# Heavy Flavor Averaging Group

$B^+$ Branching Fractions (decays with kaons part 1) ($\times 10^6$) - December 2011. (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | BABAR | Belle | CLEO | CDF | New avg. |
|---|---|---|---|---|---|---|---|
| 220 | $K^0\pi^+$ | $23.1 \pm 1.0$ | $23.9 \pm 1.1 \pm 1.0$ | $23.97^{+0.53}_{-0.52} \pm 0.69$ | $18.8^{+3.7+2.1}_{-3.3-1.8}$ | | $23.80 \pm 0.74$ |
| 221 | $K^+\pi^0$ | $12.9 \pm 0.6$ | $13.6 \pm 0.6 \pm 0.7$ | $12.62 \pm 0.31 \pm 0.56$ | $12.9^{+2.4+1.2}_{-2.2-1.1}$ | | $12.94^{+0.52}_{-0.51}$ |
| 222 | $\eta' K^+$ | $70.6 \pm 2.5$ | $71.5 \pm 1.3 \pm 3.2$ | $69.2 \pm 2.2 \pm 3.7$ | $80^{+10}_{-9} \pm 7$ | | $71.1 \pm 2.6$ |
| 223 | $\eta' K^{*+}$ | $4.9^{+2.1}_{-1.9}$ | $4.8^{+1.6}_{-1.4} \pm 0.8$ | $< 2.9$ | $11.1^{+12.7}_{-8.0}$ | | $5.0^{+1.8}_{-1.6}$ |
| – | $\eta' K_0^*(1430)^+$ | New | $5.2 \pm 1.9 \pm 1.0$ | | | | $5.2 \pm 2.1$ |
| – | $\eta' K_2^*(1430)^+$ | New | $28.0^{+4.6}_{-4.3} \pm 2.6$ | | | | $28.0^{+5.3}_{-5.0}$ |
| 224 | $\eta K^+$ | $2.33^{+0.33}_{-0.29}$ | $2.94^{+0.39}_{-0.34} \pm 0.21$ | $2.12 \pm 0.23 \pm 0.11$ | $2.2^{+2.8}_{-2.2}$ | | $2.36^{+0.22}_{-0.21}$ |
| 225 | $\eta K^{*+}$ | $19.3 \pm 1.6$ | $18.9 \pm 1.8 \pm 1.3$ | $19.3^{+2.0}_{-1.9} \pm 1.5$ | $26.4^{+9.6}_{-8.2} \pm 3.3$ | | $19.3 \pm 1.6$ |
| 226 | $\eta K_0^*(1430)^+$ | $15.8 \pm 3.1$ | $15.8 \pm 2.2 \pm 2.2$ | | | | $15.8 \pm 3.1$ |
| 227 | $\eta K_2^*(1430)^+$ | $9.1 \pm 3.0$ | $9.1 \pm 2.7 \pm 1.4$ | | | | $9.1 \pm 3.0$ |
| 228 | $\eta(1295)K^+$† | $2.9^{+0.8}_{-0.7}$ | $< 4.0$ | | | | $< 4.0$ |
| 230 | $\eta(1405)K^+$† | $< 1.2$ | $< 1.2$ | | | | $< 1.2$ |
| 231 | $\eta(1475)K^+$† | $13.8^{+2.1}_{-1.8}$ | $13.8^{+1.8+1.0}_{-1.7-0.6}$ | | | | $13.8^{+2.1}_{-1.8}$ |
| 232 | $f_1(1285)K^+$ | $< 2.0$ | $< 2.0$ | | | | $< 2.0$ |
| 233 | $f_1(1420)K^+$† | $< 2.9$ | $< 2.9$ | | | | $< 2.9$ |
| 235 | $\phi(1680)K^+$† | $< 3.4$ | $< 3.4$ | | | | $< 3.4$ |
| 236 | $\omega K^+$ | $6.7 \pm 0.8$ | $6.3 \pm 0.5 \pm 0.3$ | $8.1 \pm 0.6 \pm 0.6$ | $3.2^{+2.4}_{-1.9} \pm 0.8$ | | $6.7 \pm 0.5$ |
| 237 | $\omega K^{*+}$ | $< 7.4$ | $< 7.4$ | | $< 87$ | | $< 7.4$ |
| 239 | $\omega K_0^*(1430)^+$ | $24.0 \pm 5.1$ | $24.0 \pm 2.6 \pm 4.4$ | | | | $24.0 \pm 5.1$ |
| 240 | $\omega K_2^*(1430)^+$ | $21.5 \pm 4.3$ | $21.5 \pm 3.6 \pm 2.4$ | | | | $21.5 \pm 4.3$ |
| 240 | $a_0(980)^0 K^+$ † | $< 2.5$ | $< 2.5$ | | | | $< 2.5$ |
| 241 | $a_0(980)^+ K^0$ † | $< 3.9$ | $< 3.9$ | | | | $< 3.9$ |
| 243 | $K^{*0}\pi^+$ | $10.1 \pm 0.9$ | $10.8 \pm 0.6^{+1.2}_{-1.4}$ | $9.7 \pm 0.6^{+0.8}_{-0.9}$ | $7.6^{+3.5}_{-3.0} \pm 1.6$ | | $9.9^{+0.8}_{-0.9}$ |
| 244 | $K^{*+}\pi^0$ | $6.9 \pm 2.4$ | $8.2 \pm 1.5 \pm 1.1$ | | $7.1^{+11.4}_{-7.1} \pm 1.0$ | | $8.2 \pm 1.8$ |
| 245 | $K^+\pi^+\pi^-$ | $51 \pm 2.9$ | $54.4 \pm 1.1 \pm 4.6$ | $48.8 \pm 1.1 \pm 3.6$ | | | $51.0 \pm 3.0$ |
| 246 | $K^+\pi^+\pi^-(NR)$ | $16.3^{+2.1}_{-1.5}$ | $9.3 \pm 1.0^{+6.9}_{-1.7}$ | $16.9 \pm 1.3^{+1.7}_{-1.6}$ | $< 28$ | | $16.3 \pm 2.0$ |
| – | $K^+\pi^0\pi^0$ | New | $16.2 \pm 1.2 \pm 1.5$ | | | | $16.2 \pm 1.9$ |
| 248 | $f_0(980)K^+$ † | $9.4^{+1.0}_{-1.2}$ | $10.3 \pm 0.5^{+2.0}_{-1.4}$ | $8.8 \pm 0.8^{+0.9}_{-1.8}$ | | | $9.4^{+0.9}_{-1.0}$ |
| 249 | $f_2(1270)^0 K^+$ | $1.07 \pm 0.27$ | $0.88 \pm 0.26^{+0.26}_{-0.21}$ | $1.33 \pm 0.30^{+0.23}_{-0.34}$ | | | $1.06^{+0.28}_{-0.29}$ |
| 250 | $f_0(1370)^0 K^+$ † | $< 10.7$ | $< 10.7$ | | | | $< 10.7$ |
| 251 | $\rho^0(1450)K^+$ | $< 11.7$ | $< 11.7$ | | | | $< 11.7$ |
| 253 | $f_0(1500)K^+$ † | $0.73 \pm 0.52$ | $0.73 \pm 0.21 \pm 0.47$ | | | | $0.73 \pm 0.52$ |
| 254 | $f_2'(1525)K^+$ † | $< 3.4$ | $< 3.4$ | $< 4.9$ | | | $< 3.4$ |
| 255 | $\rho^0 K^+$ | $3.7 \pm 0.5$ | $3.56 \pm 0.45^{+0.57}_{-0.46}$ | $3.89 \pm 0.47^{+0.43}_{-0.41}$ | $8.4^{+4.0}_{-3.4} \pm 1.8$ | | $3.81^{+0.48}_{-0.46}$ |
| 256 | $K_0^*(1430)^0\pi^+$ | $45^{+9}_{-7}$ | $32.0 \pm 1.2^{+10.8}_{-6.0}$ | $51.6 \pm 1.7^{+7.0}_{-7.5}$ | | | $45.1 \pm 6.3$ |
| 257 | $K_2^*(1430)^0\pi^+$ | $5.6^{+2.2}_{-1.5}$ | $5.6 \pm 1.2^{+1.8}_{-0.8}$ | $< 6.9$ | | | $5.6^{+2.2}_{-1.4}$ |
| 258 | $K^*(1410)^0\pi^+$ | $< 45$ | | $< 45$ | | | $< 45$ |
| 259 | $K^*(1680)^0\pi^+$ | $< 12$ | $< 15$ | $< 12$ | | | $< 12$ |
| 260 | $K^-\pi^+\pi^+$ | $< 0.95$ | $< 0.95$ | $< 4.5$ | | | $< 0.95$ |
| 262 | $K_1(1270)^0\pi^+$ | $< 40$ | $< 40$ | | | | $< 40$ |
| 263 | $K_1(1400)^0\pi^+$ | $< 39$ | $< 39$ | | | | $< 39$ |
| 264 | $K^0\pi^+\pi^0$ | $< 66$ | | | $< 66$ | | $< 66$ |
| 265 | $\rho^+ K^0$ | $8.0 \pm 1.5$ | $8.0^{+1.4}_{-1.3} \pm 0.6$ | | $< 48$ | | $8.0^{+1.5}_{-1.4}$ |
| 266 | $K^{*+}\pi^+\pi^-$ | $75 \pm 10$ | $75.3 \pm 6.0 \pm 8.1$ | | | | $75.3 \pm 10.1$ |
| 267 | $K^{*+}\rho^0$ | $< 6.1$ | $4.6 \pm 1.0 \pm 0.4$ | | $< 74$ | | $4.6 \pm 1.1$ |
| 268 | $f_0(980)K^{*+}$ † | $5.2 \pm 1.3$ | $4.2 \pm 0.6 \pm 0.3$ | | | | $4.2 \pm 0.7$ |

† Product BF - daughter BF taken to be 100%;

# Heavy Flavor Averaging Group

$B^+$ Branching Fractions (decays with kaons part 2) ($\times 10^6$) - December 2011. (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | BABAR | Belle | CLEO | CDF | New avg. |
|---|---|---|---|---|---|---|---|
| 269 | $a_1^+ K^0$ | $35 \pm 7$ | $34.9 \pm 5.0 \pm 4.4$ | | | | $34.9 \pm 6.7$ |
| 270 | $b_1^+ K^0$ † | $9.6 \pm 1.9$ | $9.6 \pm 1.7 \pm 0.9$ | | | | $9.6 \pm 1.9$ |
| 271 | $K^{*0} \rho^+$ | $9.2 \pm 1.5$ | $9.6 \pm 1.7 \pm 1.5$ | $8.9 \pm 1.7 \pm 1.2$ | | | $9.2 \pm 1.5$ |
| 274 | $b_1^0 K^+$ † | $9.1 \pm 2.0$ | $9.1 \pm 1.7 \pm 1.0$ | | | | $9.1 \pm 2.0$ |
| 275 | $b_1^+ K^{*^0}$ † | $< 5.9$ | $< 5.9$ | | | | $< 5.9$ |
| 276 | $b_1^0 K^{*^+}$ † | $< 6.7$ | $< 6.7$ | | | | $< 6.7$ |
| 277 | $K^+ \overline{K}^0$ | $1.36 \pm 0.27$ | $1.61 \pm 0.44 \pm 0.09$ | $1.11^{+0.19}_{-0.18} \pm 0.05$ | $< 3.3$ | | $1.19 \pm 0.18$ |
| 278 | $\overline{K}^0 K^+ \pi^0$ | $< 24$ | | | $< 24$ | | $< 24$ |
| 279 | $K^+ K_S K_S$ | $11.5 \pm 1.3$ | $10.7 \pm 1.2 \pm 1.0$ | $13.4 \pm 1.9 \pm 1.5$ | | | $11.5 \pm 1.3$ |
| 280 | $K_S K_S \pi^+$ | $< 0.51$ | $< 0.51$ | $< 3.2$ | | | $< 0.51$ |
| 281 | $K^+ K^- \pi^+$ | $5.0 \pm 0.7$ | $5.0 \pm 0.5 \pm 0.5$ | $< 13$ | | | $5.0 \pm 0.7$ |
| 283 | $\overline{K}^{*0} K^+$ | $< 1.1$ | $< 1.1$ | | $< 5.3$ | | $< 1.1$ |
| 284 | $\overline{K}_0^*(1430)^0 K^+$ | $< 2.2$ | $< 2.2$ | | | | $< 2.2$ |
| – | $\overline{K}_2^*(1430)^0 K^+$ | New | | | | | $< 1.1$ |
| 285 | $K^+ K^+ \pi^-$ | $< 0.16$ | $< 0.16$ | $< 2.4$ | | | $< 0.16$ |
| 288 | $K^{*+} \pi^+ K^-$ | $< 11.8$ | $< 11.8$ | | | | $< 11.8$ |
| 289 | $K^{*+} \overline{K}^{*0}$ | $1.2 \pm 0.5$ | $1.2 \pm 0.5 \pm 0.1$ | | $< 71$ | | $1.2 \pm 0.5$ |
| 290 | $K^{*+} K^+ \pi^-$ | $< 6.1$ | $< 6.1$ | | | | $< 6.1$ |
| 291 | $K^+ K^- K^+$ | $33.7 \pm 2.2$ | $33.5 \pm 0.9 \pm 1.6$ | $30.6 \pm 1.2 \pm 2.3$ | | | $32.5 \pm 1.5$ |
| 292 | $\phi K^+$ | $8.3 \pm 0.7$ | $8.4 \pm 0.7 \pm 0.7$ | $9.60 \pm 0.92^{+1.05}_{-0.84}$ | $5.5^{+2.1}_{-1.8} \pm 0.6$ | $7.6 \pm 1.3 \pm 0.6$ | $8.30 \pm 0.65$ |
| 294 | $a_2(1320) K^+$ † | $< 1.1$ | | $< 1.1$ | | | $< 1.1$ |
| 297 | $\phi(1680) K^+$† | $< 0.8$ | | $< 0.8$ | | | $< 0.8$ |
| 300 | $K^{*+} K^+ K^-$ | $36 \pm 5$ | $36.2 \pm 3.3 \pm 3.6$ | | | | $36.2 \pm 4.9$ |
| 301 | $\phi K^{*+}$ | $10.0 \pm 2.0$ | $11.2 \pm 1.0 \pm 0.9$ | $6.7^{+2.1+0.7}_{-1.9-1.0}$ | $10.6^{+6.4+1.8}_{-4.9-1.6}$ | | $10.0 \pm 1.1$ |
| 303 | $\phi K_1(1270)^+$ | $6.1 \pm 1.9$ | $6.1 \pm 1.6 \pm 1.1$ | | | | $6.1 \pm 1.9$ |
| 304 | $\phi K_1(1400)^+$ | $< 3.2$ | $< 3.2$ | | | | $< 3.2$ |
| 305 | $\phi K^*(1410)^+$ | $< 4.3$ | $< 4.3$ | | | | $< 4.3$ |
| 306 | $\phi K_0^*(1430)^+$ | $7.0 \pm 1.6$ | $7.0 \pm 1.3 \pm 0.9$ | | | | $7.0 \pm 1.6$ |
| 307 | $\phi K_2^*(1430)^+$ | $8.4 \pm 2.1$ | $8.4 \pm 1.8 \pm 1.0$ | | | | $8.4 \pm 2.1$ |
| 308 | $\phi K_2(1770)^+$ | $< 15$ | $< 15$ | | | | $< 15$ |
| 309 | $\phi K_2(1820)^+$ | $< 16$ | $< 16$ | | | | $< 16$ |
| – | $a_1^+ K^{*0}$ | New | $< 3.6$ | | | | $< 3.6$ |
| 310 | $\phi\phi K^+$ § | $4.9^{+2.4}_{-2.2}$ | $5.6 \pm 0.5 \pm 0.3$ | $3.2^{+0.6}_{-0.5} \pm 0.3$ | | | $4.6 \pm 0.4$ |
| 311 | $\eta'\eta' K^+$ | $< 25$ | $< 25$ | | | | $< 25$ |
| 312 | $K^+ \omega\phi$ | $< 1.9$ | | $< 1.9$ | | | $< 1.9$ |
| 313 | $K^+ X(1812)$ † | $< 0.32$ | | $< 0.32$ | | | $< 0.32$ |

† Product BF - daughter BF taken to be 100%; §$M_{\phi\phi} < 2.85$ GeV/$c^2$

Heavy Flavor Averaging Group

$B^+$ Branching Fractions (decays without kaons) ($\times 10^6$) - December 2011. (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | BABAR | Belle | CLEO | CDF | New avg. |
|---|---|---|---|---|---|---|---|
| 330 | $\pi^+\pi^0$ | $5.7 \pm 0.5$ | $5.02 \pm 0.46 \pm 0.29$ | $5.86 \pm 0.26 \pm 0.38$ | $4.6^{+1.8+0.6}_{-1.6-0.7}$ | | $5.48^{+0.35}_{-0.34}$ |
| 331 | $\pi^+\pi^+\pi^-$ | $15.2 \pm 1.5$ | $15.2 \pm 0.6 \pm 1.3$ | | | | $15.2 \pm 1.4$ |
| 332 | $\rho^0\pi^+$ | $8.3 \pm 1.2$ | $8.1 \pm 0.7^{+1.3}_{-1.6}$ | $8.0^{+2.3}_{-2.0} \pm 0.7$ | $10.4^{+3.3}_{-3.4} \pm 2.1$ | | $8.3^{+1.2}_{-1.3}$ |
| 333 | $f_0(980)\pi^+$ † | $< 1,5$ | $< 1.5$ | | | | $< 1.5$ |
| 334 | $f_2(1270)\pi^+$ | $1.57^{+0.69}_{-0.49}$ | $1.57 \pm 0.42^{+0.55}_{-0.25}$ | | | | $1.57^{+0.69}_{-0.49}$ |
| 335 | $\rho(1450)^0\pi^+$ † | $1.4^{+0.6}_{-0.9}$ | $1.4 \pm 0.4^{+0.5}_{-0.8}$ | | | | $1.4^{+0.6}_{-0.9}$ |
| 336 | $f_0(1370)\pi^+$ † | $< 4.0$ | $< 4.0$ | | | | $< 4.0$ |
| 338 | $\pi^+\pi^-\pi^+(NR)$ | $5.3^{+1.5}_{-1.1}$ | $5.3 \pm 0.7^{+1.3}_{-0.8}$ | | | | $5.3^{+1.5}_{-1.1}$ |
| 340 | $\rho^+\pi^0$ | $10.9 \pm 1.4$ | $10.2 \pm 1.4 \pm 0.9$ | $13.2 \pm 2.3^{+1.4}_{-1.9}$ | $< 43$ | | $10.9^{+1.4}_{-1.5}$ |
| 342 | $\rho^+\rho^0$ | $24.0 \pm 1.9$ | $23.7 \pm 1.4 \pm 1.4$ | $31.7 \pm 7.1^{+3.8}_{-6.7}$ | | | $24.0^{+1.9}_{-2.0}$ |
| 343 | $f_0(980)\rho^+$ † | $< 2.0$ | $< 2.0$ | | | | $< 2.0$ |
| 344 | $a_1^+\pi^0$ | $26 \pm 7$ | $26.4 \pm 5.4 \pm 4.1$ | | | | $26.4 \pm 6.8$ |
| 345 | $a_1^0\pi^+$ | $20 \pm 6$ | $20.4 \pm 4.7 \pm 3.4$ | | | | $20.4 \pm 5.8$ |
| 346 | $\omega\pi^+$ | $6.9 \pm 0.5$ | $6.7 \pm 0.5 \pm 0.4$ | $6.9 \pm 0.6 \pm 0.5$ | $11.3^{+3.3}_{-2.9} \pm 1.4$ | | $6.9 \pm 0.5$ |
| 347 | $\omega\rho^+$ | $15.9 \pm 2.1$ | $15.9 \pm 1.6 \pm 1.4$ | | $< 61$ | | $15.9 \pm 2.1$ |
| 348 | $\eta\pi^+$ | $4.07 \pm 0.32$ | $4.00 \pm 0.40 \pm 0.24$ | $4.07 \pm 0.26 \pm 0.21$ | $1.2^{+2.8}_{-1.2}$ | | $4.02 \pm 0.27$ |
| 349 | $\eta\rho^+$ | $7.0 \pm 2.9$ | $9.9 \pm 1.2 \pm 0.8$ | $4.1^{+1.4}_{-1.3} \pm 0.4$ | $4.8^{+5.2}_{-3.8}$ | | $6.9 \pm 1.0$ |
| 350 | $\eta'\pi^+$ | $2.7 \pm 0.9$ | $3.5 \pm 0.6 \pm 0.2$ | $1.8^{+0.7}_{-0.6} \pm 0.1$ | $1.0^{+5.8}_{-1.0}$ | | $2.7^{+0.5}_{-0.4}$ |
| 351 | $\eta'\rho^+$ | $8.7^{+3.9}_{-3.1}$ | $9.7^{+1.9}_{-1.8} \pm 1.1$ | $< 5.8$ | $11.2^{+11.9}_{-7.0}$ | | $9.8^{+2.1}_{-2.0}$ |
| 352 | $\phi\pi^+$ | $< 0.24$ | $< 0.24$ | | $< 5$ | | $< 0.24$ |
| 353 | $\phi\rho^+$ | $< 3.0$ | $< 3.0$ | | $< 16$ | | $< 3.0$ |
| 354 | $a_0(980)^0\pi^+$ † | $< 5.8$ | $< 5.8$ | | | | $< 5.8$ |
| 355 | $a_0(980)^+\pi^0$ † | $< 1.4$ | $< 1.4$ | | | | $< 1.4$ |
| 359 | $b_1^0\pi^+$ † | $6.7 \pm 2.0$ | $6.7 \pm 1.7 \pm 1.0$ | | | | $6.7 \pm 2.0$ |
| 360 | $b_1^+\pi^0$ † | $< 3.3$ | $< 3.3$ | | | | $< 3.3$ |
| 362 | $b_1^+\rho^0$ † | $< 5.2$ | $< 5.2$ | | | | $< 5.2$ |
| 364 | $b_1^0\rho^+$ † | $< 3.3$ | $< 3.3$ | | | | $< 3.3$ |

† Product BF - daughter BF taken to be 100%;

# Heavy Flavor Averaging Group

$B^0$ Branching Fractions (decays with kaons) ($\times 10^6$) - December 2011. (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | BABAR | Belle | CLEO | CDF | New avg. |
|---|---|---|---|---|---|---|---|
| 210 | $K^+\pi^-$ | $19.4 \pm 0.6$ | $19.1 \pm 0.6 \pm 0.6$ | $20.0 \pm 0.34 \pm 0.63$ | $18.0^{+2.3+1.2}_{-2.1-0.9}$ | | $19.55^{+0.54}_{-0.53}$ |
| 211 | $K^0\pi^0$ | $9.5 \pm 0.8$ | $10.1 \pm 0.6 \pm 0.4$ | $9.66 \pm 0.46 \pm 0.49$ | $12.8^{+4.0+1.7}_{-3.3-1.4}$ | | $9.92^{+0.49}_{-0.48}$ |
| 212 | $\eta' K^0$ | $66 \pm 4$ | $68.5 \pm 2.2 \pm 3.1$ | $58.9^{+3.6}_{-3.5} \pm 4.3$ | $89^{+18}_{-16} \pm 9$ | | $66.1 \pm 3.1$ |
| 213 | $\eta' K^{*0}$ | $3.8 \pm 1.1 \pm 0.5$ | $3.1^{+0.9}_{-0.8} \pm 0.3$ | $< 2.6$ | $7.8^{+7.7}_{-5.7}$ | | $3.1 \pm 0.9$ |
| – | $\eta' K_0^*(1430)^0$ | New | $6.3 \pm 1.3 \pm 0.9$ | | | | $6.3 \pm 1.6$ |
| – | $\eta' K_2^*(1430)^0$ | New | $13.7^{+3.0}_{-1.9} \pm 1.2$ | | | | $13.7^{+3.2}_{-2.2}$ |
| 214 | $\eta K^0$ | $1.15^{+0.43}_{-0.38} \pm 0.09$ | $1.15^{+0.43}_{-0.38} \pm 0.09$ | $1.27^{+0.33}_{-0.29} \pm 0.08$ | $0.0^{+3.0}_{-0.0}$ | | $1.23^{+0.27}_{-0.24}$ |
| 215 | $\eta K^{*0}$ | $15.9 \pm 1.0$ | $16.5 \pm 1.1 \pm 0.8$ | $15.2 \pm 1.2 \pm 1.0$ | $13.8^{+5.5}_{-4.6} \pm 1.6$ | | $15.9 \pm 1.0$ |
| 216 | $\eta K_0^*(1430)^0$ | $9.6 \pm 1.9$ | $9.6 \pm 1.4 \pm 1.3$ | | | | $9.6 \pm 1.9$ |
| 217 | $\eta K_2^*(1430)^0$ | $9.6 \pm 2.1$ | $9.6 \pm 1.8 \pm 1.1$ | | | | $9.6 \pm 2.1$ |
| 218 | $\omega K^0$ | $5.0 \pm 0.6$ | $5.4 \pm 0.8 \pm 0.3$ | $4.4^{+0.8}_{-0.7} \pm 0.4$ | $10.0^{+5.4}_{-4.2} \pm 1.4$ | | $5.0 \pm 0.6$ |
| 219 | $a_0(980)^0 K^0$ † | $< 7.8$ | $< 7.8$ | | | | $< 7.8$ |
| 220 | $b_1^0 K^0$ † | $< 7.8$ | $< 7.8$ | | | | $< 7.8$ |
| 221 | $a_0(980)^- K^+$ † | $< 1.9$ | $< 1.9$ | | | | $< 1.9$ |
| 222 | $b_1^- K^+$ † | $7.4 \pm 1.4$ | $7.4 \pm 1.0 \pm 1.0$ | | | | $7.4 \pm 1.4$ |
| 223 | $b_1^0 K^{*0}$ † | $< 8.0$ | $< 8.0$ | | | | $< 8.0$ |
| 224 | $b_1^- K^{*+}$ † | $< 5.0$ | $< 5.0$ | | | | $< 5.0$ |
| 225 | $a_0(1450)^- K^+$ † | $< 3.1$ | $< 3.1$ | | | | $< 3.1$ |
| 227 | $\omega K^{*0}$ | $2.0 \pm 0.5$ | $2.2 \pm 0.6 \pm 0.2$ | $1.8 \pm 0.7^{+0.3}_{-0.2}$ | $< 23$ | | $2.0 \pm 0.5$ |
| 229 | $\omega K_0^*(1430)^0$ | $16.0 \pm 3.4$ | $16.0 \pm 1.6 \pm 3.0$ | | | | $16.0 \pm 3.4$ |
| 230 | $\omega K_2^*(1430)^0$ | $10.1 \pm 2.3$ | $10.1 \pm 2.0 \pm 1.1$ | | | | $10.1 \pm 2.3$ |
| 231 | $\omega K^+\pi^-$ $(NR)^1$ | $5.1 \pm 1.0$ | | $5.1 \pm 0.7 \pm 0.7$ | | | $5.1 \pm 1.0$ |
| 232 | $K^+\pi^-\pi^0$ | $35.9^{+2.8}_{-2.4}$ | $38.5 \pm 1.0 \pm 3.9$ | $36.6^{+4.2}_{-4.3} \pm 3.0$ | $< 40$ | | $37.8 \pm 3.2$ |
| 233 | $\rho^- K^+$ | $8.4^{+1.6}_{-2.2}$ | $6.6 \pm 0.5 \pm 0.8$ | $15.1^{+3.4+2.4}_{-3.3-2.6}$ | $16^{+8}_{-6} \pm 3$ | | $7.2 \pm 0.9$ |
| 234 | $\rho(1450)^- K^+$ | $< 2.1$ | $2.4 \pm 1.0 \pm 0.6$ | | | | $2.4 \pm 1.2$ |
| 235 | $\rho(1700)^- K^+$ | $< 1.1$ | $0.6 \pm 0.6 \pm 0.4$ | | | | $0.6 \pm 0.7$ |
| 236 | $K^+\pi^-\pi^0(NR)$ | $4.4 \pm 1.0$ | $2.8 \pm 0.5 \pm 0.4$ | $< 9.4$ | | | $2.8 \pm 0.6$ |
| 239 | $K_2^*(1430)^0\pi^0$ | $< 4.0$ | $< 4.0$ | | | | $< 4.0$ |
| 240 | $K^*(1680)^0\pi^0$ | $< 7.5$ | $< 7.5$ | | | | $< 7.5$ |
| 242 | $K^0\pi^+\pi^-$ | $49.6 \pm 2.0$ | $50.2 \pm 1.5 \pm 1.8$ | $47.5 \pm 2.4 \pm 3.7$ | $50^{+10}_{-9} \pm 7$ | | $49.6 \pm 2.0$ |
| 243 | $K^0\pi^+\pi^-(NR)$ | $14.7^{+4.0}_{-2.6}$ | $11.1^{+2.5}_{-1.0} \pm 0.9$ | $19.9 \pm 2.5^{+1.7}_{-2.0}$ | | | $14.7 \pm 2.0$ |
| 244 | $\rho^0 K^0$ | $4.7 \pm 0.6$ | $4.4 \pm 0.7 \pm 0.3$ | $6.1 \pm 1.0^{+1.1}_{-1.2}$ | $< 39$ | | $4.7 \pm 0.7$ |
| 245 | $K^{*+}\pi^-$ | $9.4^{+1.3}_{-1.2}$ | $8.3^{+0.9}_{-0.8} \pm 0.8$ | $8.4 \pm 1.1^{+1.0}_{-0.9}$ | $16^{+6}_{-5} \pm 2$ | | $8.6 \pm 0.9$ |
| 246 | $K_0^*(1430)^+\pi^-$ | $33 \pm 7$ | $29.9^{+2.3}_{-1.7} \pm 3.6$ | $49.7 \pm 3.8^{+6.8}_{-8.2}$ | | | $33.5^{+3.9}_{-3.8}$ |
| 248 | $K^*(1410)^+\pi^-$ † | $< 86$ | | $< 86$ | | | $< 86$ |
| 249 | $f_0(980)K^0$ † | $7.0 \pm 0.9$ | $6.9 \pm 0.8 \pm 0.6$ | $7.6 \pm 1.7^{+0.9}_{-1.3}$ | | | $7.0 \pm 0.9$ |
| 250 | $f_2(1270)^0 K^0$ | $2.7^{+1.0}_{-0.8} \pm 0.9$ | $2.7^{+1.0}_{-0.8} \pm 0.9$ | $< 2.5$† | | | $2.7^{+1.3}_{-1.2}$ |

† Product BF - daughter BF taken to be 100%; ‡ Relative BF converted to absolute BF; [1] $0.755 < M(K\pi) < 1.250$ GeV/$c^2$;

# Heavy Flavor Averaging Group

## $B^0$ Branching Fractions (decays with kaons) ($\times 10^6$) - December 2011. (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | BABAR | Belle | CLEO | CDF | New avg. |
|---|---|---|---|---|---|---|---|
| 252 | $K^{*0}\pi^0$ | $3.6 \pm 0.7 \pm 0.4$ | $3.3 \pm 0.5 \pm 0.4$ | $0.4^{+1.9}_{-1.7} \pm 0.1$ | $0.0^{+1.3+0.5}_{-0.0-0.0}$ | | $2.5 \pm 0.6$ |
| 253 | $K_2^*(1430)^+\pi^-$ | $< 6.3$ | $< 16.2$ | $< 6.3$ | | | $< 6.3$ |
| 254 | $K^*(1680)^+\pi^-$ | $< 10$ | $< 25$ | $< 10.1$ | | | $< 10.1$ |
| 256 | $\rho^0 K^+\pi^-$ | $2.8 \pm 0.5 \pm 0.5$ | | $2.8 \pm 0.5 \pm 0.5$ [2] | | | $2.8 \pm 0.7$ |
| 257 | $f_0(980)K^+\pi^-$ | $1.4 \pm 0.4^{+0.3}_{-0.4}$ | | $1.4 \pm 0.4^{+0.3}_{-0.4}$ [2] | | | $1.4^{+0.5}_{-0.6}$ |
| 258 | $K^+\pi^-\pi^+\pi^-$ | $< 2.1$ | | $< 2.1$ | | | $< 2.1$ |
| 259 | $K^{*0}\pi^+\pi^-$ | $54 \pm 5$ | $54.5 \pm 2.9 \pm 4.3$ | | | | $54.5 \pm 5.2$ |
| 260 | $K^{*0}\rho^0$ | $3.4^{+1.7}_{-1.3}$ | $5.1 \pm 0.6^{+0.6}_{-0.8}$ | $2.1^{+0.8+0.9}_{-0.7-0.5}$ | $< 34$ | | $3.9 \pm 0.8$ |
| 261 | $f_0(980)K^{*0}$ † | $< 2.2$ | $5.7 \pm 0.6 \pm 0.3$ | $< 2.2$ | | | $5.7 \pm 0.7$ |
| – | $f_0(980)K_2^*(1430)^0$ † | New | $8.6 \pm 1.7 \pm 1.0$ | | | | $8.6 \pm 2.0$ |
| 262 | $K_1(1270)^+\pi^-$ | $< 30$ | $17^{+8}_{-11}$ | | | | $17^{+8}_{-11}$ |
| 263 | $K_1(1400)^+\pi^-$ | $< 27$ | $17^{+7}_{-9}$ | | | | $17^{+7}_{-9}$ |
| 264 | $a_1^- K^+$ | $16 \pm 4$ | $16.3 \pm 2.9 \pm 2.3$ | | | | $16.3 \pm 3.7$ |
| 265 | $K^{*+}\rho^-$ | $< 12$ | $10.3 \pm 2.3 \pm 1.3$ | | | | $10.3 \pm 2.6$ |
| 267 | $K^+K^-$ | $< 0.41$ | $0.04 \pm 0.15 \pm 0.08$ | $0.09^{+0.18}_{-0.13} \pm 0.01$ | $< 0.8$ | $0.23 \pm 0.10 \pm 0.10$‡ | $0.13^{+0.10}_{-0.09}$ |
| 268 | $K^0\overline{K}^0$ | $0.96^{+0.20}_{-0.18}$ | $1.08 \pm 0.28 \pm 0.11$ | $1.26^{+0.19}_{-0.18} \pm 0.06$ | $< 3.3$ | | $1.21 \pm 0.16$ |
| 269 | $K^0K^-\pi^+$ | $< 18$ | $6.4 \pm 1.0 \pm 0.6$ | $< 18$ | $< 21$ | | $6.4 \pm 1.2$ |
| 270 | $K^{*0}\overline{K}^0$ | $< 1.9$ | $< 1.9$ | | | | $< 1.9$ |
| 271 | $K^+K^-\pi^0$ | $< 19$ | | | $< 19$ | | $< 19$ |
| 272 | $K_SK_S\pi^0$ | $< 0.9$ | $< 0.9$ | | | | $< 0.9$ |
| 273 | $K_SK_S\eta$ | $< 1.0$ | $< 1.0$ | | | | $< 1.0$ |
| 274 | $K_SK_S\eta'$ | $< 2.0$ | $< 2.0$ | | | | $< 2.0$ |
| 275 | $K^+K^-K^0$ | $24.7 \pm 2.3$ | $23.8 \pm 2.0 \pm 1.6$ | $28.3 \pm 3.3 \pm 4.0$ | | | $24.7 \pm 2.3$ |
| 276 | $\phi K^0$ | $8.6^{+1.3}_{-1.1}$ | $8.4^{+1.5}_{-1.3} \pm 0.5$ | $9.0^{+2.2}_{-1.8} \pm 0.7$ | $5.4^{+3.7}_{-2.7} \pm 0.7$ | | $8.3^{+1.2}_{-1.0}$ |
| 277 | $K_SK_SK_S$ | $6.2^{+1.2}_{-1.1}$ | $6.19 \pm 0.48 \pm 0.19$ | $4.2^{+1.6}_{-1.3} \pm 0.8$ | | | $6.04 \pm 0.50$ |
| – | $f_0(1710)K_S$ † | New | $0.50^{+0.46}_{-0.24} \pm 0.11$ † | | | | $0.50^{+0.47}_{-0.26}$ |
| – | $f_0(2010)K_S$ † | New | $0.54^{+0.21}_{-0.20} \pm 0.52$ † | | | | $0.54 \pm 0.56$ |
| 278 | $K_SK_SK_L$ | $< 16$ | $< 16$ [2] | | | | $< 16$ [2] |
| 279 | $K^{*0}K^+K^-$ | $27.5 \pm 2.6$ | $27.5 \pm 1.3 \pm 2.2$ | | | | $27.5 \pm 2.6$ |
| 280 | $\phi K^{*0}$ | $9.8 \pm 0.6$ | $9.7 \pm 0.5 \pm 0.6$ | $10.0^{+1.6+0.7}_{-1.5-0.8}$ | $11.5^{+4.5+1.8}_{-3.7-1.7}$ | | $9.8 \pm 0.7$ |
| 281 | $K^{*0}\pi^+K^-$ | $4.6 \pm 1.4$ | $4.6 \pm 1.1 \pm 0.8$ | $< 13.9$ [3] | | | $4.6 \pm 1.4$ |
| 282 | $K^{*0}\overline{K}^{*0}$ | $1.28^{+0.35}_{-0.30} \pm 0.11$ | $1.28^{+0.35}_{-0.30} \pm 0.11$ | $0.26^{+0.33+0.10}_{-0.29-0.08}$ | $< 22$ | | $0.81 \pm 0.23$ |
| – | $K_0^*(1430)^0\overline{K}_0^*(1430)^0$ | New | | $< 8.4$ | | | $< 8.4$ |
| – | $K_0^*(1430)^0\overline{K}^{*0}$ | New | | $< 3.3$ | | | $< 3.3$ |
| – | $K_0^*(1430)^0\pi^+K^-$ | New | | $< 31.8$ [3] | | | $< 31.8$ [3] |
| – | $K^+\pi^-\pi^+K^-$ | New | | $< 72$ [3] | | | $< 72$ [3] |
| 283 | $K^{*0}K^+\pi^-$ | $< 2.2$ | $< 2.2$ | $< 7.6$ [3] | | | $< 2.2$ |
| 284 | $K^{*0}K^{*0}$ | $< 0.41$ | $< 0.41$ | $< 0.2$ | $< 37$ | | $< 0.2$ |
| – | $K_0^*(1430)^0K_0^*(1430)^0$ | New | | $< 4.7$ | | | $< 4.7$ |
| – | $K_0^*(1430)^0K^{*0}$ | New | | $< 1.7$ | | | $< 1.7$ |
| – | $K^+\pi^-K^+\pi^-$ | New | | $< 6.0$ [3] | | | $< 6.0$ [3] |
| 285 | $K^{*+}K^{*-}$ | $< 2.0$ | $< 2.0$ | | $< 141$ | | $< 2.0$ |
| 289 | $\phi K_0^*(1430)^0$ | $3.9 \pm 0.5 \pm 0.6$ | $3.9 \pm 0.5 \pm 0.6$ | | | | $3.9 \pm 0.8$ |
| 290 | $\phi K^*(1680)^0$ | $< 3.5$ | $< 3.5$ | | | | $< 3.5$ |
| 291 | $\phi K_3^*(1780)^0$ | $< 2.7$ | $< 2.7$ | | | | $< 2.7$ |
| 292 | $\phi K_4^*(2045)^0$ | $< 15.3$ | $< 15.3$ | | | | $< 15.3$ |
| 294 | $\phi K_2^*(1430)^0$ | $7.5 \pm 1.0$ | $7.5 \pm 0.9 \pm 0.5$ | | | | $7.5 \pm 1.0$ |
| 295 | $\phi\phi K^0$ § | $4.1^{+1.7}_{-1.4} \pm 0.4$ | $4.5 \pm 0.8 \pm 0.3$ | $2.3^{+1.0}_{-0.7} \pm 0.2$ | | | $3.6 \pm 0.7$ |
| 296 | $\eta'\eta'K^0$ | $< 31$ | $< 31$ | | | | $< 31$ |

† Product BF - daughter BF taken to be 100%, §$M_{\phi\phi} < 2.85$ GeV/$c^2$ ‡ Relative BF converted to absolute BF [1]$0.55 < M(\pi\pi) < 1.42$ GeV/$c^2$; [2]$0.75 < M(K\pi) < 1.20$ GeV/$c^2$; [3]$0.70 < M(K\pi) < 1.70$ GeV/$c^2$

# Heavy Flavor Averaging Group

$B^0$ Branching Fractions (decays without kaons) ($\times 10^6$) - December 2011. (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | BABAR | Belle | CLEO | CDF | New avg. |
|---|---|---|---|---|---|---|---|
| 315 | $\pi^+\pi^-$ | $5.13 \pm 0.24$ | $5.5 \pm 0.4 \pm 0.3$ | $5.04 \pm 0.21 \pm 0.19$ | $4.5^{+1.4+0.5}_{-1.2-0.4}$ | $5.02 \pm 0.33 \pm 0.35$‡ | $5.11 \pm 0.22$ |
| 316 | $\pi^0\pi^0$ | $1.62 \pm 0.31$ | $1.83 \pm 0.21 \pm 0.13$ | $2.3^{+0.4+0.2}_{-0.5-0.3}$ | $< 4.4$ | | $1.91^{+0.22}_{-0.23}$ |
| 317 | $\eta\pi^0$ | $< 1.5$ | $< 1.5$ | $< 2.5$ | $< 2.9$ | | $< 1.5$ |
| 318 | $\eta\eta$ | $< 1.0$ | $< 1.0$ | $< 2.0$ | $< 18$ | | $< 1.0$ |
| 319 | $\eta'\pi^0$ | $1.2 \pm 0.6$ | $0.9 \pm 0.4 \pm 0.1$ | $2.8 \pm 1.0 \pm 0.3$ | $0.0^{+1.8}_{-0.0}$ | | $1.2 \pm 0.4$ |
| 320 | $\eta'\eta'$ | $< 1.7$ | $< 1.7$ | $< 6.5$ | $< 47$ | | $< 1.7$ |
| 321 | $\eta'\eta$ | $< 1.2$ | $< 1.2$ | $< 4.5$ | $< 27$ | | $< 1.2$ |
| 322 | $\eta'\rho^0$ | $< 1.3$ | $< 2.8$ | $< 1.3$ | $< 12$ | | $< 1.3$ |
| 323 | $f_0(980)\eta'$ † | $< 1.5$ | $< 0.9$ | | | | $< 0.9$ |
| 324 | $\eta\rho^0$ | $< 1.5$ | $< 1.5$ | $< 1.9$ | $< 10$ | | $< 1.5$ |
| 325 | $f_0(980)\eta$ † | $< 0.4$ | $< 0.4$ | | | | $< 0.4$ |
| 326 | $\omega\eta$ | $0.94^{+0.35}_{-0.30} \pm 0.09$ | $< 1.4$ | | $< 12$ | | $< 1.4$ |
| 327 | $\omega\eta'$ | $1.01^{+0.46}_{-0.38} \pm 0.09$ | $< 1.8$ | $< 2.2$ | $< 60$ | | $< 1.8$ |
| 328 | $\omega\rho^0$ | $< 1.6$ | $< 1.6$ | | $< 11$ | | $< 1.6$ |
| 329 | $f_0(980)\omega$ † | $< 1.5$ | $< 1.5$ | | | | $< 1.5$ |
| 330 | $\omega\omega$ | $< 4.0$ | $< 4.0$ | | $< 19$ | | $< 4.0$ |
| 331 | $\phi\pi^0$ | $< 0.28$ | $< 0.28$ | | $< 5$ | | $< 0.28$ |
| 332 | $\phi\eta$ | $< 0.5$ | $< 0.5$ | | $< 9$ | | $< 0.5$ |
| 333 | $\phi\eta'$ | $< 0.5$ | $< 1.1$ | $< 0.5$ | $< 31$ | | $< 0.5$ |
| 334 | $\phi\rho^0$ | $< 0.33$ | $< 0.33$ | | $< 13$ | | $< 0.33$ |
| 335 | $f_0(980)\phi$ † | $< 0.38$ | $< 0.38$ | | | | $< 0.38$ |
| 336 | $\omega\phi$ | $< 1.2$ | $< 1.2$ | | $< 21$ | | $< 1.2$ |
| 337 | $\phi\phi$ | $< 0.2$ | $< 0.2$ | | $< 12$ | | $< 0.2$ |
| 338 | $a_0^\mp(980)\pi^\pm$ † | $< 3.1$ | $< 3.1$ | | | | $< 3.1$ |
| 339 | $a_0^\mp(1450)\pi^\pm$ † | $< 2.3$ | $< 2.3$ | | | | $< 2.3$ |
| 341 | $\rho^0\pi^0$ | $2.0 \pm 0.5$ | $1.4 \pm 0.6 \pm 0.3$ | $3.0 \pm 0.5 \pm 0.7$ | $1.6^{+2.0}_{-1.4} \pm 0.8$ | | $2.0 \pm 0.5$ |
| 342 | $\rho^\mp\pi^\pm$ | $23.0 \pm 2.3$ | $22.6 \pm 1.8 \pm 2.2$ | $22.6 \pm 1.1 \pm 4.4$ | $27.6^{+8.4}_{-7.4} \pm 4.2$ | | $23.0 \pm 2.3$ |
| 343 | $\pi^+\pi^-\pi^+\pi^-$ | $< 19.3$ | $< 23.1$ | $< 19.3$ | | | $< 19.3$ |
| 344 | $\rho^0\pi^+\pi^-(NR)$ | $< 8.8$ | $< 8.8$ | $< 12$ | | | $< 8.8$ |
| 345 | $\rho^0\rho^0$ | $0.73 \pm 0.28$ | $0.92 \pm 0.32 \pm 0.14$ | $0.4 \pm 0.4^{+0.2}_{-0.3}$ | $< 18$ | | $0.73^{+0.27}_{-0.28}$ |
| 346 | $f_0(980)\pi^+\pi^-(NR)$ | $< 3.8$ | | $< 3.8$ | | | $< 3.8$ |
| 347 | $f_0(980)\rho^0$ † | $< 0.3$ | $< 0.40$ | $< 0.3$ | | | $< 0.3$ |
| 348 | $f_0(980)f_0(980)$ † | $< 0.1$ | $< 0.19$ | $< 0.1$ | | | $< 0.1$ |
| 350 | $a_1^\mp\pi^\pm$ | $33 \pm 5$ | $33.2 \pm 3.8 \pm 3.0$ | | | | $33.2 \pm 4.8$ |
| 353 | $\rho^+\rho^-$ | $24.2 \pm 3.1$ | $25.5 \pm 2.1^{+3.6}_{-3.9}$ | $22.8 \pm 3.8^{+2.3}_{-2.6}$ | | | $24.2^{+3.1}_{-3.2}$ |
| 355 | $\omega\pi^0$ | $< 0.5$ | $< 0.5$ | $< 2.0$ | $< 5.5$ | | $< 0.5$ |
| 357 | $a_1^\pm\rho^\mp$ | $< 61$ | $< 61$ | | | | $< 61$ |
| 359 | $b_1^\mp\pi^\pm$ † | $10.9 \pm 1.5$ | $10.9 \pm 1.2 \pm 0.9$ | | | | $10.9 \pm 1.5$ |
| 360 | $b_1^0\pi^0$ † | $< 1.9$ | $< 1.9$ | | | | $< 1.9$ |
| 361 | $b_1^\pm\rho^\mp$ † | $< 1.4$ | $< 1.4$ | | | | $< 1.4$ |
| 362 | $b_1^0\rho^0$ † | $< 3.4$ | $< 3.4$ | | | | $< 3.4$ |
| 364 | $a_1^\pm a_1^\mp$ | $47.3 \pm 10.5 \pm 6.3$ | $47.3 \pm 10.5 \pm 6.3$ | | | | $47.3 \pm 12.2$ |

† Product BF - daughter BF taken to be 100%, ‡ Relative BF converted to absolute BF

Heavy Flavor Averaging Group
December 2011

# Compilation of $B^0$ Relative Branching Fractions (UL 90% CL)

In PDG2010 New since PDG2010 (preliminary) New since PDG2010 (published)

| RPP# | Mode | PDG2010 Avg. | CDF | DØ | New avg. |
|---|---|---|---|---|---|
| 267 | $\mathcal{B}(B^0 \to K^+K^-)/\mathcal{B}(B^0 \to K^+\pi^-)$ | | $0.020 \pm 0.008 \pm 0.006$ | | $0.020 \pm 0.010$ |
| 315 | $\mathcal{B}(B^0 \to \pi^+\pi^-)/\mathcal{B}(B^0 \to K^+\pi^-)$ | | $0.259 \pm 0.017 \pm 0.016$ | | $0.259 \pm 0.023$ |

# Charmless Mesonic Decays: *BABAR* References


[1] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **97**, 171805 (2006).

[2] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **101**, 201801 (2008).

[3] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 031103 (2007).

[4] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **80**, 112002 (2009).

[5] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **70**, 111102 (2004).

[6] *BABAR* Collaboration (B. Aubert *et al.*), arXiv:0807.4226 (2008).

[7] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **91**, 201802 (2003).

[8] *BABAR* Collaboration, (B. Aubert *et al.*), Phys. Rev. D **78**, 091102 (2008).

[9] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 051802 (2004).

[10] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 011103 (2007).

[11] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **75**, 012008 (2007).

[12] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **78**, 071104 (2008).

[13] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 091102 (2007).

[14] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 181805 (2004).

[15] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **99**, 201802 (2007).

[16] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **99**, 261801 (2007).

[17] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **97**, 051802 (2006).

[18] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **69**, 011102 (2004).

[19] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **78**, 092008 (2008).

[20] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 052007 (2007).

[21] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 032003 (2006).

[22] *BABAR* Collaboration, (B. Aubert *et al.*), Phys. Rev. D **78**, 011104 (2008).

[23] *BABAR* Collaboration (P. del Amo Sanchez *et al.*), Phys. Rev. D **82**, 011502 (2010).

[24] *BABAR* Collaboration (P. del Amo Sanchez *et al.*), Phys. Rev. D **82**, 031101 (2010).

[25] *BABAR* Collaboration (J. P. Lees *et al.*), arXiv:1111.3636 (2011).

[26] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **80**, 092007 (2009).

[27] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 031105 (2006).

[28] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **80**, 112001 (2009).

[29] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 051104 (2006).

[30] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 051102 (2006).

[31] *BABAR* Collaboration (J. P. Lees *et al.*), Phys. Rev. D **84**, 092007 (2011).

[32] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **72**, 072003 (2005).

[33] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **75**, 091103 (2007).

[34] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **78**, 011107 (2008).

[35] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 032005 (2006).

[36] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **97**, 201801 (2006).

[37] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 031104 (2006).

[38] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 011102 (2006).

[39] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **74**, 072008 (2006).

[40] *BABAR* Collaboration (J. P. Lees *et al.*), Phys. Rev. D **84**, 012001 (2011).

[41] *BABAR* Collaboration, (B. Aubert *et al.*, Phys. Rev. D **80**, 051101 (2009).

[42] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **102**, 141802 (2009).

[43] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **77**, 011101 (2008).

[44] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **97**, 201802 (2006).

[45] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **75**, 111102 (2007).

[46] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **81**, 052009 (2010).

[47] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 051103 (2007).

[48] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 071103 (2007).

[49] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **99**, 241803 (2007).

[50] *BABAR* Collaboration, (B. Aubert *et al.*), Phys. Rev. Lett. **100**, 051803 (2008).

[51] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **100**, 081801 (2008).

[52] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **99**, 221801 (2007).

[53] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **76**, 071104 (2007).

[54] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **79**, 051101 (2009).

[55] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **78**, 052005 (2008).

[56] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **78**, 012004 (2008).

[57] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **101**, 091801 (2008).

[58] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **78**, 051103 (2008).

[59] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **101**, 161801 (2008).

[60] *BABAR* Collaboration (P. del Amo Sanchez *et al.*), Phys. Rev. D **82**, 091101 (2010).

[61] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **79**, 052005 (2009).

[62] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **79**, 051102 (2009).

[63] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **79**, 072006 (2009).

[64] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **80**, 011101 (2009).

[65] *BABAR* Collaboration, talk by B. Lindquist at DPF 2011 (2011).

[66] *BABAR* Collaboration (P. del Amo Sanchez *et al.*), Phys. Rev. D **83**, 051101 (2010).

[67] *BABAR* Collaboration (J. P. Lees *et al.*), Phys. Rev. D **83**, 112010 (2011).

[68]

[69]

[70]

# Belle References


[71] Belle Collaboration (S.-W. Lin, P. Chang *et al.*), Phys. Rev. Lett. **98**, 181804 (2007).

[72] Belle Collaboration, (J. Schümann, C.H. Wang *et al.*), Phys. Rev. D **75**, 092002 (2007).

[73] Belle Collaboration (S.-W. Lin, P. Chang *et al.*), Phys. Rev. Lett. **99**, 121601 (2007).

[74] Belle Collaboration, (P. Chang *et al.*), Phys. Rev. D **71**, 091106 (2005).

[75] Belle Collaboration, (P. Goldenzweig *et al.*), Phys. Rev. Lett. **101**, 231801 (2008).

[76] Belle Collaboration, (C.-M. Jen, P. Chang *et al.*), Phys. Rev. D **74**, 111101 (2006).

[77] Belle Collaboration, (C.H. Wang *et al.*), Phys. Rev. D **75**, 092005 (2007).

[78] Belle Collaboration (A. Garmash *et al.*), Phys. Rev. D **69**, 012001 (2004).

[79] Belle Collaboration, (A. Kusaka, C.H. Wang *et al.*), Phys. Rev. D **77**, 072001 (2008).

[80] Belle Collaboration, (C.C. Chiang *et al.*), Phys. Rev. D **78**, 111102 (2008).

[81] Belle Collaboration (J. Zhang, M. Nakao *et al.*), Phys. Rev. Lett. **91**, 221801 (2003).

[82] Belle Collaboration (A. Gordon *et al.*), Phys. Lett. B **542**, 183 (2002).

[83] Belle Collaboration (Y.-T. Shen, K.-F. Chen, P. Chang *et al.*), arXiv:0802.1547 (2008).

[84] Belle Collaboration (K.-F. Chen *et al.*), Phys. Rev. Lett. **91**, 201801 (2003).

[85] Belle Collaboration (P. Chang *et al.*), Phys. Lett. B **599**, 148 (2004).

[86] Belle Collaboration (A. Garmash *et al.*), Phys. Rev. D **71**, 092003 (2005).

[87] Belle Collaboration, (C.T. Hoi, P. Chang *et al.*), Phys. Rev. Lett. **108**, 031801 (2012).

[88] Belle Collaboration, (J. Zhang *et al.*), Phys. Rev. Lett. **94**, 031801 (2005).

[89] Belle Collaboration, (Y. Chao *et al.*), Phys. Rev. Lett. **94**, 181803 (2005).

[90] Belle Collaboration talk by P. Chang presented at EPS-HEP (2011).

[91] Belle Collaboration, (C.C. Chiang *et al.*), Phys. Rev. D **81**, 071101 (2010).

[92] Belle Collaboration, (J. Zhang *et al.*), Phys. Rev. Lett. **95**, 141801 (2005).

[93] Belle Collaboration, (A. Somov *et al.*), Phys. Rev. Lett. **96**, 171801 (2006).

[94] Belle Collaboration, (J. Schümann *et al.*), Phys. Rev. Lett. **97**, 061802 (2006).

[95]

[96] Belle Collaboration, (A. Garmash *et al.*), Phys. Rev. Lett. **96**, 251803 (2006).

[97]

[98] Belle Collaboration, (A. Garmash *et al.*), Phys. Rev. D **75**, 012006 (2007).

[99] Belle Collaboration, (C. Liu *et al.*), Phys. Rev. D **79**, 071102 (2009).

[100] Belle Collaboration, (S.-H. Kyeong, Y.-J. Kwon *et al.*), Phys. Rev. D **80**, 051103 (2009).

## CLEO References


[101] CLEO Collaboration (A. Bornheim *et al.*), Phys. Rev. D **68**, 052002 (2003).

[102] CLEO Collaboration (S.J. Richichi *et al.*), Phys. Rev. Lett. **85**, 520 (2000).

[103] CLEO Collaboration (R.A. Briere *et al.*), Phys. Rev. Lett. **86**, 3718 (2001).

[104] CLEO Collaboration (C.P. Jessop *et al.*), Phys. Rev. Lett. **85**, 2881 (2000).

[105] CLEO Collaboration (R. Godang *et al.*), Phys. Rev. Lett. **88**, 021802 (2002).

[106] CLEO Collaboration (T. Bergfeld *et al.*), Phys. Rev. Lett. **81**, 272 (1998).

[107] CLEO Collaboration (E. Eckhart *et al.*), Phys. Rev. Lett. **89**, 251801 (2002).

[108] CLEO Collaboration (D.M. Asner *et al.*), Phys. Rev. D **53**, 1039 (1996).

[109] CLEO Collaboration (T. Bergfeld *et al.*), Phys. Rev. Lett. **77** 4503 (1996).

[110] CLEO Collaboration (B. Behrens *et al.*), Phys. Rev. Lett. **80** 3710 (1998).


## CDF References


[111] CDF Collaboration (D. Acosta *et al.*), Phys. Rev. Lett. **95** 031801 (2005).

[112] CDF Collaboration, (T. Aaltonen *et al.*), Phys. Rev. Lett. **106**, 181802 (2011).

[113] CDF Collaboration, (A. Aaltonen *et al.*), Phys. Rev. Lett. **103**, 031801 (2009).

[114] CDF Collaboration, (A. Aaltonen *et al.*), arXiv:1111.0485 (2011).