

# B<sup>±</sup>/B<sup>0</sup> ADMIXTURE

## B DECAY MODES

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

For inclusive branching fractions, *e.g.*,  $B \rightarrow D^\pm$  anything, the treatment of multiple  $D$ 's in the final state must be defined. One possibility would be to count the number of events with one-or-more  $D$ 's and divide by the total number of  $B$ 's. Another possibility would be to count the total number of  $D$ 's and divide by the total number of  $B$ 's, which is the definition of average multiplicity. The two definitions are identical when only one of the specified particles is allowed in the final state. Even though the "one-or-more" definition seems sensible, for practical reasons inclusive branching fractions are almost always measured using the multiplicity definition. For heavy final state particles, authors call their results inclusive branching fractions while for light particles some authors call their results multiplicities. In the  $B$  sections, we list all results as inclusive branching fractions, adopting a multiplicity definition. This means that inclusive branching fractions can exceed 100% and that inclusive partial widths can exceed total widths, just as inclusive cross sections can exceed total cross sections.

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

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level
<b>Semileptonic and leptonic modes</b>		
$\Gamma_1$ $B \rightarrow e^+ \nu_e$ anything	[a] ( 10.41 ± 0.29 ) %	S=1.2
$\Gamma_2$ $B \rightarrow \bar{p} e^+ \nu_e$ anything	< 1.6 × 10 <sup>-3</sup>	CL=90%
$\Gamma_3$ $B \rightarrow \mu^+ \nu_\mu$ anything	[a] ( 10.3 ± 0.5 ) %	
$\Gamma_4$ $B \rightarrow \ell^+ \nu_\ell$ anything	[a,b] ( 10.45 ± 0.21 ) %	
$\Gamma_5$ $B \rightarrow D^- \ell^+ \nu_\ell$ anything	[b] ( 2.7 ± 0.8 ) %	
$\Gamma_6$ $B \rightarrow \bar{D}^0 \ell^+ \nu_\ell$ anything	[b] ( 7.0 ± 1.4 ) %	
$\Gamma_7$ $B \rightarrow D^{*-} \ell^+ \nu_\ell$ anything		
$\Gamma_8$ $B \rightarrow D^{*0} \ell^+ \nu_\ell$ anything		
$\Gamma_9$ $B \rightarrow \bar{D}^{**} \ell^+ \nu_\ell$	[b,c] ( 2.7 ± 0.7 ) %	
$\Gamma_{10}$ $B \rightarrow \bar{D}_1(2420) \ell^+ \nu_\ell$ anything	( 7.4 ± 1.6 ) × 10 <sup>-3</sup>	
$\Gamma_{11}$ $B \rightarrow D \pi \ell^+ \nu_\ell$ anything + $D^* \pi \ell^+ \nu_\ell$ anything	( 2.3 ± 0.4 ) %	
$\Gamma_{12}$ $B \rightarrow \bar{D}_2^*(2460) \ell^+ \nu_\ell$ anything	< 6.5 × 10 <sup>-3</sup>	CL=95%

$\Gamma_{13}$	$B \rightarrow D^{*-} \pi^+ \ell^+ \nu_\ell$ anything	( 1.00 ± 0.34 ) %		
$\Gamma_{14}$	$B \rightarrow D_s^- \ell^+ \nu_\ell$ anything	[b] < 9	$\times 10^{-3}$	CL=90%
$\Gamma_{15}$	$B \rightarrow D_s^- \ell^+ \nu_\ell K^+$ anything	[b] < 6	$\times 10^{-3}$	CL=90%
$\Gamma_{16}$	$B \rightarrow D_s^- \ell^+ \nu_\ell K^0$ anything	[b] < 9	$\times 10^{-3}$	CL=90%
$\Gamma_{17}$	$B \rightarrow \ell^+ \nu_\ell$ noncharmed	[b]		
$\Gamma_{18}$	$B \rightarrow K^+ \ell^+ \nu_\ell$ anything	[b] ( 6.0 ± 0.5 ) %		
$\Gamma_{19}$	$B \rightarrow K^- \ell^+ \nu_\ell$ anything	[b] ( 10 ± 4 ) $\times 10^{-3}$		
$\Gamma_{20}$	$B \rightarrow K^0 / \bar{K}^0 \ell^+ \nu_\ell$ anything	[b] ( 4.4 ± 0.5 ) %		

### D, D\*, or D<sub>s</sub> modes

$\Gamma_{21}$	$B \rightarrow D^\pm$ anything	( 24.1 ± 1.9 ) %		
$\Gamma_{22}$	$B \rightarrow D^0 / \bar{D}^0$ anything	( 63.1 ± 2.9 ) %		S=1.1
$\Gamma_{23}$	$B \rightarrow D^*(2010)^\pm$ anything	( 22.7 ± 1.6 ) %		
$\Gamma_{24}$	$B \rightarrow D^*(2007)^0$ anything	( 26.0 ± 2.7 ) %		
$\Gamma_{25}$	$B \rightarrow D_s^\pm$ anything	[d] ( 10.0 ± 2.5 ) %		
$\Gamma_{26}$	$b \rightarrow c \bar{c} s$	( 22 ± 4 ) %		
$\Gamma_{27}$	$B \rightarrow D_s D, D_s^* D, D_s D^*,$ or $D_s^* D^*$	[d] ( 4.9 ± 1.3 ) %		
$\Gamma_{28}$	$B \rightarrow D^*(2010) \gamma$	< 1.1	$\times 10^{-3}$	CL=90%
$\Gamma_{29}$	$B \rightarrow D_s^+ \pi^-, D_s^{*+} \pi^-, D_s^+ \rho^-,$ $D_s^{*+} \rho^-, D_s^+ \pi^0, D_s^{*+} \pi^0,$ $D_s^+ \eta, D_s^{*+} \eta, D_s^+ \rho^0,$ $D_s^{*+} \rho^0, D_s^+ \omega, D_s^{*+} \omega$	[d] < 5	$\times 10^{-4}$	CL=90%
$\Gamma_{30}$	$B \rightarrow D_{s1}(2536)^+$ anything	< 9.5	$\times 10^{-3}$	CL=90%

### Charmonium modes

$\Gamma_{31}$	$B \rightarrow J/\psi(1S)$ anything	( 1.13 ± 0.06 ) %		
$\Gamma_{32}$	$B \rightarrow J/\psi(1S)$ (direct) anything	( 8.0 ± 0.8 ) $\times 10^{-3}$		
$\Gamma_{33}$	$B \rightarrow \psi(2S)$ anything	( 3.5 ± 0.5 ) $\times 10^{-3}$		
$\Gamma_{34}$	$B \rightarrow \chi_{c1}(1P)$ anything	( 4.2 ± 0.7 ) $\times 10^{-3}$		
$\Gamma_{35}$	$B \rightarrow \chi_{c1}(1P)$ (direct) anything	( 3.7 ± 0.7 ) $\times 10^{-3}$		
$\Gamma_{36}$	$B \rightarrow \chi_{c2}(1P)$ anything	< 3.8	$\times 10^{-3}$	CL=90%
$\Gamma_{37}$	$B \rightarrow \eta_c(1S)$ anything	< 9	$\times 10^{-3}$	CL=90%

### K or K\* modes

$\Gamma_{38}$	$B \rightarrow K^\pm$ anything	[d] ( 78.9 ± 2.5 ) %		
$\Gamma_{39}$	$B \rightarrow K^+$ anything	( 66 ± 5 ) %		
$\Gamma_{40}$	$B \rightarrow K^-$ anything	( 13 ± 4 ) %		
$\Gamma_{41}$	$B \rightarrow K^0 / \bar{K}^0$ anything	[d] ( 64 ± 4 ) %		
$\Gamma_{42}$	$B \rightarrow K^*(892)^\pm$ anything	( 18 ± 6 ) %		
$\Gamma_{43}$	$B \rightarrow K^*(892)^0 / \bar{K}^*(892)^0$ anything	[d] ( 14.6 ± 2.6 ) %		

$\Gamma_{44}$	$B \rightarrow K^*(892)\gamma$			
$\Gamma_{45}$	$B \rightarrow K_1(1400)\gamma$	< 4.1	$\times 10^{-4}$	CL=90%
$\Gamma_{46}$	$B \rightarrow K_2^*(1430)\gamma$	< 8.3	$\times 10^{-4}$	CL=90%
$\Gamma_{47}$	$B \rightarrow K_2(1770)\gamma$	< 1.2	$\times 10^{-3}$	CL=90%
$\Gamma_{48}$	$B \rightarrow K_3^*(1780)\gamma$	< 3.0	$\times 10^{-3}$	CL=90%
$\Gamma_{49}$	$B \rightarrow K_4^*(2045)\gamma$	< 1.0	$\times 10^{-3}$	CL=90%
$\Gamma_{50}$	$B \rightarrow \bar{b} \rightarrow \bar{s}\gamma$	( 2.3 $\pm$ 0.7 )	$\times 10^{-4}$	
$\Gamma_{51}$	$B \rightarrow \bar{b} \rightarrow \bar{s}\text{gluon}$	< 6.8	%	CL=90%

### Light unflavored meson modes

$\Gamma_{52}$	$B \rightarrow \pi^\pm$ anything	[d,e] (359 $\pm$ 7 ) %		
$\Gamma_{53}$	$B \rightarrow \eta$ anything	( 17.6 $\pm$ 1.6 ) %		
$\Gamma_{54}$	$B \rightarrow \rho^0$ anything	( 21 $\pm$ 5 ) %		
$\Gamma_{55}$	$B \rightarrow \omega$ anything	< 81	%	CL=90%
$\Gamma_{56}$	$B \rightarrow \phi$ anything	( 3.5 $\pm$ 0.7 ) %		S=1.8

### Baryon modes

$\Gamma_{57}$	$B \rightarrow \Lambda_c^\pm$ anything	( 6.4 $\pm$ 1.1 ) %		
$\Gamma_{58}$	$B \rightarrow \Lambda_c^+$ anything			
$\Gamma_{59}$	$B \rightarrow \Lambda_c^-$ anything			
$\Gamma_{60}$	$B \rightarrow \Lambda_c^- e^+$ anything	< 3.2	$\times 10^{-3}$	CL=90%
$\Gamma_{61}$	$B \rightarrow \Lambda_c^- p$ anything	( 3.6 $\pm$ 0.7 ) %		
$\Gamma_{62}$	$B \rightarrow \Lambda_c^- p e^+ \nu_e$	< 1.5	$\times 10^{-3}$	CL=90%
$\Gamma_{63}$	$B \rightarrow \bar{\Sigma}_c^{--}$ anything	( 4.2 $\pm$ 2.4 ) $\times 10^{-3}$		
$\Gamma_{64}$	$B \rightarrow \bar{\Sigma}_c^-$ anything	< 9.6	$\times 10^{-3}$	CL=90%
$\Gamma_{65}$	$B \rightarrow \bar{\Sigma}_c^0$ anything	( 4.6 $\pm$ 2.4 ) $\times 10^{-3}$		
$\Gamma_{66}$	$B \rightarrow \bar{\Sigma}_c^0 N (N = p \text{ or } n)$	< 1.5	$\times 10^{-3}$	CL=90%
$\Gamma_{67}$	$B \rightarrow \Xi_c^0$ anything $\times B(\Xi_c^0 \rightarrow \Xi^- \pi^+)$	( 1.4 $\pm$ 0.5 ) $\times 10^{-4}$		
$\Gamma_{68}$	$B \rightarrow \Xi_c^+$ anything $\times B(\Xi_c^+ \rightarrow \Xi^- \pi^+ \pi^+)$	( 4.5 $^{+1.3}_{-1.2}$ ) $\times 10^{-4}$		
$\Gamma_{69}$	$B \rightarrow p/\bar{p}$ anything	[d] ( 8.0 $\pm$ 0.4 ) %		
$\Gamma_{70}$	$B \rightarrow p/\bar{p}$ (direct) anything	[d] ( 5.5 $\pm$ 0.5 ) %		
$\Gamma_{71}$	$B \rightarrow \Lambda/\bar{\Lambda}$ anything	[d] ( 4.0 $\pm$ 0.5 ) %		
$\Gamma_{72}$	$B \rightarrow \Lambda$ anything			
$\Gamma_{73}$	$B \rightarrow \bar{\Lambda}$ anything			
$\Gamma_{74}$	$B \rightarrow \Xi^-/\bar{\Xi}^+$ anything	[d] ( 2.7 $\pm$ 0.6 ) $\times 10^{-3}$		
$\Gamma_{75}$	$B \rightarrow$ baryons anything	( 6.8 $\pm$ 0.6 ) %		
$\Gamma_{76}$	$B \rightarrow p\bar{p}$ anything	( 2.47 $\pm$ 0.23 ) %		
$\Gamma_{77}$	$B \rightarrow \Lambda\bar{p}/\bar{\Lambda}p$ anything	[d] ( 2.5 $\pm$ 0.4 ) %		
$\Gamma_{78}$	$B \rightarrow \Lambda\bar{\Lambda}$ anything	< 5	$\times 10^{-3}$	CL=90%

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

$\Gamma_{79}$	$B \rightarrow e^+ e^- s$	<i>B1</i>	$< 5.7$	$\times 10^{-5}$	CL=90%
$\Gamma_{80}$	$B \rightarrow \mu^+ \mu^- s$	<i>B1</i>	$< 5.8$	$\times 10^{-5}$	CL=90%
$\Gamma_{81}$	$B \rightarrow e^\pm \mu^\mp s$	<i>LF</i>	$< 2.2$	$\times 10^{-5}$	CL=90%

[a] These values are model dependent. See 'Note on Semileptonic Decays' in the  $B^+$  Particle Listings.

[b] An  $\ell$  indicates an  $e$  or a  $\mu$  mode, not a sum over these modes.

[c]  $D^{**}$  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.

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

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

**$B^\pm/B^0$  ADMIXTURE BRANCHING RATIOS**

$\Gamma(\ell^+ \nu_\ell \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_4/\Gamma$

These branching fraction values are model dependent. See the note on "Semileptonic Decays of  $B$  Mesons at the beginning of the  $B^+$  Particle Listings.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.1045 ± 0.0021 OUR AVERAGE</b>	Includes data from the 2 datablocks that follow this one.		
0.108 ± 0.002 ± 0.0056	<sup>1</sup> HENDERSON 92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> HENDERSON 92 measurement employs  $e$  and  $\mu$ . 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.

$\Gamma(e^+ \nu_e \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$

These branching fraction values are model dependent. See the note on "Semileptonic Decays of  $B$  Mesons at the beginning of the  $B^+$  Particle Listings.

VALUE	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.			

<b>0.1041 ± 0.0029 OUR AVERAGE</b>	Error includes scale factor of 1.2.		
0.1049 ± 0.0017 ± 0.0043	<sup>2</sup> BARISH	96B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.097 ± 0.005 ± 0.004	<sup>3</sup> ALBRECHT	93H ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.100 ± 0.004 ± 0.003	<sup>4</sup> YANAGISAWA	91 CSB2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.103 ± 0.006 ± 0.002	<sup>5</sup> ALBRECHT	90H ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.117 ± 0.004 ± 0.010	<sup>6</sup> WACHS	89 CBAL	Direct $e$ at $\Upsilon(4S)$
0.120 ± 0.007 ± 0.005	CHEN	84 CLEO	Direct $e$ at $\Upsilon(4S)$

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

0.132 ± 0.008 ± 0.014	<sup>7</sup> KLOPFEN...	83B CUSB	Direct $e$ at $\Upsilon(4S)$
<sup>2</sup> BARISH 96B analysis performed using tagged semileptonic decays of the $B$ . This technique is almost model independent for the lepton branching ratio.			

- <sup>3</sup> ALBRECHT 93H analysis performed using tagged semileptonic decays of the  $B$ . This technique is almost model independent for the lepton branching ratio.
- <sup>4</sup> 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.
- <sup>5</sup> ALBRECHT 90H uses the model of ALTARELLI 82 to correct over all lepton momenta.  $0.099 \pm 0.006$  is obtained using ISGUR 89B.
- <sup>6</sup> 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.
- <sup>7</sup> Ratio  $\sigma(b \rightarrow e\nu\text{up})/\sigma(b \rightarrow e\nu\text{charm}) < 0.055$  at CL = 90%.

$\Gamma(\mu^+ \nu_\mu \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$   
 These branching fraction values are model dependent. See the note on "Semileptonic Decays of  $B$  Mesons at the beginning of the  $B^+$  Particle Listings.

VALUE DOCUMENT ID TECN COMMENT  
 The data in this block is included in the average printed for a previous datablock.

**0.103±0.005 OUR AVERAGE**

0.100±0.006±0.002	<sup>8</sup> ALBRECHT	90H ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.108±0.006±0.01	CHEN	84 CLEO	Direct $\mu$ at $\Upsilon(4S)$
0.112±0.009±0.01	LEVMAN	84 CUSB	Direct $\mu$ at $\Upsilon(4S)$

- <sup>8</sup> ALBRECHT 90H uses the model of ALTARELLI 82 to correct over all lepton momenta.  $0.097 \pm 0.006$  is obtained using ISGUR 89B.

$\Gamma(\bar{p}e^+ \nu_e \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.0016	90	ALBRECHT	90H ARG	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(D^- \ell^+ \nu_\ell \text{ anything})/\Gamma(\ell^+ \nu_\ell \text{ anything})$   $\Gamma_5/\Gamma_4$   
 $\ell = e$  or  $\mu$ .

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.26±0.07±0.04	<sup>9</sup> FULTON	91 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

- <sup>9</sup> FULTON 91 uses  $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.1 \pm 1.3 \pm 0.4)\%$  as measured by MARK III.

$\Gamma(\bar{D}^0 \ell^+ \nu_\ell \text{ anything})/\Gamma(\ell^+ \nu_\ell \text{ anything})$   $\Gamma_6/\Gamma_4$   
 $\ell = e$  or  $\mu$ .

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.67±0.09±0.10	<sup>10</sup> FULTON	91 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

- <sup>10</sup> FULTON 91 uses  $B(D^0 \rightarrow K^- \pi^+) = (4.2 \pm 0.4 \pm 0.4)\%$  as measured by MARK III.

$\Gamma(D^{*-} \ell^+ \nu_\ell \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_7/\Gamma$

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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- • • We do not use the following data for averages, fits, limits, etc. • • •

0.6±0.3±0.1	<sup>11</sup> BARISH	95 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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- <sup>11</sup> BARISH 95 use  $B(D^0 \rightarrow K^- \pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$  and  $B(D^{*+} \rightarrow D^0 \pi^+) = (68.1 \pm 1.0 \pm 1.3)\%$ .

$$\Gamma(D^{*0}\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}} \qquad \Gamma_8/\Gamma$$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.6 \pm 0.6 \pm 0.1$	<sup>12</sup> BARISH	95	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
<sup>12</sup> BARISH 95 use $B(D^0 \rightarrow K^-\pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$ , $B(D^{*+} \rightarrow D^0\pi^+) = (68.1 \pm 1.0 \pm 1.3)\%$ , $B(D^{*0} \rightarrow D^0\pi^0) = (63.6 \pm 2.3 \pm 3.3)\%$ .			

$$\Gamma(\overline{D}^{**}\ell^+\nu_\ell)/\Gamma_{\text{total}} \qquad \Gamma_9/\Gamma$$

$D^{**}$  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  $\mu$ , not sum over  $e$  and  $\mu$  modes.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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<b><math>0.027 \pm 0.005 \pm 0.005</math></b>		63	<sup>13</sup> ALBRECHT	93	ARG $e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$<0.028$	95		<sup>14</sup> BARISH	95	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
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<sup>13</sup> ALBRECHT 93 assumes the GISW model to correct for unseen modes. Using the BHKT model, the result becomes  $0.023 \pm 0.006 \pm 0.004$ . 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  $\mu$  value.

<sup>14</sup> BARISH 95 use  $B(D^0 \rightarrow K^-\pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$ , assume all nonresonant channels are zero, and use GISW model for relative abundances of  $D^{**}$  states.

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

VALUE	DOCUMENT ID	TECN	COMMENT
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<b><math>0.0074 \pm 0.0016</math></b>	<sup>15</sup> BUSKULIC	97B	ALEP $e^+e^- \rightarrow Z$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

seen	<sup>16</sup> BUSKULIC	95B	ALEP Repl. by BUSKULIC 97B
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<sup>15</sup> BUSKULIC 97B assumes  $B(D_1(2420) \rightarrow D^*\pi) = 1$ ,  $B(D_1(2420) \rightarrow D^*\pi^\pm) = 2/3$ , and  $B(b \rightarrow B) = 0.378 \pm 0.022$ .

<sup>16</sup> BUSKULIC 95B reports  $f_B \times B(B \rightarrow \overline{D}_1(2420)^0\ell^+\nu_\ell\text{anything}) \times B(\overline{D}_1(2420)^0 \rightarrow \overline{D}^*(2010)^-\pi^+) = (2.04 \pm 0.58 \pm 0.34)10^{-3}$ , where  $f_B$  is the production fraction for a single  $B$  charge state.

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

VALUE	DOCUMENT ID	TECN	COMMENT
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<b><math>0.0226 \pm 0.0029 \pm 0.0033</math></b>	<sup>17</sup> BUSKULIC	97B	ALEP $e^+e^- \rightarrow Z$
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<sup>17</sup> BUSKULIC 97B assumes  $B(b \rightarrow B) = 0.378 \pm 0.022$  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  $\Lambda_b^0$ .

$$\Gamma(\bar{D}_2^*(2460)\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}} \quad \Gamma_{12}/\Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.0065</b>	95	18 BUSKULIC	97B ALEP	$e^+e^- \rightarrow Z$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

not seen		19 BUSKULIC	95B ALEP	$e^+e^- \rightarrow Z$
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<sup>18</sup> A revised number based on BUSKULIC 97B which assumes  $B(D_2^*(2460) \rightarrow D^*\pi^\pm) = 0.20$  and  $B(b \rightarrow B) = 0.378 \pm 0.022$ .

<sup>19</sup> BUSKULIC 95B reports  $f_B \times B(B \rightarrow \bar{D}_2^*(2460)^0\ell^+\nu_\ell\text{anything}) \times B(\bar{D}_2^*(2460)^0 \rightarrow \bar{D}^*(2010)^-\pi^+) \leq 0.81 \times 10^{-3}$  at CL=95%, where  $f_B$  is the production fraction for a single  $B$  charge state.

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

Includes resonant and nonresonant contributions.

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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<b>10.0 ± 2.7 ± 2.1</b>	20 BUSKULIC	95B ALEP	$e^+e^- \rightarrow Z$
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<sup>20</sup> BUSKULIC 95B reports  $f_B \times B(B \rightarrow \bar{D}^*(2010)^-\pi^+\ell^+\nu_\ell\text{anything}) = (3.7 \pm 1.0 \pm 0.7)10^{-3}$ . Above value assumes  $f_B = 0.37 \pm 0.03$ .

$$\Gamma(D_s^-\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}} \quad \Gamma_{14}/\Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.009</b>	90	21 ALBRECHT	93E ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>21</sup> ALBRECHT 93E reports  $< 0.012$  for  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ . We rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ .

$$\Gamma(D_s^-\ell^+\nu_\ell K^+\text{anything})/\Gamma_{\text{total}} \quad \Gamma_{15}/\Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.006</b>	90	22 ALBRECHT	93E ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>22</sup> ALBRECHT 93E reports  $< 0.008$  for  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ . We rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ .

$$\Gamma(D_s^-\ell^+\nu_\ell K^0\text{anything})/\Gamma_{\text{total}} \quad \Gamma_{16}/\Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.009</b>	90	23 ALBRECHT	93E ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>23</sup> ALBRECHT 93E reports  $< 0.012$  for  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ . We rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ .

$$\Gamma(\ell^+\nu_\ell\text{noncharmed})/\Gamma(\ell^+\nu_\ell\text{anything}) \quad \Gamma_{17}/\Gamma_4$$

$\ell$  denotes  $e$  or  $\mu$ , not the sum. These experiments measure this ratio in very limited momentum intervals.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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			24 ALBRECHT	94C ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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		107	25 BARTELT	93B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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		77	26 ALBRECHT	91C ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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		76	27 FULTON	90 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

		41	28	ALBRECHT	90	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<0.04	90		29	BEHREND	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<0.04	90			CHEN	84	CLEO	Direct $e$ at $\Upsilon(4S)$
<0.055	90			KLOPFEN...	83B	CUSB	Direct $e$ at $\Upsilon(4S)$

<sup>24</sup> ALBRECHT 94C find  $\Gamma(b \rightarrow c)/\Gamma(b \rightarrow \text{all}) = 0.99 \pm 0.02 \pm 0.04$ .

<sup>25</sup> 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  $b \rightarrow u\ell\nu_\ell$ . This corresponds to a model-dependent partial branching ratio  $\Delta B_{ub}$  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  $0.056 \pm 0.006$  and  $0.076 \pm 0.008$ , respectively.

<sup>26</sup> ALBRECHT 91C result supersedes ALBRECHT 90. Two events are fully reconstructed providing evidence for the  $b \rightarrow u$  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.

<sup>27</sup> FULTON 90 observe  $76 \pm 20$  excess  $e$  and  $\mu$  (lepton) events in the momentum interval  $p = 2.4\text{--}2.6$  GeV signaling the presence of the  $b \rightarrow u$  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  $B(b \rightarrow c\ell\nu) = 10.2 \pm 0.2 \pm 0.7\%$ .

<sup>28</sup> ALBRECHT 90 observes  $41 \pm 10$  excess  $e$  and  $\mu$  (lepton) events in the momentum interval  $p = 2.3\text{--}2.6$  GeV signaling the presence of the  $b \rightarrow u$  transition. The events correspond to a model-dependent measurement of  $|V_{ub}/V_{cb}| = 0.10 \pm 0.01$ .

<sup>29</sup> 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.

### $\Gamma(K^+ \ell^+ \nu_\ell \text{ anything})/\Gamma(\ell^+ \nu_\ell \text{ anything})$

$\Gamma_{18}/\Gamma_4$

$\ell$  denotes  $e$  or  $\mu$ , not the sum.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.58 ± 0.05 OUR AVERAGE</b>			
0.594 ± 0.021 ± 0.056	ALBRECHT 94C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.54 ± 0.07 ± 0.06	<sup>30</sup> ALAM 87B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>30</sup> ALAM 87B measurement relies on lepton-kaon correlations.

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

$\Gamma_{19}/\Gamma_4$

$\ell$  denotes  $e$  or  $\mu$ , not the sum.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.092 ± 0.035 OUR AVERAGE</b>			
0.086 ± 0.011 ± 0.044	ALBRECHT 94C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.10 ± 0.05 ± 0.02	<sup>31</sup> ALAM 87B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>31</sup> ALAM 87B measurement relies on lepton-kaon correlations.

### $\Gamma(K^0/\bar{K}^0 \ell^+ \nu_\ell \text{ anything})/\Gamma(\ell^+ \nu_\ell \text{ anything})$

$\Gamma_{20}/\Gamma_4$

$\ell$  denotes  $e$  or  $\mu$ , not the sum. Sum over  $K^0$  and  $\bar{K}^0$  states.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.42 ± 0.05 OUR AVERAGE</b>			
0.452 ± 0.038 ± 0.056	<sup>32</sup> ALBRECHT 94C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.39 ± 0.06 ± 0.04	<sup>33</sup> ALAM 87B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>32</sup> ALBRECHT 94C assume a  $K^0/\bar{K}^0$  multiplicity twice that of  $K_S^0$ .

<sup>33</sup> ALAM 87B measurement relies on lepton-kaon correlations.



$\langle n_c \rangle$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.10±0.05</b>	34 GIBBONS	97B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

0.98±0.16±0.12	35 ALAM	87B CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>34</sup> GIBBONS 97B from charm counting using  $B(D_s^+ \rightarrow \phi\pi) = 0.036 \pm 0.009$  and  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = 0.044 \pm 0.006$ .

<sup>35</sup> From the difference between  $K^-$  and  $K^+$  widths. ALAM 87B measurement relies on lepton-kaon correlations. It does not consider the possibility of  $B\bar{B}$  mixing. We have thus removed it from the average.

$\Gamma(D^\pm \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{21}/\Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.241±0.019 OUR AVERAGE</b>				

0.240±0.013 <sup>+0.015</sup> <sub>-0.016</sub>	36 GIBBONS	97B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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0.25 ±0.04 ±0.02	37 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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0.23 ±0.05 <sup>+0.01</sup> <sub>-0.02</sub>	38 ALBRECHT	91H ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.21 ±0.05 ±0.01	20k	39 BORTOLETTO87	CLEO	Sup. by BORTOLETTO 92
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<sup>36</sup> GIBBONS 97B reports  $[B(B \rightarrow D^\pm \text{ anything}) \times B(D^+ \rightarrow K^- \pi^+ \pi^+)] = 0.0216 \pm 0.0008 \pm 0.00082$ . We divide by our best value  $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.0 \pm 0.6) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>37</sup> BORTOLETTO 92 reports  $[B(B \rightarrow D^\pm \text{ anything}) \times B(D^+ \rightarrow K^- \pi^+ \pi^+)] = 0.0226 \pm 0.0030 \pm 0.0018$ . We divide by our best value  $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.0 \pm 0.6) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>38</sup> ALBRECHT 91H reports  $[B(B \rightarrow D^\pm \text{ anything}) \times B(D^+ \rightarrow K^- \pi^+ \pi^+)] = 0.0209 \pm 0.0027 \pm 0.0040$ . We divide by our best value  $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.0 \pm 0.6) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>39</sup> BORTOLETTO 87 reports  $[B(B \rightarrow D^\pm \text{ anything}) \times B(D^+ \rightarrow K^- \pi^+ \pi^+)] = 0.019 \pm 0.004 \pm 0.002$ . We divide by our best value  $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.0 \pm 0.6) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^0/\bar{D}^0 \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{22}/\Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.631±0.029 OUR AVERAGE</b>				Error includes scale factor of 1.1.

0.651±0.025±0.015	40 GIBBONS	97B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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0.60 ±0.05 ±0.01	41 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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0.50 ±0.08 ±0.01	42 ALBRECHT	91H ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.55 ±0.07 ±0.01	21k	43 BORTOLETTO87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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0.62 ±0.19 ±0.01	44 GREEN	83 CLEO	Repl. by BORTOLETTO 87
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<sup>40</sup> GIBBONS 97B reports  $[B(B \rightarrow D^0/\bar{D}^0 \text{ anything}) \times B(D^0 \rightarrow K^- \pi^+)] = 0.0251 \pm 0.0006 \pm 0.00075$ . We divide by our best value  $B(D^0 \rightarrow K^- \pi^+) = (3.85 \pm 0.09) \times 10^{-2}$ .

Our first error is their experiment's error and our second error is the systematic error from using our best value.

41 BORTOLETTO 92 reports  $[B(B \rightarrow D^0/\bar{D}^0 \text{ anything}) \times B(D^0 \rightarrow K^- \pi^+)] = 0.0233 \pm 0.0012 \pm 0.0014$ . We divide by our best value  $B(D^0 \rightarrow K^- \pi^+) = (3.85 \pm 0.09) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

42 ALBRECHT 91H reports  $[B(B \rightarrow D^0/\bar{D}^0 \text{ anything}) \times B(D^0 \rightarrow K^- \pi^+)] = 0.0194 \pm 0.0015 \pm 0.0025$ . We divide by our best value  $B(D^0 \rightarrow K^- \pi^+) = (3.85 \pm 0.09) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

43 BORTOLETTO 87 reports  $[B(B \rightarrow D^0/\bar{D}^0 \text{ anything}) \times B(D^0 \rightarrow K^- \pi^+)] = 0.0210 \pm 0.0015 \pm 0.0021$ . We divide by our best value  $B(D^0 \rightarrow K^- \pi^+) = (3.85 \pm 0.09) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

44 GREEN 83 reports  $[B(B \rightarrow D^0/\bar{D}^0 \text{ anything}) \times B(D^0 \rightarrow K^- \pi^+)] = 0.024 \pm 0.006 \pm 0.004$ . We divide by our best value  $B(D^0 \rightarrow K^- \pi^+) = (3.85 \pm 0.09) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

### $\Gamma(D^*(2010)^\pm \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{23}/\Gamma$

VALUE	EVTs	DOCUMENT ID	TECN	COMMENT
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#### 0.227 ± 0.016 OUR AVERAGE

0.247 ± 0.019 ± 0.01		45 GIBBONS	97B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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0.205 ± 0.019 ± 0.007		46 ALBRECHT	96D ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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0.230 ± 0.028 ± 0.009		47 BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.28 ± 0.05 ± 0.01		48 ALBRECHT	91H ARG	Sup. by AL-BRECHT 96D
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0.22 ± 0.04 <sup>+0.07</sup> / <sub>-0.04</sub>	5200	49 BORTOLETTO87	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
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0.27 ± 0.06 <sup>+0.08</sup> / <sub>-0.06</sub>	510	50 CSORNA	85 CLEO	Repl. by BORTOLETTO 87
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45 GIBBONS 97B reports  $B(B \rightarrow D^*(2010)^+ \text{ anything}) = 0.239 \pm 0.015 \pm 0.014 \pm 0.009$  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.

46 ALBRECHT 96D reports  $B(B \rightarrow D^*(2010)^+ \text{ anything}) = 0.196 \pm 0.019$  using CLEO measured  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.681 \pm 0.01 \pm 0.013$ ,  $B(D^0 \rightarrow K^- \pi^+) = 0.0401 \pm 0.0014$ ,  $B(D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-) = 0.081 \pm 0.005$ . 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.

47 BORTOLETTO 92 reports  $B(B \rightarrow D^*(2010)^+ \text{ anything}) = 0.25 \pm 0.03 \pm 0.04$  using MARK II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$  and  $B(D^0 \rightarrow K^- \pi^+) = 0.042 \pm 0.008$ . 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.

48 ALBRECHT 91H reports  $0.348 \pm 0.060 \pm 0.035$  for  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.55 \pm 0.04$ . We rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (68.3 \pm 1.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Uses the PDG 90  $B(D^0 \rightarrow K^- \pi^+) = 0.0371 \pm 0.0025$ .

49 BORTOLETTO 87 uses old MARK III (BALTRUSAITIS 86E) branching ratios  $B(D^0 \rightarrow K^- \pi^+) = 0.056 \pm 0.004 \pm 0.003$  and also assumes  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) =$

$0.60^{+0.08}_{-0.15}$ . The product branching ratio for  $B(B \rightarrow D^*(2010)^+) B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  is  $0.13 \pm 0.02 \pm 0.012$ . Superseded by BORTOLETTO 92.

<sup>50</sup>  $V-A$  momentum spectrum used to extrapolate below  $p = 1$  GeV. We correct the value assuming  $B(D^0 \rightarrow K^- \pi^+) = 0.042 \pm 0.006$  and  $B(D^{*+} \rightarrow D^0 \pi^+) = 0.6^{+0.08}_{-0.15}$ . The product branching fraction is  $B(B \rightarrow D^{*+} X) \cdot B(D^{*+} \rightarrow \pi^+ D^0) \cdot B(D^0 \rightarrow K^- \pi^+) = (68 \pm 15 \pm 9) \times 10^{-4}$ .

### $\Gamma(D^*(2007)^0 \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{24}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.260 \pm 0.023 \pm 0.015</math></b>	<sup>51</sup> GIBBONS	97B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>51</sup> GIBBONS 97B reports  $B(B \rightarrow D^*(2007)^0 \text{ anything}) = 0.247 \pm 0.012 \pm 0.018 \pm 0.018$  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.

### $\Gamma(D_s^\pm \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{25}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.100 \pm 0.025</math> OUR AVERAGE</b>				

$0.117 \pm 0.009^{+0.028}_{-0.029}$  <sup>52</sup> GIBAUT 96 CLE2  $e^+ e^- \rightarrow \Upsilon(4S)$

$0.081 \pm 0.014^{+0.019}_{-0.020}$  <sup>53</sup> ALBRECHT 92G ARG  $e^+ e^- \rightarrow \Upsilon(4S)$

$0.085 \pm 0.013^{+0.020}_{-0.021}$  <sup>257</sup> <sup>54</sup> BORTOLETTO90 CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

$0.105 \pm 0.028^{+0.025}_{-0.026}$  <sup>55</sup> HAAS 86 CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

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

$0.116 \pm 0.030 \pm 0.028$  <sup>56</sup> ALBRECHT 87H ARG  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>52</sup> GIBAUT 96 reports  $0.1211 \pm 0.0039 \pm 0.0088$  for  $B(D_s^+ \rightarrow \phi \pi^+) = 0.035$ . We rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>53</sup> 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  $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>54</sup> 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  $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>55</sup> 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  $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  $64 \pm 22\%$  decays are 2-body.

<sup>56</sup> 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  $B(D_s^+ \rightarrow \phi \pi^+) = (3.6 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  $46 \pm 16\%$  of  $B \rightarrow D_s X$  decays are 2-body. Superseded by ALBRECHT 92G.

$\Gamma(c\bar{c}s)/\Gamma_{\text{total}}$   $\Gamma_{26}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.219±0.037</b>	57 COAN	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>57</sup> COAN 98 uses  $D$ - $\ell$  correlation.

 $\Gamma(D_s D, D_s^* D, D_s D^*, \text{ or } D_s^* D^*)/\Gamma(D_s^\pm \text{ anything})$   $\Gamma_{27}/\Gamma_{25}$   
 Sum over modes.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.48 ±0.04 OUR AVERAGE</b>			
0.457±0.019±0.037	GIBAUT	96 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.58 ±0.07 ±0.09	ALBRECHT	92G ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.56 ±0.10	BORTOLETTO90	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(D^*(2010)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{28}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.1 × 10<sup>-3</sup></b>	90	58 LESIAK	92 CBAL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>58</sup> 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.

 $\Gamma(D_{s1}(2536)^+ \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{30}/\Gamma$ 

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.0095</b>	90	59 BISHAI	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>59</sup> Assuming factorization, the decay constant  $f_{D_{s1}^+}$  is at least a factor of 2.5 times smaller than  $f_{D_s^+}$ .

 $\Gamma(D_s^+ \pi^-, D_s^{*+} \pi^-, D_s^+ \rho^-, D_s^{*+} \rho^-, D_s^+ \pi^0, D_s^{*+} \pi^0, D_s^+ \eta, D_s^{*+} \eta, D_s^+ \rho^0, D_s^{*+} \rho^0, D_s^+ \omega, D_s^{*+} \omega)/\Gamma_{\text{total}}$   $\Gamma_{29}/\Gamma$   
 Sum over modes.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.0005</b>	90	60 ALEXANDER	93B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>60</sup> ALEXANDER 93B reports  $< 4.8 \times 10^{-4}$  for  $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$ . We rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ . This branching ratio limit provides a model-dependent upper limit  $|V_{ub}|/|V_{cb}| < 0.16$  at CL=90%.

 $\Gamma(J/\psi(1S)\text{anything})/\Gamma_{\text{total}}$   $\Gamma_{31}/\Gamma$ 

VALUE (units 10 <sup>-2</sup> )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1.13±0.06 OUR AVERAGE</b>				
1.11±0.05±0.04	1489	61 BALEST	95B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
1.28±0.44±0.04	27	62 MASCHMANN	90 CBAL	$e^+e^- \rightarrow \Upsilon(4S)$
1.23±0.27±0.04	120	63 ALBRECHT	87D ARG	$e^+e^- \rightarrow \Upsilon(4S)$
1.34±0.24±0.04	52	64 ALAM	86 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4 <sup>+0.6</sup> / <sub>-0.5</sub>	7	65 ALBRECHT	85H ARG	$e^+e^- \rightarrow \Upsilon(4S)$
1.1 ±0.21±0.23	46	66 HAAS	85 CLEO	Repl. by ALAM 86

- <sup>61</sup> BALEST 95B reports  $1.12 \pm 0.04 \pm 0.06$  for  $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0599 \pm 0.0025$ . We rescale to our best value  $B(J/\psi(1S) \rightarrow e^+ e^-) = (6.02 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.. They measure  $J/\psi(1S) \rightarrow e^+ e^-$  and  $\mu^+ \mu^-$  and use PDG 1994 values for the branching fractions. The rescaling is the same for either mode so we use  $e^+ e^-$ .
- <sup>62</sup> MASCHMANN 90 reports  $1.12 \pm 0.33 \pm 0.25$  for  $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.069 \pm 0.009$ . We rescale to our best value  $B(J/\psi(1S) \rightarrow e^+ e^-) = (6.02 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>63</sup> ALBRECHT 87D reports  $1.07 \pm 0.16 \pm 0.22$  for  $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.069 \pm 0.009$ . We rescale to our best value  $B(J/\psi(1S) \rightarrow e^+ e^-) = (6.02 \pm 0.19) \times 10^{-2}$ . 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  $J/\psi$  not from  $\psi(2S)$  to be  $0.0081 \pm 0.0023$ .
- <sup>64</sup> ALAM 86 reports  $1.09 \pm 0.16 \pm 0.21$  for  $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.074 \pm 0.012$ . We rescale to our best value  $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = (6.01 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>65</sup> Statistical and systematic errors were added in quadrature. ALBRECHT 85H also report a CL = 90% limit of 0.007 for  $B \rightarrow J/\psi(1S) + X$  where  $m_X < 1$  GeV.
- <sup>66</sup> Dimuon and dielectron events used.

### $\Gamma(J/\psi(1S)(\text{direct anything})/\Gamma_{\text{total}} \quad \Gamma_{32}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0080 ± 0.0008</b>	<sup>67</sup> BALEST	95B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>67</sup> BALEST 95B assume PDG 1994 values for sub mode branching ratios.  $J/\psi(1S)$  mesons are reconstructed in  $J/\psi(1S) \rightarrow e^+ e^-$  and  $J/\psi(1S) \rightarrow \mu^+ \mu^-$ . The  $B \rightarrow J/\psi(1S) X$  branching ratio contains  $J/\psi(1S)$  mesons directly from  $B$  decays and also from feeddown through  $\psi(2S) \rightarrow J/\psi(1S)$ ,  $\chi_{c1}(1P) \rightarrow J/\psi(1S)$ , or  $\chi_{c2}(1P) \rightarrow J/\psi(1S)$ . Using the measured inclusive rates, BALEST 95B corrects for the feeddown and finds the  $B \rightarrow J/\psi(1S)(\text{direct}) X$  branching ratio.

### $\Gamma(\psi(2S)\text{ anything})/\Gamma_{\text{total}} \quad \Gamma_{33}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0035 ± 0.0005 OUR AVERAGE</b>				
0.0034 ± 0.0004 ± 0.0003	240	<sup>68</sup> BALEST	95B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0046 ± 0.0017 ± 0.0011	8	ALBRECHT	87D ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>68</sup> BALEST 95B assume PDG 1994 values for sub mode branching ratios. They find  $B(B \rightarrow \psi(2S) X, \psi(2S) \rightarrow \ell^+ \ell^-) = 0.30 \pm 0.05 \pm 0.04$  and  $B(B \rightarrow \psi(2S) X, \psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = 0.37 \pm 0.05 \pm 0.05$ . Weighted average is quoted for  $B(B \rightarrow \psi(2S) X)$ .

### $\Gamma(\chi_{c1}(1P)\text{ anything})/\Gamma_{\text{total}} \quad \Gamma_{34}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0042 ± 0.0007 OUR AVERAGE</b>				
0.0040 ± 0.0006 ± 0.0004	112	<sup>69</sup> BALEST	95B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0105 ± 0.0035 ± 0.0025		<sup>70</sup> ALBRECHT	92E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>69</sup> BALEST 95B assume  $B(\chi_{c1}(1P) \rightarrow J/\psi(1S) \gamma) = (27.3 \pm 1.6) \times 10^{-2}$ , the PDG 1994 value. Fit to  $\psi$ -photon invariant mass distribution allows for a  $\chi_{c1}(1P)$  and a  $\chi_{c2}(1P)$  component.

- <sup>70</sup> ALBRECHT 92E assumes no  $\chi_{c2}(1P)$  production.

$\Gamma(\chi_{c1}(1P)(\text{direct}) \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{35}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0037 ± 0.0007</b>	<sup>71</sup> BALEST	95B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>71</sup> BALEST 95B assume PDG 1994 values.  $J/\psi(1S)$  mesons are reconstructed in the  $e^+e^-$  and  $\mu^+\mu^-$  modes. The  $B \rightarrow \chi_{c1}(1P)X$  branching ratio contains  $\chi_{c1}(1P)$  mesons directly from  $B$  decays and also from feeddown through  $\psi(2S) \rightarrow \chi_{c1}(1P)\gamma$ . Using the measured inclusive rates, BALEST 95B corrects for the feeddown and finds the  $B \rightarrow \chi_{c1}(1P)(\text{direct}) X$  branching ratio.

 $\Gamma(\chi_{c2}(1P) \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{36}/\Gamma$ 

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.0038</b>	90	35	<sup>72</sup> BALEST	95B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>72</sup> BALEST 95B assume  $B(\chi_{c2}(1P) \rightarrow J/\psi(1S)\gamma) = (13.5 \pm 1.1) \times 10^{-2}$ , 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  $35 \pm 13$  events correspond to  $B(B \rightarrow \chi_{c2}(1P)X) = (0.25 \pm 0.10 \pm 0.03) \times 10^{-2}$ .

 $\Gamma(\eta_c(1S) \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{37}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.009</b>	90	<sup>73</sup> BALEST	95B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>73</sup> BALEST 95B assume PDG 1994 values for sub mode branching ratios.  $J/\psi(1S)$  mesons are reconstructed in  $J/\psi(1S) \rightarrow e^+e^-$  and  $J/\psi(1S) \rightarrow \mu^+\mu^-$ . Search region  $2960 < m_{\eta_c(1S)} < 3010$  MeV/ $c^2$ .

 $\Gamma(K^\pm \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{38}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.789 ± 0.025 OUR AVERAGE</b>			

0.82 ± 0.01 ± 0.05 ALBRECHT 94C ARG  $e^+e^- \rightarrow \Upsilon(4S)$

0.775 ± 0.015 ± 0.025 <sup>74</sup> ALBRECHT 93I ARG  $e^+e^- \rightarrow \Upsilon(4S)$

0.85 ± 0.07 ± 0.09 ALAM 87B CLEO  $e^+e^- \rightarrow \Upsilon(4S)$

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

seen <sup>75</sup> BRODY 82 CLEO  $e^+e^- \rightarrow \Upsilon(4S)$

seen <sup>76</sup> GIANNINI 82 CUSB  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>74</sup> ALBRECHT 93I value is not independent of the sum of  $B \rightarrow K^+$  anything and  $B \rightarrow K^-$  anything ALBRECHT 94C values.

<sup>75</sup> Assuming  $\Upsilon(4S) \rightarrow B\bar{B}$ , a total of  $3.38 \pm 0.34 \pm 0.68$  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  $(b\text{-quark} \rightarrow c\text{-quark})/(b\text{-quark} \rightarrow \text{all})$  of  $1.09 \pm 0.33 \pm 0.13$ .

<sup>76</sup> GIANNINI 82 at CESR-CUSB observed  $1.58 \pm 0.35 K^0$  per hadronic event much higher than  $0.82 \pm 0.10$  below threshold. Consistent with predominant  $b \rightarrow cX$  decay.

 $\Gamma(K^+ \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{39}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.66 ± 0.05</b>	<sup>77</sup> ALBRECHT	94C ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

0.620 ± 0.013 ± 0.038 <sup>78</sup> ALBRECHT 94C ARG  $e^+e^- \rightarrow \Upsilon(4S)$

0.66 ± 0.05 ± 0.07 <sup>78</sup> ALAM 87B CLEO  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>77</sup> 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  $(18.1 \pm 4.3)\%$ .

<sup>78</sup> Measurement relies on lepton-kaon correlations. It includes production through mixing of the neutral  $B$  meson.

### $\Gamma(K^- \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{40}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.13 ± 0.04</b>	<sup>79</sup> ALBRECHT	94C ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.165 ± 0.011 ± 0.036	<sup>80</sup> ALBRECHT	94C ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.19 ± 0.05 ± 0.02	<sup>80</sup> ALAM	87B CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>79</sup> 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  $(18.1 \pm 4.3)\%$ .

<sup>80</sup> Measurement relies on lepton-kaon correlations. It includes production through mixing of the neutral  $B$  meson.

### $\Gamma(K^0/\bar{K}^0 \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{41}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.64 ± 0.04 OUR AVERAGE</b>			
0.642 ± 0.010 ± 0.042	<sup>81</sup> ALBRECHT	94C ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.63 ± 0.06 ± 0.06	ALAM	87B CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>81</sup> ALBRECHT 94C assume a  $K^0/\bar{K}^0$  multiplicity twice that of  $K_S^0$ .

### $\Gamma(K^*(892)^\pm \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{42}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.182 ± 0.054 ± 0.024</b>	ALBRECHT	94J ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

### $\Gamma(K^*(892)^0/\bar{K}^*(892)^0 \text{ anything})/\Gamma_{\text{total}}$ $\Gamma_{43}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.146 ± 0.016 ± 0.020</b>	ALBRECHT	94J ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

### $\Gamma(K^*(892)\gamma)/\Gamma_{\text{total}}$ $\Gamma_{44}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$< 1.5 \times 10^{-3}$	90	<sup>82</sup> LESIAK	92 CBAL	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 2.4 \times 10^{-4}$	90	ALBRECHT	88H ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>82</sup> 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.

### $\Gamma(K_1(1400)\gamma)/\Gamma_{\text{total}}$ $\Gamma_{45}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>&lt; 4.1 \times 10^{-4}</math></b>	90	ALBRECHT	88H ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$< 1.6 \times 10^{-3}$	90	<sup>83</sup> LESIAK	92 CBAL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>83</sup> 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.

$\Gamma(K_2^*(1430)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{46}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<8.3 \times 10^{-4}$	90	ALBRECHT	88H ARG	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(K_2(1770)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{47}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.2 \times 10^{-3}$	90	<sup>84</sup> LESIAK	92 CBAL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>84</sup> 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.

 $\Gamma(K_3^*(1780)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{48}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.0 \times 10^{-3}$	90	ALBRECHT	88H ARG	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(K_4^*(2045)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{49}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.0 \times 10^{-3}$	90	<sup>85</sup> LESIAK	92 CBAL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>85</sup> 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.

 $\Gamma(\bar{b} \rightarrow \bar{s}\gamma)/\Gamma_{\text{total}}$   $\Gamma_{50}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
$(2.32 \pm 0.57 \pm 0.35) \times 10^{-4}$	ALAM	95 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(\bar{b} \rightarrow \bar{s}\text{gluon})/\Gamma_{\text{total}}$   $\Gamma_{51}/\Gamma$ 

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<0.068$	90		<sup>86</sup> COAN	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

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

$<0.08$	2		<sup>87</sup> ALBRECHT	95D ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>86</sup> COAN 98 uses  $D$ - $l$  correlation.

<sup>87</sup> ALBRECHT 95D use full reconstruction of one  $B$  decay as tag. Two candidate events for charmless  $B$  decay can be interpreted as either  $b \rightarrow s\text{gluon}$  or  $b \rightarrow u$  transition. If interpreted as  $b \rightarrow s\text{gluon}$  they find a branching ratio of  $\sim 0.026$  or the upper limit quoted above. Result is highly model dependent.

 $\Gamma(\pi^\pm \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{52}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
$3.585 \pm 0.025 \pm 0.070$	<sup>88</sup> ALBRECHT	93I ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>88</sup> ALBRECHT 93 excludes  $\pi^\pm$  from  $K_S^0$  and  $\Lambda$  decays. If included, they find  $4.105 \pm 0.025 \pm 0.080$ .

 $\Gamma(\eta \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{53}/\Gamma$ 

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

 $\Gamma(\rho^0 \text{ anything})/\Gamma_{\text{total}}$   $\Gamma_{54}/\Gamma$ 

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



$\Gamma(\omega \text{ anything})/\Gamma_{\text{total}} \qquad \Gamma_{55}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.81</b>	90	ALBRECHT	94J ARG	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(\phi \text{ anything})/\Gamma_{\text{total}} \qquad \Gamma_{56}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.035 ± 0.007 OUR AVERAGE</b>	Error includes scale factor of 1.8.		
0.0390 ± 0.0030 ± 0.0035	ALBRECHT	94J ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.023 ± 0.006 ± 0.005	BORTOLETTO86	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(\Lambda_c^\pm \text{ anything})/\Gamma_{\text{total}} \qquad \Gamma_{57}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.064 ± 0.008 ± 0.008</b>		<sup>89</sup> CRAWFORD	92 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.14 ± 0.09		<sup>90</sup> ALBRECHT	88E ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<0.112	90	<sup>91</sup> ALAM	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>89</sup>CRAWFORD 92 result derived from lepton baryon correlations. Assumes all charmed baryons in  $B^0$  and  $B^\pm$  decay are  $\Lambda_c$ .

<sup>90</sup>ALBRECHT 88E measured  $B(B \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (0.30 \pm 0.12 \pm 0.06)\%$  and used  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (2.2 \pm 1.0)\%$  from ABRAMS 80 to obtain above number.

<sup>91</sup>Assuming all baryons result from charmed baryons, ALAM 86 conclude the branching fraction is  $7.4 \pm 2.9\%$ . The limit given above is model independent.

 $\Gamma(\Lambda_c^+ \text{ anything})/\Gamma(\Lambda_c^- \text{ anything}) \qquad \Gamma_{58}/\Gamma_{59}$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.19 ± 0.13 ± 0.04</b>	<sup>92</sup> AMMAR	97 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>92</sup>AMMAR 97 uses a high-momentum lepton tag ( $P_\ell > 1.4 \text{ GeV}/c^2$ ).

 $\Gamma(\Lambda_c^- e^+ \text{ anything})/\Gamma(\Lambda_c^\pm \text{ anything}) \qquad \Gamma_{60}/\Gamma_{57}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.05</b>	90	<sup>93</sup> BONVICINI	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>93</sup>BONVICINI 98 uses the electron with momentum above 0.6 GeV/c.

 $\Gamma(\Lambda_c^- p \text{ anything})/\Gamma(\Lambda_c^\pm \text{ anything}) \qquad \Gamma_{61}/\Gamma_{57}$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.57 ± 0.05 ± 0.05</b>	BONVICINI	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(\Lambda_c^- p e^+ \nu_e)/\Gamma(\Lambda_c^- p \text{ anything}) \qquad \Gamma_{62}/\Gamma_{61}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.04</b>	90	<sup>94</sup> BONVICINI	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>94</sup>BONVICINI 98 uses the electron with momentum above 0.6 GeV/c.

$$\Gamma(\overline{\Sigma}_c^{--} \text{ anything})/\Gamma_{\text{total}} \qquad \Gamma_{63}/\Gamma$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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<b>0.0042 ± 0.0021 ± 0.0011</b>	77	95 PROCARIO	94 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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95 PROCARIO 94 reports  $[B(B \rightarrow \overline{\Sigma}_c^{--} \text{ anything}) \times B(\Lambda_c^+ \rightarrow p K^- \pi^+)] = 0.00021 \pm 0.00008 \pm 0.00007$ . We divide by our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\overline{\Sigma}_c^- \text{ anything})/\Gamma_{\text{total}} \qquad \Gamma_{64}/\Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 0.010</b>	90	96 PROCARIO	94 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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96 PROCARIO 94 reports  $[B(B \rightarrow \overline{\Sigma}_c^- \text{ anything}) \times B(\Lambda_c^+ \rightarrow p K^- \pi^+)] = < 0.00048$ . We divide by our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.050$ .

$$\Gamma(\overline{\Sigma}_c^0 \text{ anything})/\Gamma_{\text{total}} \qquad \Gamma_{65}/\Gamma$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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<b>0.0046 ± 0.0021 ± 0.0012</b>	76	97 PROCARIO	94 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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97 PROCARIO 94 reports  $[B(B \rightarrow \overline{\Sigma}_c^0 \text{ anything}) \times B(\Lambda_c^+ \rightarrow p K^- \pi^+)] = 0.00023 \pm 0.00008 \pm 0.00007$ . We divide by our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\overline{\Sigma}_c^0 N(N = p \text{ or } n))/\Gamma_{\text{total}} \qquad \Gamma_{66}/\Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 0.0015</b>	90	98 PROCARIO	94 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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98 PROCARIO 94 reports  $< 0.0017$  for  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.043$ . We rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.050$ .

$$\Gamma(\Xi_c^0 \text{ anything} \times B(\Xi_c^0 \rightarrow \Xi^- \pi^+))/\Gamma_{\text{total}} \qquad \Gamma_{67}/\Gamma$$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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<b>0.144 ± 0.048 ± 0.021</b>	99 BARISH	97 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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99 BARISH 97 find  $79 \pm 27 \Xi_c^0$  events.

$$\Gamma(\Xi_c^+ \text{ anything} \times B(\Xi_c^+ \rightarrow \Xi^- \pi^+ \pi^+))/\Gamma_{\text{total}} \qquad \Gamma_{68}/\Gamma$$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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<b>0.453 ± 0.096<sup>+0.085</sup><sub>-0.065</sub></b>	100 BARISH	97 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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100 BARISH 97 find  $125 \pm 28 \Xi_c^+$  events.

$\Gamma(p/\bar{p}\text{anything})/\Gamma_{\text{total}}$   $\Gamma_{69}/\Gamma$ 

 Includes  $p$  and  $\bar{p}$  from  $\Lambda$  and  $\bar{\Lambda}$  decay.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.080±0.004 OUR AVERAGE</b>				
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±0.005 <sup>+0.013</sup> <sub>-0.010</sub>	2163	<sup>101</sup> ALBRECHT 89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

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

>0.021 <sup>102</sup>ALAM 83B CLEO  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>101</sup>ALBRECHT 89K include direct and nondirect protons.

<sup>102</sup>ALAM 83B reported their result as  $> 0.036 \pm 0.006 \pm 0.009$ . Data are consistent with equal yields of  $p$  and  $\bar{p}$ . Using assumed yields below cut,  $B(B \rightarrow p+X) = 0.03$  not including protons from  $\Lambda$  decays.

 $\Gamma(p/\bar{p}(\text{direct})\text{anything})/\Gamma_{\text{total}}$   $\Gamma_{70}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.055±0.005 OUR AVERAGE</b>				
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	<sup>103</sup> ALBRECHT 89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>103</sup>ALBRECHT 89K subtract contribution of  $\Lambda$  decay from the inclusive proton yield.

 $\Gamma(\Lambda/\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$   $\Gamma_{71}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.040±0.005 OUR AVERAGE</b>				
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 <sup>104</sup>ACKERSTAFF 97N OPAL  $e^+e^- \rightarrow Z$

>0.011 <sup>105</sup>ALAM 83B CLEO  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>104</sup>ACKERSTAFF 97N assumes  $B(b \rightarrow B) = 0.868 \pm 0.041$ , i.e., an admixture of  $B^0$ ,  $B^\pm$ , and  $B_s$ .

<sup>105</sup>ALAM 83B reported their result as  $> 0.022 \pm 0.007 \pm 0.004$ . Values are for  $(B(\Lambda X)+B(\bar{\Lambda} X))/2$ . Data are consistent with equal yields of  $p$  and  $\bar{p}$ . Using assumed yields below cut,  $B(B \rightarrow \Lambda X) = 0.03$ .

 $\Gamma(\Lambda\text{anything})/\Gamma(\bar{\Lambda}\text{anything})$   $\Gamma_{72}/\Gamma_{73}$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.43±0.09±0.07</b>	<sup>106</sup> AMMAR 97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>106</sup>AMMAR 97 uses a high-momentum lepton tag ( $P_\ell > 1.4 \text{ GeV}/c^2$ ).

 $\Gamma(\Xi^-/\Xi^+\text{anything})/\Gamma_{\text{total}}$   $\Gamma_{74}/\Gamma$ 

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

$\Gamma(\text{baryons anything})/\Gamma_{\text{total}}$ 
 $\Gamma_{75}/\Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.068 ± 0.005 ± 0.003</b>	<sup>107</sup> ALBRECHT 92O	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.076 ± 0.014	<sup>108</sup> ALBRECHT 89K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>107</sup> ALBRECHT 92O result is from simultaneous analysis of $p$ and $\Lambda$ yields, $p\bar{p}$ and $\Lambda\bar{\Lambda}$ correlations, and various lepton-baryon and lepton-baryon-antibaryon correlations. Supersedes ALBRECHT 89K.			
<sup>108</sup> ALBRECHT 89K obtain this result by adding their their measurements ( $5.5 \pm 1.6$ )% for direct protons and ( $4.2 \pm 0.5 \pm 0.6$ )% for inclusive $\Lambda$ production. They then assume ( $5.5 \pm 1.6$ )% for neutron production and add it in also. Since each $B$ decay has two baryons, they divide by 2 to obtain ( $7.6 \pm 1.4$ )%.			

 $\Gamma(p\bar{p}\text{anything})/\Gamma_{\text{total}}$ 
 $\Gamma_{76}/\Gamma$ 

 Includes  $p$  and  $\bar{p}$  from  $\Lambda$  and  $\bar{\Lambda}$  decay.

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

 $\Gamma(p\bar{p}\text{anything})/\Gamma(p/\bar{p}\text{anything})$ 
 $\Gamma_{76}/\Gamma_{69}$ 

 Includes  $p$  and  $\bar{p}$  from  $\Lambda$  and  $\bar{\Lambda}$  decay.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.30 ± 0.02 ± 0.05	<sup>109</sup> CRAWFORD 92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>109</sup> CRAWFORD 92 value is not independent of their $\Gamma(p\bar{p}\text{anything})/\Gamma_{\text{total}}$ value.			

 $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$ 
 $\Gamma_{77}/\Gamma$ 

 Includes  $p$  and  $\bar{p}$  from  $\Lambda$  and  $\bar{\Lambda}$  decay.

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

 $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma(\Lambda/\bar{\Lambda}\text{anything})$ 
 $\Gamma_{77}/\Gamma_{71}$ 

 Includes  $p$  and  $\bar{p}$  from  $\Lambda$  and  $\bar{\Lambda}$  decay.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.76 ± 0.11 ± 0.08	<sup>110</sup> CRAWFORD 92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>110</sup> CRAWFORD 92 value is not independent of their $[\Gamma(\Lambda\bar{p}\text{anything}) + \Gamma(\bar{\Lambda}p\text{anything})]/\Gamma_{\text{total}}$ value.			

 $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$ 
 $\Gamma_{78}/\Gamma$ 

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

$\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma(\Lambda/\bar{\Lambda}\text{anything})$ 
 $\Gamma_{78}/\Gamma_{71}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.13                      90      <sup>111</sup>CRAWFORD    92    CLEO     $e^+e^- \rightarrow \Upsilon(4S)$

<sup>111</sup>CRAWFORD 92 value is not independent of their  $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$  value.

 $\Gamma(e^+e^-s)/\Gamma_{\text{total}}$ 
 $\Gamma_{79}/\Gamma$ 

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<5.7  $\times 10^{-5}$             90            GLENN            98    CLEO     $e^+e^- \rightarrow \Upsilon(4S)$

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

<0.05                      90            BEBEK            81    CLEO     $e^+e^- \rightarrow \Upsilon(4S)$

 $\Gamma(\mu^+\mu^-s)/\Gamma_{\text{total}}$ 
 $\Gamma_{80}/\Gamma$ 

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<5.8  $\times 10^{-5}$             90            GLENN            98    CLEO     $e^+e^- \rightarrow \Upsilon(4S)$

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

<0.017                    90            CHADWICK       81    CLEO     $e^+e^- \rightarrow \Upsilon(4S)$

 $[\Gamma(e^+e^-s) + \Gamma(\mu^+\mu^-s)]/\Gamma_{\text{total}}$ 
 $(\Gamma_{79} + \Gamma_{80})/\Gamma$ 

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<4.2  $\times 10^{-5}$             90            GLENN            98    CLEO     $e^+e^- \rightarrow \Upsilon(4S)$

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

<0.0024                  90      <sup>112</sup>BEAN            87    CLEO    Repl. by GLENN 98

<0.0062                  90      <sup>113</sup>AVERY          84    CLEO    Repl. by BEAN 87

<sup>112</sup>BEAN 87 reports  $[(\mu^+\mu^-) + (e^+e^-)]/2$  and we converted it.

<sup>113</sup>Determine ratio of  $B^+$  to  $B^0$  semileptonic decays to be in the range 0.25–2.9.

 $\Gamma(e^\pm\mu^\mp s)/\Gamma_{\text{total}}$ 
 $\Gamma_{81}/\Gamma$ 

Test for lepton family number conservation.

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

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

BISHAI	98	PR D57 3847	M. Bishai+	(CLEO Collab.)
BONVICINI	98	PR D (to be publ.)	G. Bonvicini+	(CLEO Collab.)
CLNS 97/1519				
COAN	98	PRL 80 1150	T.E. Coan+	(CLEO Collab.)
GLENN	98	PRL 80 2289	S. Glenn+	(CLEO Collab.)
ACKERSTAFF	97N	ZPHY C74 423	K. Ackerstaff+	(OPAL Collab.)
AMMAR	97	PR D55 13	R. Ammar+	(CLEO Collab.)
BARISH	97	PRL 79 3599	B. Barish+	(CLEO Collab.)
BUSKULIC	97B	ZPHY C73 601	D. Buskalic+	(ALEPH Collab.)
GIBBONS	97B	PR D56 3783	L. Gibbons+	(CLEO Collab.)
ALBRECHT	96D	PL B374 256	+Hamacher, Hofmann, Kirchhoff+	(ARGUS Collab.)
BARISH	96B	PRL 76 1570	+Chadha, Chan, Eigen+	(CLEO Collab.)
GIBAUT	96	PR D53 4734	+Kinoshita, Pomianowski, Barish+	(CLEO Collab.)
KUBOTA	96	PR D53 6033	+Lattery, Momayezi, Nelson+	(CLEO Collab.)
PDG	96	PR D54 1		
ALAM	95	PRL 74 2885	+Kim, Ling, Mahmood+	(CLEO Collab.)
ALBRECHT	95D	PL B353 554	+Hamacher, Hofmann, Kirchhoff+	(ARGUS Collab.)
BALEST	95B	PR D52 2661	+Cho, Ford, Johnson+	(CLEO Collab.)
BARISH	95	PR D51 1014	+Chadha, Chan, Cowen+	(CLEO Collab.)
BUSKULIC	95B	PL B345 103	+Casper, De Bonis, Decamp+	(ALEPH Collab.)
ALBRECHT	94C	ZPHY C62 371	+Ehrlichmann, Hamacher, Hofmann+	(ARGUS Collab.)
ALBRECHT	94J	ZPHY C61 1	+Ehrlichmann, Hamacher, Hofmann+	(ARGUS Collab.)
PROCARIO	94	PRL 73 1306	+Balest, Cho, Daoudi, Ford+	(CLEO Collab.)
ALBRECHT	93	ZPHY C57 533	+Ehrlichmann, Hamacher, Hofmann+	(ARGUS Collab.)
ALBRECHT	93E	ZPHY C60 11	+Ehrlichmann, Hamacher, Hofmann+	(ARGUS Collab.)
ALBRECHT	93H	PL B318 397	+Ehrlichmann, Hamacher, Hofmann+	(ARGUS Collab.)
ALBRECHT	93I	ZPHY C58 191	+Cronstroem, Ehrlichmann, Hamacher+	(ARGUS Collab.)
ALEXANDER	93B	PL B319 365	+Bebek, Berkelman, Bloom, Browder+	(CLEO Collab.)
ARTUSO	93	PL B311 307		(SYRA)
BARTELT	93B	PRL 71 4111	+Csorna, Egyed, Jain, Akerib+	(CLEO Collab.)
ALBRECHT	92E	PL B277 209	+Ehrlichmann, Hamacher, Krueger, Nau+	(ARGUS Collab.)
ALBRECHT	92G	ZPHY C54 1	+Ehrlichmann, Hamacher, Krueger, Nau+	(ARGUS Collab.)
ALBRECHT	92O	ZPHY C56 1	+Cronstroem, Ehrlichmann+	(ARGUS Collab.)
BORTOLETTO	92	PR D45 21	+Brown, Dominick, McIlwain+	(CLEO Collab.)
CRAWFORD	92	PR D45 752	+Fulton, Jensen, Johnson+	(CLEO Collab.)
HENDERSON	92	PR D45 2212	+Kinoshita, Pipkin, Procario+	(CLEO Collab.)
LESIAK	92	ZPHY C55 33	+Antreasyan, Bartels, Besset, Bieler+	(Crystal Ball Collab.)
ALBRECHT	91C	PL B255 297	+Ehrlichmann, Glaeser, Harder, Krueger+	(ARGUS Collab.)
ALBRECHT	91H	ZPHY C52 353	+Ehrlichmann, Hamacher, Harder+	(ARGUS Collab.)
FULTON	91	PR D43 651	+Jensen, Johnson, Kagan, Kass+	(CLEO Collab.)
YANAGISAWA	91	PRL 66 2436	+Heintz, Lee-Franzini, Lovelock, Narain+	(CUSB II Collab.)
ALBRECHT	90	PL B234 409	+Glaeser, Harder, Krueger+	(ARGUS Collab.)
ALBRECHT	90H	PL B249 359	+Ehrlichmann, Glaeser, Harder, Krueger+	(Argus Collab.)
BORTOLETTO	90	PR D45 2117	+Goldberg, Horwitz, Jain, Mestayer+	(CLEO Collab.)
Also	92	PR D45 21	Bortoletto, Brown, Dominick, McIlwain+	(CLEO Collab.)
FULTON	90	PRL 64 16	+Hempstead, Jensen, Johnson+	(CLEO Collab.)
MASCHMANN	90	ZPHY C46 555	+Antreasyan, Bartels, Besset+	(Crystal Ball Collab.)
PDG	90	PL B239	Hernandez, Stone, Porter+	(IFIC, BOST, CIT+)
ALBRECHT	89K	ZPHY C42 519	+Boeckmann, Glaeser, Harder+	(ARGUS Collab.)
ISGUR	89B	PR D39 799	+Scora, Grinstein, Wise	(TNT0, CIT)
WACHS	89	ZPHY C42 33	+Antreasyan, Bartels, Bieler+	(Crystal Ball Collab.)
ALBRECHT	88E	PL B210 263	+Boeckmann, Glaeser+	(ARGUS Collab.)
ALBRECHT	88H	PL B210 258	+Boeckmann, Glaeser+	(ARGUS Collab.)
KOERNER	88	ZPHY C38 511	+Schuler	(MANZ, DESY)
ALAM	87	PRL 59 22	+Kitukama, Kim, Li+	(CLEO Collab.)
ALAM	87B	PRL 58 1814	+Katayama, Kim, Sun+	(CLEO Collab.)
ALBRECHT	87D	PL B199 451	+Andam, Binder, Boeckmann+	(ARGUS Collab.)
ALBRECHT	87H	PL B187 425	+Binder, Boeckmann, Glaser+	(ARGUS Collab.)
BEAN	87	PR D35 3533	+Bobbink, Brock, Engler+	(CLEO Collab.)
BEHREND	87	PRL 59 407	+Morrow, Guida, Guida+	(CLEO Collab.)
BORTOLETTO	87	PR D35 19	+Chen, Garren, Goldberg+	(CLEO Collab.)
ALAM	86	PR D34 3279	+Katayama, Kim, Sun+	(CLEO Collab.)
BALTRUSAIT...	86E	PRL 56 2140	Baltrusaitis, Becker, Blaylock, Brown+	(Mark III Collab.)
BORTOLETTO	86	PRL 56 800	+Chen, Garren, Goldberg+	(CLEO Collab.)
HAAS	86	PRL 56 2781	+Hempstead, Jensen, Kagan+	(CLEO Collab.)

ALBRECHT	85H	PL 162B 395	+Binder, Harder+	(ARGUS Collab.)
CSORNA	85	PRL 54 1894	+Garren, Mestayer, Panvini+	(CLEO Collab.)
HAAS	85	PRL 55 1248	+Hempstead, Jensen, Kagan+	(CLEO Collab.)
AVERY	84	PRL 53 1309	+Bebek, Berkelman, Cassel+	(CLEO Collab.)
CHEN	84	PRL 52 1084	+Goldberg, Horwitz, Jawahery+	(CLEO Collab.)
LEVMAN	84	PL 141B 271	+Sreedhar, Han, Imlay+	(CUSB Collab.)
ALAM	83B	PRL 51 1143	+Csorna, Garren, Mestayer+	(CLEO Collab.)
GREEN	83	PRL 51 347	+Hicks, Sannes, Skubic+	(CLEO Collab.)
KLOPFEN...	83B	PL 130B 444	Klopfenstein, Horstkotte+	(CUSB Collab.)
ALTARELLI	82	NP B208 365	+Cabibbo, Corbo, Maini, Martinelli	(ROMA, INFN, FRAS)
BRODY	82	PRL 48 1070	+Chen, Goldberg, Horwitz+	(CLEO Collab.)
GIANNINI	82	NP B206 1	+Finocchiaro, Franzini+	(CUSB Collab.)
BEBEK	81	PRL 46 84	+Haggerty, Izen, Longuemare+	(CLEO Collab.)
CHADWICK	81	PRL 46 88	+Ganci, Kagar, Kass+	(CLEO Collab.)
ABRAMS	80	PRL 44 10	+Alam, Blocker, Boyarski+	(SLAC, LBL)

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