

April 2005
Heavy Flavor Averaging Group

Compilation of Charmless Hadronic *CP* Asymmetries

Charged *B* Modes

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

RPP#	Mode	PDG2004 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
117	$K^0\pi^+$	0.03 ± 0.08	$-0.087 \pm 0.046 \pm 0.010$	$0.05 \pm 0.05 \pm 0.01$	$0.18 \pm 0.24 \pm 0.02$		-0.020 ± 0.034
118	$K^+\pi^0$	-0.10 ± 0.08	$0.06 \pm 0.06 \pm 0.01$	$0.04 \pm 0.05 \pm 0.02$	$-0.29 \pm 0.23 \pm 0.02$		0.04 ± 0.04
119	$\eta'K^+$	0.009 ± 0.035	$0.033 \pm 0.028 \pm 0.005$	$-0.015 \pm 0.070 \pm 0.009$	$0.03 \pm 0.12 \pm 0.02$		0.027 ± 0.025
121	ηK^+	New	$-0.20 \pm 0.15 \pm 0.01$	$-0.49 \pm 0.31 \pm 0.07$			-0.25 ± 0.14
122	ηK^{*+}	New	$0.13 \pm 0.14 \pm 0.02$	$-0.09^{+0.16}_{-0.15} \pm 0.01$			$0.03^{+0.11}_{-0.10}$
123	ωK^+	$-0.21 \pm 0.28 \pm 0.03$	$-0.09 \pm 0.17 \pm 0.01$	$0.06^{+0.21}_{-0.18} \pm 0.01$			$-0.02^{+0.13}_{-0.12}$
125	$K^{*0}\pi^+$	New		$-0.14 \pm 0.08^{+0.04}_{-0.07}$			$-0.14^{+0.09}_{-0.11}$
126	$K^{*+}\pi^0$	New	$0.04 \pm 0.29 \pm 0.05$				0.04 ± 0.29
127	$K^+\pi^+\pi^-$	$0.01 \pm 0.07 \pm 0.03$	$0.01 \pm 0.07 \pm 0.03$	$0.046 \pm 0.030^{+0.17}_{-0.12}$			$0.018^{+0.068}_{-0.063}$
129	$K^+f_0(980)$	New		$-0.13 \pm 0.11^{+0.16}_{-0.06}$			$-0.13^{+0.19}_{-0.12}$
130	$K^+\rho^0$	New		$0.27 \pm 0.12^{+0.59}_{-0.04}$			$0.27^{+0.60}_{-0.13}$
-	$K_0^*(1430)^0\pi^+$	New		$0.06 \pm 0.05^{+0.02}_{-0.32}$			$0.06^{+0.05}_{-0.32}$
-	$K^{*0}\rho^+$	New	$-0.14 \pm 0.17 \pm 0.4$				-0.14 ± 0.43
138	$K^{*+}\rho^0$	$0.20^{+0.32}_{-0.29} \pm 0.04$	$0.20^{+0.32}_{-0.29} \pm 0.04$				$0.20^{+0.32}_{-0.29}$
144	$K^+K_S K_S$	New	$-0.04 \pm 0.11 \pm 0.02$				-0.04 ± 0.11
152	$K^+K^-K^+$	$0.02 \pm 0.07 \pm 0.03$	$0.02 \pm 0.07 \pm 0.03$				0.02 ± 0.08
153	ϕK^+	0.03 ± 0.07	$0.054 \pm 0.056 \pm 0.012$	$0.01 \pm 0.12 \pm 0.05$		$-0.07 \pm 0.17^{+0.03}_{-0.02}$	0.037 ± 0.050
156	ϕK^{*+}	0.09 ± 0.15	$0.16 \pm 0.17 \pm 0.03$	$-0.02 \pm 0.14 \pm 0.03$			0.05 ± 0.11
173	$\pi^+\pi^0$	0.05 ± 0.15	$-0.01 \pm 0.10 \pm 0.02$	$-0.02 \pm 0.10 \pm 0.01$			-0.02 ± 0.07
174	$\pi^+\pi^-\pi^+$	$-0.39 \pm 0.33 \pm 0.12$	$-0.39 \pm 0.33 \pm 0.12$				-0.39 ± 0.35
175	$\rho^0\pi^+$	New	$-0.19 \pm 0.11 \pm 0.02$				-0.19 ± 0.11
180	$\rho^+\pi^0$	New	$0.24 \pm 0.16 \pm 0.06$	$0.06 \pm 0.19^{+0.04}_{-0.06}$			0.16 ± 0.13
182	$\rho^+\rho^0$	-0.09 ± 0.16	$-0.19 \pm 0.23 \pm 0.03$	$0.00 \pm 0.22 \pm 0.03$			-0.09 ± 0.16
185	$\omega\pi^+$	-0.21 ± 0.19	$0.03 \pm 0.16 \pm 0.01$	$0.50^{+0.23}_{-0.20} \pm 0.02$	$-0.34 \pm 0.25 \pm 0.02$		0.10 ± 0.11
186	$\omega\rho^+$	New	$0.05 \pm 0.26 \pm 0.02$				0.05 ± 0.26
187	$\eta\pi^+$	New	$-0.13 \pm 0.12 \pm 0.01$	$0.07 \pm 0.15 \pm 0.03$			-0.05 ± 0.09
188	$\eta'\pi^+$	New	$0.14 \pm 0.16 \pm 0.01$				0.14 ± 0.16
190	$\eta\rho^+$	New	$0.02 \pm 0.18 \pm 0.02$	$-0.17^{+0.33}_{-0.29} \pm 0.02$			-0.03 ± 0.16

B^\pm/B^0 Admixture

RPP#	Mode	PDG2004 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
56	$K^*\gamma$	-0.01 ± 0.07	$-0.013 \pm 0.036 \pm 0.010$	$-0.015 \pm 0.044 \pm 0.012$	$0.08 \pm 0.13 \pm 0.03$		-0.010 ± 0.028
67	$s\gamma$	$-0.079 \pm 0.108 \pm 0.022$	$0.025 \pm 0.050 \pm 0.015$	$0.002 \pm 0.050 \pm 0.026$	$-0.079 \pm 0.108 \pm 0.022$		0.004 ± 0.036
103	sll	New	$-0.22 \pm 0.26 \pm 0.02$				-0.22 ± 0.26

April 2005
Heavy Flavor Averaging Group

Compilation of Charmless Hadronic *CP* Asymmetries

Neutral *B* Modes

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

RPP#	Mode	PDG2004 Avg.	BABAR	Belle	CLEO	CDF	New Avg.
123	$K^+\pi^-$	-0.09 ± 0.04	$-0.133 \pm 0.030 \pm 0.009$	$-0.101 \pm 0.025 \pm 0.005$	$-0.04 \pm 0.16 \pm 0.02$	$-0.04 \pm 0.08 \pm 0.006$	-0.109 ± 0.019
124	$K^0\pi^0$ †						
127	ηK^{*0}	New	$0.02 \pm 0.11 \pm 0.02$	$-0.04^{+0.11}_{-0.10} \pm 0.01$			-0.01 ± 0.08
136	$K^+\rho^-$	0.28 ± 0.19	$0.13^{+0.14}_{-0.17} \pm 0.14$	$0.22^{+0.22+0.06}_{-0.23-0.02}$			$0.17^{+0.15}_{-0.16}$
–	$K_0^*(1430)^+\pi^-$	New	$-0.07 \pm 0.12 \pm 0.08$				-0.07 ± 0.14
–	$K_0^*(1430)^0\pi^0$	New	$-0.34 \pm 0.15 \pm 0.11$				-0.34 ± 0.19
140	$K^{*+}\pi^-$	0.26 ± 0.35	-0.04 ± 0.13		$0.26^{+0.33+0.10}_{-0.34-0.08}$		-0.00 ± 0.12
–	$K^+\pi^-\pi^0$	New		$0.07 \pm 0.11 \pm 0.01$			0.07 ± 0.11
141	$K^{*0}\pi^0$	New	$-0.01^{+0.24}_{-0.22} \pm 0.13$				$-0.01^{+0.27}_{-0.26}$
154	ϕK^{*0}	0.05 ± 0.10	$0.04 \pm 0.12 \pm 0.02$	$0.02 \pm 0.09 \pm 0.02$			0.03 ± 0.07
177	$\pi^0\pi^0$	New	$0.12 \pm 0.56 \pm 0.06$	$0.44^{+0.53}_{-0.52} \pm 0.17$			$0.28^{+0.40}_{-0.39}$
197	$\rho^+\pi^-$ †						

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

Charmless Hadronic CP Asymmetry References:

BABAR References

- [1] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0408080 (ICHEP 2004 contributed paper).
- [2] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 021804 (2004).
- [3] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **70**, 112006 (2004).
- [4] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **71**, 031103 (2005).
- [5] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **92**, 061801 (2004).
- [6] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 131801 (2004).
- [7] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0408072 (ICHEP 2004 contributed paper).
- [8] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0502017 (submitted to Phys. Rev. Lett.).
- [9] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **91**, 171802 (2003).
- [10] *BABAR* Collaboration, B. Aubert *et al.*, Phys. Rev. D **70**, 032006 (2004).
- [11] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0503035 (submitted to Phys. Rev. Lett.).
- [12] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0412037 (submitted to Phys. Rev. Lett.).
- [13] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 051802 (2004).
- [14] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 081802 (2004).
- [15] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0408093 (ICHEP 2004 contributed paper).
- [16] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. D **70**, 091103 (2004).
- [17] *BABAR* Collaboration (B. Aubert *et al.*), hep-ex/0408073 (ICHEP 2004 contributed paper), 2004.
- [18] F. Couderc (for the *BABAR* Collaboration), talk at Moriond QCD 2005.
- [19] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **93**, 181805 (2004).
- [20] *BABAR* Collaboration (B. Aubert *et al.*), Phys. Rev. Lett. **91**, 051801 (2003).

Belle References

- [21] Belle Collaboration, (C.H. Wang *et al.*), Phys. Rev. D **70**, 012001 (2004).
- [22] Belle Collaboration (K. F. Chen *et al.*), Phys. Lett. B **546**, 196 (2002).
- [23] Belle Collaboration (K. F. Chen *et al.*), hep-ex/0503013 (2005).
- [24] Belle Collaboration (P. Chang *et al.*), Phys. Lett. B **599**, 148 (2004).
- [25] Belle Collaboration, (Y. Chao *et al.*), Phys. Rev. D **71**, 031502 (2005).
- [26] Belle Collaboration, (M. Nakao *et al.*), Phys. Rev. D **69**, 112001 (2004).
- [27] Belle Collaboration, (P. Chang *et al.*), hep-ex/0412043 (submitted to Phys. Rev. D), 2004.
- [28] Belle Collaboration, (K. Abe. *et al.*), BELLE-CONF-0408 (2004).
- [29] Belle Collaboration (K.-F. Chen *et al.*), Phys. Rev. Lett. **91**, 201801 (2003).
- [30] Belle Collaboration (J. Zhang, M. Nakao *et al.*), Phys. Rev. Lett. **91**, 221801 (2003).
- [31] Belle Collaboration (S. Nishida *et al.*), Phys. Rev. Lett. **93**, 031803 (2004).
- [32] A. Garmash for the Belle Collaboration, talk presented in the Moriond QCD, 2005.
- [33]
- [34] Belle Collaboration, (J. Zhang *et al.*), Phys. Rev. Lett. **94**, 031801 (2005).
- [35] Belle Collaboration, (Y. Chao *et al.*), Phys. Rev. Lett. **93**, 191802 (2004).
- [36] Belle Collaboration, (Y. Chao *et al.*), hep-ex/0408101 (submitted to Phys. Rev. Lett.), 2004.
- [37]
- [38]
- [39]
- [40]

CLEO References

- [41] CLEO Collaboration (S. Chen *et al.*), Phys. Rev. Lett. **85**, 525 (2000).
- [42] CLEO Collaboration (T.E. Coan *et al.*), Phys. Rev. Lett. **84**, 5283 (2000).
- [43] CLEO Collaboration (B. I. Eisenstein *et al.*), Phys. Rev. D **68**, 017101 (2003).
- [44] CLEO Collaboration, (T. E. Coan *et al.*), Phys. Rev. Lett. **86**, 5661 (2001).

CDF References

- [45] CDF Collaboration (D. Acosta *et al.*), hep-ex/0502044, 2005.
- [46] G. Punzi (for the CDF Collaboration), talk at ICHEP 2004.