Heavy Flavor Averaging Group
April 2005

Compilation of B^+ Semi-leptonic and Radiative Branching Fractions
All branching fractions are in units of 10^{-6}

In PDG2004 New since PDG2004 (preliminary) New since PDG2004 (published)

RPP#	Mode	PDG2004 Avg.	BaBar	Belle	CLEO	New Avg.
160	$K^*(892)^+\gamma$	38 ± 5	$38.7 \pm 2.8 \pm 2.6$	$42.5 \pm 3.1 \pm 2.4$	$37.6^{+8.9}_{-8.3} \pm 2.8$	40.3 ± 2.6
161	$K_1(1270)^+\gamma$	< 99		$42.8 \pm 9.4 \pm 4.3$		42.8 ± 10.3
162	$K^+\phi\gamma$	3.4 ± 1.0		$3.4 \pm 0.9 \pm 0.4$		3.4 ± 1.0
163	$K^+\pi^-\pi^+\gamma$ §	24^{+6}_{-5}		$25 \pm 1.8 \pm 2.2$		25.0 ± 2.8
164	$K^{*0}\pi^+\gamma$ §	20^{+7}_{-6}		$20^{+7}_{-6} \pm 2$		20^{+7}_{-6}
165	$K^+\rho^0\gamma$ §	< 20		< 20		< 20
166	$K^+\pi^-\pi^+\gamma$ (N.R.) §	< 9.2		< 9.2		< 9.2
167	$K_1(1400)^+\gamma$	< 50		< 14.4		< 14.4
168	$K_2^*(1430)^+\gamma$	< 1400	$14.5 \pm 4.0 \pm 1.5$			14.5 ± 4.3
172	$\rho^+\gamma$	< 2.1	< 1.8	< 2.2	< 13	< 1.8
–	$K^+\eta\gamma$	New		$8.4^{+1.5}_{-1.1} \pm 0.9$		$8.4^{+1.7}_{-1.4}$
207	$p\overline{\Lambda}\gamma$	New		$2.16^{+0.58}_{-0.53} \pm 0.20$		$2.16^{+0.61}_{-0.57}$
208	$p\overline{\Sigma^0}\gamma$	New		< 3.3		< 3.3
–	$\pi^+\nu\overline{\nu}$	New	< 100			< 100
226	$K^+e^+e^-$	$0.63^{+0.19}_{-0.17}$	$1.05^{+0.25}_{-0.22} \pm 0.07$	$0.63^{+0.19}_{-0.17} \pm 0.03$	< 2.4	0.80 ± 0.15
227	$K^+\mu^+\mu^-$	$0.45^{+0.14}_{-0.12}$	$0.07^{+0.19}_{-0.11} \pm 0.02$	$0.45^{+0.14}_{-0.12} \pm 0.03$	< 3.68	0.34 ± 0.10
229	$K^+\nu\overline{\nu}$	< 240	< 52		< 240	< 52
230	$K^*(892)^+e^+e^-$	< 4.6	$0.20^{+1.34}_{-0.87} \pm 0.28$ ‡	$2.02^{+1.27+0.23}_{-1.01-0.24}$ ‡		$1.29^{+0.90}_{-0.77}$
231	$K^*(892)^+\mu^+\mu^-$	< 2.2	$3.07^{+2.58}_{-1.78} \pm 0.42$ ‡	$0.65^{+0.69+0.14}_{-0.53-0.15}$ ‡		$0.92^{+0.70}_{-0.58}$
238	$\pi^-e^+e^+$	< 1.6			< 1.6	< 1.6
239	$\pi^-\mu^+\mu^+$	< 1.4			< 1.4	< 1.4
240	$\pi^-e^+\mu^+$	< 1.3			< 1.3	< 1.3
241	$\rho^-e^+e^+$	< 2.6			< 2.6	< 2.6
242	$\rho^-\mu^+\mu^+$	< 5.0			< 5.0	< 5.0
243	$\rho^-e^+\mu^+$	< 3.3			< 3.3	< 3.3
244	$K^-e^+e^+$	< 1.0			< 1.0	< 1.0
245	$K^-\mu^+\mu^+$	< 1.8			< 1.8	< 1.8
246	$K^-e^+\mu^+$	< 2.0			< 2.0	< 2.0
247	$K^{*-}e^+e^+$	< 2.8			< 2.8	< 2.8
248	$K^{*-}\mu^+\mu^+$	< 8.3			< 8.3	< 8.3
249	$K^{*-}e^+\mu^+$	< 4.4			< 4.4	< 4.4

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

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In PDG2004 New since PDG2004 (preliminary) New since PDG2004 (published)

RPP#	Mode	PDG2004 Avg.	BaBar	Belle	CLEO	New Avg.
162	$K^*(892)^0\gamma$	43 ± 4	$39.2 \pm 2.0 \pm 2.4$	$40.1 \pm 2.1 \pm 1.7$	$45.5^{+7.2}_{-6.8} \pm 3.4$	40.1 ± 2.0
163	$K^0\phi\gamma$	< 8.3		< 8.3		< 8.3
164	$K^+\pi^-\gamma$ †	4.6 ± 1.4		$4.6^{+1.3+0.5}_{-1.2-0.7}$		4.6 ± 1.4
–	$K^0\pi^+\pi^-\gamma$	New		$24.3 \pm 3.6 \pm 3.4$		24.3 ± 5.0
165	$K^*(1410)^0\gamma$	< 130		< 130		< 130
166	$K^+\pi^-\gamma$ (N.R.) †	< 2.6		< 2.6		< 2.6
169	$K_2^*(1430)^0\gamma$	13 ± 5	$12.2 \pm 2.5 \pm 1.0$	$13 \pm 5 \pm 1$		12.4 ± 2.4
–	$K^0\eta\gamma$	New		$8.7^{+3.1+1.9}_{-2.7-1.6}$		$8.7^{+3.6}_{-3.1}$
173	$\rho^0\gamma$	< 1.2	< 0.4	< 0.8	< 17	< 0.4
174	$\omega\gamma$	< 1.0	< 1.0	< 0.8	< 9.2	< 0.8
175	$\phi\gamma$	< 3.3	< 0.94		< 3.3	< 0.94
237	$K^0e^+e^-$	< 0.54	$-0.21^{+0.23}_{-0.16} \pm 0.08$ ‡	$0.00^{+0.20+0.02}_{-0.12-0.05}$ ‡	< 8.45	$-0.06^{+0.14}_{-0.10}$
238	$K^0\mu^+\mu^-$	$0.56^{+0.29}_{-0.24}$	$1.63^{+0.82}_{-0.63} \pm 0.14$	$0.56^{+0.29}_{-0.23} \pm 0.05$	< 6.64	$0.73^{+0.28}_{-0.25}$
240	$K^*(892)^0e^+e^-$	< 2.4	$1.11^{+0.56}_{-0.47} \pm 0.11$	$1.29^{+0.57+0.13}_{-0.49-0.10}$		$1.20^{+0.41}_{-0.35}$
241	$K^*(892)^0\mu^+\mu^-$	1.3 ± 0.4	$0.86^{+0.79}_{-0.58} \pm 0.11$	$1.33^{+0.42}_{-0.37} \pm 0.11$		$1.22^{+0.39}_{-0.33}$

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

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RPP#	Mode	PDG2004 Avg.	BaBar	Belle	CLEO	New Avg.
60	$K_3^*(1780)\gamma$	< 3000		< 2.8		< 2.8
67	$s\gamma$	330 ± 40	$338 \pm 19^{+64}_{-42}$	$355 \pm 32^{+30+11}_{-31-7}$	$321 \pm 43^{+32}_{-29}$	339^{+30}_{-27}
–	$s\gamma$ with baryons	New			< 38 †	< 38 †
71	$\rho\gamma$	< 1.9	< 1.2	< 1.4	< 14	< 1.2
–	$K\eta\gamma$	New		$8.5^{+1.3}_{-1.2} \pm 0.9$		$8.5^{+1.6}_{-1.5}$
101	se^+e^- ‡	5.0 ± 2.6	$6.0 \pm 1.7 \pm 1.3$	$4.04 \pm 1.30^{+0.80}_{-0.76}$	< 57	$4.70^{+1.24}_{-1.23}$
102	$s\mu^+\mu^-$	$7.9^{+3.0}_{-2.6}$	$5.0 \pm 2.8 \pm 1.2$	$4.13 \pm 1.05^{+0.73}_{-0.69}$	< 58	$4.26^{+1.18}_{-1.16}$
103	$s\ell^+\ell^-$ ‡	$6.1^{+2.0}_{-1.8}$	$5.6 \pm 1.5 \pm 1.3$	$4.11 \pm 0.83^{+0.74}_{-0.70}$	< 42	$4.46^{+0.98}_{-0.96}$
104	Ke^+e^-	$0.48^{+0.15}_{-0.13}$	$0.74^{+0.18}_{-0.16} \pm 0.05$	$0.454^{+0.116+0.023}_{-0.104-0.025}$		$0.547^{+0.098}_{-0.095}$
105	$K^*(892)e^+e^-$	1.5 ± 0.5	$0.98^{+0.50}_{-0.42} \pm 0.11$	$1.84^{+0.48}_{-0.44} \pm 0.17$		$1.44^{+0.35}_{-0.34}$
106	$K\mu^+\mu^-$	0.48 ± 0.12	$0.45^{+0.23}_{-0.19} \pm 0.04$	$0.626^{+0.103+0.033}_{-0.064-0.034}$		$0.605^{+0.090}_{-0.064}$
107	$K^*(892)\mu^+\mu^-$	$1.17^{+0.37}_{-0.33}$	$1.27^{+0.76}_{-0.61} \pm 0.16$	$1.81^{+0.30}_{-0.28} \pm 0.11$		$1.73^{+0.30}_{-0.27}$
108	$K\ell^+\ell^-$	0.54 ± 0.08	$0.65^{+0.14}_{-0.13} \pm 0.04$	$0.550^{+0.075}_{-0.070} \pm 0.027$	< 1.7	$0.574^{+0.071}_{-0.066}$
109	$K^*(892)\ell^+\ell^-$	1.05 ± 0.20	$0.88^{+0.33}_{-0.29} \pm 0.10$	$1.65^{+0.23}_{-0.23} \pm 0.10$	< 3.3	1.38 ± 0.20
111	$\pi e^\pm\mu^\mp$	< 1.6			< 1.6	< 1.6
112	$\rho e^\pm\mu^\mp$	< 3.2			< 3.2	< 3.2
113	$Ke^\pm\mu^\mp$	< 1.6			< 1.6	< 1.6
114	$K^*e^\pm\mu^\mp$	< 6.2			< 6.2	< 6.2

†$E_\gamma > 2.0$ GeV; ‡$M(\ell^+\ell^-) > 0.2$ GeV/c^2

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Compilation of B Leptonic Branching Fractions

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

In PDG2004 New since PDG2004 (preliminary) New since PDG2004 (published)

RPP#	Mode	PDG2004 Avg.	BaBar	Belle	CLEO	CDF	D0	New Avg.
12	$e^+\nu$	< 15		< 5.4	< 15			< 5.4
13	$\mu^+\nu$	< 21	< 6.6	< 2.0	< 21			< 2.0
14	$\tau^+\nu$	< 570	< 330	< 290	< 840			< 290
15	$e^+\nu_e\gamma$	< 200		< 22	< 200			< 22
16	$\mu^+\nu_\mu\gamma$	< 52		< 23	< 52			< 23
235	e^+e^-	< 0.19	< 0.06	< 0.19	< 0.83			< 0.06
236	$\mu^+\mu^-$	< 0.16	< 0.08	< 0.16	< 0.61	< 0.15		< 0.08
244	$e^\pm\mu^\mp$	< 0.17	< 0.18	< 0.17	< 1.5			< 0.17
247	$e^\pm\tau^\mp$	< 530			< 110			< 110
248	$\mu^\pm\tau^\mp$	< 830			< 38			< 38
–	$\nu\bar{\nu}$	New	< 220					< 220
–	$\nu\bar{\nu}\gamma$	New	< 47					< 47

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