Heavy Flavor Averaging Group

March 2004

Compilation of B^+ Semi-leptonic and Radiative Branching Fractions

All branching fractions are in units of 10^{-6}

In PDG2002 New since PDG2002 (preliminary) New since PDG2002 (published)

RPP#	Mode	PDG2002 Avg.	BaBar	Belle	CLEO	New Avg.
130	$\rho^+\gamma$	< 13	< 2.1	< 2.5	< 13	< 2.1
130	$\rho^+\gamma$	< 13	< 2.1	< 2.5	< 13	< 2.1
–	$K^+\phi\gamma$	New		$3.4 \pm 0.9 \pm 0.4$		3.4 ± 1.0
–	$K^+\phi\gamma$	New		$3.4 \pm 0.9 \pm 0.4$		3.4 ± 1.0
173	$K^+e^+e^-$	< 1.4	$1.05^{+0.25}_{-0.22} \pm 0.07$	$0.63^{+0.19}_{-0.17} \pm 0.03$	< 2.4	0.80 ± 0.15
173	$K^+e^+e^-$	< 1.4	$1.05^{+0.25}_{-0.22} \pm 0.08$	$0.63^{+0.19}_{-0.17} \pm 0.03$	< 2.4	0.80 ± 0.15
174	$K^+\mu^+\mu^-$	$1.0^{+0.5}_{-0.4}$	$0.07^{+0.19}_{-0.11} \pm 0.02$	$0.45^{+0.14}_{-0.12} \pm 0.03$	< 3.68	0.34 ± 0.10
174	$K^+\mu^+\mu^-$	$1.0^{+0.5}_{-0.4}$	$0.07^{+0.19}_{-0.11} \pm 0.02$	$0.45^{+0.14}_{-0.12} \pm 0.03$	< 3.68	0.34 ± 0.10
176	$K^*(892)^+e^+e^-$	< 8.9	$0.20^{+1.34}_{-0.87} \pm 0.28$ ‡	$2.02^{+1.27+0.23}_{-1.01-0.24}$ ‡		$1.29^{+0.90}_{-0.77}$
176	$K^*(892)^+e^+e^-$	< 8.9	$0.20^{+1.34}_{-0.87} \pm 0.27$ ‡	$2.02^{+1.27+0.23}_{-1.01-0.24}$ ‡		$1.29^{+0.89}_{-0.77}$
177	$K^*(892)^+\mu^+\mu^-$	< 3.9	$3.07^{+2.58}_{-1.78} \pm 0.42$ ‡	$0.65^{+0.69+0.14}_{-0.53-0.15}$ ‡		$0.92^{+0.70}_{-0.58}$
177	$K^*(892)^+\mu^+\mu^-$	< 3.9	$3.07^{+2.58}_{-1.78} \pm 0.44$ ‡	$0.65^{+0.69+0.14}_{-0.53-0.15}$ ‡		$0.92^{+0.70}_{-0.58}$

§ $M_{K\pi\pi} < 2.4$ GeV/c^2 ‡ Central values are not significant.

Heavy Flavor Averaging Group

March 2004

Compilation of B^0 Semi-leptonic and Radiative Branching Fractions

All branching fractions are in units of 10^{-6}

In PDG2002 New since PDG2002 (preliminary) New since PDG2002 (published)

RPP#	Mode	PDG2002 Avg.	BaBar	Belle	CLEO	New Avg.
131	$\omega\gamma$	< 9.2	< 1.0	< 3.0	< 9.2	< 1.0
131	$\omega\gamma$	< 9.2	< 1.0	< 3.0	< 9.2	< 1.0
–	$K^0\phi\gamma$	New		< 8.3		< 8.3
–	$K^0\phi\gamma$	New		< 8.3		< 8.3
184	$K^0e^+e^-$	< 2.7	$-0.21^{+0.23}_{-0.16} \pm 0.08$ ‡	$0.00^{+0.20+0.02}_{-0.12-0.05}$ ‡	< 8.45	$-0.06^{+0.14}_{-0.10}$
184	$K^0e^+e^-$	< 2.7	$-0.21^{+0.23}_{-0.16} \pm 0.08$ ‡	$0.00^{+0.20+0.02}_{-0.12-0.05}$ ‡	< 8.45	$-0.06^{+0.14}_{-0.10}$
185	$K^0\mu^+\mu^-$	< 3.3	$1.63^{+0.82}_{-0.63} \pm 0.14$	$0.56^{+0.29}_{-0.23} \pm 0.05$	< 6.64	$0.73^{+0.28}_{-0.25}$
185	$K^0\mu^+\mu^-$	< 3.3	$1.63^{+0.82}_{-0.63} \pm 0.17$	$0.56^{+0.29}_{-0.23} \pm 0.05$	< 6.64	$0.73^{+0.28}_{-0.25}$
186	$K^*(892)^0e^+e^-$	< 6.4	$1.11^{+0.56}_{-0.47} \pm 0.11$	$1.29^{+0.57+0.13}_{-0.49-0.10}$		$1.20^{+0.41}_{-0.35}$
186	$K^*(892)^0e^+e^-$	< 6.4	$1.11^{+0.56}_{-0.47} \pm 0.12$	$1.29^{+0.57+0.13}_{-0.49-0.10}$		$1.20^{+0.41}_{-0.35}$
187	$K^*(892)^0\mu^+\mu^-$	< 4.2	$0.86^{+0.79}_{-0.58} \pm 0.11$	$1.33^{+0.42}_{-0.37} \pm 0.11$		$1.22^{+0.39}_{-0.33}$
187	$K^*(892)^0\mu^+\mu^-$	< 4.2	$0.86^{+0.79}_{-0.58} \pm 0.12$	$1.33^{+0.42}_{-0.37} \pm 0.11$		$1.22^{+0.39}_{-0.33}$

† $1.25\ \text{GeV}/c^2 < M_{K\pi} < 1.6\ \text{GeV}/c^2$ ‡ Central values are not significant.

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Compilation of B Semi-leptonic and Radiative Branching Fractions

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In PDG2002 New since PDG2002 (preliminary) New since PDG2002 (published)

RPP#	Mode	PDG2002 Avg.	BaBar	Belle	CLEO	New Avg.
67	$\rho\gamma$	< 14	< 1.9	$1.8^{+0.6}_{-0.5} \pm 0.1$	< 14	$1.8^{+0.6}_{-0.5}$
67	$\rho\gamma$	< 14	< 1.9	$1.8^{+0.6}_{-0.5} \pm 0.1$	< 14	< 1.9
99	Ke^+e^-	< 1.3	$0.74^{+0.18}_{-0.16} \pm 0.05$	$0.48^{+0.15}_{-0.13} \pm 0.03$		$0.59^{+0.12}_{-0.11}$
99	Ke^+e^-	< 1.3	$0.79^{+0.19}_{-0.17} \pm 0.07$	$0.48^{+0.15}_{-0.13} \pm 0.03$		0.60 ± 0.12
100	$K^*(892)e^+e^-$	< 5.6	$0.98^{+0.50}_{-0.42} \pm 0.11$	$1.49^{+0.52+0.11}_{-0.46-0.13}$		$1.24^{+0.37}_{-0.33}$
100	$K^*(892)e^+e^-$	< 5.6	$1.00^{+0.50}_{-0.42} \pm 0.12$	$1.49^{+0.52+0.11}_{-0.46-0.13}$		$1.25^{+0.37}_{-0.33}$
101	$K\mu^+\mu^-$	$0.99^{+0.40+0.13}_{-0.32-0.14}$	$0.45^{+0.23}_{-0.19} \pm 0.04$	$0.48^{+0.13}_{-0.11} \pm 0.04$		$0.47^{+0.12}_{-0.10}$
101	$K\mu^+\mu^-$	$0.99^{+0.40+0.13}_{-0.32-0.14}$	$0.48^{+0.25}_{-0.20} \pm 0.04$	$0.48^{+0.13}_{-0.11} \pm 0.04$		$0.48^{+0.12}_{-0.10}$
102	$K^*(892)\mu^+\mu^-$	< 3.1	$1.27^{+0.76}_{-0.61} \pm 0.16$	$1.17^{+0.36}_{-0.31} \pm 0.10$		$1.19^{+0.34}_{-0.29}$
102	$K^*(892)\mu^+\mu^-$	< 3.1	$1.28^{+0.78}_{-0.62} \pm 0.17$	$1.17^{+0.36}_{-0.31} \pm 0.10$		$1.19^{+0.34}_{-0.29}$
103	Kl^+l^-	$0.75^{+0.25}_{-0.21} \pm 0.06$	$0.65^{+0.14}_{-0.13} \pm 0.04$	$0.48^{+0.10}_{-0.09} \pm 0.03$	< 1.7	0.54 ± 0.08
103	Kl^+l^-	$0.75^{+0.25}_{-0.21} \pm 0.06$	$0.69^{+0.15}_{-0.13} \pm 0.06$	$0.48^{+0.10}_{-0.09} \pm 0.03$	< 1.7	$0.55^{+0.09}_{-0.08}$
104	$K^*(892)l^+l^-$	< 3.3	$0.88^{+0.33}_{-0.29} \pm 0.10$	$1.15^{+0.26}_{-0.24} \pm 0.08$	< 3.3	$1.05^{+0.21}_{-0.20}$
104	$K^*(892)l^+l^-$	< 3.3	$0.89^{+0.34}_{-0.29} \pm 0.11$	$1.15^{+0.26}_{-0.24} \pm 0.08$	< 3.3	$1.06^{+0.22}_{-0.20}$

$\dagger E_\gamma > 2.0$ GeV; $\ddagger M(l^+l^-) > 0.2$ GeV/c^2

Heavy Flavor Averaging Group

March 2004

Compilation of B Leptonic Branching Fractions

All branching fractions are in units of 10^{-6}

In PDG2002 New since PDG2002 (preliminary) New since PDG2002 (published)

RPP#	Mode	PDG2002 Avg.	BaBar	Belle	CLEO	CDF	D0	New Avg.
11	$\mu^+\nu$	< 21	< 6.6	< 6.8	< 21			< 6.6
11	$\mu^+\nu$	< 21		< 6.8	< 21			< 6.8
182	e^+e^-	< 0.83	< 0.33	< 0.19	< 0.83			< 0.19
182	e^+e^-	< 0.83	< 0.33	< 0.19	< 0.83			< 0.19
183	$\mu^+\mu^-$	< 0.61	< 0.20	< 0.16	< 0.61	< 0.25		< 0.16
–	$\mu^+\mu^-$	New	< 0.95	< 1.6	< 0.95			
189	$e^\pm\mu^\mp$	< 1.5	< 0.21	< 0.17	< 1.5			< 0.17
189	$e^\pm\mu^\mp$	< 1.5	< 0.21	< 0.17	< 1.5			< 0.17

Compilation of B_s Leptonic Branching Fractions

All branching fractions are in units of 10^{-6}

In PDG2002 New since PDG2002 (preliminary) New since PDG2002 (published)

RPP#	Mode	PDG2002 Avg.	CDF	D0	New Avg.

Radiative and Leptonic Decays: *BABAR* References

[1] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **88**, 101805 (2002).

[2] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **92**, 111801 (2004).

[3] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **91**, 221802 (2003).

[4] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0207069 (ICHEP2002 contributed paper), 2002.

[5] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0207083 (ICHEP2002 contributed paper), 2002.

[6] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0207076 (ICHEP2002 contributed paper), 2002.

[7] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0308021 (LepPho03 contributed paper), 2003.

[8] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0308016 (LepPho03 contributed paper), 2003.

[9] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0303034 and hep-ex/0304030 (Moriond Electroweak 2003 contributed papers), 2003.

[10] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0401002 (submitted to Phys. Rev. Lett.), 2004.

Belle References

[11] Belle Collaboration (K. Abe *et al.*), BELLE-CONF-0247 (ICHEP2002 contributed paper), 2002.

[12] Belle Collaboration (M. Nakao *et al.*), hep-ex/0402042 (2004).

[13] Belle Collaboration (S. Nishida *et al.*), Phys. Rev. Lett. **89**, 231801 (2002).

[14] Belle Collaboration M. Iwasaki, talk given at Moriond EW (2004).

[15] Belle Collaboration (K. Abe *et al.*), BELLE-CONF-0241, (ICHEP2002 contributed paper), 2002.

[16] Belle Collaboration (M.-C. Chang *et al.*), Phys. Rev. D **68**, 111101 (2004).

[17] Belle Collaboration (P. Koppenburg *et al.*), hep-ex/0403004 (2004).

[18] Belle Collaboration talk presented by M. Iwasaki at Moriond EW (2004).

[19] Belle Collaboration (D. Drutskoy *et al.*), Phys. Rev. Lett. **92**, 051801 (2004).

[20] Belle Collaboration (K. Abe *et al.*), Phys. Rev. Lett. **91**, 261601 (2003).

CLEO References

[21] CLEO Collaboration (M. Artuso *et al.*), Phys. Rev. Lett. **75**, 785 (1995).

[22] CLEO Collaboration (T.E. Coan *et al.*), Phys. Rev. Lett. **84**, 5283 (2000).

[23] CLEO Collaboration (S. Anderson *et al.*), Phys. Rev. Lett. **87**, 181803 (2001).

[24] CLEO Collaboration (T. Browder *et al.*), Phys. Rev. Lett. **86**, 2950 (2001).

[25] CLEO Collaboration (K.W. Edwards *et al.*), Phys. Rev. D **65**, 111102R (2002).

[26] CLEO Collaboration (T. Bergfeld *et al.*), Phys. Rev. D **62**, 091102R (2000).

[27] CLEO Collaboration (S. Chen *et al.*), Phys. Rev. Lett. **87**, 251807 (2002).

[28] CLEO Collaboration (S. Glenn *et al.*), Phys. Rev. Lett. **80**, 2289 (1998).

[29] CLEO Collaboration (K.W. Edwards *et al.*), Phys. Rev. D **65**, 111102 (2002).

[30] CLEO Collaboration (K.W. Edwards *et al.*), Phys. Rev. D **68**, 011102 (2003).