

# Heavy Flavor Averaging group (HFLLAV) - November 2016

## Compilation of $CP$ Asymmetries for $B^+$ modes (part 1)

In PDG2014 New since PDG2014 (preliminary) New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	BABAR	Belle	CDF	LHCb	Our Avg.
262	$K^0 \pi^+$	$-0.017 \pm 0.016$	$-0.029 \pm 0.039 \pm 0.010$ [1]	$-0.011 \pm 0.021 \pm 0.006$ [2]		$-0.022 \pm 0.025 \pm 0.010$ [3]	$-0.017 \pm 0.016$
263	$K^+ \pi^0$	$0.037 \pm 0.021$ ‡	$0.030 \pm 0.039 \pm 0.010$ [4]	$0.043 \pm 0.024 \pm 0.002$ [2]			$0.040 \pm 0.021$
264	$\eta' K^+$	$0.013 \pm 0.017$	$0.008^{+0.017}_{-0.018} \pm 0.009$ [5]	$0.028 \pm 0.028 \pm 0.021$ [6]			$0.013 \pm 0.017$
265	$\eta' K^{*+}$	$-0.26 \pm 0.27$	$-0.26 \pm 0.27 \pm 0.02$ [7]				$-0.26 \pm 0.27$
266	$\eta' K_0^*(1430)^+$	$0.06 \pm 0.20$	$0.06 \pm 0.20 \pm 0.02$ [7]				$0.06 \pm 0.20$
267	$\eta' K_2^*(1430)^+$	$0.15 \pm 0.13$	$0.15 \pm 0.13 \pm 0.02$ [7]				$0.15 \pm 0.13$
268	$\eta K^+$	$-0.37 \pm 0.08$	$-0.36 \pm 0.11 \pm 0.03$ [5]	$-0.38 \pm 0.11 \pm 0.01$ [8]			$-0.37 \pm 0.08$
269	$\eta K^{*+}$	$0.02 \pm 0.06$	$0.01 \pm 0.08 \pm 0.02$ [9]	$0.03 \pm 0.10 \pm 0.01$ [10]			$0.02 \pm 0.06$
270	$\eta K_0^*(1430)^+$	$0.05 \pm 0.13 \pm 0.02$	$0.05 \pm 0.13 \pm 0.02$ [9]				$0.05 \pm 0.13$
271	$\eta K_2^*(1430)^+$	$-0.45 \pm 0.30 \pm 0.02$	$-0.45 \pm 0.30 \pm 0.02$ [9]	$-0.03 \pm 0.04 \pm 0.01$ [12]			$-0.45 \pm 0.30$
281	$\omega K^+$	$0.02 \pm 0.05$	$-0.01 \pm 0.07 \pm 0.01$ [11]				$-0.02 \pm 0.04$
282	$\omega K^{*+}$	$0.29 \pm 0.35$	$0.29 \pm 0.35 \pm 0.02$ [13]				$0.29 \pm 0.35$
284	$\omega K_0^*(1430)^+$	$-0.10 \pm 0.09$	$-0.10 \pm 0.09 \pm 0.02$ [13]				$-0.10 \pm 0.09$
285	$\omega K_2^*(1430)^+$	$0.14 \pm 0.15$	$0.14 \pm 0.15 \pm 0.02$ [13]				$0.14 \pm 0.15$
288	$K^{*0} \pi^+$	$-0.04 \pm 0.09$	$0.032 \pm 0.052^{+0.016}_{-0.013}$ [14]	$-0.149 \pm 0.064 \pm 0.022$ [15]			$-0.038 \pm 0.042$
289	$K^{*+} \pi^0$	$-0.06 \pm 0.24$	$-0.06 \pm 0.24 \pm 0.04$ [16]				$-0.06 \pm 0.24$
290	$K^+ \pi^+ \pi^-$	$0.033 \pm 0.010$	$0.028 \pm 0.020 \pm 0.023$ [14]	$0.049 \pm 0.026 \pm 0.020$ [15]			$0.027 \pm 0.008$
293	$f_0(980) K^+$	$-0.08 \pm 0.09$ †	$-0.106 \pm 0.050^{+0.036}_{-0.015}$ [14]	$-0.077 \pm 0.065^{+0.046}_{-0.026}$ [15]		$0.025 \pm 0.004 \pm 0.008$ [17]	$-0.095^{+0.049}_{-0.042}$
294	$f_2(1270) K^+$	$-0.68^{+0.19}_{-0.19}$	$-0.85 \pm 0.22^{+0.13}_{-0.13}$ [14]	$-0.59 \pm 0.22 \pm 0.04$ [15]			$-0.68^{+0.18}_{-0.18}$
295	$f_0(1370) K^+$	$0.28^{+0.30}_{-0.29}$	$0.28 \pm 0.26^{+0.15}_{-0.14}$ [14]				$0.28^{+0.30}_{-0.29}$
298	$\rho^0 K^+$	$0.37 \pm 0.10$	$0.44 \pm 0.10^{+0.06}_{-0.14}$ [14]	$0.30 \pm 0.11^{+0.11}_{-0.028}$ [15]			$0.37 \pm 0.11$
299	$K_0^*(1430)^0 \pi^+$	$0.055 \pm 0.033$	$0.032 \pm 0.035^{+0.034}_{-0.038}$ [14]	$0.076 \pm 0.038^{+0.022}_{-0.022}$ [15]			$0.055^{+0.034}_{-0.032}$
300	$K_2^*(1430)^0 \pi^+$	$0.05^{+0.29}_{-0.24}$	$0.05 \pm 0.23^{+0.18}_{-0.08}$ [14]				$0.05^{+0.29}_{-0.24}$
303	$K^+ \pi^0 \pi^0$	$-0.06 \pm 0.07$	$-0.06 \pm 0.06 \pm 0.04$ [16]				$-0.06 \pm 0.07$
310	$\rho^+ K^0$	$-0.12 \pm 0.17$	$-0.12 \pm 0.17 \pm 0.02$ [18]				$-0.12 \pm 0.17$
311	$K^{*+} \pi^+ \pi^-$	$0.07 \pm 0.08$	$0.07 \pm 0.07 \pm 0.04$ [19]				$0.07 \pm 0.08$
312	$K^{*+} \rho^0$	$0.31 \pm 0.13$	$0.31 \pm 0.13 \pm 0.03$ [20]				$0.31 \pm 0.13$
313	$f_0(980) K^{*+}$	$-0.15 \pm 0.12$	$-0.15 \pm 0.12 \pm 0.03$ [20]				$-0.15 \pm 0.12$
314	$a_1 K^0$	$0.12 \pm 0.11$	$0.12 \pm 0.11 \pm 0.02$ [21]				$0.12 \pm 0.11$
315	$b_1^+ K^0$	$-0.03 \pm 0.15$	$-0.03 \pm 0.15 \pm 0.02$ [22]				$-0.03 \pm 0.15$
312	$K^{*0} \rho^+$	$-0.01 \pm 0.16$	$-0.01 \pm 0.16 \pm 0.02$ [23]				$-0.01 \pm 0.16$
319	$b_1^0 K^+$	$-0.46 \pm 0.20$	$-0.46 \pm 0.20 \pm 0.02$ [24]				$-0.46 \pm 0.20$
322	$K^+ \bar{K}^0$	$0.04 \pm 0.14$	$0.10 \pm 0.26 \pm 0.03$ [1]	$0.014 \pm 0.168 \pm 0.002$ [2]		$-0.21 \pm 0.14 \pm 0.01$ [3]	$-0.087 \pm 0.100$
324	$K^+ K_S K_S$	$0.04^{+0.04}_{-0.05}$	$0.04^{+0.05}_{-0.05} \pm 0.02$ [25]				$0.04^{+0.04}_{-0.05}$
329	$K^+ K^- \pi^+$	$-0.12 \pm 0.05$	$0.00 \pm 0.10 \pm 0.03$ [26]	$-0.123 \pm 0.017 \pm 0.014$ [17]			$-0.118 \pm 0.022$
340	$K^+ K^- K^+$	$-0.036 \pm 0.012$	$-0.017^{+0.019}_{-0.014} \pm 0.014$ [25]	$-0.036 \pm 0.004 \pm 0.007$ [17]			$-0.033 \pm 0.007$
341	$\phi K^+$	$0.04 \pm 0.04$	$0.128 \pm 0.044 \pm 0.013$ [25]	$0.01 \pm 0.12 \pm 0.05$ [27]	$-0.07 \pm 0.17^{+0.03}_{-0.02}$ [28]	$0.022 \pm 0.021 \pm 0.009$ [29]	$0.041 \pm 0.020$

† PDG takes the value from the BABAR amplitude analysis of  $B^+ \rightarrow K^+ K^- K^+$ , while our numbers are from amplitude analyses of  $B^+ \rightarrow K^+ \pi^- \pi^+$ .

‡ PDG uses also a result from CLEO.

# Heavy Flavor Averaging group (HFLAV) - November 2016

## Compilation of $CP$ Asymmetries for $B^+$ modes (part 2)

In PDG2014 **New since PDG2014 (preliminary)** **New since PDG2014 (published)**

RPP#	Mode	PDG2014 Avg.	BABAR	Belle	CDF	LHCb	Our Avg.
348	$K^{*+}K^+K^-$	$0.11 \pm 0.09$	$0.11 \pm 0.08 \pm 0.03$ [19]				$0.11 \pm 0.09$
349	$\phi K^{*+}$	$-0.01 \pm 0.08$	$0.00 \pm 0.19 \pm 0.04$ [30]				$-0.01 \pm 0.08$
351	$\phi K_1(1270)^+$	$0.15 \pm 0.20$	$0.15 \pm 0.19 \pm 0.05$ [32]	$-0.02 \pm 0.14 \pm 0.03$ [31]			$0.15 \pm 0.20$
354	$\phi K^*(1430)^+$	$0.04 \pm 0.15$	$0.04 \pm 0.15 \pm 0.04$ [32]				$0.04 \pm 0.15$
355	$\phi K^*(1430)^+$	$-0.23 \pm 0.20$	$-0.23 \pm 0.19 \pm 0.06$ [32]				$-0.23 \pm 0.20$
359	$\phi K^+$	$-0.10 \pm 0.08$	$-0.10 \pm 0.08$ [33]				$-0.10 \pm 0.08$
363	$K^{*+}\gamma$	$0.18 \pm 0.29$	$0.18 \pm 0.28 \pm 0.07$ [34]	$0.007 \pm 0.074 \pm 0.017$ [35]			$0.018 \pm 0.073$
365	$K^+\eta\gamma$	$-0.12 \pm 0.07$	$-0.09 \pm 0.10 \pm 0.01$ [36]	$-0.16 \pm 0.09 \pm 0.06$ [37]			$-0.12 \pm 0.07$
367	$K^+\phi\gamma$	$-0.13 \pm 0.11$	$-0.26 \pm 0.14 \pm 0.05$ [38]	$-0.03 \pm 0.11 \pm 0.08$ [39]			$-0.13 \pm 0.10$
378	$\rho^+\gamma$	$-0.11 \pm 0.33$		$-0.11 \pm 0.32 \pm 0.09$ [40]			$-0.11 \pm 0.33$
379	$\pi^+\pi^0$	$0.03 \pm 0.04$		$0.025 \pm 0.043 \pm 0.007$ [2]			$0.026 \pm 0.039$
380	$\pi^+\pi^-\pi^+$	$0.105 \pm 0.029$	$0.03 \pm 0.08 \pm 0.01$ [4]		<b><math>0.058 \pm 0.008 \pm 0.011</math></b> [17]		$0.057 \pm 0.014$
381	$\rho^0\pi^+$	$0.18^{+0.09}_{-0.17}$	$0.032 \pm 0.044^{+0.040}_{-0.037}$ [41]				$0.18^{+0.09}_{-0.17}$
383	$f_2(1270)\pi^+$	$0.41^{+0.31}_{-0.36}$	$0.18 \pm 0.07^{+0.05}_{-0.15}$ [41]				$0.41^{+0.31}_{-0.36}$
384	$\rho(1450)\pi^+$	$-0.06^{+0.36}_{-0.42}$	$0.41 \pm 0.25^{+0.18}_{-0.23}$ [41]				$-0.06^{+0.36}_{-0.42}$
385	$f_0(1370)\pi^+$	$0.72 \pm 0.22$	$0.72 \pm 0.15 \pm 0.16$ [41]				$0.72 \pm 0.22$
387	$\pi^+\pi^-\pi^+(NR)$	$-0.14^{+0.23}_{-0.16}$	$0.72 \pm 0.15 \pm 0.16$ [41]				$-0.14^{+0.23}_{-0.16}$
389	$\rho^+\pi^0$	$0.02 \pm 0.11$	$-0.01 \pm 0.13 \pm 0.02$ [42]	$0.06 \pm 0.17^{+0.04}_{-0.05}$ [43]			$0.02 \pm 0.11$
391	$\rho^+\rho^0$	$-0.05 \pm 0.05$	$-0.054 \pm 0.055 \pm 0.010$ [44]	$0.00 \pm 0.22 \pm 0.03$ [45]			$-0.051 \pm 0.054$
397	$\eta\pi^+$	$-0.14 \pm 0.07$	$-0.03 \pm 0.09 \pm 0.03$ [5]	$-0.19 \pm 0.06 \pm 0.01$ [8]			$-0.14 \pm 0.05$
398	$\eta\rho^+$	$0.11 \pm 0.11$	$0.13 \pm 0.11 \pm 0.02$ [46]	$-0.04^{+0.34}_{-0.32} \pm 0.01$ [10]			$0.11 \pm 0.11$
399	$\eta'\pi^+$	$0.06 \pm 0.16$	$0.03 \pm 0.17 \pm 0.02$ [5]	$0.20^{+0.37}_{-0.36} \pm 0.04$ [6]			$0.06 \pm 0.15$
400	$\eta'\rho^+$	$0.26 \pm 0.17$	$0.26 \pm 0.17 \pm 0.02$ [7]	$-0.02 \pm 0.09 \pm 0.01$ [47]			$0.26 \pm 0.17$
401	$\omega\pi^+$	$-0.04 \pm 0.06$ †	$-0.02 \pm 0.08 \pm 0.01$ [11]				$-0.02 \pm 0.06$
402	$\omega\rho^+$	$-0.20 \pm 0.09$	$-0.20 \pm 0.09 \pm 0.02$ [13]				$-0.20 \pm 0.09$
408	$b_1^+\pi^+$	$0.05 \pm 0.16$	$0.05 \pm 0.16 \pm 0.02$ [24]				$0.05 \pm 0.16$
417	$p\bar{p}\pi^+$	$0.00 \pm 0.04$	$0.04 \pm 0.07 \pm 0.04$ [48]				$-0.04 \pm 0.06$
420	$p\bar{p}K^+$	$-0.08 \pm 0.04$	$-0.16 \pm 0.08 \pm 0.04$ [50]	$-0.17 \pm 0.10 \pm 0.02$ † [49]			$-0.051 \pm 0.029$
425	$p\bar{p}K^{*+}$	$0.21 \pm 0.16$	$0.32 \pm 0.13 \pm 0.05$ [48]	$-0.02 \pm 0.05 \pm 0.02$ † [49]			$-0.04 \pm 0.06$
428	$p\Lambda^+\gamma$	$0.17 \pm 0.17$		$-0.01 \pm 0.19 \pm 0.02$ [52]			$0.21 \pm 0.11$
429	$p\Lambda\pi^0$	$0.01 \pm 0.17$		$0.17 \pm 0.16 \pm 0.05$ [53]			$0.17 \pm 0.17$
471	$K^+\ell\ell$	$-0.02 \pm 0.08$	$-0.03 \pm 0.14 \pm 0.01$ § [54]	$0.01 \pm 0.17 \pm 0.04$ [53]			$0.01 \pm 0.17$
472	$K^+e^+e^-$	$0.14 \pm 0.14$		$0.04 \pm 0.10 \pm 0.02$ [55]			$0.02 \pm 0.08$
473	$K^+\mu^+\mu^-$	$-0.003 \pm 0.033$		$0.14 \pm 0.14 \pm 0.03$ [55]			$0.14 \pm 0.14$
478	$K^{*+}\ell\ell$	$-0.09 \pm 0.14$	$0.01^{+0.26}_{-0.24} \pm 0.02$ [57]	$-0.05 \pm 0.13 \pm 0.03$ [55]			$0.011 \pm 0.017$
479	$K^{*+}e^+e^-$	$-0.14^{+0.23}_{-0.22}$		$-0.13^{+0.17}_{-0.23} \pm 0.01$ [55]			$-0.09^{+0.14}_{-0.23}$
480	$K^{*+}\mu^+\mu^-$	$-0.12 \pm 0.24$		$-0.14^{+0.23}_{-0.22} \pm 0.02$ [55]			$-0.14^{+0.23}_{-0.22}$
480	$\pi^+\mu^+\mu^-$			$-0.12 \pm 0.24 \pm 0.02$ [55]			$-0.036 \pm 0.024$

† PDG uses also a result from CLEO.

‡ PDG swaps the Belle results corresponding to  $A_{CP}(p\bar{p}\pi^+)$  and  $A_{CP}(p\bar{p}K^+)$ .

§ PDG uses also a previous result from BABAR ([57]).

¶ LHCb also quotes results in bins of  $m(\ell^+\ell^-)$ .

# Heavy Flavor Averaging group (HFLAV) - November 2016

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

In PDG2014 **New since PDG2014 (preliminary)** **New since PDG2014 (published)**

RPP#	Mode	PDG2014 Avg.	BaBar	Belle	CDF	LHCb	Our Avg.
227	$K^+ \pi^-$	$-0.082 \pm 0.006$ †	$-0.107 \pm 0.016^{+0.006}_{-0.004}$ [59]	$-0.069 \pm 0.014 \pm 0.007$ [2]	$-0.083 \pm 0.013 \pm 0.004$ [60]	$-0.080 \pm 0.007 \pm 0.003$ [61]	$-0.082 \pm 0.006$
230	$\eta' / K^{*0}$	$0.02 \pm 0.23$	$0.02 \pm 0.23 \pm 0.02$ [7]	$-0.22 \pm 0.29 \pm 0.07$ [62]			$-0.07 \pm 0.18$
231	$\eta' / K^{*+} (1430)^0$	$-0.19 \pm 0.17$	$-0.19 \pm 0.17 \pm 0.02$ [7]				$-0.19 \pm 0.17$
232	$\eta' / K_2^{*+} (1430)^0$	$0.14 \pm 0.18$	$0.14 \pm 0.18 \pm 0.02$ [7]				$0.14 \pm 0.18$
234	$\eta K^{*0}$	$0.19 \pm 0.05$	$0.21 \pm 0.06 \pm 0.02$ [9]				$0.19 \pm 0.05$
235	$\eta K_2^{*+} (1430)^0$	$0.06 \pm 0.13$	$0.06 \pm 0.13 \pm 0.02$ [9]				$0.06 \pm 0.13$
236	$\eta K_2^{*0} (1430)^0$	$-0.07 \pm 0.19$	$-0.07 \pm 0.19 \pm 0.02$ [9]				$-0.07 \pm 0.19$
241	$b_1^- K^+$	$-0.07 \pm 0.12$	$-0.07 \pm 0.12 \pm 0.02$ [24]				$-0.07 \pm 0.12$
246	$\omega K^{*0}$	$0.45 \pm 0.25$	$0.45 \pm 0.25 \pm 0.02$ [13]				$0.45 \pm 0.25$
248	$\omega K_0^{*+} (1430)^0$	$-0.07 \pm 0.09$	$-0.07 \pm 0.09 \pm 0.02$ [13]				$-0.07 \pm 0.09$
249	$\omega K_2^{*+} (1430)^0$	$-0.37 \pm 0.17$	$-0.37 \pm 0.17 \pm 0.02$ [13]				$-0.37 \pm 0.17$
251	$K^+ \pi^- \pi^0$	$0.00 \pm 0.06$	$-0.030^{+0.045}_{-0.051} \pm 0.055$ [63]	$0.07 \pm 0.11 \pm 0.01$ [64]			$0.000^{+0.059}_{-0.061}$
252	$\rho^- K^+$	$0.20 \pm 0.11$	$0.20 \pm 0.09 \pm 0.08$ [65]	$0.22^{+0.22+0.06}_{-0.23-0.02}$ [64]			$0.20 \pm 0.11$
253	$\rho(1450)^- K^+$	$-0.10 \pm 0.33$	$-0.10 \pm 0.32 \pm 0.09$ [65]				$-0.10 \pm 0.33$
254	$\rho(1700)^- K^+$	$-0.36 \pm 0.61$	$-0.36 \pm 0.57 \pm 0.23$ [65]				$-0.36 \pm 0.61$
255	$K^+ \pi^- \pi^0 (NR)$	$0.10 \pm 0.18$	$0.10 \pm 0.16 \pm 0.08$ [65]				$0.10 \pm 0.18$
257	$K_0^{*+} (1430)^0 \pi^0$	$-0.15 \pm 0.11$	$-0.15 \pm 0.10 \pm 0.04$ [65]				$-0.15 \pm 0.11$
261	$K^0 \pi^+ \pi^-$	$-0.01 \pm 0.05$	$-0.01 \pm 0.05 \pm 0.01$ [66]				$-0.01 \pm 0.05$
264	$K^{*+} \pi^-$	$-0.22 \pm 0.06$ †	$-0.24 \pm 0.07 \pm 0.02$ ‡ [65]	$-0.21 \pm 0.11 \pm 0.07$ [67]			$-0.23 \pm 0.06$
265	$K_0^{*+} (1430)^+ \pi^-$	$0.09 \pm 0.07$	$0.09 \pm 0.07 \pm 0.03$ [66]				$0.09 \pm 0.08$
271	$K^{*0} \pi^0$	$-0.15 \pm 0.13$	$-0.15 \pm 0.12 \pm 0.04$ [66]				$-0.15 \pm 0.13$
278	$K^{*0} \pi^+ \pi^-$	$0.07 \pm 0.05$	$0.07 \pm 0.04 \pm 0.03$ [68]				$0.07 \pm 0.05$
279	$K^{*0} \rho$	$-0.06 \pm 0.09$	$-0.06 \pm 0.09 \pm 0.02$ [69]				$-0.06 \pm 0.09$
280	$f_0(980) K^{*0}$	$0.07 \pm 0.10$	$0.07 \pm 0.10 \pm 0.02$ [69]				$0.07 \pm 0.10$
283	$a_1^- K^+$	$-0.16 \pm 0.12$	$-0.16 \pm 0.12 \pm 0.01$ [21]				$-0.16 \pm 0.12$
284	$K^+ \rho$	$0.21 \pm 0.15$	$0.21 \pm 0.15 \pm 0.02$ [69]				$0.21 \pm 0.15$
311	$K^{*0} K^+ K^-$	$0.01 \pm 0.05$	$0.01 \pm 0.05 \pm 0.02$ [68]	$-0.007 \pm 0.048 \pm 0.021$ [71]			$0.01 \pm 0.05$
312	$\phi K^{*0}$	$0.00 \pm 0.04$	$0.01 \pm 0.06 \pm 0.03$ [70]				$-0.003 \pm 0.038$
314	$K^{*0} \pi^+ K^-$	$0.22 \pm 0.39$	$0.22 \pm 0.33 \pm 0.20$ [68]				$0.22 \pm 0.39$
326	$\phi K_0^{*+} (1430)^0$	$0.12 \pm 0.08$	$0.20 \pm 0.14 \pm 0.06$ [70]	$0.093 \pm 0.094 \pm 0.017$ [71]			$0.124 \pm 0.081$
333	$\phi K_2^{*+} (1430)^0$	$-0.11 \pm 0.10$	$-0.08 \pm 0.12 \pm 0.05$ [70]	$-0.155^{+0.152}_{-0.133} \pm 0.033$ [71]			$-0.113^{+0.102}_{-0.096}$
340	$K^{*0} \gamma$	$-0.002 \pm 0.015$	$-0.016 \pm 0.022 \pm 0.007$ [34]	$-0.030 \pm 0.055 \pm 0.014$ [35]			$-0.003 \pm 0.014$
357	$\pi^0 \pi^0$	$0.43 \pm 0.14$	$0.43 \pm 0.26 \pm 0.05$ [59]	$0.44^{+0.52}_{-0.53} \pm 0.17$ [74]		$0.008 \pm 0.017 \pm 0.009$ [73]	$0.43 \pm 0.24$
391	$\phi^+ \pi^\pm$	$-0.07 \pm 0.06$	$-0.07 \pm 0.07 \pm 0.02$ [24]	$-0.06 \pm 0.05 \pm 0.07$ [75]			$-0.07 \pm 0.06$
400	$b_1^+ \pi^\pm$	$-0.05 \pm 0.10$	$-0.05 \pm 0.10 \pm 0.02$ [24]				$-0.05 \pm 0.10$
412	$p\bar{p} K^{*0}$	$0.05 \pm 0.12$	$0.11 \pm 0.13 \pm 0.06$ [48]	$-0.08 \pm 0.20 \pm 0.02$ [52]			$0.05 \pm 0.12$
414	$p\Lambda \pi^-$	$0.04 \pm 0.07$	$-0.10 \pm 0.10 \pm 0.02$ § [76]	$-0.02 \pm 0.10 \pm 0.03$ [53]			$-0.06 \pm 0.07$
477	$K^{*0} \ell \ell$	$-0.05 \pm 0.10$	$0.02 \pm 0.20 \pm 0.02$ [57]	$-0.08 \pm 0.12 \pm 0.02$ [55]			$-0.05 \pm 0.10$
478	$K^{*0} e^+ e^-$	$-0.21 \pm 0.19$		$-0.21 \pm 0.19 \pm 0.02$ [55]			$-0.21 \pm 0.19$
479	$K^{*0} \mu^+ \mu^-$	$-0.07 \pm 0.04$		$0.00 \pm 0.15 \pm 0.03$ [55]		$-0.035 \pm 0.024 \pm 0.003$ ◊ [56]	$-0.034 \pm 0.024$

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

† PDG uses also a result from CLEO.

‡ Average of BaBar results from  $B^0 \rightarrow K^+ \pi^- \pi^0$  and  $B^0 \rightarrow K^0 \pi^+ \pi^-$ .

§ PDG quotes the opposite asymmetry.

¶ Extracted from measured  $\Delta A_{CP} = A_{CP}(\phi K^{*0}) - A_{CP}(J/\psi K^{*0}) = 0.015 \pm 0.032 \pm 0.005$ .

◊ LHCb also quotes results in bins of  $m(\ell^+ \ell^-)^2$ .

## Heavy FLavor AVeraging group (HFLAV) - November 2016

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

In PDG2014    New since PDG2014 (preliminary)    New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	BABAR	Belle	Our Avg.
65	$K^*\gamma$	$-0.003 \pm 0.017$ †	$-0.003 \pm 0.017 \pm 0.007$ [34]	$-0.015 \pm 0.044 \pm 0.012$ [35]	$-0.005 \pm 0.017$
77	$s\gamma$	$-0.008 \pm 0.029$	<span style="color: red;"><math>0.017 \pm 0.019 \pm 0.010</math></span> ‡ [77]	$0.002 \pm 0.050 \pm 0.030$ [78]	$0.015 \pm 0.020$
	$(s+d)\gamma$	$-0.01 \pm 0.05$	$0.057 \pm 0.060 \pm 0.018$ § [79]	<span style="color: red;"><math>0.022 \pm 0.039 \pm 0.009</math></span> ◊ [12]	$0.032 \pm 0.034$
80	$s\eta$	$-0.13^{+0.04}_{-0.05}$		$-0.13 \pm 0.04^{+0.02}_{-0.03}$ [80]	$-0.13^{+0.04}_{-0.05}$
86	$\pi^+ X$	$0.10 \pm 0.17$	$0.10 \pm 0.16 \pm 0.05$ [81]		$0.10 \pm 0.17$
121	$sll$	$-0.22 \pm 0.26$	<span style="color: red;"><math>0.04 \pm 0.11 \pm 0.01</math></span> [82]		$0.04 \pm 0.11$
126	$K^*e^+e^-$	$-0.18 \pm 0.15$		$-0.18 \pm 0.15 \pm 0.01$ [55]	$-0.18 \pm 0.15$
128	$K^*\mu^+\mu^-$	$-0.03 \pm 0.13$		$-0.03 \pm 0.13 \pm 0.02$ [55]	$-0.03 \pm 0.13$
129	$Kll$		<span style="color: red;"><math>-0.03 \pm 0.14 \pm 0.01</math></span> [54]		$-0.03 \pm 0.14$
130	$K^*\ell\ell$	$-0.04 \pm 0.07$	$0.03 \pm 0.13 \pm 0.01$ ¶ [54]	$-0.10 \pm 0.10 \pm 0.01$ [55]	$-0.05 \pm 0.08$

† PDG includes also a result from CLEO.

‡ *BABAR* also measures the difference in direct  $CP$  asymmetry for charged and neutral  $B$  mesons:  $\Delta A_{CP} = +(5.0 \pm 3.9 \pm 1.5)\%$ .

§ There is another *BABAR* result using the recoil method (Phys. Rev. D 77, 051103), and a CLEO result (Phys. Rev. Lett. 86, 5661) that are used in the PDG average.

¶ Previous *BABAR* result is also included in the PDG Average.

◊ Requires  $E_\gamma > 2.1$  GeV.

## Heavy FLavor AVeraging group (HFLAV) - November 2016

Compilation of  $CP$  Asymmetries for  $B_s^0$  mesons

In PDG2014    New since PDG2014 (preliminary)    New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	CDF	LHCb	Our Avg.
52	$\pi^+ K^-$	$0.28 \pm 0.04$	<span style="color: red;"><math>0.22 \pm 0.07 \pm 0.02</math></span> [60]	$0.27 \pm 0.04 \pm 0.01$ [61]	$0.26 \pm 0.04$

## Heavy FLavor AVeraging group (HFLAV) - November 2016

Compilation of  $CP$  Asymmetries for  $\Lambda_b^0$  baryons

In PDG2014    New since PDG2014 (preliminary)    New since PDG2014 (published)

RPP#	Mode	PDG2014 Avg.	CDF	LHCb	Our Avg.
21	$p\pi^-$	$0.03 \pm 0.18$	<span style="color: red;"><math>0.06 \pm 0.07 \pm 0.03</math></span> [60]		$0.06 \pm 0.08$
22	$pK^-$	$0.37 \pm 0.17$	<span style="color: red;"><math>-0.10 \pm 0.08 \pm 0.04</math></span> [60]		$-0.10 \pm 0.09$
	$\overline{K^0}p\pi^-$			<span style="color: red;"><math>0.22 \pm 0.13 \pm 0.03</math></span> [83]	$0.22 \pm 0.13$
	$\Lambda K^+\pi^-$			<span style="color: red;"><math>-0.53 \pm 0.23 \pm 0.11</math></span> [84]	$-0.53 \pm 0.26$
	$\Lambda K^+K^-$			<span style="color: red;"><math>-0.28 \pm 0.10 \pm 0.07</math></span> [84]	$-0.28 \pm 0.12$

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