

April 2009

Heavy Flavor Averaging Group

Compilation of  $CP$  Asymmetries for  $B^+$  modes

In PDG2008

New since PDG2008 (preliminary)

New since PDG2008 (published)

RPP#	Mode	PDG2008 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
207	$K^0\pi^+$	$0.009 \pm 0.029$	$-0.029 \pm 0.039 \pm 0.010$	$0.03 \pm 0.03 \pm 0.01$	$0.18 \pm 0.24 \pm 0.02$		$0.009 \pm 0.025$
208	$K^+\pi^0$	$0.027 \pm 0.032$	$0.030 \pm 0.039 \pm 0.010$	$0.07 \pm 0.03 \pm 0.01$	$-0.29 \pm 0.23 \pm 0.02$		$0.050 \pm 0.025$
209	$\eta'K^+$	$0.016 \pm 0.019$	$0.010 \pm 0.022 \pm 0.006$	$0.028 \pm 0.028 \pm 0.021$	$0.03 \pm 0.12 \pm 0.02$		$0.016 \pm 0.019$
210	$\eta'K^{*+}$	$-0.30^{+0.33}_{-0.37} \pm 0.02$	$-0.30^{+0.37}_{-0.33} \pm 0.02$				$-0.30^{+0.37}_{-0.33}$
211	$\eta K^+$	$-0.27 \pm 0.09$	$-0.22 \pm 0.11 \pm 0.01$	$-0.39 \pm 0.16 \pm 0.03$			$-0.27 \pm 0.09$
212	$\eta K^{*+}$	$0.02 \pm 0.06$	$0.01 \pm 0.08 \pm 0.02$	$0.03 \pm 0.10 \pm 0.01$			$0.02 \pm 0.06$
213	$\eta K_0^*(1430)^+$	$0.05 \pm 0.13 \pm 0.02$	$0.05 \pm 0.13 \pm 0.02$				$0.05 \pm 0.13$
214	$\eta K_2^*(1430)^+$	$-0.45 \pm 0.30 \pm 0.02$	$-0.45 \pm 0.30 \pm 0.02$				$-0.45 \pm 0.30$
215	$\omega K^+$	$0.02 \pm 0.05$	$-0.01 \pm 0.07 \pm 0.01$	$0.05^{+0.08}_{-0.07} \pm 0.01$			$0.02 \pm 0.05$
216	$\omega K^{*+}$	New	$0.29 \pm 0.35 \pm 0.02$				$0.29 \pm 0.35$
-	$\omega K_0^*(1430)^+$	New	$-0.10 \pm 0.09 \pm 0.02$				$-0.10 \pm 0.09$
-	$\omega K_2^*(1430)^+$	New	$0.14 \pm 0.15 \pm 0.02$				$0.14 \pm 0.15$
219	$K^{*0}\pi^+$	$-0.08 \pm 0.10$	$0.032 \pm 0.052^{+0.016}_{-0.013}$	$-0.149 \pm 0.064 \pm 0.022$			$-0.038 \pm 0.042$
220	$K^{*+}\pi^0$	$0.04 \pm 0.29 \pm 0.05$	$0.04 \pm 0.29 \pm 0.05$				$0.04 \pm 0.29$
221	$K^+\pi^+\pi^-$	$0.023 \pm 0.031$	$0.028 \pm 0.020 \pm 0.023$	$0.049 \pm 0.026 \pm 0.020$			$0.038 \pm 0.022$
223	$f_0(980)K^+$	$-0.04^{+0.08}_{-0.07}$	$-0.106 \pm 0.050^{+0.036}_{-0.015}$	$-0.077 \pm 0.065^{+0.046}_{-0.026}$			$-0.095^{+0.049}_{-0.042}$
224	$f_2(1270)K^+$	$-0.59 \pm 0.22 \pm 0.036$	$-0.85 \pm 0.22^{+0.26}_{-0.13}$	$-0.59 \pm 0.22 \pm 0.04$			$-0.68^{+0.20}_{-0.18}$
227	$f_0(1500)K^+\dagger$	New	$0.28 \pm 0.26^{+0.15}_{-0.14}$				$0.28^{+0.30}_{-0.29}$
229	$\rho^0K^+$	$0.31^{+0.11}_{-0.09}$	$0.44 \pm 0.10^{+0.06}_{-0.14}$	$0.30 \pm 0.11^{+0.11}_{-0.05}$			$0.37 \pm 0.11$
230	$K_0^*(1430)^0\pi^+$	$0.00 \pm 0.07$	$0.032 \pm 0.035^{+0.034}_{-0.028}$	$0.076 \pm 0.038^{+0.028}_{-0.022}$			$0.055^{+0.034}_{-0.032}$
231	$K_2^*(1430)^0\pi^+$	New	$0.05 \pm 0.23^{+0.18}_{-0.08}$				$0.05^{+0.29}_{-0.24}$
238	$\rho^+K^0$	$-0.12 \pm 0.17 \pm 0.02$	$-0.12 \pm 0.17 \pm 0.02$				$-0.12 \pm 0.17$
239	$K^{*+}\pi^+\pi^-$	$0.07 \pm 0.07 \pm 0.04$	$0.07 \pm 0.07 \pm 0.04$				$0.07 \pm 0.08$
240	$K^{*+}\rho^0$	$0.20^{+0.32}_{-0.29} \pm 0.04$	$0.20^{+0.32}_{-0.29} \pm 0.04$				$0.20^{+0.32}_{-0.29}$
241	$f_0(980)K^{*+}$	$-0.34 \pm 0.21 \pm 0.03$	$-0.34 \pm 0.21 \pm 0.03$				$-0.34 \pm 0.21$
242	$a_1^+K^0$	$0.12 \pm 0.11 \pm 0.02$	$0.12 \pm 0.11 \pm 0.02$				$0.12 \pm 0.11$
243	$K^{*0}\rho^+$	$-0.01 \pm 0.16 \pm 0.02$	$-0.01 \pm 0.16 \pm 0.02$				$-0.01 \pm 0.16$
247	$K^+\overline{K}^0$	$0.12 \pm 0.16 \pm 0.02$	$0.10 \pm 0.26 \pm 0.03$	$0.13^{+0.23}_{-0.24} \pm 0.02$			$0.12^{+0.17}_{-0.18}$
249	$K^+K_S^0K_S^0$	$-0.046 \pm 0.20 \pm 0.02$	$-0.04 \pm 0.11 \pm 0.02$				$-0.04 \pm 0.11$
251	$K^+K^-\pi^+$	$0.00 \pm 0.10 \pm 0.03$	$0.00 \pm 0.10 \pm 0.03$				$0.00 \pm 0.10$
257	$b_0^0K^+$	$-0.46 \pm 0.20 \pm 0.02$	$-0.46 \pm 0.20 \pm 0.02$				$-0.46 \pm 0.20$
-	$b_1^+K^0$	New	$-0.03 \pm 0.15 \pm 0.02$				$-0.03 \pm 0.15$
261	$K^+K^-K^+$	$-0.017 \pm 0.026 \pm 0.015$	$-0.02 \pm 0.03 \pm 0.02$				$-0.02 \pm 0.04$
262	$\phi K^+$	$0.01 \pm 0.06$	$0.00 \pm 0.08 \pm 0.02$	$0.01 \pm 0.12 \pm 0.05$		$-0.07 \pm 0.17^{+0.03}_{-0.02}$	$-0.01 \pm 0.06$
270	$K^{*+}K^+K^-$	$0.11 \pm 0.08 \pm 0.03$	$0.11 \pm 0.08 \pm 0.03$				$0.11 \pm 0.09$
271	$\phi K^{*+}$	$-0.01 \pm 0.08$	$0.00 \pm 0.09 \pm 0.04$	$-0.02 \pm 0.14 \pm 0.03$			$-0.01 \pm 0.08$
-	$\phi K_1(1270)^+$	New	$0.15 \pm 0.19 \pm 0.05$				$0.15 \pm 0.20$
-	$\phi K_0^*(1430)^+$	New	$0.04 \pm 0.15 \pm 0.04$				$0.04 \pm 0.15$
273	$\phi K_2^*(1430)^+$	New	$-0.23 \pm 0.19 \pm 0.06$				$-0.23 \pm 0.20$
274	$\phi\phi K^+$	New		$0.01^{+0.19}_{-0.16} \pm 0.02$			$0.01^{+0.19}_{-0.16}$
278	$K^+\eta\gamma$	$-0.16 \pm 0.10$	$-0.09 \pm 0.10 \pm 0.01$	$-0.16 \pm 0.09 \pm 0.06$			$-0.12 \pm 0.07$
280	$K^+\phi\gamma$	$-0.26 \pm 0.14 \pm 0.05$	$-0.26 \pm 0.14 \pm 0.05$				$-0.26 \pm 0.15$
291	$\rho^+\gamma$	New		$-0.11 \pm 0.32 \pm 0.09$			$-0.11 \pm 0.33$
292	$\pi^+\pi^0$	$0.01 \pm 0.06$	$0.03 \pm 0.08 \pm 0.01$	$0.07 \pm 0.06 \pm 0.01$			$0.06 \pm 0.05$
293	$\pi^+\pi^-\pi^+$	$-0.007 \pm 0.0077 \pm 0.025$	$0.032 \pm 0.044^{+0.040}_{-0.037}$				$0.032^{+0.059}_{-0.057}$
294	$\rho^0\pi^+$	$-0.074 \pm 0.120^{+0.035}_{-0.055}$	$0.18 \pm 0.07^{+0.05}_{-0.15}$				$0.18^{+0.09}_{-0.17}$
296	$f_2(1270)\pi^+$	$-0.004 \pm 0.247^{+0.28}_{-0.32}$	$0.41 \pm 0.25^{+0.18}_{-0.15}$				$0.41^{+0.31}_{-0.29}$
297	$\rho(1450)^0\pi^+$	New	$-0.06 \pm 0.28^{+0.23}_{-0.32}$				$-0.06^{+0.36}_{-0.42}$
300	$\pi^+\pi^-\pi^+(NR)$	New	$-0.14 \pm 0.14^{+0.18}_{-0.08}$				$-0.14^{+0.23}_{-0.16}$
302	$\rho^+\pi^0$	$0.02 \pm 0.11$	$-0.01 \pm 0.13 \pm 0.02$	$0.06 \pm 0.17^{+0.04}_{-0.05}$			$0.02 \pm 0.11$
304	$\rho^+\rho^0$	$-0.08 \pm 0.13$	$-0.054 \pm 0.055 \pm 0.010$	$0.00 \pm 0.22 \pm 0.03$			$-0.051 \pm 0.054$
308	$b_1^0\pi^+$	$0.05 \pm 0.16 \pm 0.02$	$0.05 \pm 0.16 \pm 0.02$				$0.05 \pm 0.16$
309	$\omega\pi^+$	$-0.04 \pm 0.06$	$-0.02 \pm 0.08 \pm 0.01$	$-0.02 \pm 0.09 \pm 0.01$	$-0.34 \pm 0.25 \pm 0.02$		$-0.04 \pm 0.06$
310	$\omega\rho^+$	$0.04 \pm 0.18 \pm 0.02$	$-0.20 \pm 0.09 \pm 0.02$				$-0.20 \pm 0.09$
311	$\eta\pi^+$	$-0.05 \pm 0.10$	$-0.08 \pm 0.10 \pm 0.01$	$-0.23 \pm 0.09 \pm 0.02$			$-0.16 \pm 0.07$
312	$\eta'\pi^+$	$-0.16 \pm 0.07$	$0.21 \pm 0.17 \pm 0.01$	$0.20^{+0.37}_{-0.36} \pm 0.04$			$0.21 \pm 0.15$
313	$\eta'\rho^+$	$0.04 \pm 0.28 \pm 0.02$	$0.04 \pm 0.28 \pm 0.02$				$0.04 \pm 0.28$
314	$\eta\rho^+$	$0.01 \pm 0.16$	$0.13 \pm 0.11 \pm 0.02$	$-0.04^{+0.34}_{-0.32} \pm 0.01$			$0.11 \pm 0.11$
327	$p\overline{p}\pi^+$	$0.00 \pm 0.04$	$0.04 \pm 0.07 \pm 0.04$	$-0.17 \pm 0.10 \pm 0.02$			$-0.04 \pm 0.06$
330	$p\overline{p}K^+$	$-0.16 \pm 0.07$	$-0.16 \pm 0.08 \pm 0.04$	$-0.02 \pm 0.05 \pm 0.02$			$-0.06 \pm 0.05$
335	$p\overline{p}K^{*+}$	$0.32 \pm 0.13 \pm 0.05$	$0.32 \pm 0.13 \pm 0.05$	$-0.01 \pm 0.19 \pm 0.02$			$0.21 \pm 0.11$
338	$p\overline{p}\Lambda\gamma$	$0.17 \pm 0.16 \pm 0.05$		$0.17 \pm 0.16 \pm 0.05$			$0.17 \pm 0.17$
339	$p\overline{p}\Lambda\pi^0$	$0.01 \pm 0.17 \pm 0.04$		$0.01 \pm 0.17 \pm 0.04$			$0.01 \pm 0.17$
371	$K^+\ell\ell$	$-0.07 \pm 0.22 \pm 0.02$	$-0.18 \pm 0.19 \pm 0.01$	$-0.04 \pm 0.10 \pm 0.02$			$-0.07 \pm 0.09$
372	$K^+e^+e^-$	New		$-0.14 \pm 0.14 \pm 0.03$			$-0.14 \pm 0.14$
373	$K^+\mu^+\mu^-$	New		$-0.05 \pm 0.13 \pm 0.03$			$-0.05 \pm 0.13$
376	$K^{*+}\ell\ell$	$0.03 \pm 0.23 \pm 0.03$	$0.01^{+0.26}_{-0.24} \pm 0.02$	$-0.13 \pm 0.17 \pm 0.02$			$-0.08 \pm 0.14$
378	$K^{*+}e^+e^-$	New		$-0.14 \pm 0.23 \pm 0.02$			$-0.14 \pm 0.23$
379	$K^{*+}\mu^+\mu^-$	New		$-0.12 \pm 0.24 \pm 0.02$			$-0.12 \pm 0.24$

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Compilation of *CP* Asymmetries for  $B^0$  modes

In PDG2008

New since PDG2008 (preliminary)

New since PDG2008 (published)

RPP#	Mode	PDG2008 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
198	$K^+ \pi^-$	$-0.101 \pm 0.015$	$-0.107 \pm 0.016^{+0.006}_{-0.004}$	$-0.094 \pm 0.018 \pm 0.008$	$-0.04 \pm 0.16 \pm 0.02$	$-0.086 \pm 0.023 \pm 0.009$	$-0.098^{+0.012}_{-0.011}$
201	$\eta' K^{*0}$	$0.08 \pm 0.25 \pm 0.02$	$0.08 \pm 0.25 \pm 0.02$				$0.08 \pm 0.25$
203	$\eta K^{*0}$	$0.19 \pm 0.05$	$0.21 \pm 0.06 \pm 0.02$	$0.17 \pm 0.08 \pm 0.01$			$0.19 \pm 0.05$
204	$\eta K_0^0(1430)^0$	$0.06 \pm 0.13 \pm 0.02$	$0.06 \pm 0.13 \pm 0.02$				$0.06 \pm 0.13$
205	$\eta K_2^0(1430)^0$	$-0.07 \pm 0.19 \pm 0.02$	$-0.07 \pm 0.19 \pm 0.02$				$-0.07 \pm 0.19$
211	$\omega K^{*0}$	New	$0.45 \pm 0.25 \pm 0.02$				$0.45 \pm 0.25$
-	$\omega K_0^*(1430)^0$	New	$-0.07 \pm 0.09 \pm 0.02$				$-0.07 \pm 0.09$
-	$\omega K_2^*(1430)^0$	New	$0.37 \pm 0.17 \pm 0.02$				$0.37 \pm 0.17$
216	$K^+ \pi^- \pi^0$	$0.07 \pm 0.11 \pm 0.01$	$0.030^{+0.045}_{-0.051} \pm 0.055$	$0.07 \pm 0.11 \pm 0.01$			$0.042^{+0.059}_{-0.061}$
217	$\rho^- K^+$	$-0.08 \pm 0.24$	$0.14 \pm 0.06 \pm 0.01$	$0.22^{+0.22+0.06}_{-0.23-0.02}$			$0.15 \pm 0.06$
218	$K^+ \pi^- \pi^0(NR)$	New	$0.07 \pm 0.15 \pm 0.04$				$0.07 \pm 0.15$
-	$K_0^*(1430)^0 \pi^0$	New	$-0.16 \pm 0.09 \pm 0.04$				$-0.16 \pm 0.10$
224	$K^{*+} \pi^-$	$-0.05 \pm 0.14$	$-0.30 \pm 0.11 \pm 0.03$	$-0.21 \pm 0.11 \pm 0.07$	$0.26^{+0.33+0.10}_{-0.34-0.08}$		$-0.23 \pm 0.08$
232	$K^{*0} \pi^0$	New	$-0.15 \pm 0.12 \pm 0.02$				$-0.15 \pm 0.12$
233	$K_0^*(1430)^+ \pi^-$	New	$0.07 \pm 0.05 \pm 0.01$				$0.07 \pm 0.05$
240	$K^{*0} \pi^+ \pi^-$	$0.07 \pm 0.04 \pm 0.03$	$0.07 \pm 0.04 \pm 0.03$				$0.07 \pm 0.05$
241	$K^{*0} \rho^0$	$0.09 \pm 0.19 \pm 0.02$	$0.09 \pm 0.19 \pm 0.02$				$0.09 \pm 0.19$
242	$f_0(980) K^{*0}$	New	$-0.17 \pm 0.28 \pm 0.02$				$-0.17 \pm 0.28$
244	$a_1^+ K^-$	$-0.16 \pm 0.12 \pm 0.01$	$-0.16 \pm 0.12 \pm 0.01$				$-0.16 \pm 0.12$
245	$b_1^- K^+$	$0.07 \pm 0.12 \pm 0.02$	$0.07 \pm 0.12 \pm 0.02$				$0.07 \pm 0.12$
246	$K^{*0} K^+ K^-$	$0.01 \pm 0.05 \pm 0.02$	$0.01 \pm 0.05 \pm 0.02$				$0.01 \pm 0.05$
247	$\phi K^{*0}$	$0.01 \pm 0.06$	$0.01 \pm 0.06 \pm 0.03$	$0.02 \pm 0.09 \pm 0.02$			$0.01 \pm 0.05$
248	$K^{*0} \pi^+ K^-$	$0.22 \pm 0.33 \pm 0.20$	$0.22 \pm 0.33 \pm 0.20$				$0.22 \pm 0.39$
258	$\phi K_0^*(1430)^0$	New	$0.20 \pm 0.14 \pm 0.06$				$0.20 \pm 0.15$
263	$\phi K_2^*(1430)^0$	$-0.12 \pm 0.14 \pm 0.04$	$-0.08 \pm 0.12 \pm 0.05$				$-0.08 \pm 0.13$
285	$\pi^0 \pi^0$		$0.43 \pm 0.26 \pm 0.05$	$0.44^{+0.73+0.04}_{-0.62-0.06}$			$0.43^{+0.25}_{-0.24}$
316	$b_1^\mp \pi^\pm$	$-0.05 \pm 0.10 \pm 0.02$	$-0.05 \pm 0.10 \pm 0.02$				$-0.05 \pm 0.10$
330	$p\bar{p} K^{*0}$	$0.11 \pm 0.13 \pm 0.06$	$0.11 \pm 0.13 \pm 0.06$	$-0.08 \pm 0.20 \pm 0.02$			$0.05 \pm 0.12$
335	$p\bar{p} \pi^-$	$-0.02 \pm 0.10 \pm 0.03$		$-0.02 \pm 0.10 \pm 0.03$			$-0.02 \pm 0.10$
381	$K^{*0} \ell \ell$	New	$0.02 \pm 0.20 \pm 0.02$	$-0.08 \pm 0.12 \pm 0.02$			$-0.05 \pm 0.10$
382	$K^{*0} e^+ e^-$	New		$-0.21 \pm 0.19 \pm 0.02$			$-0.21 \pm 0.19$
383	$K^{*0} \mu^+ \mu^-$	New		$0.00 \pm 0.15 \pm 0.03$			$0.00 \pm 0.15$

† Measurements of time-dependent *CP* asymmetries are listed on the Unitarity Triangle home page. (<http://www.slac.stanford.edu/xorg/hfag/triangle/index.html>)

## Compilation of *CP* Asymmetries for $B^\pm/B^0$ Admixture

RPP#	Mode	PDG2008 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
62	$K^*\gamma$	$-0.010 \pm 0.028$	$-0.013 \pm 0.036 \pm 0.010$	$-0.015 \pm 0.044 \pm 0.012$	$0.08 \pm 0.13 \pm 0.03$		$-0.010 \pm 0.028$
74	$s\gamma$	$0.01 \pm 0.04$	$-0.011 \pm 0.030 \pm 0.014$	$0.002 \pm 0.050 \pm 0.030$	$-0.079 \pm 0.108 \pm 0.022$		$-0.012 \pm 0.028$
–	$(s+d)\gamma$	$-0.110 \pm 0.115 \pm 0.017$	$-0.11 \pm 0.12 \pm 0.02$				$-0.11 \pm 0.12$
111	$s\ell\ell$	$-0.22 \pm 0.26 \pm 0.02$	$-0.22 \pm 0.26 \pm 0.02$				$-0.22 \pm 0.26$
114	$K^*e^+e^-$	New		$-0.18 \pm 0.15 \pm 0.01$			$-0.18 \pm 0.15$
116	$K^*\mu^+\mu^-$	New		$-0.03 \pm 0.13 \pm 0.02$			$-0.03 \pm 0.13$
118	$K^*\ell\ell$	New	$0.01^{+0.16}_{-0.15} \pm 0.01$	$-0.10 \pm 0.10 \pm 0.02$			$-0.07^{+0.09}_{-0.08}$

## Compilation of *CP* Asymmetries for $B_s$ modes

RPP#	Mode	PDG2008 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
20	$K^+\pi^-$	New				$0.39 \pm 0.15 \pm 0.08$	$0.39 \pm 0.17$

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