 10^{-5}$	
Γ_{61}	$B \to \eta K \gamma$		(8.5 $^{+1.8}_{-1.6}$)	$\times 10^{-6}$	
Γ_{62}	$B \to K_1(1400)\gamma$		< 1.27	$\times 10^{-4}$	CL=90%
Γ_{63}	$B \to K_2^*(1430)\gamma$		(1.7 $^{+0.6}_{-0.5}$)	$\times 10^{-5}$	
Γ_{64}	$B \to K_2(1770)\gamma$		< 1.2	$\times 10^{-3}$	CL=90%
Γ_{65}	$B \to K_3^*(1780)\gamma$		< 3.7	$\times 10^{-5}$	CL=90%
Γ_{66}	$B \to K_4^*(2045)\gamma$		< 1.0	$\times 10^{-3}$	CL=90%
Γ_{67}	$B \to K\eta'(958)$		(8.3 ± 1.1)	$\times 10^{-5}$	
Γ_{68}	$B \to K^*(892)\eta'(958)$		(4.1 ± 1.1)	$\times 10^{-6}$	
Γ_{69}	$B \to K\eta$		< 5.2	$\times 10^{-6}$	CL=90%
Γ_{70}	$B \to K^*(892)\eta$		(1.8 ± 0.5)	$\times 10^{-5}$	
Γ_{71}	$B \to K\phi\phi$		(2.3 ± 0.9)	$\times 10^{-6}$	
Γ_{72}	$B \to \overline{b} \to \overline{s}\gamma$		(3.54 ± 0.26)	$\times 10^{-4}$	
Γ_{73}	$B \to \overline{b} \to \overline{s}$ gluon		< 6.8	%	CL=90%
Γ_{74}	$B \to \eta$ anything		< 4.4	$\times 10^{-4}$	CL=90%
Γ_{75}	$B \to \eta'$ anything		(4.2 ± 0.9)	$\times 10^{-4}$	

Light unflavored meson modes

Γ_{76}	$B \to \rho\gamma$		(1.36 ± 0.30)	$\times 10^{-6}$	
Γ_{77}	$B \to \rho/\omega\gamma$		(1.28 ± 0.21)	$\times 10^{-6}$	
Γ_{78}	$B \to \pi^{\pm}$ anything	[e,h]	(358 ± 7) %		
Γ_{79}	$B \to \pi^0$ anything		(235 ±11) %		
Γ_{80}	$B \to \eta$ anything		(17.6 ± 1.6) %		
Γ_{81}	$B \to \rho^0$ anything		(21 ± 5) %		
Γ_{82}	$B \to \omega$ anything		< 81	%	CL=90%
Γ_{83}	$B \to \phi$ anything		(3.42 ± 0.13) %		
Γ_{84}	$B \to \phi K^*(892)$		< 2.2	$\times 10^{-5}$	CL=90%

Baryon modes

Γ_{85}	$B \to \Lambda_c^+ / \overline{\Lambda}_c^-$ anything		(4.5 ± 1.2) %		
Γ_{86}	$B \to \Lambda_c^+$ anything				
Γ_{87}	$B \to \overline{\Lambda}_c^-$ anything				
Γ_{88}	$B \to \overline{\Lambda}_c^- e^+$ anything		< 2.3	$\times 10^{-3}$	CL=90%
Γ_{89}	$B \to \overline{\Lambda}_c^- p$ anything		(2.6 ± 0.8) %		
Γ_{90}	$B \to \overline{\Lambda}_c^- p e^+ \nu_e$		< 1.0	$\times 10^{-3}$	CL=90%

Γ_{91}	$B \to \overline{\Sigma}_c^{--}$ anything			$(4.2 \pm 2.4) \times 10^{-3}$	
Γ_{92}	$B \to \overline{\Sigma}_c^{-}$ anything			$< 9.6 \times 10^{-3}$	CL=90%
Γ_{93}	$B \to \overline{\Sigma}_c^{0}$ anything			$(4.6 \pm 2.4) \times 10^{-3}$	
Γ_{94}	$B \to \overline{\Sigma}_c^{0} N (N = p \text{ or } n)$			$< 1.5 \times 10^{-3}$	CL=90%
Γ_{95}	$B \to \Xi_c^0$ anything $\times$ B($\Xi_c^0 \to \Xi^- \pi^+$)			$(1.93 \pm 0.30) \times 10^{-4}$	S=1.1
Γ_{96}	$B \to \Xi_c^+$ anything $\times$ B($\Xi_c^+ \to \Xi^- \pi^+ \pi^+$)			$(4.5 {}^{+1.3}_{-1.2}) \times 10^{-4}$	
Γ_{97}	$B \to p/\overline{p}$ anything		[e]	(8.0 ± 0.4) %	
Γ_{98}	$B \to p/\overline{p}$(direct) anything		[e]	(5.5 ± 0.5) %	
Γ_{99}	$B \to \Lambda/\overline{\Lambda}$ anything		[e]	(4.0 ± 0.5) %	
Γ_{100}	$B \to \Lambda$ anything				
Γ_{101}	$B \to \overline{\Lambda}$ anything				
Γ_{102}	$B \to \Xi^- / \overline{\Xi}^+$ anything		[e]	$(2.7 \pm 0.6) \times 10^{-3}$	
Γ_{103}	$B \to$ baryons anything			(6.8 ± 0.6) %	
Γ_{104}	$B \to p\overline{p}$ anything			(2.47 ± 0.23) %	
Γ_{105}	$B \to \Lambda\overline{p}/\overline{\Lambda}p$ anything		[e]	(2.5 ± 0.4) %	
Γ_{106}	$B \to \Lambda\overline{\Lambda}$ anything			$< 5 \times 10^{-3}$	CL=90%

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

Γ_{107}	$B \to s e^+ e^-$	*B1*		$(4.7 \pm 1.3) \times 10^{-6}$	
Γ_{108}	$B \to s \mu^+ \mu^-$	*B1*		$(4.3 \pm 1.2) \times 10^{-6}$	
Γ_{109}	$B \to s \ell^+ \ell^-$	*B1*	[b]	$(4.5 \pm 1.0) \times 10^{-6}$	
Γ_{110}	$B \to K e^+ e^-$	*B1*		$(3.8 {}^{+0.8}_{-0.7}) \times 10^{-7}$	
Γ_{111}	$B \to K^*(892) e^+ e^-$	*B1*		$(1.13 \pm 0.27) \times 10^{-6}$	
Γ_{112}	$B \to K \mu^+ \mu^-$	*B1*		$(4.2 {}^{+0.9}_{-0.8}) \times 10^{-7}$	
Γ_{113}	$B \to K^*(892) \mu^+ \mu^-$	*B1*		$(1.03 {}^{+0.26}_{-0.23}) \times 10^{-6}$	
Γ_{114}	$B \to K \ell^+ \ell^-$	*B1*		$(3.9 \pm 0.7) \times 10^{-7}$	S=1.2
Γ_{115}	$B \to K^*(892) \ell^+ \ell^-$	*B1*		$(9.4 \pm 1.8) \times 10^{-7}$	S=1.1
Γ_{116}	$B \to e^\pm \mu^\mp s$	*LF*	[e]	$< 2.2 \times 10^{-5}$	CL=90%
Γ_{117}	$B \to \pi e^\pm \mu^\mp$	*LF*		$< 1.6 \times 10^{-6}$	CL=90%
Γ_{118}	$B \to \rho e^\pm \mu^\mp$	*LF*		$< 3.2 \times 10^{-6}$	CL=90%
Γ_{119}	$B \to K e^\pm \mu^\mp$	*LF*		$< 3.8 \times 10^{-8}$	CL=90%
Γ_{120}	$B \to K^*(892) e^\pm \mu^\mp$	*LF*		$< 5.1 \times 10^{-7}$	CL=90%

[*a*] These values are model dependent.

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

[*c*] Here "anything" means at least one particle observed.

[*d*] D^{**} stands for the sum of the $D(1\,^1P_1)$, $D(1\,^3P_0)$, $D(1\,^3P_1)$, $D(1\,^3P_2)$, $D(2\,^1S_0)$, and $D(2\,^1S_1)$ resonances.

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

[*f*] $D^{(*)}\overline{D}^{(*)}$ stands for the sum of $D^*\overline{D}^*$, $D^*\overline{D}$, $D\overline{D}^*$, and $D\overline{D}$.

[*g*] $X(3945)$ denotes a near-threshold enhancement in the $\omega J/\psi$ mass spectrum.

[*h*] Inclusive branching fractions have a multiplicity definition and can be greater than 100%.

$B^{\pm}/B^0$ ADMIXTURE BRANCHING RATIOS

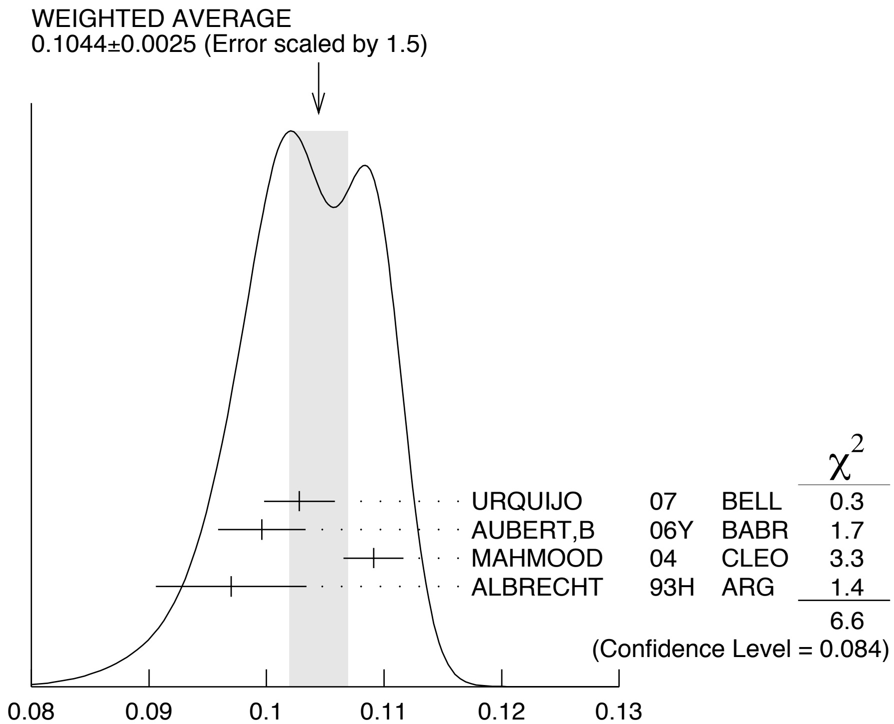
$\Gamma(\ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_4/Γ

These branching fraction values are model dependent.

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

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*
0.1024±0.0015 OUR EVALUATION			
0.1044±0.0025 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.108 ±0.002 ±0.0056	[1] HENDERSON 92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[1] HENDERSON 92 measurement employs e and μ. The systematic error contains 0.004 in quadrature from model dependence. The authors average a variation of the Isgur, Scora, Grinstein, and Wise model with that of the Altarelli-Cabibbo-Corbò-Maiani-Martinelli model for semileptonic decays to correct the acceptance.



$\Gamma\left(\ell^+ \nu_\ell \text{anything}\right)/\Gamma_{\text{total}}$ Γ_4/Γ

$\Gamma\left(e^+ \nu_e \text{anything}\right)/\Gamma_{\text{total}}$ Γ_1/Γ

These branching fraction values are model dependent.

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VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.				
0.1024±0.0015 OUR EVALUATION				
0.1044±0.0025 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.				
0.1028±0.0018±0.0024	[2] URQUIJO	07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.0996±0.0019±0.0032	[3] AUBERT,B	06Y	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.1091±0.0009±0.0024	[4] MAHMOOD	04	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.097 ±0.005 ±0.004	[5] ALBRECHT	93H	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1085±0.0021±0.0036	[6] OKABE	05	BELL	Repl. by URQUIJO 07
0.1083±0.0016±0.0006	[7] AUBERT	04X	BABR	Repl. by AUBERT,B 06Y
0.1036±0.0006±0.0023	[8] AUBERT,B	04A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.1087±0.0018±0.0030	[9] AUBERT	03	BABR	Repl. by AUBERT 04X
0.109 ±0.0012±0.0049	[10] ABE	02Y	BELL	Repl. by OKABE 05
0.1049±0.0017±0.0043	[11] BARISH	96B	CLE2	Repl. by MAHMOOD 04

0.100 ±0.004 ±0.003	[12] YANAGISAWA	91	CSB2	$e^+e^- \rightarrow \Upsilon(4S)$
0.103 ±0.006 ±0.002	[13] ALBRECHT	90H	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.117 ±0.004 ±0.010	[14] WACHS	89	CBAL	Direct e at $\Upsilon(4S)$
0.120 ±0.007 ±0.005	CHEN	84	CLEO	Direct e at $\Upsilon(4S)$
0.132 ±0.008 ±0.014	[15] KLOPFEN...	83B	CUSB	Direct e at $\Upsilon(4S)$

[2] URQUIJO 07 report a measurement of $(10.07 \pm 0.18 \pm 0.21)\%$ for the partial branching fraction of $B \rightarrow e\nu_e X_c$ decay with electron energy above 0.6 GeV. We converted the result to $B \rightarrow e\nu_e X$ branching fraction.

[3] 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. The best precision on the ratio is achieved for a momentum threshold of 1.0 GeV: B($B^+ \rightarrow e^+\nu_e X$) / B($B^0 \rightarrow e^+\nu_e X$) = $1.074 \pm 0.041 \pm 0.026$.

[4] Uses charge and angular correlations in $\Upsilon(4S)$ events with a high-momentum lepton and an additional electron.

[5] ALBRECHT 93H analysis performed using tagged semileptonic decays of the B. This technique is almost model independent for the lepton branching ratio.

[6] 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($B^+ \rightarrow e^+\nu_e X$)/B($B^0 \rightarrow e^+\nu_e X$) = $1.08 \pm 0.05 \pm 0.02$.

[7] The semileptonic branching ratio, $|V_{cb}|$ and other heavy-quark parameters are determined from a simultaneous fit to moments of the hadronic-mass and lepton-energy distribution.

[8] Uses the high-momentum lepton tag method and requires the electron energy above 0.6 GeV.

[9] Uses the high-momentum lepton tag method. They also report $|V_{cb}| = 0.0423 \pm 0.0007(\text{exp}) \pm 0.0020(\text{theo.})$.

[10] Uses the high-momentum lepton tag method. ABE 02Y also reports $|V_{cb}| = 0.0408 \pm 0.0010(\text{exp}) \pm 0.0025(\text{theo.})$. The second error is due to uncertainties of theoretical inputs.

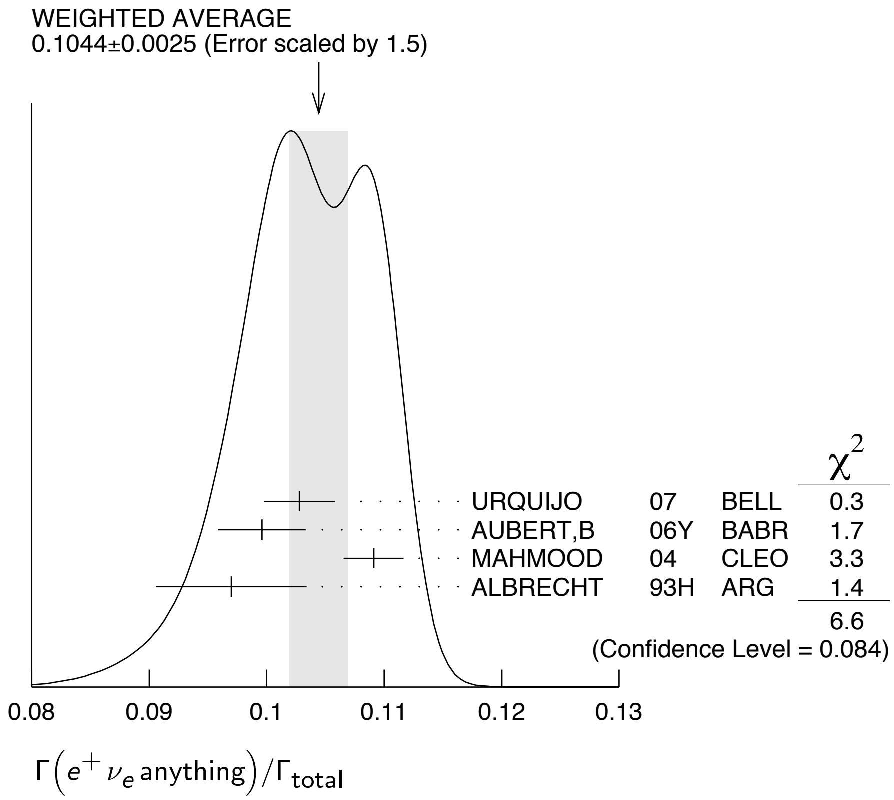
[11] BARISH 96B analysis performed using tagged semileptonic decays of the B. This technique is almost model independent for the lepton branching ratio.

[12] YANAGISAWA 91 also measures an average semileptonic branching ratio at the $\Upsilon(5S)$ of 9.6–10.5% depending on assumptions about the relative production of different B meson species.

[13] ALBRECHT 90H uses the model of ALTARELLI 82 to correct over all lepton momenta. 0.099 ± 0.006 is obtained using ISGUR 89B.

[14] Using data above $p(e)$ = 2.4 GeV, WACHS 89 determine $\sigma(B \rightarrow e\nu\text{up})/\sigma(B \rightarrow e\nu\text{charm}) < 0.065$ at 90% CL.

[15] Ratio $\sigma(b \rightarrow e\nu\text{up})/\sigma(b \rightarrow e\nu\text{charm}) < 0.055$ at CL = 90%.



$\Gamma(\mu^+ \nu_\mu \text{anything})/\Gamma_{total}$ — Γ_3/Γ

These branching fraction values are model dependent.

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VALUE	DOCUMENT ID		TECN	COMMENT

The data in this block is included in the average printed for a previous datablock.

0.1024±0.0015 OUR EVALUATION

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

0.100 ±0.006 ±0.002	[16] ALBRECHT	90H	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.108 ±0.006 ±0.01	CHEN	84	CLEO	Direct μ at $\Upsilon(4S)$
0.112 ±0.009 ±0.01	LEVMAN	84	CUSB	Direct μ at $\Upsilon(4S)$

[16] ALBRECHT 90H uses the model of ALTARELLI 82 to correct over all lepton momenta. 0.097 ± 0.006 is obtained using ISGUR 89B.

$\Gamma(\overline{p} e^+ \nu_e \text{anything})/\Gamma_{total}$ — Γ_2/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.9 × 10^{-4}	90	[17] ADAM	03B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

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

<0.0016	90	ALBRECHT	90H	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[17] Based on $V{-}A$ model.

$\Gamma(D^- \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$ — Γ_5/Γ_4

$\ell = e$ or μ.

VALUE	DOCUMENT ID		TECN	COMMENT
0.26±0.07±0.04	[18] FULTON	91	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

[18] FULTON 91 uses B($D^+ \rightarrow K^- \pi^+ \pi^+$) = (9.1 ± 1.3 ± 0.4)% as measured by MARK III.

$\Gamma(\overline{D}^0 \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$ — Γ_6/Γ_4

$\ell = e$ or μ.

VALUE	DOCUMENT ID		TECN	COMMENT
0.67±0.09±0.10	[19] FULTON	91	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

[19] FULTON 91 uses B($D^0 \rightarrow K^- \pi^+$) = (4.2 ± 0.4 ± 0.4)% as measured by MARK III.

$\Gamma(D^{*-} \ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
0.67±0.08±0.10	ABDALLAH	04D	DLPH	$e^+ e^- \rightarrow Z^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.6 ±0.3 ±0.1	[20] BARISH	95	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(D^{*0} \ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_8/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.6±0.6±0.1	[21] BARISH	95	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

[21] BARISH 95 use B($D^0 \rightarrow K^- \pi^+$) = (3.91 ± 0.08 ± 0.17)%, B($D^{*+} \rightarrow D^0 \pi^+$) = (68.1 ± 1.0 ± 1.3)%, B($D^{*0} \rightarrow D^0 \pi^0$) = (63.6 ± 2.3 ± 3.3)%.

$\Gamma(\overline{D}^{**} \ell^+ \nu_\ell)/\Gamma_{\text{total}}$ — Γ_9/Γ

D^{**} stands for the sum of the $D(1\,^1P_1)$, $D(1\,^3P_0)$, $D(1\,^3P_1)$, $D(1\,^3P_2)$, $D(2\,^1S_0)$, and $D(2\,^1S_1)$ resonances. $\ell = e$ or μ, not sum over e and μ modes.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.027±0.005±0.005		63	[22] ALBRECHT	93	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.028	95		[23] BARISH	95	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

[22] ALBRECHT 93 assumes the GISW model to correct for unseen modes. Using the BHKT model, the result becomes 0.023 ± 0.006 ± 0.004. Assumes B($D^{*+} \rightarrow D^0 \pi^+$) = 68.1%, B($D^0 \rightarrow K^- \pi^+$) = 3.65%, B($D^0 \rightarrow K^- \pi^+ \pi^- \pi^+$) = 7.5%. We have taken their average e and μ value.

[23] BARISH 95 use B($D^0 \rightarrow K^- \pi^+$) = (3.91 ± 0.08 ± 0.17)%, assume all nonresonant channels are zero, and use GISW model for relative abundances of D^{**} states.

$\Gamma(\overline{D}_1(2420) \ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_{10}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0038±0.0013 OUR AVERAGE	Error includes scale factor of 2.4.			
0.0033±0.0006	[24] ABAZOV	05O	D0	$p\overline{p}$ at 1.96 TeV
0.0074±0.0016	[25] BUSKULIC	97B	ALEP	$e^+ e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	[26] BUSKULIC	95B	ALEP	Repl. by BUSKULIC 97B

[24] Assumes B($D_1 \to D^* \pi$) = 1, B($D_1 \to D^* \pi^\pm$) = 2/3, and B($b \to B$) =0.397.

[25] BUSKULIC 97B assumes B($D_1(2420) \to D^* \pi$) = 1, B($D_1(2420) \to D^* \pi^\pm$) = 2/3, and B($b \to B$) = 0.378 ± 0.022.

[26] BUSKULIC 95B reports $f_B \times$ B($B \to \overline{D}_1(2420)^0 \ell^+ \nu_\ell$ anything) × B($\overline{D}_1(2420)^0 \to \overline{D}^*(2010)^- \pi^+$) = (2.04 ± 0.58 ± 0.34)$10^{-3}$, where f_B is the production fraction for a single B charge state.

$[\Gamma(D \pi \ell^+ \nu_\ell \text{anything}) + \Gamma(D^* \pi \ell^+ \nu_\ell \text{anything})]/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.026 ±0.005 OUR AVERAGE	Error includes scale factor of 1.5.			
0.0340±0.0052±0.0032	[27] ABREU	00R	DLPH	$e^+ e^- \to Z$
0.0226±0.0029±0.0033	[28] BUSKULIC	97B	ALEP	$e^+ e^- \to Z$

[27] Assumes no contribution from B_s and b baryons. Further assumes contributions from single pion ($D\pi$ and $D^*\pi$) states only, allowing isospin conservation to relate the relative π^0 and π^+ rates.

[28] BUSKULIC 97B assumes B($b \to B$) = 0.378 ± 0.022 and uses isospin invariance by assuming that all observed $D^0 \pi^+$, $D^{*0} \pi^+$, $D^+ \pi^-$, and $D^{*+} \pi^-$ are from D^{**} states. A correction has been applied to account for the production of B_s^0 and Λ_b^0.

$\Gamma(D \pi \ell^+ \nu_\ell \text{anything})/\Gamma_{total}$ — Γ_{12}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0154±0.0061	ABREU	00R	DLPH	$e^+ e^- \to Z$

$\Gamma(D^* \pi \ell^+ \nu_\ell \text{anything})/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0186±0.0038	ABREU	00R	DLPH	$e^+ e^- \to Z$

$\Gamma(\overline{D}_2^*(2460) \ell^+ \nu_\ell \text{anything})/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.0044±0.0016		[29] ABAZOV	05O	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0065	95	[30] BUSKULIC	97B	ALEP	$e^+ e^- \to Z$
not seen		[31] BUSKULIC	95B	ALEP	$e^+ e^- \to Z$

[29] Assumes B($D_2^* \to D^* \pi^\pm$) = 0.30 ± 0.06 and B($b \to B$) =0.397.

[30] A revised number based on BUSKULIC 97B which assumes B($D_2^*(2460) \to D^* \pi^\pm$) = 0.20 and B($b \to B$) = 0.378 ± 0.022.

[31] BUSKULIC 95B reports $f_B \times$ B($B \to \overline{D}_2^*(2460)^0 \ell^+ \nu_\ell$ anything) × B($\overline{D}_2^*(2460)^0 \to \overline{D}^*(2010)^- \pi^+$) $\leq 0.81 \times 10^{-3}$ at CL=95%, where f_B is the production fraction for a single B charge state.

$\frac{\Gamma(B \to \overline{D}_2^*(2460) \ell^+ \nu_\ell \, anything) \times B(\overline{D}_2^*(2460) \to D^{*-} \pi^+)}{\Gamma(B \to \overline{D}_1(2420) \ell^+ \nu_\ell \, anything) \times B(\overline{D}_1(2420) \to D^{*-} \pi^+)}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.39±0.09±0.12	ABAZOV	05O	D0	$p\overline{p}$ at 1.96 TeV

$\Gamma(D^{*-}\pi^+\ell^+\nu_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_{15}/Γ

Includes resonant and nonresonant contributions.

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
10.0±2.7±2.1	[32] BUSKULIC	95B	ALEP	$e^+e^- \to Z$

[32] BUSKULIC 95B reports $f_B \times$ B($B \to \overline{D}^*(2010)^-\pi^+\ell^+\nu_\ell$ anything) = $(3.7 \pm 1.0 \pm 0.7)10^{-3}$. Above value assumes $f_B = 0.37 \pm 0.03$.

$\Gamma(D_s^-\ell^+\nu_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_{16}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.007	90	[33] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[33] ALBRECHT 93E reports < 0.012 for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.045.

$\Gamma(D_s^-\ell^+\nu_\ell K^+ \text{anything})/\Gamma_{\text{total}}$ — Γ_{17}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.005	90	[34] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[34] ALBRECHT 93E reports < 0.008 for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.045.

$\Gamma(D_s^-\ell^+\nu_\ell K^0 \text{anything})/\Gamma_{\text{total}}$ — Γ_{18}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.007	90	[35] ALBRECHT	93E	ARG	$e^+e^- \to \Upsilon(4S)$

[35] ALBRECHT 93E reports < 0.012 for B($D_s^+ \to \phi\pi^+$) = 0.027. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.045.

$\Gamma(\ell^+\nu_\ell \text{ charm})/\Gamma_{\text{total}}$ — Γ_{19}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.1057±0.0015 OUR AVERAGE				
0.1044±0.0019±0.0022	[36] URQUIJO	07	BELL	$e^+e^- \to \Upsilon(4S)$
0.1061±0.0016±0.0006	[37] AUBERT	04X	BABR	$e^+e^- \to \Upsilon(4S)$

[36] Measured the independent B^+ and B^0 partial branching fractions with electron energy above 0.4 GeV.

[37] The semileptonic branching ratio, $|V_{cb}|$ and other heavy-quark parameters are determined from a simultaneous fit to moments of the hadronic-mass and lepton-energy distribution.

$\Gamma(X_u\ell^+\nu_\ell)/\Gamma_{\text{total}}$ — Γ_{20}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.33±0.22 OUR AVERAGE				
$2.27\pm0.26^{+0.37}_{-0.33}$	[38] AUBERT	06H	BABR	$e^+e^- \to \Upsilon(4S)$
2.53±0.24±0.24	[39] AUBERT,B	05X	BABR	$e^+e^- \to \Upsilon(4S)$
2.80±0.52±0.41	[40] LIMOSANI	05	BELL	$e^+e^- \to \Upsilon(4S)$
1.77±0.29±0.38	[41] BORNHEIM	02	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.24±0.27±0.47	[42,43] AUBERT	04I	BABR	Repl. by AUBERT,B 05X

[38] Obtained from the partial rate $\Delta B = (0.572 \pm 0.041 \pm 0.065) \times 10^{-3}$ for the electron momentum interval of 2.0–2.6 GeV/c based on BLNP method.

[39] Determined from the partial rate $\Delta B = (4.41 \pm 0.42 \pm 0.42) \times 10^{-4}$ measured for electron energy > 2 GeV and hadronic mass squared < 3.5 GeV^2, and calculated acceptance 0.174 in that region. The V_{ub} is measured as $(4.41 \pm 0.30^{+0.65}_{-0.47} \pm 0.28) \times 10^{-3}$.

[40] Uses electrons in the momentum interval 1.9–2.6 GeV/c in the center-of-mass frame. The V_{ub} is found to be $(5.08 \pm 0.47^{+0.49}_{-0.48}) \times 10^{-3}$.

[41] BORNHEIM 02 uses the observed yield of leptons from semileptonic B decays in the end-point momentum interval 2.2–2.6 GeV/c with recent CLEO-2 data on $B \to X_s \gamma$. The V_{ub} is found to be $(4.08 \pm 0.34 \pm 0.53) \times 10^{-3}$.

[42] Used BaBar measurement of Semileptonic branching fraction $B(B \to X \ell \nu_\ell) = (10.87 \pm 0.18 \pm 0.30)\%$ to convert the ratio of rates to branching fraction.

[43] The third error includes the systematics and theoretical errors summed in quadrature.

$\Gamma(X_u \ell^+ \nu_\ell)/\Gamma(\ell^+ \nu_\ell \text{anything})$ — Γ_{20}/Γ_4

ℓ denotes e or μ, not the sum. These experiments measure this ratio in very limited momentum intervals.

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.06±0.25±0.42			[44] AUBERT	04I	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
			[45] ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
		107	[46] BARTELT	93B	CLE2	$e^+e^- \to \Upsilon(4S)$
		77	[47] ALBRECHT	91C	ARG	$e^+e^- \to \Upsilon(4S)$
		41	[48] ALBRECHT	90	ARG	$e^+e^- \to \Upsilon(4S)$
		76	[49] FULTON	90	CLEO	$e^+e^- \to \Upsilon(4S)$
<4.0	90		[50] BEHRENDS	87	CLEO	$e^+e^- \to \Upsilon(4S)$
<4.0	90		CHEN	84	CLEO	Direct e at $\Upsilon(4S)$
<5.5	90		KLOPFEN...	83B	CUSB	Direct e at $\Upsilon(4S)$

[44] The third error includes the systematics and theoretical errors summed in quadrature.

[45] ALBRECHT 94C find $\Gamma(b \to c)/\Gamma(b \to \text{all}) = 0.99 \pm 0.02 \pm 0.04$.

[46] BARTELT 93B (CLEO II) measures an excess of $107 \pm 15 \pm 11$ leptons in the lepton momentum interval 2.3–2.6 GeV/c which is attributed to $b \to u \ell \nu_\ell$. This corresponds to a model-dependent partial branching ratio ΔB_{ub} between $(1.15 \pm 0.16 \pm 0.15) \times 10^{-4}$, as evaluated using the KS model (KOERNER 88), and $(1.54 \pm 0.22 \pm 0.20) \times 10^{-4}$ using the ACCMM model (ARTUSO 93). The corresponding values of $|V_{ub}|/|V_{cb}|$ are 0.056 ± 0.006 and 0.076 ± 0.008, respectively.

[47] ALBRECHT 91C result supersedes ALBRECHT 90. Two events are fully reconstructed providing evidence for the $b \to u$ transition. Using the model of ALTARELLI 82, they obtain $|V_{ub}/V_{cb}| = 0.11 \pm 0.012$ from 77 leptons in the 2.3–2.6 GeV momentum range.

[48] ALBRECHT 90 observes 41 ± 10 excess e and μ (lepton) events in the momentum interval $p = 2.3$–2.6 GeV signaling the presence of the $b \to u$ transition. The events correspond to a model-dependent measurement of $|V_{ub}/V_{cb}| = 0.10 \pm 0.01$.

[49] FULTON 90 observe 76 ± 20 excess e and μ (lepton) events in the momentum interval $p = 2.4$–2.6 GeV signaling the presence of the $b \to u$ transition. The average branching ratio, $(1.8 \pm 0.4 \pm 0.3) \times 10^{-4}$, corresponds to a model-dependent measurement of approximately $|V_{ub}/V_{cb}| = 0.1$ using $B(b \to c \ell \nu) = 10.2 \pm 0.2 \pm 0.7\%$.

[50] The quoted possible limits range from 0.018 to 0.04 for the ratio, depending on which model or momentum range is chosen. We select the most conservative limit they have calculated. This corresponds to a limit on $|V_{ub}|/|V_{cb}| < 0.20$. While the endpoint technique employed is more robust than their previous results in CHEN 84, these results do not provide a numerical improvement in the limit.

$\Gamma(\pi \ell \nu_\ell)/\Gamma_{total}$ Γ_{21}/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/scaling procedure takes into account correlation between the measurements.

VALUE (units 10^{-4})	DOCUMENT ID
1.35±0.07±0.07 OUR EVALUATION The result includes measurements of $B^0 \to \pi^- \ell^+ \ell_\nu$ and $B^+ \to \pi^0 \ell^+ \nu_\ell$ decay rates.	

$\Gamma(K^+ \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$ Γ_{22}/Γ_4

ℓ denotes e or μ, not the sum.

VALUE	DOCUMENT ID		TECN	COMMENT
0.58 ±0.05 OUR AVERAGE				
0.594±0.021±0.056	ALBRECHT	94C	ARG	$e^+ e^- \to \Upsilon(4S)$
0.54 ±0.07 ±0.06	[51] ALAM	87B	CLEO	$e^+ e^- \to \Upsilon(4S)$

[51] ALAM 87B measurement relies on lepton-kaon correlations.

$\Gamma(K^- \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$ Γ_{23}/Γ_4

ℓ denotes e or μ, not the sum.

VALUE	DOCUMENT ID		TECN	COMMENT
0.092±0.035 OUR AVERAGE				
0.086±0.011±0.044	ALBRECHT	94C	ARG	$e^+ e^- \to \Upsilon(4S)$
0.10 ±0.05 ±0.02	[52] ALAM	87B	CLEO	$e^+ e^- \to \Upsilon(4S)$

[52] ALAM 87B measurement relies on lepton-kaon correlations.

$\Gamma(K^0/\overline{K}^0 \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$ Γ_{24}/Γ_4

ℓ denotes e or μ, not the sum. Sum over K^0 and $\overline{K}^0$ states.

VALUE	DOCUMENT ID		TECN	COMMENT
0.42 ±0.05 OUR AVERAGE				
0.452±0.038±0.056	[53] ALBRECHT	94C	ARG	$e^+ e^- \to \Upsilon(4S)$
0.39 ±0.06 ±0.04	[54] ALAM	87B	CLEO	$e^+ e^- \to \Upsilon(4S)$

[53] ALBRECHT 94C assume a $K^0/\overline{K}^0$ multiplicity twice that of K^0_S.

[54] ALAM 87B measurement relies on lepton-kaon correlations.

$\langle n_c \rangle$

VALUE	DOCUMENT ID		TECN	COMMENT
1.10±0.05	[55] GIBBONS	97B	CLE2	$e^+ e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.98±0.16±0.12	[56] ALAM	87B	CLEO	$e^+ e^- \to \Upsilon(4S)$

[55] GIBBONS 97B from charm counting using B($D_s^+ \to \phi\pi$) = 0.036 ± 0.009 and B($\Lambda_c^+ \to p K^- \pi^+$) = 0.044 ± 0.006.

[56] From the difference between K^- and K^+ widths. ALAM 87B measurement relies on lepton-kaon correlations. It does not consider the possibility of $B\overline{B}$ mixing. We have thus removed it from the average.

$\Gamma(D^{\pm}\text{anything})/\Gamma_{total}$ — Γ_{25}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.228±0.014 OUR AVERAGE				
0.227±0.012±0.008		[57] GIBBONS 97B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.24 ±0.04 ±0.01		[58] BORTOLETTO 92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.22 ±0.05 ±0.01		[59] ALBRECHT 91H	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.20 ±0.05 ±0.01	20k	[60] BORTOLETTO 87	CLEO	Sup. by BORTOLETTO 92

[57] GIBBONS 97B reports $[B(B \to D^{\pm}\text{anything}) \times B(D^+ \to K^-\pi^+\pi^+)] = 0.0216 \pm 0.0008 \pm 0.00082$. We divide by our best value $B(D^+ \to K^-\pi^+\pi^+) = (9.51 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[58] BORTOLETTO 92 reports $[B(B \to D^{\pm}\text{anything}) \times B(D^+ \to K^-\pi^+\pi^+)] = 0.0226 \pm 0.0030 \pm 0.0018$. We divide by our best value $B(D^+ \to K^-\pi^+\pi^+) = (9.51 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[59] ALBRECHT 91H reports $[B(B \to D^{\pm}\text{anything}) \times B(D^+ \to K^-\pi^+\pi^+)] = 0.0209 \pm 0.0027 \pm 0.0040$. We divide by our best value $B(D^+ \to K^-\pi^+\pi^+) = (9.51 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[60] BORTOLETTO 87 reports $[B(B \to D^{\pm}\text{anything}) \times B(D^+ \to K^-\pi^+\pi^+)] = 0.019 \pm 0.004 \pm 0.002$. We divide by our best value $B(D^+ \to K^-\pi^+\pi^+) = (9.51 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^0/\overline{D}^0\text{anything})/\Gamma_{total}$ — Γ_{26}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.637±0.030 OUR AVERAGE		Error includes scale factor of 1.2.		
0.658±0.025±0.012		[61] GIBBONS 97B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.61 ±0.05 ±0.01		[62] BORTOLETTO 92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.51 ±0.08 ±0.01		[63] ALBRECHT 91H	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.55 ±0.07 ±0.01	21k	[64] BORTOLETTO 87	CLEO	$e^+e^- \to \Upsilon(4S)$
0.63 ±0.19 ±0.01		[65] GREEN 83	CLEO	Repl. by BORTOLETTO 87

[61] GIBBONS 97B reports $[B(B \to D^0/\overline{D}^0\text{anything}) \times B(D^0 \to K^-\pi^+)] = 0.0251 \pm 0.0006 \pm 0.00075$. We divide by our best value $B(D^0 \to K^-\pi^+) = (3.82 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[62] BORTOLETTO 92 reports $[B(B \to D^0/\overline{D}^0\text{anything}) \times B(D^0 \to K^-\pi^+)] = 0.0233 \pm 0.0012 \pm 0.0014$. We divide by our best value $B(D^0 \to K^-\pi^+) = (3.82 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[63] ALBRECHT 91H reports $[B(B \to D^0/\overline{D}^0\text{anything}) \times B(D^0 \to K^-\pi^+)] = 0.0194 \pm 0.0015 \pm 0.0025$. We divide by our best value $B(D^0 \to K^-\pi^+) = (3.82 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[64] BORTOLETTO 87 reports $[B(B \to D^0/\overline{D}^0\text{anything}) \times B(D^0 \to K^-\pi^+)] = 0.0210 \pm 0.0015 \pm 0.0021$. We divide by our best value $B(D^0 \to K^-\pi^+) = (3.82 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[65] GREEN 83 reports $[B(B \to D^0/\overline{D}^0 \text{anything}) \times B(D^0 \to K^-\pi^+)] = 0.024 \pm 0.006 \pm 0.004$. We divide by our best value $B(D^0 \to K^-\pi^+) = (3.82 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^*(2010)^{\pm}\text{anything})/\Gamma_{total}$ — Γ_{27}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.225±0.015 OUR AVERAGE					
0.247±0.019±0.01		[66] GIBBONS	97B	CLE2	$e^+e^- \to \Upsilon(4S)$
0.205±0.019±0.007		[67] ALBRECHT	96D	ARG	$e^+e^- \to \Upsilon(4S)$
0.230±0.028±0.009		[68] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.283±0.053±0.002		[69] ALBRECHT	91H	ARG	Sup. by ALBRECHT 96D
$0.22 \pm 0.04 {}^{+0.07}_{-0.04}$	5200	[70] BORTOLETTO	87	CLEO	$e^+e^- \to \Upsilon(4S)$
$0.27 \pm 0.06 {}^{+0.08}_{-0.06}$	510	[71] CSORNA	85	CLEO	Repl. by BORTOLETTO 87

[66] GIBBONS 97B reports $B(B \to D^*(2010)^+ \text{anything}) = 0.239 \pm 0.015 \pm 0.014 \pm 0.009$ using CLEO measured D and D^* branching fractions. We rescale to our PDG 96 values of D and D^* branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[67] ALBRECHT 96D reports $B(B \to D^*(2010)^+ \text{anything})$ 0.196 ± 0.019 using CLEO measured $B(D^*(2010)^+ \to D^0\pi^+) = 0.681 \pm 0.01 \pm 0.013$, $B(D^0 \to K^-\pi^+) = 0.0401 \pm 0.0014$, $B(D^0 \to K^-\pi^+\pi^+\pi^-) = 0.081 \pm 0.005$., We rescale to our PDG 96 values of D and D^* branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[68] BORTOLETTO 92 reports $B(B \to D^*(2010)^+ \text{anything}) = 0.25 \pm 0.03 \pm 0.04$ using MARK II $B(D^*(2010)^+ \to D^0\pi^+) = 0.57 \pm 0.06$ and $B(D^0 \to K^-\pi^+) = 0.042 \pm 0.008$. We rescale to our PDG 96 values of D and D^* branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[69] ALBRECHT 91H reports $0.348 \pm 0.060 \pm 0.035$ for $B(D^*(2010)^+ \to D^0\pi^+) = 0.55 \pm 0.04$. 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. Uses the PDG 90 $B(D^0 \to K^-\pi^+) = 0.0371 \pm 0.0025$.

[70] BORTOLETTO 87 uses old MARK III (BALTRUSAITIS 86E) branching ratios $B(D^0 \to K^-\pi^+) = 0.056 \pm 0.004 \pm 0.003$ and also assumes $B(D^*(2010)^+ \to D^0\pi^+) = 0.60^{+0.08}_{-0.15}$. The product branching ratio for $B(B \to D^*(2010)^+)$ $B(D^*(2010)^+ \to D^0\pi^+)$ is $0.13 \pm 0.02 \pm 0.012$. Superseded by BORTOLETTO 92.

[71] $V{-}A$ momentum spectrum used to extrapolate below $p = 1$ GeV. We correct the value assuming $B(D^0 \to K^-\pi^+) = 0.042 \pm 0.006$ and $B(D^{*+} \to D^0\pi^+) = 0.6^{+0.08}_{-0.15}$. The product branching fraction is $B(B \to D^{*+}X) \cdot B(D^{*+} \to \pi^+ D^0) \cdot B(D^0 \to K^-\pi^+) = (68 \pm 15 \pm 9) \times 10^{-4}$.

$\Gamma(D^*(2007)^0\text{anything})/\Gamma_{total}$ — Γ_{28}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.260±0.023±0.015	[72] GIBBONS	97B	CLE2	$e^+e^- \to \Upsilon(4S)$

[72] GIBBONS 97B reports $B(B \to D^*(2007)^0 \text{anything})$ $0.247 \pm 0.012 \pm 0.018 \pm 0.018$ using CLEO measured D and D^* branching fractions. We rescale to our PDG 96 values of D and D^* branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{\pm}\text{anything})/\Gamma_{total}$ Γ_{29}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.083±0.008 OUR AVERAGE					
0.089±0.010±0.008		[73] ARTUSO	05B	CLE2	$e^+e^- \rightarrow \Upsilon(5S)$
0.087±0.005±0.008		[74] AUBERT	02G	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.065±0.011±0.006		[75] ALBRECHT	92G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.068±0.010±0.006	257	[76] BORTOLETTO	90	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.085±0.022±0.008		[77] HAAS	86	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.094±0.007±0.008		[78] GIBAUT	96	CLE2	Repl. by ARTUSO 05B
0.094±0.024±0.008		[79] ALBRECHT	87H	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[73] ARTUSO 05B reports 0.0905 ± 0.0025 ± 0.0140 for $B(D_s^+ \rightarrow \phi\pi^+) = (4.4 \pm 0.5) \times 10^{-2}$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[74] AUBERT 02G reports $[B(B \rightarrow D_s^{\pm}\text{anything}) \times B(D_s^+ \rightarrow \phi\pi^+)] = 0.00393 \pm 0.00007 \pm 0.00021$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[75] ALBRECHT 92G reports $[B(B \rightarrow D_s^{\pm}\text{anything}) \times B(D_s^+ \rightarrow \phi\pi^+)] = 0.00292 \pm 0.00039 \pm 0.00031$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[76] BORTOLETTO 90 reports $[B(B \rightarrow D_s^{\pm}\text{anything}) \times B(D_s^+ \rightarrow \phi\pi^+)] = 0.00306 \pm 0.00047$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[77] HAAS 86 reports $[B(B \rightarrow D_s^{\pm}\text{anything}) \times B(D_s^+ \rightarrow \phi\pi^+)] = 0.0038 \pm 0.0010$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. 64 ± 22% decays are 2-body.

[78] GIBAUT 96 reports 0.1211 ± 0.0039 ± 0.0088 for $B(D_s^+ \rightarrow \phi\pi^+) = 0.035$. We rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[79] ALBRECHT 87H reports $[B(B \rightarrow D_s^{\pm}\text{anything}) \times B(D_s^+ \rightarrow \phi\pi^+)] = 0.0042 \pm 0.0009 \pm 0.0006$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. 46 ± 16% of $B \rightarrow D_s X$ decays are 2-body. Superseded by ALBRECHT 92G.

$\Gamma(D_s^{*\pm}\text{anything})/\Gamma_{total}$ Γ_{30}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.063±0.009±0.006	[80] AUBERT	02G	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[80] AUBERT 02G reports $[B(B \rightarrow D_s^{*\pm}\text{anything}) \times B(D_s^+ \rightarrow \phi\pi^+)] = 0.00284 \pm 0.00029 \pm 0.00025$. We divide by our best value $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{*\pm}\overline{D}^{(*)})/\Gamma(D_s^{*\pm}\text{ anything})$ — Γ_{31}/Γ_{30}

Sum over modes

VALUE	DOCUMENT ID		TECN	COMMENT
0.533±0.037±0.037	AUBERT	02G	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{D}D_{s0}(2317))/\Gamma_{total}$ — Γ_{32}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[81] KROKOVNY	03B	BELL	$e^+e^- \to \Upsilon(4S)$

[81] The product branching ratio for $B(B \to \overline{D}D_{s0}(2317)^+)\times B(D_{s0}(2317)^+ \to D_s\pi^0)$ is measured to be $(8.5^{+2.1}_{-1.9} \pm 2.6) \times 10^{-4}$.

$\Gamma(\overline{D}D_{sJ}(2457))/\Gamma_{total}$ — Γ_{33}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[82] KROKOVNY	03B	BELL	$e^+e^- \to \Upsilon(4S)$

[82] The product branching ratio for $B(B \to \overline{D}D_{sJ}(2457)^+)\times B(D_{sJ}(2457)^+ \to D_s^{*+}\pi^0, D_s^+\gamma)$ are measured to be $(17.8^{+4.5}_{-3.9} \pm 5.3) \times 10^{-4}$ and $(6.7^{+1.3}_{-1.2} \pm 2.0) \times 10^{-4}$, respectively.

$[\Gamma(D^{(*)}\overline{D}^{(*)}K^0) + \Gamma(D^{(*)}\overline{D}^{(*)}K^\pm)]/\Gamma_{total}$ — Γ_{34}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.071^{+0.025}_{-0.015}{}^{+0.010}_{-0.009}}$	[83] BARATE	98Q	ALEP	$e^+e^- \to Z$

[83] The systematic error includes the uncertainties due to the charm branching ratios.

$\Gamma(c\overline{c}s)/\Gamma_{total}$ — Γ_{35}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.219±0.037	[84] COAN	98	CLE2	$e^+e^- \to \Upsilon(4S)$

[84] COAN 98 uses D-ℓ correlation.

$\Gamma(D_s^{(*)}\overline{D}^{(*)})/\Gamma(D_s^\pm\text{ anything})$ — Γ_{36}/Γ_{29}

Sum over modes.

VALUE	DOCUMENT ID		TECN	COMMENT
0.469±0.017 OUR AVERAGE				
0.464±0.013±0.015	AUBERT	02G	BABR	$e^+e^- \to \Upsilon(4S)$
$0.56\ ^{+0.21}_{-0.15}\ ^{+0.09}_{-0.08}$	[85] BARATE	98Q	ALEP	$e^+e^- \to Z$
0.457±0.019±0.037	GIBAUT	96	CLE2	$e^+e^- \to \Upsilon(4S)$
0.58 ±0.07 ±0.09	ALBRECHT	92G	ARG	$e^+e^- \to \Upsilon(4S)$
0.56 ±0.10	BORTOLETTO	90	CLEO	$e^+e^- \to \Upsilon(4S)$

[85] BARATE 98Q measures $B(B \to D_s{}^{(*)}\overline{D}^{(*)}) = 0.056^{+0.021}_{-0.015}{}^{+0.009}_{-0.008}{}^{+0.019}_{-0.011}$, where the third error results from the uncertainty on the different D branching ratios and is dominated by the uncertainty on $B(D_s^+ \to \phi\pi^+)$. We divide $B(B \to D_s{}^{(*)}\overline{D}^{(*)})$ by our best value of $B(B \to D_s\text{ anything}) = 0.1 \pm 0.025$.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<5.9 \times 10^{-3}}$	90	BARATE	98Q	ALEP	$e^+e^- \to Z$

$\left[\Gamma\left(D D^*(2010)^{\pm}\right)+\Gamma\left(D^* D^{\pm}\right)\right]/\Gamma_{total}$ — Γ_{38}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.5 × 10^{-3}	90	BARATE	98Q	ALEP	$e^+e^- \to Z$

$\Gamma\left(D D^{\pm}\right)/\Gamma_{total}$ — Γ_{39}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.1 × 10^{-3}	90	BARATE	98Q	ALEP	$e^+e^- \to Z$

$\Gamma\left(D_s^{(*)\pm}\overline{D}^{(*)}X(n\pi^{\pm})\right)/\Gamma_{total}$ — Γ_{40}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$0.094^{+0.040}_{-0.031}{}^{+0.034}_{-0.024}$	[86] BARATE	98Q	ALEP	$e^+e^- \to Z$

[86] The systematic error includes the uncertainties due to the charm branching ratios.

$\Gamma\left(D^*(2010)\gamma\right)/\Gamma_{total}$ — Γ_{41}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.1 × 10^{-3}	90	[87] LESIAK	92	CBAL	$e^+e^- \to \Upsilon(4S)$

[87] LESIAK 92 set a limit on the inclusive process B($b \to s\gamma$) $< 2.8 \times 10^{-3}$ at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about s-quark hadronization.

$\Gamma\left(D_s^+\pi^-, D_s^{*+}\pi^-, D_s^+\rho^-, D_s^{*+}\rho^-, D_s^+\pi^0, D_s^{*+}\pi^0, D_s^+\eta, D_s^{*+}\eta, D_s^+\rho^0, D_s^{*+}\rho^0, D_s^+\omega, D_s^{*+}\omega\right)/\Gamma_{total}$ — Γ_{42}/Γ

Sum over modes.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0004	90	[88] ALEXANDER	93B	CLE2	$e^+e^- \to \Upsilon(4S)$

[88] ALEXANDER 93B reports $< 4.8 \times 10^{-4}$ for B($D_s^+ \to \phi\pi^+$) = 0.037. We rescale to our best value B($D_s^+ \to \phi\pi^+$) = 0.045. This branching ratio limit provides a model-dependent upper limit $\left|V_{ub}\right|/\left|V_{cb}\right| < 0.16$ at CL=90%.

$\Gamma\left(D_{s1}(2536)^+\text{anything}\right)/\Gamma_{total}$ — Γ_{43}/Γ

$D_{s1}(2536)^+$ is the narrow P-wave D_s^+ meson with $J^P = 1^+$.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0095	90	[89] BISHAI	98	CLE2	$e^+e^- \to \Upsilon(4S)$

[89] Assuming factorization, the decay constant $f_{D_{s1}^+}$ is at least a factor of 2.5 times smaller than $f_{D_s^+}$.

$\Gamma\left(J/\psi(1S)\text{anything}\right)/\Gamma_{total}$ — Γ_{44}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.094±0.032 OUR AVERAGE		Error includes scale factor of 1.1.			
1.057±0.012±0.040		[90] AUBERT	03F	BABR	$e^+e^- \to \Upsilon(4S)$
1.121±0.013±0.042		ANDERSON	02	CLE2	$e^+e^- \to \Upsilon(4S)$
1.30 ±0.45 ±0.01	27	[91] MASCHMANN	90	CBAL	$e^+e^- \to \Upsilon(4S)$
1.24 ±0.27 ±0.01	120	[92] ALBRECHT	87D	ARG	$e^+e^- \to \Upsilon(4S)$
1.36 ±0.24 ±0.01	52	[93] ALAM	86	CLEO	$e^+e^- \to \Upsilon(4S)$

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

1.13 ± 0.06 ± 0.01	1489	[94] BALEST	95B	CLE2	$e^+e^- \to \Upsilon(4S)$
1.4 $^{+0.6}_{-0.5}$	7	[95] ALBRECHT	85H	ARG	$e^+e^- \to \Upsilon(4S)$
1.1 ± 0.21 ± 0.23	46	[96] HAAS	85	CLEO	Repl. by ALAM 86

[90] AUBERT 03F also reports the momentum distribution and helicity of $J/\psi \to \ell^+\ell^-$ in the $\Upsilon(4S)$ center-of-mass frame.

[91] MASCHMANN 90 reports $(1.12 \pm 0.33 \pm 0.25) \times 10^{-2}$ for $B(J/\psi(1S) \to e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \to e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[92] ALBRECHT 87D reports $(1.07 \pm 0.16 \pm 0.22) \times 10^{-2}$ for $B(J/\psi(1S) \to e^+e^-) = 0.069 \pm 0.009$. We rescale to our best value $B(J/\psi(1S) \to e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. ALBRECHT 87D find the branching ratio for J/ψ not from $\psi(2S)$ to be 0.0081 ± 0.0023.

[93] ALAM 86 reports $(1.09 \pm 0.16 \pm 0.21) \times 10^{-2}$ for $B(J/\psi(1S) \to \mu^+\mu^-) = 0.074 \pm 0.012$. We rescale to our best value $B(J/\psi(1S) \to \mu^+\mu^-) = (5.93 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[94] BALEST 95B reports $(1.12 \pm 0.04 \pm 0.06) \times 10^{-2}$ for $B(J/\psi(1S) \to e^+e^-) = 0.0599 \pm 0.0025$. We rescale to our best value $B(J/\psi(1S) \to e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.. They measure $J/\psi(1S) \to e^+e^-$ and $\mu^+\mu^-$ and use PDG 1994 values for the branching fractions. The rescaling is the same for either mode so we use e^+e^-.

[95] Statistical and systematic errors were added in quadrature. ALBRECHT 85H also report a CL = 90% limit of 0.007 for $B \to J/\psi(1S) + X$ where m_X <1 GeV.

[96] Dimuon and dielectron events used.

$\Gamma(J/\psi(1S)\text{(direct) anything})/\Gamma_{\text{total}}$ Γ_{45}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0078 ±0.0004 OUR AVERAGE	Error includes scale factor of 1.1.			
$0.00740 \pm 0.00023 \pm 0.00043$	[97] AUBERT	03F	BABR	$e^+e^- \to \Upsilon(4S)$
$0.00813 \pm 0.00017 \pm 0.00037$	[98] ANDERSON	02	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0080 ± 0.0008	[99] BALEST	95B	CLE2	$e^+e^- \to \Upsilon(4S)$

[97] AUBERT 03F also reports the helicity of $J/\psi \to \ell^+\ell^-$ produced directly in B decay.

[98] Also reports the measurement of $J/\psi \to \ell^+\ell^-$ polarization produced directly from B decay.

[99] BALEST 95B assume PDG 1994 values for sub mode branching ratios. $J/\psi(1S)$ mesons are reconstructed in $J/\psi(1S) \to e^+e^-$ and $J/\psi(1S) \to \mu^+\mu^-$. The $B \to J/\psi(1S)X$ branching ratio contains $J/\psi(1S)$ mesons directly from B decays and also from feeddown through $\psi(2S) \to J/\psi(1S)$, $\chi_{c1}(1P) \to J/\psi(1S)$, or $\chi_{c2}(1P) \to J/\psi(1S)$. Using the measured inclusive rates, BALEST 95B corrects for the feeddown and finds the $B \to J/\psi(1S)$(direct) X branching ratio.

$\Gamma(\psi(2S)\text{anything})/\Gamma_{total}$ — Γ_{46}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.00307±0.00021 OUR AVERAGE					
0.00297±0.00020±0.00020		AUBERT	03F	BABR	$e^+e^- \to \Upsilon(4S)$
0.00316±0.00014±0.00028		[100] ANDERSON	02	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0046 ±0.0017 ±0.0011	8	ALBRECHT	87D	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0034 ±0.0004 ±0.0003	240	[101] BALEST	95B	CLE2	$e^+e^- \to \Upsilon(4S)$

[100] Also reports the measurement of $\psi(2S) \to \ell^+\ell^-$ polarization produced directly from B decay.

[101] BALEST 95B assume PDG 1994 values for sub mode branching ratios. They find B($B \to \psi(2S)$X, $\psi(2S) \to \ell^+\ell^-$) = 0.30 ± 0.05 ± 0.04 and B($B \to \psi(2S)$X, $\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = 0.37±0.05±0.05. Weighted average is quoted for B($B \to \psi(2S)$X).

$\Gamma(\chi_{c1}(1P)\text{anything})/\Gamma_{total}$ — Γ_{47}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.00386±0.00027 OUR AVERAGE					
0.00367±0.00035±0.00044		AUBERT	03F	BABR	$e^+e^- \to \Upsilon(4S)$
0.00363±0.00022±0.00034		[102] ABE	02L	BELL	$e^+e^- \to \Upsilon(4S)$
0.00435±0.00029±0.00040		ANDERSON	02	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00315±0.00034±0.00017		[103] CHEN	01	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0040 ±0.0006 ±0.0004	112	[104] BALEST	95B	CLE2	Repl. by CHEN 01
0.0105 ±0.0035 ±0.0025		[105] ALBRECHT	92E	ARG	$e^+e^- \to \Upsilon(4S)$

[102] ABE 02L uses PDG 01 values for B($J/\psi(1S) \to \ell^+\ell^-$) and B($\chi_{c1,c2} \to J/\psi(1S)\gamma$).

[103] CHEN 01 reports 0.00414 ± 0.00031 ± 0.00040 for B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = 0.273 ± 0.016. We rescale to our best value B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = (35.9 ± 1.9) × 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 $\Upsilon(4S)$.

[104] BALEST 95B assume B($\chi_{c1}(1P) \to J/\psi(1S)\gamma$) = (27.3 ± 1.6) × 10^{-2}, the PDG 1994 value. Fit to ψ-photon invariant mass distribution allows for a $\chi_{c1}(1P)$ and a $\chi_{c2}(1P)$ component.

[105] ALBRECHT 92E assumes no $\chi_{c2}(1P)$ production.

$\Gamma(\chi_{c1}(1P)(\text{direct})\text{ anything})/\Gamma_{total}$ — Γ_{48}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.00316±0.00025 OUR AVERAGE				
0.00341±0.00035±0.00042	AUBERT	03F	BABR	$e^+e^- \to \Upsilon(4S)$
0.00332±0.00022±0.00034	[106] ABE	02L	BELL	$e^+e^- \to \Upsilon(4S)$
0.00291±0.00034±0.00015	[107] CHEN	01	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0037 ±0.0007	[108] BALEST	95B	CLE2	Repl. by CHEN 01

[106] ABE 02L uses PDG 01 values for B($J/\psi(1S) \to \ell^+\ell^-$) and B($\chi_{c1,c2} \to J/\psi(1S)\gamma$).

[107] CHEN 01 reports 0.00383 ± 0.00031 ± 0.00040 for B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = 0.273 ± 0.016. We rescale to our best value B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = (35.9 ± 1.9) × 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] BALEST 95B assume PDG 1994 values. $J/\psi(1S)$ mesons are reconstructed in the e^+e^- and $\mu^+\mu^-$ modes. The $B \to \chi_{c1}(1P)$X branching ratio contains $\chi_{c1}(1P)$ mesons

directly from B decays and also from feeddown through $\psi(2S) \to \chi_{c1}(1P)\gamma$. Using the measured inclusive rates, BALEST 95B corrects for the feeddown and finds the $B \to \chi_{c1}(1P)$(direct) X branching ratio.

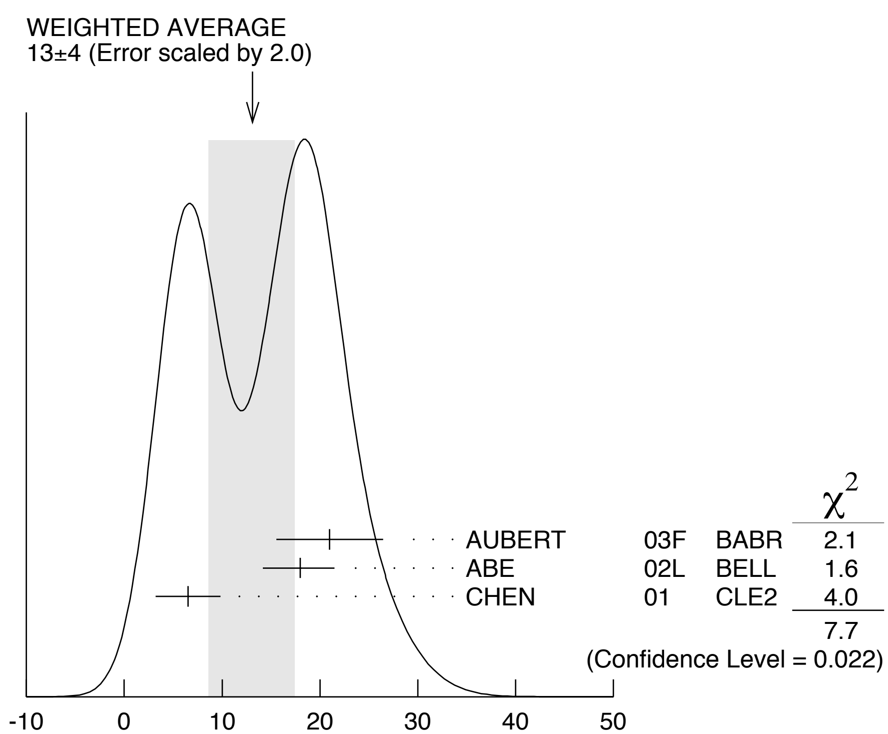
$\Gamma(\chi_{c2}(1P)\text{anything})/\Gamma_{total}$ — Γ_{49}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
13 ±4 OUR AVERAGE			Error includes scale factor of 2.0. See the ideogram below.		
$21.0\pm4.5\pm3.1$			AUBERT 03F	BABR	$e^+e^- \to \Upsilon(4S)$
$18.0^{+2.3}_{-2.8}\pm2.6$			[109] ABE 02L	BELL	$e^+e^- \to \Upsilon(4S)$
$6.5\pm3.3\pm0.3$			[110] CHEN 01	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<38	90	35	[111] BALEST 95B	CLE2	Repl. by CHEN 01

[109] ABE 02L uses PDG 01 values for B($J/\psi(1S) \to \ell^+\ell^-$) and B($\chi_{c1,c2} \to J/\psi(1S)\gamma$).

[110] CHEN 01 reports $(9.8\pm4.8\pm1.5)\times10^{-4}$ for B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$) = 0.135 ± 0.011. We rescale to our best value B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$) = $(20.3 \pm 1.0) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.

[111] BALEST 95B assume B($\chi_{c2}(1P) \to J/\psi(1S)\gamma$) = $(13.5 \pm 1.1)\times10^{-2}$, the PDG 1994 value. $J/\psi(1S)$ mesons are reconstructed in the e^+e^- and $\mu^+\mu^-$ modes, and PDG 1994 branching fractions are used. If interpreted as signal, the 35 ± 13 events correspond to B($B \to \chi_{c2}(1P)$X) =$(0.25 \pm 0.10 \pm 0.03) \times 10^{-2}$.



$\Gamma(\chi_{c2}(1P)\text{anything})/\Gamma_{total}$ — Γ_{49}/Γ

$\Gamma(\chi_{c2}(1P)(\text{direct})\text{ anything})/\Gamma_{\text{total}}$ — Γ_{50}/Γ

VALUE		DOCUMENT ID		TECN	COMMENT
0.00165±0.00031 OUR AVERAGE					
0.00190±0.00045±0.00029		AUBERT	03F	BABR	$e^+e^- \to \Upsilon(4S)$
$0.00153^{+0.00023}_{-0.00028}\pm0.00027$	112	ABE	02L	BELL	$e^+e^- \to \Upsilon(4S)$

[112] ABE 02L uses PDG 01 values for B($J/\psi(1S) \to \ell^+\ell^-$) and B($\chi_{c1,c2} \to J/\psi(1S)\gamma$).

$\Gamma(\eta_c(1S)\text{ anything})/\Gamma_{\text{total}}$ — Γ_{51}/Γ

VALUE	CL%		DOCUMENT ID		TECN	COMMENT
<0.009	90	113	BALEST	95B	CLE2	$e^+e^- \to \Upsilon(4S)$

[113] BALEST 95B assume PDG 1994 values for sub mode branching ratios. $J/\psi(1S)$ mesons are reconstructed in $J/\psi(1S) \to e^+e^-$ and $J/\psi(1S) \to \mu^+\mu^-$. Search region 2960 $< m_{\eta_c(1S)} <$ 3010 MeV/c^2.

$\Gamma(X(3872)K \times \text{B}(X \to D^0\overline{D}^0\pi^0))/\Gamma_{\text{total}}$ — Γ_{52}/Γ

VALUE		DOCUMENT ID		TECN	COMMENT
$\mathbf{1.22\pm0.31^{+0.23}_{-0.30}}$	114	GOKHROO	06	BELL	$e^+e^- \to \Upsilon(4S)$

[114] Measure the near-threshold enhancements in the ($D^0\overline{D}^0\pi^0$) system at a mass 3875.2 ± $0.7^{+0.3}_{-1.6}$ ± 0.8 MeV/c^2.

$\Gamma(K X(3945) \times \text{B}(X(3945) \to \omega J/\psi))/\Gamma_{\text{total}}$ — Γ_{53}/Γ

VALUE (units 10^{-5})		DOCUMENT ID		TECN	COMMENT
7.1±1.3±3.1	115	CHOI	05	BELL	$e^+e^- \to \Upsilon(4S)$

[115] CHOI 05 reports the observation of a near-threshold enhancement in the $\omega J/\psi$ mass spectrum in exclusive $B \to K\omega J/\psi$. The new state, denoted as $X(3945)$, has a mass of 3943 ± 11 ± 13 GeV/c^2 and a width Γ = 87 ± 22 ± 26 MeV.

$\Gamma(K^\pm\text{ anything})/\Gamma_{\text{total}}$ — Γ_{54}/Γ

VALUE		DOCUMENT ID		TECN	COMMENT
0.789±0.025 OUR AVERAGE					
0.82 ±0.01 ±0.05		ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
0.775±0.015±0.025	116	ALBRECHT	93I	ARG	$e^+e^- \to \Upsilon(4S)$
0.85 ±0.07 ±0.09		ALAM	87B	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	117	BRODY	82	CLEO	$e^+e^- \to \Upsilon(4S)$
seen	118	GIANNINI	82	CUSB	$e^+e^- \to \Upsilon(4S)$

[116] ALBRECHT 93I value is not independent of the sum of $B \to K^+$ anything and $B \to K^-$ anything ALBRECHT 94C values.

[117] Assuming $\Upsilon(4S) \to B\overline{B}$, a total of 3.38 ± 0.34 ± 0.68 kaons per $\Upsilon(4S)$ decay is found (the second error is systematic). In the context of the standard B-decay model, this leads to a value for (b-quark → c-quark)/(b-quark → all) of 1.09 ± 0.33 ± 0.13.

[118] GIANNINI 82 at CESR-CUSB observed 1.58 ± 0.35 K^0 per hadronic event much higher than 0.82 ± 0.10 below threshold. Consistent with predominant $b \to cX$ decay.

$\Gamma(K^+ \text{anything})/\Gamma_{\text{total}}$ — Γ_{55}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.66 ±0.05	[119] ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.620±0.013±0.038	[120] ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
0.66 ±0.05 ±0.07	[120] ALAM	87B	CLEO	$e^+e^- \to \Upsilon(4S)$

[119] Measurement relies on lepton-kaon correlations. It is for the weak decay vertex and does not include mixing of the neutral B meson. Mixing effects were corrected for by assuming a mixing parameter r of (18.1 ± 4.3)%.

[120] Measurement relies on lepton-kaon correlations. It includes production through mixing of the neutral B meson.

$\Gamma(K^- \text{anything})/\Gamma_{\text{total}}$ — Γ_{56}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.13 ±0.04	[121] ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.165±0.011±0.036	[122] ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
0.19 ±0.05 ±0.02	[122] ALAM	87B	CLEO	$e^+e^- \to \Upsilon(4S)$

[121] Measurement relies on lepton-kaon correlations. It is for the weak decay vertex and does not include mixing of the neutral B meson. Mixing effects were corrected for by assuming a mixing parameter r of (18.1 ± 4.3)%.

[122] Measurement relies on lepton-kaon correlations. It includes production through mixing of the neutral B meson.

$\Gamma(K^0/\overline{K}^0 \text{anything})/\Gamma_{\text{total}}$ — Γ_{57}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.64 ±0.04 OUR AVERAGE				
0.642±0.010±0.042	[123] ALBRECHT	94C	ARG	$e^+e^- \to \Upsilon(4S)$
0.63 ±0.06 ±0.06	ALAM	87B	CLEO	$e^+e^- \to \Upsilon(4S)$

[123] ALBRECHT 94C assume a $K^0/\overline{K}^0$ multiplicity twice that of K^0_S.

$\Gamma(K^*(892)^\pm \text{anything})/\Gamma_{\text{total}}$ — Γ_{58}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.182±0.054±0.024	ALBRECHT	94J	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^*(892)^0/\overline{K}^*(892)^0 \text{anything})/\Gamma_{\text{total}}$ — Γ_{59}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.146±0.016±0.020	ALBRECHT	94J	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^*(892)\gamma)/\Gamma_{\text{total}}$ — Γ_{60}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
4.24±0.54±0.32		[124] COAN	00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<150	90	[125] LESIAK	92	CBAL	$e^+e^- \to \Upsilon(4S)$
< 24	90	ALBRECHT	88H	ARG	$e^+e^- \to \Upsilon(4S)$

[124] An average of B($B^+ \to K^*(892)^+\gamma$) and B($B^0 \to K^*(892)^0\gamma$) measurements reported in COAN 00 by assuming full correlated systematic errors.

[125] LESIAK 92 set a limit on the inclusive process B($b \to s\gamma$) < 2.8×10^{-3} at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about s-quark hadronization.

$\Gamma(\eta K \gamma)/\Gamma_{total}$ — Γ_{61}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$8.5 \pm 1.3^{+1.2}_{-0.9}$	[126] NISHIDA	05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[126] $m_{\eta K} < 2.4$ GeV/c^2

$\Delta_{0+}(B \rightarrow K^*(892)\gamma)$

Δ_{0+} describes the isospin asymmetry between $\Gamma(B^0 \rightarrow K^*(892)^0 \gamma)$ and $\Gamma(B^+ \rightarrow K^*(892)^+ \gamma)$.

VALUE	DOCUMENT ID		TECN	COMMENT
$0.050 \pm 0.045 \pm 0.037$	[127] AUBERT,BE	04A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

[127] Uses the production ratio of charged and neutral B from $\Upsilon(4S)$ decays $R^{+/0} = 1.006 \pm 0.048$ and the lifetime ratio of $\tau_{B^+} / \tau_{B^0} = 1.083 \pm 0.017$. The 90% CL interval is $-0.046 < \Delta_{0+} < 0.146$.

$\Gamma(K_1(1400)\gamma)/\Gamma_{total}$ — Γ_{62}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<12.7 \times 10^{-5}$	90	[128] COAN	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 1.6 \times 10^{-3}$	90	[129] LESIAK	92	CBAL	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 4.1 \times 10^{-4}$	90	ALBRECHT	88H	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

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

[129] LESIAK 92 set a limit on the inclusive process $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$ at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about s-quark hadronization.

$\Gamma(K_2^*(1430)\gamma)/\Gamma_{total}$ — Γ_{63}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$1.66^{+0.59}_{-0.53} \pm 0.13$		[130] COAN	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<83	90	ALBRECHT	88H	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[130] COAN 00 obtains a fitted signal yield of $15.9^{+5.7}_{-5.2}$ events. A search for contamination by $K^*(1410)$ yielded a rate consistent with 0; the central value assumes no contamination.

$\Gamma(K_2(1770)\gamma)/\Gamma_{total}$ — Γ_{64}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-3}$	90	[131] LESIAK	92	CBAL	$e^+ e^- \rightarrow \Upsilon(4S)$

[131] LESIAK 92 set a limit on the inclusive process $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$ at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about s-quark hadronization.

$\Gamma(K_3^*(1780)\gamma)/\Gamma_{total}$ — Γ_{65}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.7 \times 10^{-5}$	90	[132] NISHIDA	05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.0 \times 10^{-3}$	90	ALBRECHT	88H	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

[132] Uses $B(K_3^*(1780) \rightarrow \eta K) = 0.11^{+0.05}_{-0.04}$.

$\Gamma(K_4^*(2045)\gamma)/\Gamma_{total}$ — Γ_{66}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-3}$	90	[133] LESIAK	92	CBAL	$e^+e^- \rightarrow \Upsilon(4S)$

[133] LESIAK 92 set a limit on the inclusive process B($b \rightarrow s\gamma$) $< 2.8 \times 10^{-3}$ at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about s-quark hadronization.

$\Gamma(K\eta'(958))/\Gamma_{total}$ — Γ_{67}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(8.3^{+0.9}_{-0.8}\pm0.7) \times 10^{-5}$	[134] RICHICHI	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K^*(892)\eta'(958))/\Gamma_{total}$ — Γ_{68}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$4.1^{+1.0}_{-0.9}\pm0.5$		[135] AUBERT	07E	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<22	90	[135] RICHICHI	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K\eta)/\Gamma_{total}$ — Γ_{69}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.2 \times 10^{-6}$	90	[136] RICHICHI	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K^*(892)\eta)/\Gamma_{total}$ — Γ_{70}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$(1.80^{+0.49}_{-0.43}\pm0.18) \times 10^{-5}$	[137] RICHICHI	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$\Gamma(K\phi\phi)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$2.3^{+0.9}_{-0.8}\pm0.3$	[138] HUANG	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

[138] Assumes equal production of charged and neutral B meson pairs and isospin symmetry.

$\Gamma(\overline{b} \rightarrow \overline{s}\gamma)/\Gamma_{total}$ — Γ_{72}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.54±0.26 OUR AVERAGE				
3.92±0.31±0.47	[139,140] AUBERT,BE	06B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$3.49\pm0.20^{+0.59}_{-0.46}$	[140,141] AUBERT,B	05R	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
3.50±0.32±0.31	[140,142] KOPPENBURG	04	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
3.29±0.44±0.29	[140,143] CHEN	01C	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.36\pm0.53^{+0.65}_{-0.68}$	[144] ABE	01F	BELL	Repl. by KOPPENBURG 04
2.32±0.57±0.35	ALAM	95	CLE2	Repl. by CHEN 01C

[139] The measurement reported is 3.67 ± 0.29 ± 0.45 for $E_\gamma > 1.9$ GeV.

[140] We correct it to $E_\gamma >1.6$ GeV using the method of hep-ph/0507253 (average of three theoretical models).

[141] The measurement reported is $3.27 \pm 0.18^{+0.55}_{-0.42}$ for $E_\gamma >1.9$ GeV.

[142] The measurement reported is 3.55 ± 0.32 ± 0.32 for $E_\gamma >1.8$ GeV.

[143] The measurement reported is $3.21 \pm 0.43^{+0.32}_{-0.29}$ for $E_\gamma >2.0$ GeV.

[144] ABE 01F reports their systematic errors $\pm 0.42^{+0.50}_{-0.54}$, where the second error is due to the theoretical uncertainty. We combine them in quadrature.

$\Gamma(\overline{b} \to \overline{s}\text{gluon})/\Gamma_{total}$ Γ_{73}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.068	90		[145] COAN	98	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.08		2	[146] ALBRECHT	95D	ARG	$e^+e^- \to \Upsilon(4S)$

[145] COAN 98 uses D-ℓ correlation.

[146] ALBRECHT 95D use full reconstruction of one B decay as tag. Two candidate events for charmless B decay can be interpreted as either $b \to s$gluon or $b \to u$ transition. If interpreted as $b \to s$gluon they find a branching ratio of ∼ 0.026 or the upper limit quoted above. Result is highly model dependent.

$\Gamma(\eta\,\text{anything})/\Gamma_{total}$ Γ_{74}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.4 \times 10^{-4}$	90	[147] BROWDER	98	CLE2	$e^+e^- \to \Upsilon(4S)$

[147] BROWDER 98 search for high momentum $B \to \eta X_s$ between 2.1 and 2.7 GeV/c.

$\Gamma(\eta'\,\text{anything})/\Gamma_{total}$ Γ_{75}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.2±0.9 OUR AVERAGE				
3.9±0.8±0.9	[148] AUBERT,B	04F	BABR	$e^+e^- \to \Upsilon(4S)$
4.6±1.1±0.6	[149] BONVICINI	03	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$6.2 \pm 1.6^{+1.3}_{-2.0}$	[150] BROWDER	98	CLE2	$e^+e^- \to \Upsilon(4S)$

[148] The reported branching ratio is for high momentum η between 2.0 and 2.7 GeV in the $\Upsilon(4S)$ center-of-mass frame. Xs represents a recoil system consisting of a kaon and zero to four pions.

[149] BONVICINI 03 observed a signal of 61.2 ± 13.9 events in $B \to \eta' X_{nc}$ production for high momentum η' between 2.0 and 2.7 GeV/c in the $\Upsilon(4S)$ center-of-mass frame. The X_{nc} denotes "charmless" hadronic states recoiling against η'. The second error combines systematic and background subtraction uncertainties in quadrature.

[150] BROWDER 98 observed a signal of 39.0 ± 11.6 events in high momentum $B \to \eta' X_s$ production between 2.0 and 2.7 GeV/c. The branching fraction is based on the interpretation of $b \to sg$, where the last error includes additional uncertainties due to the color-suppressed $b \to$ backgrounds.

$\Gamma(\rho\gamma)/\Gamma_{total}$ — Γ_{76}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$1.36^{+0.29}_{-0.27}\pm0.10$		AUBERT	07L	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 1.9	90	[151] AUBERT	04C	BABR	Repl. by AUBERT 07L
$<$14	90	[152] COAN	00	CLE2	$e^+e^- \to \Upsilon(4S)$

[151] Assumes $\Gamma(B \to \rho\gamma) = \Gamma(B^+ \to \rho^+\gamma) = 2\,\Gamma(B^0 \to \rho^0\gamma)$ and uses lifetime ratio of $\tau_{B^+}/\tau_{B^0} = 1.083 \pm 0.017$.

[152] COAN 00 reports $B(B \to \rho\gamma)/B(B \to K^*(892)\gamma) < 0.32$ at 90%CL and scaled by the central value of $B(B \to K^*(892)\gamma)=(4.24 \pm 0.54 \pm 0.32) \times 10^{-5}$.

$\Gamma(\rho/\omega\gamma)/\Gamma_{total}$ — Γ_{77}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
1.28±0.21 OUR AVERAGE					
$1.25^{+0.25}_{-0.24}\pm0.09$		AUBERT	07L	BABR	$e^+e^- \to \Upsilon(4S)$
$1.32^{+0.34}_{-0.31}{}^{+0.10}_{-0.09}$		MOHAPATRA	06	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.6 \pm0.3 \pm0.1$		AUBERT	05	BABR	Repl. by AUBERT 07L
$<$1.4	90	MOHAPATRA	05	BELL	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\rho/\omega\gamma)/\Gamma(K^*(892)\gamma)$ — Γ_{77}/Γ_{60}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.035	90	[153] MOHAPATRA	05	BELL	$e^+e^- \to \Upsilon(4S)$

[153] A limit of $|V_{td} / V_{ts}| < 0.22$ at 90% CL is also obtained from the measurement.

$\Gamma(\pi^\pm \text{ anything})/\Gamma_{total}$ — Γ_{78}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
3.585±0.025±0.070	[154] ALBRECHT	93I	ARG	$e^+e^- \to \Upsilon(4S)$

[154] ALBRECHT 93 excludes $\pi^\pm$ from K^0_S and Λ decays. If included, they find $4.105 \pm 0.025 \pm 0.080$.

$\Gamma(\pi^0 \text{ anything})/\Gamma_{total}$ — Γ_{79}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
2.35±0.02±0.11	[155] ABE	01J	BELL	$e^+e \to \Upsilon(4S)$

[155] From fully inclusive π^0 yield with no corrections from decays of K^0_S or other particles.

$\Gamma(\eta \text{ anything})/\Gamma_{total}$ — Γ_{80}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.176±0.011±0.012	KUBOTA	96	CLE2	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\rho^0 \text{ anything})/\Gamma_{total}$ — Γ_{81}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.208±0.042±0.032	ALBRECHT	94J	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\omega \text{ anything})/\Gamma_{total}$ — Γ_{82}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.81	90	ALBRECHT	94J	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\phi \text{ anything})/\Gamma_{total}$ — Γ_{83}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0342±0.0013 OUR AVERAGE				
0.0341±0.0006±0.0012	AUBERT	04S	BABR	$e^+e^- \to \Upsilon(4S)$
0.0390±0.0030±0.0035	ALBRECHT	94J	ARG	$e^+e^- \to \Upsilon(4S)$
0.023 ±0.006 ±0.005	BORTOLETTO	86	CLEO	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\phi K^*(892))/\Gamma_{total}$ — Γ_{84}/Γ

VALUE	CL%	DOCUMENT ID		TECN
$<2.2 \times 10^{-5}$	90	[156] BERGFELD	98	CLE2

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

$\Gamma(\Lambda_c^+ / \overline{\Lambda}_c^- \text{ anything})/\Gamma_{total}$ — Γ_{85}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.045±0.004±0.012		[157] AUBERT	07C	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.064±0.008±0.008		[158] CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.14 ±0.09		[159] ALBRECHT	88E	ARG	$e^+e^- \to \Upsilon(4S)$
<0.112	90	[160] ALAM	87	CLEO	$e^+e^- \to \Upsilon(4S)$

[157] AUBERT 07C reports 0.045 ± 0.003 ± 0.012 for $B(\Lambda_c^+ \to pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. 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.

[158] CRAWFORD 92 result derived from lepton baryon correlations. Assumes all charmed baryons in B^0 and $B^\pm$ decay are Λ_c.

[159] ALBRECHT 88E measured $B(B \to \Lambda_c^+ X) \cdot B(\Lambda_c^+ \to pK^-\pi^+) = (0.30 \pm 0.12 \pm 0.06)\%$ and used $B(\Lambda_c^+ \to pK^-\pi^+) = (2.2 \pm 1.0)\%$ from ABRAMS 80 to obtain above number.

[160] Assuming all baryons result from charmed baryons, ALAM 86 conclude the branching fraction is 7.4 ± 2.9%. The limit given above is model independent.

$\Gamma(\Lambda_c^+ \text{ anything})/\Gamma(\overline{\Lambda}_c^- \text{ anything})$ — Γ_{86}/Γ_{87}

VALUE	DOCUMENT ID		TECN	COMMENT
0.19±0.13±0.04	[161] AMMAR	97	CLE2	$e^+e^- \to \Upsilon(4S)$

[161] AMMAR 97 uses a high-momentum lepton tag ($P_\ell > 1.4\,\text{GeV}/c^2$).

$\Gamma(\overline{\Lambda}_c^- e^+ \text{ anything})/\Gamma(\Lambda_c^+ / \overline{\Lambda}_c^- \text{ anything})$ — Γ_{88}/Γ_{85}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	[162] BONVICINI	98	CLE2	$e^+e^- \to \Upsilon(4S)$

[162] BONVICINI 98 uses the electron with momentum above 0.6 GeV/c.

$\Gamma(\overline{\Lambda}_c^- p \text{ anything})/\Gamma(\Lambda_c^+ / \overline{\Lambda}_c^- \text{ anything})$ — Γ_{89}/Γ_{85}

VALUE	DOCUMENT ID		TECN	COMMENT
0.57±0.05±0.05	BONVICINI	98	CLE2	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\overline{\Lambda}_c^- p e^+ \nu_e)/\Gamma(\overline{\Lambda}_c^- p \text{anything})$ — Γ_{90}/Γ_{89}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	[163] BONVICINI	98	CLE2	$e^+ e^- \to \Upsilon(4S)$

[163] BONVICINI 98 uses the electron with momentum above 0.6 GeV/c.

$\Gamma(\overline{\Sigma}_c^{--} \text{anything})/\Gamma_{\text{total}}$ — Γ_{91}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0042±0.0021±0.0011	77	[164] PROCARIO	94	CLE2	$e^+ e^- \to \Upsilon(4S)$

[164] PROCARIO 94 reports $[B(B \to \overline{\Sigma}_c^{--} \text{anything}) \times B(\Lambda_c^+ \to p K^- \pi^+)] = 0.00021 \pm 0.00008 \pm 0.00007$. We divide by our best value $B(\Lambda_c^+ \to p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{\Sigma}_c^{-} \text{anything})/\Gamma_{\text{total}}$ — Γ_{92}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.010	90	[165] PROCARIO	94	CLE2	$e^+ e^- \to \Upsilon(4S)$

[165] PROCARIO 94 reports $[B(B \to \overline{\Sigma}_c^{-} \text{anything}) \times B(\Lambda_c^+ \to p K^- \pi^+)] = < 0.00048$. We divide by our best value $B(\Lambda_c^+ \to p K^- \pi^+) = 0.050$.

$\Gamma(\overline{\Sigma}_c^{0} \text{anything})/\Gamma_{\text{total}}$ — Γ_{93}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0046±0.0021±0.0012	76	[166] PROCARIO	94	CLE2	$e^+ e^- \to \Upsilon(4S)$

[166] PROCARIO 94 reports $[B(B \to \overline{\Sigma}_c^{0} \text{anything}) \times B(\Lambda_c^+ \to p K^- \pi^+)] = 0.00023 \pm 0.00008 \pm 0.00007$. We divide by our best value $B(\Lambda_c^+ \to p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{\Sigma}_c^{0} N (N = p \text{ or } n))/\Gamma_{\text{total}}$ — Γ_{94}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0015	90	[167] PROCARIO	94	CLE2	$e^+ e^- \to \Upsilon(4S)$

[167] PROCARIO 94 reports < 0.0017 for $B(\Lambda_c^+ \to p K^- \pi^+) = 0.043$. We rescale to our best value $B(\Lambda_c^+ \to p K^- \pi^+) = 0.050$.

$\Gamma(\Xi_c^0 \text{anything} \times B(\Xi_c^0 \to \Xi^- \pi^+))/\Gamma_{\text{total}}$ — Γ_{95}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.193±0.030 OUR AVERAGE	Error includes scale factor of 1.1.			
0.211±0.019±0.025	[168] AUBERT,B	05M	BABR	$e^+ e^- \to \Upsilon(4S)$
0.144±0.048±0.021	[169] BARISH	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[168] The yield is obtained by requiring the momentum P < 2.15 GeV/c.
[169] BARISH 97 find 79 ± 27 Ξ_c^0 events.

$\Gamma(\Xi_c^+ \text{anything} \times B(\Xi_c^+ \to \Xi^- \pi^+ \pi^+))/\Gamma_{\text{total}}$ — Γ_{96}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$0.453 \pm 0.096^{+0.085}_{-0.065}$	[170] BARISH	97	CLE2	$e^+ e^- \to \Upsilon(4S)$

[170] BARISH 97 find 125 ± 28 Ξ_c^+ events.

$\Gamma(p/\overline{p}\text{anything})/\Gamma_{\text{total}}$ Γ_{97}/Γ

Includes p and $\overline{p}$ from Λ and $\overline{\Lambda}$ decay.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.080±0.004 OUR AVERAGE					
0.080±0.005±0.005		ALBRECHT	93I	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.080±0.005±0.003		CRAWFORD	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$0.082\pm0.005^{+0.013}_{-0.010}$	2163	[171] ALBRECHT	89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.021		[172] ALAM	83B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[171] ALBRECHT 89K include direct and nondirect protons.

[172] ALAM 83B reported their result as $> 0.036 \pm 0.006 \pm 0.009$. Data are consistent with equal yields of p and $\overline{p}$. Using assumed yields below cut, B($B \rightarrow p+$ X) = 0.03 not including protons from Λ decays.

$\Gamma(p/\overline{p}(\text{direct})\text{ anything})/\Gamma_{\text{total}}$ Γ_{98}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.055±0.005 OUR AVERAGE					
0.055±0.005±0.0035		ALBRECHT	93I	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.056±0.006±0.005		CRAWFORD	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.055±0.016	1220	[173] ALBRECHT	89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

[173] ALBRECHT 89K subtract contribution of Λ decay from the inclusive proton yield.

$\Gamma(\Lambda/\overline{\Lambda}\text{anything})/\Gamma_{\text{total}}$ Γ_{99}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.040±0.005 OUR AVERAGE					
0.038±0.004±0.006	2998	CRAWFORD	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.042±0.005±0.006	943	ALBRECHT	89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.022±0.003±0.0022		[174] ACKERSTAFF	97N	OPAL	$e^+e^- \rightarrow Z$
>0.011		[175] ALAM	83B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

[174] ACKERSTAFF 97N assumes B($b \rightarrow B$) = 0.868 ± 0.041, *i.e.*, an admixture of B^0, $B^\pm$, and B_s.

[175] ALAM 83B reported their result as $> 0.022 \pm 0.007 \pm 0.004$. Values are for (B($\Lambda$X)+B($\overline{\Lambda}$X))/2. Data are consistent with equal yields of p and $\overline{p}$. Using assumed yields below cut, B($B \rightarrow \Lambda$X) = 0.03.

$\Gamma(\Lambda\text{anything})/\Gamma(\overline{\Lambda}\text{anything})$ $\Gamma_{100}/\Gamma_{101}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.43±0.09±0.07	[176] AMMAR	97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[176] AMMAR 97 uses a high-momentum lepton tag ($P_\ell > 1.4$ GeV/c^2).

$\Gamma(\Xi^-/\overline{\Xi}^+\text{ anything})/\Gamma_{\text{total}}$ Γ_{102}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0027±0.0006 OUR AVERAGE					
0.0027±0.0005±0.0004	147	CRAWFORD	92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.0028±0.0014	54	ALBRECHT	89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(\text{baryons anything})/\Gamma_{\text{total}}$ — Γ_{103}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.068±0.005±0.003	[177] ALBRECHT	92O	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.076±0.014	[178] ALBRECHT	89K	ARG	$e^+e^- \to \Upsilon(4S)$

[177] ALBRECHT 92O result is from simultaneous analysis of p and Λ yields, $p\overline{p}$ and $\Lambda\overline{p}$ correlations, and various lepton-baryon and lepton-baryon-antibaryon correlations. Supersedes ALBRECHT 89K.

[178] ALBRECHT 89K obtain this result by adding their their measurements (5.5 ± 1.6)% for direct protons and (4.2 ± 0.5 ± 0.6)% for inclusive Λ production. They then assume (5.5 ± 1.6)% for neutron production and add it in also. Since each B decay has two baryons, they divide by 2 to obtain (7.6 ± 1.4)%.

$\Gamma(p\overline{p}\text{anything})/\Gamma_{\text{total}}$ — Γ_{104}/Γ

Includes p and $\overline{p}$ from Λ and $\overline{\Lambda}$ decay.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0247±0.0023 OUR AVERAGE					
0.024 ±0.001 ±0.004		CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.025 ±0.002 ±0.002	918	ALBRECHT	89K	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(p\overline{p}\text{anything})/\Gamma(p/\overline{p}\text{anything})$ — Γ_{104}/Γ_{97}

Includes p and $\overline{p}$ from Λ and $\overline{\Lambda}$ decay.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.30±0.02±0.05	[179] CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$

[179] CRAWFORD 92 value is not independent of their $\Gamma(p\overline{p}\text{anything})/\Gamma_{\text{total}}$ value.

$\Gamma(\Lambda\overline{p}/\overline{\Lambda}p\text{anything})/\Gamma_{\text{total}}$ — Γ_{105}/Γ

Includes p and $\overline{p}$ from Λ and $\overline{\Lambda}$ decay.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.025±0.004 OUR AVERAGE					
0.029±0.005±0.005		CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.023±0.004±0.003	165	ALBRECHT	89K	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\Lambda\overline{p}/\overline{\Lambda}p\text{anything})/\Gamma(\Lambda/\overline{\Lambda}\text{anything})$ — Γ_{105}/Γ_{99}

Includes p and $\overline{p}$ from Λ and $\overline{\Lambda}$ decay.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.76±0.11±0.08	[180] CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$

[180] CRAWFORD 92 value is not independent of their $[\Gamma(\Lambda\overline{p}\text{anything})+\Gamma(\overline{\Lambda}p\text{anything})]/\Gamma_{\text{total}}$ value.

$\Gamma(\Lambda\overline{\Lambda}\text{anything})/\Gamma_{\text{total}}$ — Γ_{106}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.005	90		CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.0088	90	12	ALBRECHT	89K	ARG	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\Lambda\overline{\Lambda}\text{anything})/\Gamma(\Lambda/\overline{\Lambda}\text{anything})$ Γ_{106}/Γ_{99}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.13	90	[181] CRAWFORD	92	CLEO	$e^+e^- \to \Upsilon(4S)$

[181] CRAWFORD 92 value is not independent of their $\Gamma(\Lambda\overline{\Lambda}\text{anything})/\Gamma_{total}$ value.

$\Gamma(se^+e^-)/\Gamma_{total}$ Γ_{107}/Γ

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
4.7 ±1.3 OUR AVERAGE					
$4.04\pm1.30^{+0.87}_{-0.83}$		[182] IWASAKI	05	BELL	$e^+e^- \to \Upsilon(4S)$
$6.0 \pm1.7 \pm1.3$		[183] AUBERT,B	04I	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.0 \pm2.3 ^{+1.3}_{-1.1}$		[183] KANEKO	03	BELL	Repl. by IWASAKI 05
< 57	90	GLENN	98	CLEO	$e^+e^- \to \Upsilon(4S)$
<50000	90	BEBEK	81	CLEO	$e^+e^- \to \Upsilon(4S)$

[182] Requires $M_{\ell^+\ell^-} > 0.2$ GeV/c^2.
[183] Requires $M_{e^+e^-} > 0.2$ GeV/c^2.

$\Gamma(s\mu^+\mu^-)/\Gamma_{total}$ Γ_{108}/Γ

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
4.3 ±1.2 OUR AVERAGE					
$4.13\pm1.05^{+0.85}_{-0.81}$		[184] IWASAKI	05	BELL	$e^+e^- \to \Upsilon(4S)$
$5.0 \pm2.8 \pm1.2$		AUBERT,B	04I	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$7.9 \pm2.1 ^{+2.1}_{-1.5}$		KANEKO	03	BELL	Repl. by IWASAKI 05
< 58	90	GLENN	98	CLEO	$e^+e^- \to \Upsilon(4S)$
<17000	90	CHADWICK	81	CLEO	$e^+e^- \to \Upsilon(4S)$

[184] Requires $M_{\ell^+\ell^-} > 0.2$ GeV/c^2.

$[\Gamma(se^+e^-)+\Gamma(s\mu^+\mu^-)]/\Gamma_{total}$ $(\Gamma_{107}+\Gamma_{108})/\Gamma$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.2 × 10^{-5}	90	GLENN	98	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0024	90	[185] BEAN	87	CLEO	Repl. by GLENN 98
<0.0062	90	[186] AVERY	84	CLEO	Repl. by BEAN 87

[185] BEAN 87 reports $[(\mu^+\mu^-)+(e^+e^-)]/2$ and we converted it.
[186] Determine ratio of B^+ to B^0 semileptonic decays to be in the range 0.25–2.9.

$\Gamma(s\ell^+\ell^-)/\Gamma_{total}$ Γ_{109}/Γ

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

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
4.5 ±1.0 OUR AVERAGE				
$4.11 \pm 0.83^{+0.85}_{-0.81}$	[187] IWASAKI	05	BELL	$e^+e^- \to \Upsilon(4S)$
$5.6 \pm 1.5 \pm 1.3$	[188] AUBERT,B	04I	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$6.1 \pm 1.4\ ^{+1.4}_{-1.1}$	[188] KANEKO	03	BELL	Repl. by IWASAKI 05

[187] Requires $M_{\ell^+\ell^-} > 0.2$ GeV/c^2.
[188] Requires $M_{e^+e^-} > 0.2$ GeV/c^2.

$\Gamma(K e^+ e^-)/\Gamma_{total}$ Γ_{110}/Γ

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

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
$3.8^{+0.8}_{-0.7}$ OUR AVERAGE					
$3.3^{+0.9}_{-0.8} \pm 0.2$		[189] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$4.8^{+1.5}_{-1.3} \pm 0.3$		[189,190] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$7.4^{+1.8}_{-1.6} \pm 0.5$		[189] AUBERT	03U	BABR	Repl. by AUBERT,B 06J
<13	90	ABE	02	BELL	Repl. by ISHIKAWA 03

[189] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[190] The second error is a total of systematic uncertainties including model dependence.

$\Gamma(K^*(892) e^+ e^-)/\Gamma_{total}$ Γ_{111}/Γ

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

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
11.3±2.7 OUR AVERAGE					
$9.7^{+3.0}_{-2.7} \pm 1.4$		[191] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$14.9^{+5.2}_{-4.6}{}^{+1.2}_{-1.3}$		[192] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$9.8^{+5.0}_{-4.2} \pm 1.1$		[191] AUBERT	03U	BABR	Repl. by AUBERT,B 06J
<56	90	ABE	02	BELL	Repl. by ISHIKAWA 03

[191] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[192] Assumes equal production of B^0 and B^+ at $\Upsilon(4S)$. The second error is a total of systematic uncertainties including model dependence.

$\Gamma(K\mu^+\mu^-)/\Gamma_{total}$ — Γ_{112}/Γ

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

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
$4.2^{+0.9}_{-0.8}$ OUR AVERAGE				
$3.5^{+1.3}_{-1.1}\pm0.3$	[193] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$4.8^{+1.2}_{-1.1}\pm0.4$	[193,194] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4.5^{+2.3}_{-1.9}\pm0.4$	[193] AUBERT	03U	BABR	Repl. by AUBERT,B 06J
$9.9^{+4.0}_{-3.2}{}^{+1.3}_{-1.0}$	ABE	02	BELL	Repl. by ISHIKAWA 03

[193] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[194] The second error is a total of systematic uncertainties including model dependence.

$\Gamma(K\mu^+\mu^-)/\Gamma(Ke^+e^-)$ — $\Gamma_{112}/\Gamma_{110}$

VALUE	DOCUMENT ID		TECN	COMMENT
1.06±0.48±0.08	AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K^*(892)\mu^+\mu^-)/\Gamma_{total}$ — Γ_{113}/Γ

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

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
$10.3^{+2.6}_{-2.3}$ OUR AVERAGE					
$8.8^{+3.5}_{-3.0}\pm1.2$		[195] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$11.7^{+3.6}_{-3.1}\pm1.0$		[196] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$12.7^{+7.6}_{-6.1}\pm1.6$		[195] AUBERT	03U	BABR	Repl. by AUBERT,B 06J
<31	90	ABE	02	BELL	Repl. by ISHIKAWA 03

[195] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[196] Assumes equal production of B^0 and B^+ at $\Upsilon(4S)$. The second error is a total of systematic uncertainties including model dependence.

$\Gamma(K^*(892)\mu^+\mu^-)/\Gamma(K^*(892)e^+e^-)$ — $\Gamma_{113}/\Gamma_{111}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.91±0.45±0.06	AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$

$\Gamma(K\ell^+\ell^-)/\Gamma_{total}$ — Γ_{114}/Γ

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

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
3.9±0.7 OUR AVERAGE	Error includes scale factor of 1.2.				
3.4±0.7±0.2		[197] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$4.8^{+1.0}_{-0.9}\pm0.3$		[198] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$

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

$6.5^{+1.4}_{-1.3}\pm0.4$		[199] AUBERT	03U	BABR	Repl. by AUBERT,B 06J
$7.5^{+2.5}_{-2.1}\pm0.6$		[200] ABE	02	BELL	Repl. by ISHIKAWA 03
$<$ 5.1	90	[197] AUBERT	02L	BABR	$e^+e^- \to \Upsilon(4S)$
$<$17	90	[201] ANDERSON	01B	CLE2	$e^+e^- \to \Upsilon(4S)$

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

[198] Assumes equal production rate for charge and neutral B meson pairs, isospin invariance, lepton universality for $B \to K\ell^+\ell^-$, and B($B \to K^*(892)\mu^+\mu^-$) = 1.33. The second error is total systematic uncertainties including model dependence.

[199] Assumes all four $B \to K\ell^+\ell^-$ modes having equal partial widths in the fit.

[200] Assumes lepton universality.

[201] The result is for di-lepton masses above 0.5 GeV.

$\Gamma(K^*(892)\ell^+\ell^-)/\Gamma_{total}$ Γ_{115}/Γ

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

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
9.4±1.8 OUR AVERAGE	Error includes scale factor of 1.1.				
$7.8^{+1.9}_{-1.7}\pm1.1$		[202] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$11.5^{+2.6}_{-2.4}\pm0.8$		[203] ISHIKAWA	03	BELL	$e^+e^- \to \Upsilon(4S)$

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

$8.8^{+3.3}_{-2.9}\pm1.0$		[204] AUBERT	03U	BABR	Repl. by AUBERT,B 06J
$<$31	90	[202,205] AUBERT	02L	BABR	Repl. by AUBERT 03U
$<$33	90	[206] ANDERSON	01B	CLE2	$e^+e^- \to \Upsilon(4S)$

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

[203] Assumes equal production rate for charge and neutral B meson pairs, isospin invariance, lepton universality for $B \to K\ell^+\ell^-$, and B($B \to K^*(892)\mu^+\mu^-$) = 1.33. The second error is total systematic uncertainties including model dependence.

[204] Assumes the partial width ratio of electron and muon modes to be $\Gamma(B \to K^*(892)e^+e^-)/\Gamma(B \to K^*(892)\mu^+\mu^-) = 1.33$.

[205] For averaging $K^*(892)\mu^+\mu^-$ and $K^*(892)e^+e^-$ modes, AUBERT 02L assumed $B(B \to K^*(892)e^+e^-)/B(B \to K^*(892)\mu^+\mu^-) = 1.2$.

[206] The result is for di-lepton masses above 0.5 GeV.

$\Gamma(e^\pm\mu^\mp s)/\Gamma_{total}$ Γ_{116}/Γ

Test for lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.2 \times 10^{-5}$	90	GLENN	98	CLEO	$e^+e^- \to \Upsilon(4S)$

$\Gamma(\pi e^\pm\mu^\mp)/\Gamma_{total}$ Γ_{117}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.6 \times 10^{-6}$	90	[207] EDWARDS	02B	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\rho e^{\pm}\mu^{\mp})/\Gamma_{total}$ — Γ_{118}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<3.2 × 10^{-6}	90	[208] EDWARDS 02B	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K e^{\pm}\mu^{\mp})/\Gamma_{total}$ — Γ_{119}/Γ

Test of lepton family number conservation.

VALUE (units 10^{-7})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.38	90	[209] AUBERT,B 06J	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<16	90	[209] EDWARDS 02B	CLE2	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(K^*(892) e^{\pm}\mu^{\mp})/\Gamma_{total}$ — Γ_{120}/Γ

Test of lepton family number conservation.

VALUE (units 10^{-7})	CL%	DOCUMENT ID	TECN	COMMENT
< 5.1	90	[210] AUBERT,B 06J	BABR	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<62	90	[210] EDWARDS 02B	CLE2	$e^+e^- \to \Upsilon(4S)$

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

CP VIOLATION

A_{CP} is defined as

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

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

$A_{CP}(B \to K^*(892)\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
−0.010±0.028 OUR AVERAGE			
−0.013±0.036±0.010	[211] AUBERT,BE 04A	BABR	$e^+e^- \to \Upsilon(4S)$
−0.015±0.044±0.012	[212] NAKAO 04	BELL	$e^+e^- \to \Upsilon(4S)$
+0.08 ±0.13 ±0.03	[212] COAN 00	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
−0.044±0.076±0.012	[213] AUBERT 02C	BABR	Repl. by AUBERT,BE 04A

[211] Corresponds to a 90% CL allowed region, $-0.074 < A_{CP} < 0.049$.
[212] Assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$.
[213] A 90% CL range is $-0.170 < A_{CP} < 0.082$.

$A_{CP}(B \to s\gamma)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.00 ±0.04 OUR AVERAGE				
0.025±0.050±0.015	[214] AUBERT,B	04E	BABR	$e^+e^- \to \Upsilon(4S)$
0.002±0.050±0.030	[215] NISHIDA	04	BELL	$e^+e^- \to \Upsilon(4S)$
−0.079±0.108±0.022	[216] COAN	01	CLE2	$e^+e^- \to \Upsilon(4S)$

[214] Corresponds to $-0.06 < A_{CP} < +0.11$ at 90% CL.
[215] This measurement is performed inclusively for recoil mass Xs less than 2.1 GeV, which corresponds to $-0.093 < A_{CP} < 0.096$ at 90% CL.
[216] Corresponds to $-0.27 < A_{CP} < 0.10$ at 90% CL.

$A_{CP}(b \to (s+d)\gamma)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.110±0.115±0.017	AUBERT,BE	06B	BABR	$e^+e^- \to \Upsilon(4S)$

$A_{CP}(b \to X_s \ell^+\ell^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.22±0.26±0.02	[217] AUBERT,B	04I	BABR	$e^+e^- \to \Upsilon(4S)$

[217] The final state flavor is determined by the kaon and pion charges where modes with $X_s = K^0_S$, $K^0_S\pi^0$ or $K^0_S\pi^+\pi^-$ are not used.

LEPTON FORWARD-BACKWARD ASYMMETRY IN $B \to K^{(*)}\ell^+\ell^-$ DECAY

The forward-backward angular asymmetry of the lepton pair in $B \to K^{(*)}\ell^+\ell^-$ decay is defined as

$$A_{FB}(s) = \frac{N(cos\theta>0)-N(cos\theta<0)}{N(cos\theta>0)+N(cos\theta<0)},$$

where $s=q^2/m^2_B$, and θ is the angle of the lepton with respect to the flight direction of the B meson, measured in the dilepton rest frame. In addition, the fraction of longitudinal polarization F_L of the K^* and F_S, the relative contribution from scalar and pseudoscalar penguin amplitudes in $B \to K\ell^+\ell^-$, can be measured from the angular distribution of its decay products.

$A_{FB}(B \to K^*\ell^+\ell^-)$ ($q^2 > 0.1$ GeV^2/c^4)

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.50±0.15±0.02		[218] ISHIKAWA	06	BELL	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.55	95	[219] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$

[218] Using an unbinned max. likelihood fits to the M_{bc} distribution in five q^2 bins for $\cos\theta > 0$ and $\cos\theta < 0$.
[219] Results with different q^2 cuts are also reported.

$F_L(B \to K^*\ell^+\ell^-)$ ($q^2 > 0.1$ GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
$0.63^{+0.18}_{-0.19}\pm0.05$	[220] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$

[220] Results with different q^2 cuts are also reported.

$A_{FB}(B \to K\ell^+\ell^-)$ (q^2 > 0.1 GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
0.11±0.12 OUR AVERAGE				
$0.15^{+0.21}_{-0.23}\pm0.08$	[221] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$
$0.10\pm0.14\pm0.01$	[222] ISHIKAWA	06	BELL	$e^+e^- \to \Upsilon(4S)$

[221] Results with different q^2 cuts are also reported.
[222] Using an unbinned max. likelihood fits to the M_{bc} distribution in five q^2 bins for $\cos\theta > 0$ and $\cos\theta < 0$.

$F_S(B \to K\ell^+\ell^-)$ (q^2 > 0.1 GeV^2/c^4)

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.81^{+0.58}_{-0.61}\pm0.46}$	[223] AUBERT,B	06J	BABR	$e^+e^- \to \Upsilon(4S)$

[223] Results with different q^2 cuts are also reported.

ISOSPIN ASYMMETRY

Δ_{0-} is defined as

$$\frac{\Gamma(B^0 \to f_d) - \Gamma(B^+ \to f_u)}{\Gamma(B^0 \to f) + \Gamma(B^+ \to f)},$$

the isospin asymmetry of inclusive neutral and charged B decay.

$\Delta_{0-}(B(B \to X_s\gamma))$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.006±0.058±0.026	AUBERT,B	05R	BABR	$e^+e^- \to \Upsilon(4S)$

$B \to X_c\ell\nu$ HADRONIC MASS MOMENTS

$\langle M_X^2 - \overline{M}_D^2 \rangle$ (First Moments)

VALUE (GeV^2)	DOCUMENT ID		TECN	COMMENT
0.36 ±0.08 OUR AVERAGE	Error includes scale factor of 1.8.			
0.467±0.038±0.068	[224] ACOSTA	05F	CDF	$p\overline{p}$ at 1.96 TeV
0.293±0.012±0.058	[225] CSORNA	04	CLE2	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.251±0.023±0.062	[226] CRONIN-HEN..	01B	CLE2	$e^+e^- \to \Upsilon(4S)$

[224] Moments are measured with a minimum lepton momentum of 0.7 GeV/c in the B rest frame;
[225] Uses minimum lepton energy of 1.5 GeV and also reports moments with E_ℓ > 1.0 GeV.
[226] The leptons are required to have $P_\ell > 1.5$ GeV/c.

$\langle M_X^2 \rangle$ (First Moments)

VALUE (GeV^2)	DOCUMENT ID		TECN	COMMENT
4.156±0.029 OUR AVERAGE				
4.144±0.028±0.022	[227] SCHWANDA	07	BELL	$e^+e^- \to \Upsilon(4S)$
4.18 ±0.04 ±0.03	[227] AUBERT,B	04	BABR	$e^+e^- \to \Upsilon(4S)$

[227] The leptons are required to have $E_\ell > 1.5$ GeV/c.

$\langle (M_X^2 - \overline{M}_X^2)^2 \rangle$ (Second Moments)

VALUE (GeV^4)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.55 ±0.08 OUR AVERAGE				
0.515±0.061±0.064	[228] SCHWANDA	07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.629±0.031±0.143	[229] CSORNA	04	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.05 ±0.26 ±0.13	[230] ACOSTA	05F	CDF	$p\overline{p}$ at 1.96 TeV
0.576±0.048±0.168	[228] CRONIN-HEN..01B		CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[228] The leptons are required to have $E_\ell > 1.5$ GeV/c.

[229] Uses minimum lepton energy of 1.5 GeV and also reports moments with $E_\ell > 1.0$ GeV.

[230] Moments are measured with a minimum lepton momentum of 0.7 GeV/c in the B rest frame;

$\langle (M_X^2 - \overline{M}_D^2)^2 \rangle$ (Second Moments)

VALUE (GeV^4)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.639±0.056±0.178	[231] CRONIN-HEN..01B		CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[231] The leptons are required to have $E_\ell > 1.5$ GeV/c.

$B \rightarrow X_c \ell \nu$ LEPTON MOMENTUM MOMENTS

R_0 ($\Gamma_{E_l > 1.7GeV}$ / $\Gamma_{E_l > 1.5GeV}$)

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.6187±0.0014±0.0016	[232] MAHMOOD	03	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[232] The leptons are required to have E_l >1.5 GeV in the B rest frame.

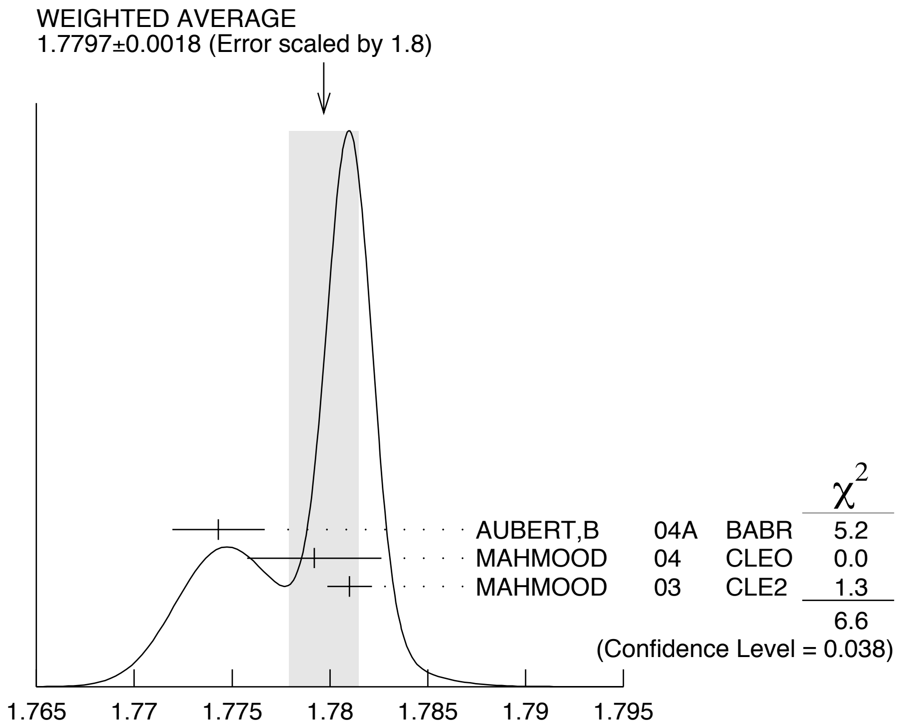
R_1 ($\langle E_l \rangle_{E_l > 1.5GeV}$)

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
1.7797±0.0018 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.				
1.7743±0.0019±0.0014	[233] AUBERT,B	04A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.7792±0.0021±0.0027	[234] MAHMOOD	04	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
1.7810±0.0007±0.0009	[235] MAHMOOD	03	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

[233] The leptons are required to have $E_l > 1.5$ GeV in the B rest frame. The result with $E_l > 0.6$ GeV is also given.

[234] Uses $E_e > 1.5$ GeV and also reports moments with other minimum minimum E_e conditions, as low as $E_e > 0.6$ GeV.

[235] The leptons are required to have E_l >1.5 GeV in the B rest frame.



R_1 ($\langle E_l \rangle_{E_l > 1.5 GeV}$)

R_2 ($\langle E_l^2 - \overline{E}_l^2 \rangle_{E_l > 1.5 GeV}$)

VALUE (10^{-3} GeV^2)	*DOCUMENT ID*		*TECN*	*COMMENT*
30.8±0.8 OUR AVERAGE				
30.3±0.9±0.5	[236] AUBERT,B	04A	BABR	$e^+ e^- \to \Upsilon(4S)$
31.6±0.8±1.0	[237] MAHMOOD	04	CLEO	$e^+ e^- \to \Upsilon(4S)$

[236] The leptons are required to have $E_l > 1.5$ GeV in the B rest frame. The result with $E_l > 0.6$ GeV is also given.

[237] Uses $E_e > 1.5$ GeV and also reports moments with other minimum minimum E_e conditions, as low as $E_e > 0.6$ GeV.

R_3 ($\langle E_l^3 - \overline{E}_l^3 \rangle_{E_l > 1.5 GeV}$)

VALUE (10^{-3} GeV^3)	*DOCUMENT ID*		*TECN*	*COMMENT*
2.12±0.47±0.20	[238] AUBERT,B	04A	BABR	$e^+ e^- \to \Upsilon(4S)$

[238] The leptons are required to have $E_l > 1.5$ GeV in the B rest frame. The result with $E_l > 0.6$ GeV is also given.

$B \to X_s \gamma$ PHOTON ENERGY MOMENTS

$\langle E_\gamma \rangle$

VALUE (GeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2.288±0.025±0.023	[239] AUBERT,BE	06B	BABR	$e^+ e^- \to \Upsilon(4S)$

[239] The result is for $E_\gamma > 1.9$ GeV.

$\langle E_\gamma^2 \rangle - \langle E_\gamma \rangle^2$

VALUE (GeV^2)	DOCUMENT ID		TECN	COMMENT
0.0328±0.0040±0.0043	[240] AUBERT,BE	06B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

[240] The result is for $E_\gamma > 1.9$ GeV.

$B^\pm/B^0$ ADMIXTURE REFERENCES

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AUBERT	07E	PRL 98 051802	B. Aubert et al.	(BABAR Collab.)
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AUBERT	06H	PR D73 012006	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	06J	PR D73 092001	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	06Y	PR D74 091105R	B. Aubert et al.	(BABAR Collab.)
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GOKHROO	06	PRL 97 162002	G. Gokhroo et al.	(BELLE Collab.)
ISHIKAWA	06	PRL 96 251801	A. Ishikawa et al.	(BELLE Collab.)
MOHAPATRA	06	PRL 96 221601	D. Mohapatra et al.	(BELLE Collab.)
ABAZOV	05O	PRL 95 171803	V.M. Abazov et al.	(D0 Collab.)
ACOSTA	05F	PR D71 051103R	D. Acosta et al.	(CDF Collab.)
ARTUSO	05B	PRL 95 261801	M. Artuso et al.	(CLEO Collab.)
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BONVICINI	03	PR D68 011101R	G. Bonvicini et al.	(CLEO Collab.)
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ALAM	95	PRL 74 2885	M.S. Alam *et al.*	(CLEO Collab.)
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ALBRECHT	94C	ZPHY C62 371	H. Albrecht *et al.*	(ARGUS Collab.)
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ALBRECHT	90	PL B234 409	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	90H	PL B249 359	H. Albrecht *et al.*	(ARGUS Collab.)
BORTOLETTO	90	PRL 64 2117	D. Bortoletto *et al.*	(CLEO Collab.)
Also		PR D45 21	D. Bortoletto *et al.*	(CLEO Collab.)
FULTON	90	PRL 64 16	R. Fulton *et al.*	(CLEO Collab.)
MASCHMANN	90	ZPHY C46 555	W.S. Maschmann *et al.*	(Crystal Ball Collab.)
PDG	90	PL B239 1	J.J. Hernandez *et al.*	(IFIC, BOST, CIT+)
ALBRECHT	89K	ZPHY C42 519	H. Albrecht *et al.*	(ARGUS Collab.)
ISGUR	89B	PR D39 799	N. Isgur *et al.*	(TNTO, CIT)
WACHS	89	ZPHY C42 33	K. Wachs *et al.*	(Crystal Ball Collab.)
ALBRECHT	88E	PL B210 263	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	88H	PL B210 258	H. Albrecht *et al.*	(ARGUS Collab.)
KOERNER	88	ZPHY C38 511	J.G. Korner, G.A. Schuler	(MANZ, DESY)
ALAM	87	PRL 59 22	M.S. Alam *et al.*	(CLEO Collab.)
ALAM	87B	PRL 58 1814	M.S. Alam *et al.*	(CLEO Collab.)

ALBRECHT	87D	PL B199 451	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	87H	PL B187 425	H. Albrecht *et al.*	(ARGUS Collab.)
BEAN	87	PR D35 3533	A. Bean *et al.*	(CLEO Collab.)
BEHRENDS	87	PRL 59 407	S. Behrends *et al.*	(CLEO Collab.)
BORTOLETTO	87	PR D35 19	D. Bortoletto *et al.*	(CLEO Collab.)
ALAM	86	PR D34 3279	M.S. Alam *et al.*	(CLEO Collab.)
BALTRUSAIT...	86E	PRL 56 2140	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
BORTOLETTO	86	PRL 56 800	D. Bortoletto *et al.*	(CLEO Collab.)
HAAS	86	PRL 56 2781	J. Haas *et al.*	(CLEO Collab.)
ALBRECHT	85H	PL 162B 395	H. Albrecht *et al.*	(ARGUS Collab.)
CSORNA	85	PRL 54 1894	S.E. Csorna *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.)
CHEN	84	PRL 52 1084	A. Chen *et al.*	(CLEO Collab.)
LEVMAN	84	PL 141B 271	G.M. Levman *et al.*	(CUSB Collab.)
ALAM	83B	PRL 51 1143	M.S. Alam *et al.*	(CLEO Collab.)
GREEN	83	PRL 51 347	J. Green *et al.*	(CLEO Collab.)
KLOPFEN...	83B	PL 130B 444	C. Klopfenstein *et al.*	(CUSB Collab.)
ALTARELLI	82	NP B208 365	G. Altarelli *et al.*	(ROMA, INFN, FRAS)
BRODY	82	PRL 48 1070	A.D. Brody *et al.*	(CLEO Collab.)
GIANNINI	82	NP B206 1	G. Giannini *et al.*	(CUSB Collab.)
BEBEK	81	PRL 46 84	C. Bebek *et al.*	(CLEO Collab.)
CHADWICK	81	PRL 46 88	K. Chadwick *et al.*	(CLEO Collab.)
ABRAMS	80	PRL 44 10	G.S. Abrams *et al.*	(SLAC, LBL)