Γ_{164}	$B \to p$(direct) anything + $\overline{p}$(direct) anything		(5.6 ± 0.7) %	
Γ_{165}	$B \to \Lambda$anything + $\overline{\Lambda}$anything		(4.0 ± 0.5) %	
Γ_{166}	$B \to \Xi^-$ anything + $\overline{\Xi}^+$ anything		(2.7 ± 0.6) $\times 10^{-3}$	
Γ_{167}	$B \to$ baryons anything		(6.8 ± 0.6) %	
Γ_{168}	$B \to p\overline{p}$anything		(2.47± 0.23) %	
Γ_{169}	$B \to \Lambda\overline{p}$anything + $\overline{\Lambda}p$anything		(2.5 ± 0.4) %	
Γ_{170}	$B \to \Lambda\overline{\Lambda}$anything		< 5 $\times 10^{-3}$	CL=90%

$\Delta B = 1$ weak neutral current ($B1$) modes

Γ_{171}	$\overline{b} \to e^+e^-$ anything	$B1$	[f] < 2.4 $\times 10^{-3}$	
Γ_{172}	$\overline{b} \to \mu^+\mu^-$ anything	$B1$	[f] < 5.0 $\times 10^{-5}$	CL=90%

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

[b] These values are model dependent. See note on "Semileptonic Decays" in these Full Listings.

[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] B^0, B^+, B^0_s, and B baryon states not separated.

[e] The value is for the sum of the charge states indicated.

[f] B^0, B^+, and B^0_s not separated.

B^+ BRANCHING RATIOS

$\Gamma(\overline{D}^0\ell^+\nu)/\Gamma_{\text{total}}$ — Γ_1/Γ

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.016±0.006±0.003	[24] FULTON	91	CLEO	$e^+e^- \to \Upsilon(4S)$

[24] FULTON 91 assumes equal production of $B^0\overline{B}^0$ and B^+B^- at the $\Upsilon(4S)$.

$\Gamma(\overline{D}^*(2007)^0\ell^+\nu)/\Gamma_{\text{total}}$ — Γ_2/Γ

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.066±0.016±0.015		[25] ALBRECHT	92C	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	398	[26] SANGHERA	93	CLE2	$e^+e^- \to \Upsilon(4S)$
$0.041\pm0.008^{+0.008}_{-0.009}$		[27] FULTON	91	CLEO	$e^+e^- \to \Upsilon(4S)$

[25] ALBRECHT 92C reports $0.058\pm0.014\pm0.013$. We rescale using the method described in STONE 94 but with the updated PDG 94 B($D^0 \to K^-\pi^+$). Assumes equal production of $B^0\overline{B}^0$ and B^+B^- at the $\Upsilon(4S)$.

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

[27] Assumes equal production of $B^0\overline{B}^0$ and B^+B^- at the $\Upsilon(4S)$. Uncorrected for D and D^* branching ratio assumptions.

$\Gamma(\pi^0e^+\nu_e)/\Gamma_{\text{total}}$ — Γ_3/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0022	90	ANTREASYAN	90B	CBAL	$e^+e^- \to \Upsilon(4S)$

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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.1 × 10⁻⁴	90	[28] BEAN	93B	CLE2	$e^+e^- \to \Upsilon(4S)$

[28] BEAN 93B limit set using ISGW Model. Using isospin and the quark model to combine $\Gamma(\rho^0\ell^+\nu_\ell)$ and $\Gamma(\rho^-\ell^+\nu_\ell)$ with this result, they obtain a limit $<(1.6\text{–}2.7)\times10^{-4}$ at 90% CL for $B^+ \to \omega\ell^+\nu_\ell$. The range corresponds to the ISGW, WSB, and KS models. An upper limit on $|V_{ub}/V_{cb}| < 0.8$–0.13 at 90% CL is derived as well.

$\Gamma(\omega\mu^+\nu_\mu)/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE	DOCUMENT ID		TECN
seen	[29] ALBRECHT	91C	ARG

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

$\Gamma(\rho^0\ell^+\nu_\ell)/\Gamma_{\text{total}}$ — Γ_6/Γ

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.1 × 10⁻⁴	90	[30] BEAN	93B	CLE2	$e^+e^- \to \Upsilon(4S)$

[30] BEAN 93B limit set using ISGW Model. Using isospin and the quark model to combine $\Gamma(\omega^0\ell^+\nu_\ell)$ and $\Gamma(\rho^-\ell^+\nu_\ell)$ with this result, they obtain a limit $<(1.6\text{–}2.7)\times10^{-4}$ at 90% CL for $B^+ \to \rho^0\ell^+\nu_\ell$. The range corresponds to the ISGW, WSB, and KS models. An upper limit on $|V_{ub}/V_{cb}| < 0.8$–0.13 at 90% CL is derived as well.

$\Gamma(\overline{D}^0\pi^+)/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0053±0.0005 OUR AVERAGE					
0.0055±0.0004±0.0005	304	[31] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0050±0.0007±0.0006	54	[32] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
$0.0054^{+0.0018}_{-0.0015}{}^{+0.0012}_{-0.0009}$	14	[33] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0020±0.0008±0.0006	12	[32] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
0.0019±0.0010±0.0006	7	[34] ALBRECHT	88K	ARG	$e^+e^- \to \Upsilon(4S)$

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

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

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

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

$\Gamma(\overline{D}^0\rho^+)/\Gamma_{\text{total}}$ — Γ_8/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0134±0.0018 OUR AVERAGE					
0.0135±0.0012±0.0015	212	[35] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.013 ±0.004 ±0.004	19	[36] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.021 ±0.008 ±0.009	10	[37] ALBRECHT	88K	ARG	$e^+e^- \to \Upsilon(4S)$

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

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

[37] ALBRECHT 88K assumes $B^0\overline{B}^0$:B^+B^- ratio is 45:55.

$\Gamma(\overline{D}^0\pi^+\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_9/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0115±0.0029±0.0021	[38] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0051±0.0034±0.0023	[39] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}^0\pi^+\rho^0)/\Gamma_{\text{total}}$ — Γ_{11}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0042±0.0023±0.0020	[40] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(\overline{D}^0a_1(1260)^+)/\Gamma_{\text{total}}$ — Γ_{12}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0045±0.0019±0.0031	[41] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$

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

$\Gamma(D^*(2010)^-\pi^+\pi^+)/\Gamma_{\text{total}}$ — Γ_{13}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.0021±0.0006 OUR AVERAGE						
0.0019±0.0007±0.0003		14	[42] ALAM	94	CLE2	$e^+e^- \to \Upsilon(4S)$
0.0026±0.0014±0.0007		11	[43] ALBRECHT	90J	ARG	$e^+e^- \to \Upsilon(4S)$
$0.0024^{+0.0017}_{-0.0016}{}^{+0.0010}_{-0.0006}$		3	[44] BEBEK	87	CLEO	$e^+e^- \to \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.004	90		[45] BORTOLETTO	92	CLEO	$e^+e^- \to \Upsilon(4S)$
0.005 ±0.002 ±0.003		7	[46] ALBRECHT	87C	ARG	$e^+e^- \to \Upsilon(4S)$

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

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

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

[45] BORTOLETTO 92 assumes equal production of B^+ and B^0 at the $\Upsilon(4S)$ and uses Mark III branching fractions for the D and $D^*(2010)$. The authors also find the product branching fraction into $D^{**}\pi$ followed by $D^{**} \to D^*(2010)\pi$ to be $0.0014^{+0.0008}_{-0.0006} \pm 0.0003$ where D^{**} represents all orbitally excited D mesons.

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