$D_s^{\pm}$

$I(J^P) = 0(0^-)$

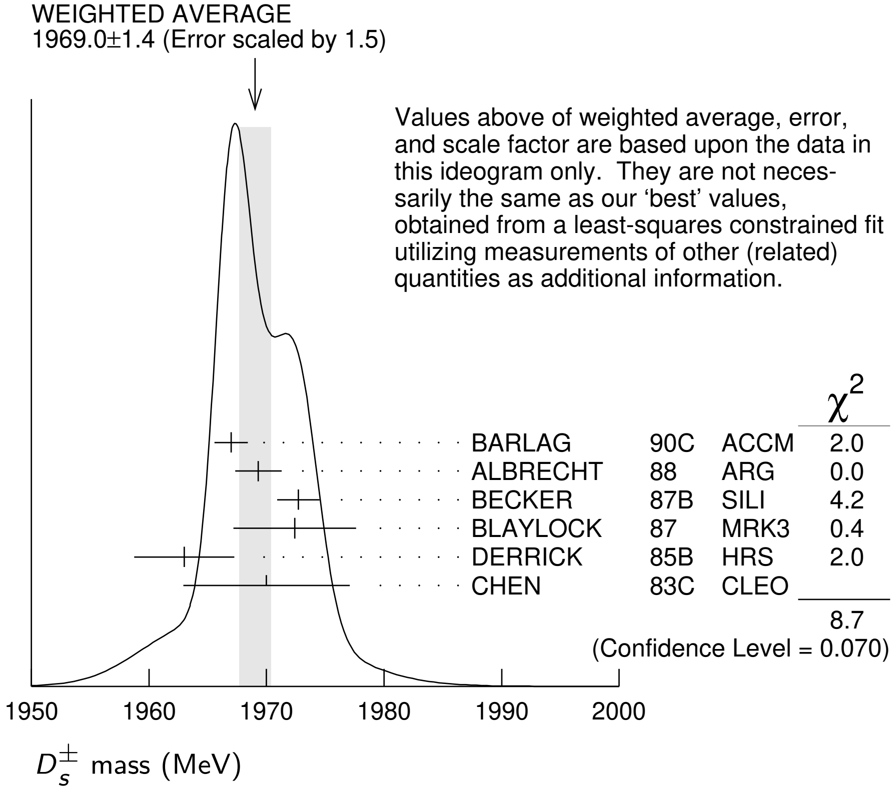
The angular distributions of the decays of the ϕ and $\overline{K}^*(892)^0$ in the $\phi\pi^+$ and $K^+\overline{K}^*(892)^0$ modes strongly indicate that the spin is zero. The parity given is that expected of a $c\overline{s}$ ground state.

$D_s^{\pm}$ MASS

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements. Measurements of the $D_s^{\pm}$ mass with an error greater than 10 MeV are omitted from the fit and average. A number of early measurements have been omitted altogether.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1968.35± 0.07 OUR FIT					
1969.0 ± 1.4 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.					
1967.0 ± 1.0 ± 1.0	54	BARLAG	90C	ACCM	π^- Cu 230 GeV
1969.3 ± 1.4 ± 1.4		ALBRECHT	88	ARG	e^+e^- 9.4–10.6 GeV
1972.7 ± 1.5 ± 1.0	21	BECKER	87B	SILI	200 GeV π,K,p
1972.4 ± 3.7 ± 3.7	27	BLAYLOCK	87	MRK3	e^+e^- 4.14 GeV
1963 ± 3 ± 3	30	DERRICK	85B	HRS	e^+e^- 29 GeV
1970 ± 5 ± 5	104	CHEN	83C	CLEO	e^+e^- 10.5 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1968.3 ± 0.7 ± 0.7	290	[1] ANJOS	88	E691	Photoproduction
1980 ±15	6	USHIDA	86	EMUL	ν wideband
1973.6 ± 2.6 ± 3.0	163	ALBRECHT	85D	ARG	e^+e^- 10 GeV
1948 ±28 ±10	65	AIHARA	84D	TPC	e^+e^- 29 GeV
1975 ± 9 ±10	49	ALTHOFF	84	TASS	e^+e^- 14–25 GeV
1975 ± 4	3	BAILEY	84	ACCM	hadron$^+$ Be $\rightarrow$ $\phi\pi^+$X

[1] ANJOS 88 enters the fit via $m_{D_s^{\pm}} - m_{D^{\pm}}$ (see below).



$m_{D_s^{\pm}} - m_{D^{\pm}}$

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
98.69±0.05 OUR FIT					
98.69±0.05 OUR AVERAGE					
98.68±0.03±0.04		AAIJ	13V	LHCB	$D_s^+ \to K^+ K^- \pi^+$
99.41±0.38±0.21		ACOSTA	03D	CDF2	$\overline{p}p$, $\sqrt{s}$= 1.96 TeV
98.4 ±0.1 ±0.3	48k	AUBERT	02G	BABR	$e^+e^- \approx \Upsilon(4S)$
99.5 ±0.6 ±0.3		BROWN	94	CLE2	$e^+e^- \approx \Upsilon(4S)$
98.5 ±1.5	555	CHEN	89	CLEO	e^+e^- 10.5 GeV
99.0 ±0.8	290	ANJOS	88	E691	Photoproduction

$D_s^{\pm}$ MEAN LIFE

Measurements with an error greater than 100×10^{-15} s or with fewer than 100 events have been omitted from the Listings.

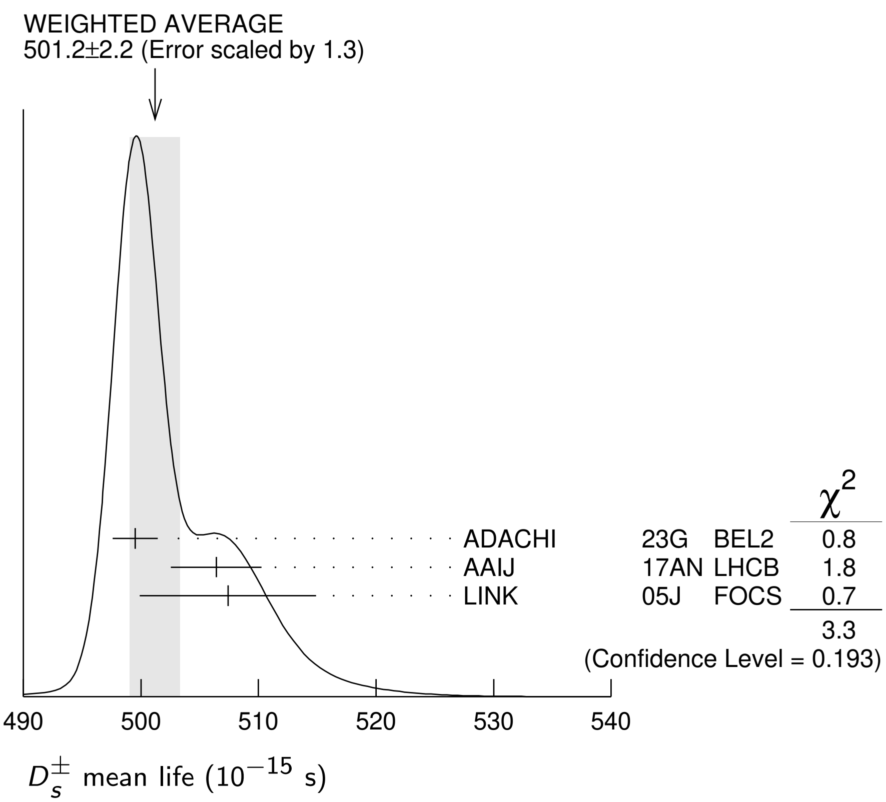
VALUE (10^{-15} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
501.2± 2.2 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
499.5± 1.7± 0.9	116k	ADACHI	23G	BEL2	$D_s^+ \to \phi\pi^+$
506.4± 3.0± 1.7±1.7		[1] AAIJ	17AN	LHCB	pp at 7, 8 TeV
507.4± 5.5± 5.1	13.6k	LINK	05J	FOCS	$\Phi\pi^+$ and $\overline{K}^{*0}K^+$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$472.5 \pm 17.2 \pm 6.6$	760	IORI	01	SELX	600 GeV Σ^-, π^-, p
$518 \pm 14 \pm 7$	1662	AITALA	99	E791	π^- nucleus, 500 GeV
$486.3 \pm 15.0^{+4.9}_{-5.1}$	2167	[2] BONVICINI	99	CLE2	$e^+e^- \approx \Upsilon(4S)$
$475 \pm 20 \pm 7$	900	FRABETTI	93F	E687	γBe, $\phi\pi^+$
$500 \pm 60 \pm 30$	104	FRABETTI	90	E687	γBe, $\phi\pi^+$
$470 \pm 40 \pm 20$	228	RAAB	88	E691	Photoproduction

[1] This AAIJ 17AN value is derived from the difference between the D_s^- and D^- widths. The 3rd uncertainty, $\pm 1.7 \times 10^{-15}$ s, arises from the uncertainty of the D^- width.

[2] BONVICINI 99 obtains 1.19 ± 0.04 for the ratio of D_s^+ to D^0 lifetimes.



D_s^+ DECAY MODES

Unless otherwise noted, the branching fractions for modes with a resonance in the final state include all the decay modes of the resonance. D_s^- modes are charge conjugates of the modes below.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Inclusive modes			
Γ_1	e^+ semileptonic	[a]	(6.33 ± 0.15) %	
Γ_2	π^+ anything		(119.3 ± 1.4) %	
Γ_3	π^- anything		(43.2 ± 0.9) %	

Γ_{4}	π^0 anything		(123 ± 7) %	
Γ_{5}	K^- anything		(18.7 ± 0.5) %	
Γ_{6}	K^+ anything		(28.9 ± 0.7) %	
Γ_{7}	K^0_S anything		(19.0 ± 1.1) %	
Γ_{8}	η anything	[b]	(29.9 ± 2.8) %	
Γ_{9}	ω anything		(6.1 ± 1.4) %	
Γ_{10}	η' anything	[c]	(10.3 ± 1.4) %	S=1.1
Γ_{11}	$f_0(980)$ anything, $f_0 \to \pi^+\pi^-$		< 1.3 %	CL=90%
Γ_{12}	ϕ anything		(15.7 ± 1.0) %	
Γ_{13}	K^+K^- anything		(15.8 ± 0.7) %	
Γ_{14}	$K^0_S K^+$ anything		(5.8 ± 0.5) %	
Γ_{15}	$K^0_S K^-$ anything		(1.9 ± 0.4) %	
Γ_{16}	$2K^0_S$ anything		(1.70 ± 0.32) %	
Γ_{17}	$2K^+$ anything		< 2.6 $\times 10^{-3}$	CL=90%
Γ_{18}	$2K^-$ anything		< 6 $\times 10^{-4}$	CL=90%
Γ_{19}	$2\pi^+\pi^- +$ anything		(32.8 ± 0.7) %	

Leptonic and semileptonic modes

Γ_{20}	$e^+\nu_e$		< 8.3 $\times 10^{-5}$	CL=90%
Γ_{21}	$\mu^+\nu_\mu$		(5.37 ± 0.11) $\times 10^{-3}$	
Γ_{22}	$\tau^+\nu_\tau$		(5.39 ± 0.09) %	
Γ_{23}	$\gamma e^+\nu_e$		< 1.3 $\times 10^{-4}$	CL=90%
Γ_{24}	$K^+K^-e^+\nu_e$		—	
Γ_{25}	$K^0_S K^0_S e^+\nu_e$		< 3.8 $\times 10^{-4}$	CL=90%
Γ_{26}	$\phi e^+\nu_e$	[d]	(2.34 ± 0.12) %	S=1.2
Γ_{27}	$K_1(1270)^0 e^+\nu_e$		< 4.1 $\times 10^{-4}$	CL=90%
Γ_{28}	$b_1(1235)^0 e^+\nu_e$, $b^0_1 \to \omega\pi^0$		< 6.4 $\times 10^{-4}$	CL=90%
Γ_{29}	$\phi\mu^+\nu_\mu$		(2.24 ± 0.11) %	
Γ_{30}	$\eta e^+\nu_e$	[d]	(2.27 ± 0.06) %	
Γ_{31}	$\eta'(958) e^+\nu_e$	[d]	(8.1 ± 0.4) $\times 10^{-3}$	
Γ_{32}	$\eta\mu^+\nu_\mu$		(2.24 ± 0.07) %	
Γ_{33}	$\eta'(958)\mu^+\nu_\mu$		(8.0 ± 0.6) $\times 10^{-3}$	
Γ_{34}	$\omega e^+\nu_e$	[e]	< 2.0 $\times 10^{-3}$	CL=90%
Γ_{35}	$K^0 e^+\nu_e$		(2.88 ± 0.26) $\times 10^{-3}$	S=1.2
Γ_{36}	$K^*(892)^0 e^+\nu_e$	[d]	(2.05 ± 0.20) $\times 10^{-3}$	
Γ_{37}	$f_0(500) e^+\nu_e$, $f_0 \to \pi^0\pi^0$		< 7.3 $\times 10^{-4}$	CL=90%
Γ_{38}	$f_0(500) e^+\nu_e$, $f_0 \to \pi^+\pi^-$		< 3.3 $\times 10^{-4}$	CL=90%
Γ_{39}	$f_0(980) e^+\nu_e$, $f_0 \to \pi^0\pi^0$		(7.9 ± 1.5) $\times 10^{-4}$	
Γ_{40}	$f_0(980) e^+\nu_e$, $f_0 \to \pi^+\pi^-$		(1.64 ± 0.13) $\times 10^{-3}$	
Γ_{41}	$f_0(980)\mu^+\nu_\mu$, $f_0 \to K^+K^-$		< 5.45 $\times 10^{-4}$	CL=90%
Γ_{42}	$a_0(980)^0 e^+\nu_e$, $a^0_0 \to \pi^0\eta$		< 1.2 $\times 10^{-4}$	CL=90%
Γ_{43}	$\pi^0 e^+\nu_e$		< 6.4 $\times 10^{-5}$	CL=90%

Hadronic modes with a $K\overline{K}$ pair

Γ_{44}	$K^+ K^0_S$		(1.500 ± 0.014) %	
Γ_{45}	$K^+ K^0_L$		$(1.49\ \pm0.06)$ %	
Γ_{46}	$K^+ \overline{K}^0$		$(2.95\ \pm0.14)$ %	
Γ_{47}	$K^+ K^- \pi^+$	[f]	$(5.45\ \pm0.08)$ %	S=1.3
Γ_{48}	$\phi\pi^+$	[d,g]	$(4.5\ \pm0.4)$ %	
Γ_{49}	$\phi\pi^+,\ \phi\to\ K^+K^-$	[g]	$(2.25\ \pm0.05)$ %	
Γ_{50}	$K^+\overline{K}^*(892)^0$		$(12.7\ {}^{+4.0}_{-3.1})$ %	
Γ_{51}	$K^+\overline{K}^*(892)^0,\ \overline{K}^{*0}\to\ K^-\pi^+$		$(2.61\ \pm0.05)$ %	
Γ_{52}	$K^+\overline{K}^*(892)^0,\ \overline{K}^{*0}\to\ K^0_S\pi^0$		$(4.8\ \pm0.4)\times10^{-3}$	
Γ_{53}	$f_0(980)\pi^+,\ f_0\to\ K^+K^-$		$(1.12\ \pm0.19)$ %	
Γ_{54}	$f_0(1370)\pi^+,\ f_0\to\ K^+K^-$		$(7.2\ \pm3.0)\times10^{-4}$	
Γ_{55}	$f_0(1710)\pi^+,\ f_0\to\ K^+K^-$		$(6.8\ \pm2.8)\times10^{-4}$	
Γ_{56}	$a_0(980)^+\pi^0,\ a_0^+\to\ K^+K^0_S$		$(1.1\ \pm0.4)\times10^{-3}$	
Γ_{57}	$a_0(1710)^+\pi^0,\ a_0^+\to\ K^+K^0_S$		$(3.5\ \pm0.6)\times10^{-3}$	
Γ_{58}	$K^+\overline{K}^*_0(1430)^0,\ \overline{K}^*_0\to\ K^-\pi^+$		$(1.79\ \pm0.26)\times10^{-3}$	
Γ_{59}	$K^+\overline{K}^*(1410)^0,\ \overline{K}^*_0\to\ K^0_S\pi^0$		$(8.8\ \pm2.8)\times10^{-4}$	
Γ_{60}	$K^+K^0_S\pi^0$		(1.471 ± 0.028) %	
Γ_{61}	$K^*(892)^+K^0_S,\ K^{*+}\to\ K^+\pi^0$		$(2.04\ \pm0.32)\times10^{-3}$	
Γ_{62}	$2K^0_S\pi^+$		$(7.32\ \pm0.14)\times10^{-3}$	
Γ_{63}	$f_0(980)\pi^+,\ f_0\to\ K^0_SK^0_S$		$<\ 1.8\ \times10^{-4}$	CL=90%
Γ_{64}	$f_0(1710)\pi^+,\ f_0\to\ K^0_SK^0_S$		$(3.39\ \pm0.31)\times10^{-3}$	
Γ_{65}	$K^*(892)^+K^0_S,\ K^{*+}\to\ K^0_S\pi^+$		$(3.19\ \pm0.29)\times10^{-3}$	
Γ_{66}	$K^0\overline{K}^0\pi^+$		—	
Γ_{67}	$K^*(892)^+\overline{K}^0$	[d]	$(5.4\ \pm1.2)$ %	
Γ_{68}	$K^+K^-\pi^+\pi^0$		$(5.53\ \pm0.15)$ %	S=1.3
Γ_{69}	$\phi\rho^+$	[d]	$(5.59\ \pm0.34)$ %	
Γ_{70}	$\overline{K}_1(1270)^0K^+,\ \overline{K}_1(1270)^0\to\ K^-\rho^+$		$(5.7\ \pm0.6)\times10^{-3}$	
Γ_{71}	$\overline{K}_1(1270)^0K^+,\ \overline{K}_1(1270)^0\to\ K^*(892)\pi$		$(1.31\ \pm0.25)$ %	
Γ_{72}	$\overline{K}_1(1400)^0K^+,\ \overline{K}_1(1400)^0\to\ K^*(892)\pi$		$(2.0\ \pm0.4)$ %	
Γ_{73}	$a_0(980)^0\rho^+,\ a_0^0\to\ K^+K^-$		$(1.9\ \pm0.4)\times10^{-3}$	
Γ_{74}	$f_1(1420)^0\pi^+,\ f_1(1420)^0\to\ K^*(892)^\mp K^\pm$		$(3.9\ \pm0.7)\times10^{-3}$	

Γ_{75}	$f_1(1420)^0\pi^+$, $f_1^0 \to a_0(980)^0\pi^0$, $a_0^0 \to K^+K^-$		$(4.0 \pm 1.4) \times 10^{-4}$
Γ_{76}	$\eta(1475)\pi^+$, $\eta \to a_0(980)^0\pi^0$, $a_0^0 \to K^+K^-$		$(7.0 \pm 2.8) \times 10^{-4}$
Γ_{77}	$K_S^0 K^- 2\pi^+$		(1.569 ± 0.028) %
Γ_{78}	$K^+ K^- K_S^0 \pi^+$		$(1.27 \pm 0.15) \times 10^{-4}$
Γ_{79}	$K^*(892)^+ \overline{K}^*(892)^0$	[d]	(5.64 ± 0.35) %
Γ_{80}	$\eta(1475) K_S^0$, $\eta \to K^*(892)^0\pi^+$, $K^{*0} \to K^-\pi^+$		$(3.5 \pm 1.0) \times 10^{-4}$
Γ_{81}	$\eta(1475)\pi^+$, $\eta \to \overline{K}^*(892)^+ K^-$, $\overline{K}^{*+} \to K_S^0\pi^+$		$(3.5 \pm 1.0) \times 10^{-4}$
Γ_{82}	$\eta(1475)\pi^+$, $\eta \to a_0(980)^-\pi^+$, $a_0^- \to K_S^0 K^-$		$(1.7 \pm 0.9) \times 10^{-3}$
Γ_{83}	$f_1(1285)\pi^+$, $f_1 \to a_0(980)^-\pi^+$, $a_0^- \to K_S^0 K^-$		$(3.5 \pm 0.8) \times 10^{-4}$
Γ_{84}	$K^+ K_S^0 \pi^+ \pi^-$		$(9.34 \pm 0.22) \times 10^{-3}$
Γ_{85}	$K^+ K^- 2\pi^+ \pi^-$		$(6.6 \pm 0.6) \times 10^{-3}$
Γ_{86}	$\phi 2\pi^+\pi^-$	[d]	(1.21 ± 0.16) %
Γ_{87}	$\phi\rho^0\pi^+$, $\phi \to K^+K^-$		$(4.9 \pm 0.7) \times 10^{-3}$
Γ_{88}	$\phi a_1(1260)^+$, $\phi \to K^+K^-$, $a_1^+ \to \rho^0\pi^+$		$(7.5 \pm 1.2) \times 10^{-3}$
Γ_{89}	$\phi 2\pi^+\pi^-$ non-ρ, $\phi \to K^+K^-$		$(1.4 \pm 0.5) \times 10^{-3}$
Γ_{90}	$K^+K^-\rho^0\pi^+$ non-ϕ		$< 2.0 \times 10^{-4}$ CL=90%
Γ_{91}	$K^+K^-2\pi^+\pi^-$ nonresonant		$(1.0 \pm 0.4) \times 10^{-3}$
Γ_{92}	$2K_S^0 2\pi^+\pi^-$		$(8.0 \pm 3.3) \times 10^{-4}$

Hadronic modes without K's

Γ_{93}	$\pi^+\pi^0$		$< 1.2 \times 10^{-4}$ CL=90%
Γ_{94}	$2\pi^+\pi^-$		(1.090 ± 0.014) %
Γ_{95}	$\rho^0\pi^+$		$(1.14 \pm 0.16) \times 10^{-4}$
Γ_{96}	$\omega\pi^+$, $\omega \to \pi^+\pi^-$		$(3.9 \pm 0.4) \times 10^{-5}$
Γ_{97}	$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$	[h]	$(9.23 \pm 0.13) \times 10^{-3}$
Γ_{98}	$f_0(980)\pi^+$, $f_0 \to \pi^+\pi^-$		
Γ_{99}	$f_0(1370)\pi^+$, $f_0 \to \pi^+\pi^-$		
Γ_{100}	$f_0(1500)\pi^+$, $f_0 \to \pi^+\pi^-$		
Γ_{101}	$f_2(1270)\pi^+$, $f_2 \to \pi^+\pi^-$		$(1.42 \pm 0.10) \times 10^{-3}$

Γ_{102}	$f_2'(1525)^0\pi^+$, $f_2' \to \pi^+\pi^-$		$(5.8 \pm 2.0) \times 10^{-6}$	
Γ_{103}	$\rho(1450)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		$(1.8 \pm 0.6) \times 10^{-4}$	
Γ_{104}	$\rho(1700)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		$(4 \pm 4) \times 10^{-5}$	
Γ_{105}	$\pi^+ 2\pi^0$		$(5.2 \pm 0.5) \times 10^{-3}$	S=1.1
Γ_{106}	$f_0(980)\pi^+$, $f_0 \to \pi^0\pi^0$		$(2.9 \pm 0.6) \times 10^{-3}$	
Γ_{107}	$f_0(1370)\pi^+$, $f_0 \to \pi^0\pi^0$		$(1.3 \pm 0.6) \times 10^{-3}$	
Γ_{108}	$f_2(1270)\pi^+$, $f_2 \to \pi^0\pi^0$		$(5.0 \pm 3.5) \times 10^{-4}$	
Γ_{109}	$2\pi^+\pi^-\pi^0$		—	
Γ_{110}	$\omega\pi^+$	[d]	$(1.93 \pm 0.30) \times 10^{-3}$	
Γ_{111}	$\eta\pi^+$	[d]	(1.686 ± 0.027) %	
Γ_{112}	$(2\pi^+\pi^-\pi^0)_{\text{non}-\eta}$		(2.04 ± 0.09) %	
Γ_{113}	$f_0(1370)\rho^+$, $f_0\rho^+ \to 2\pi^+\pi^-\pi^0$		$(5.1 \pm 0.9) \times 10^{-3}$	
Γ_{114}	$f_0(980)^0\rho^+$, $f_0^0\rho^+ \to 2\pi^+\pi^-\pi^0$		$(2.6 \pm 0.5) \times 10^{-3}$	
Γ_{115}	$f_2(1270)^0\rho^+$, $f_2(1270)^0\rho^+ \to 2\pi^+\pi^-\pi^0$		$(1.9 \pm 0.4) \times 10^{-3}$	
Γ_{116}	$(\rho^+\rho^0)_{S-wave} \to 2\pi^+\pi^-\pi^0$		$(7.1 \pm 2.8) \times 10^{-4}$	
Γ_{117}	$(\rho(1450)^+\rho^0)_{S-wave} \to 2\pi^+\pi^-\pi^0$		$(9.4 \pm 3.1) \times 10^{-4}$	
Γ_{118}	$(\rho^+\rho(1450)^0)_{P-wave} \to 2\pi^+\pi^-\pi^0$		$(1.75 \pm 0.29) \times 10^{-3}$	
Γ_{119}	$\phi\pi^+$, $\phi \to \rho\pi$		$(5.08 \pm 0.35) \times 10^{-3}$	
Γ_{120}	$\omega\pi^+$, $\omega \to \rho\pi$		$(1.41 \pm 0.19) \times 10^{-3}$	
Γ_{121}	$a_1(1260)^+\pi^0$, $a_1^+ \to (\rho^0\pi^+)_{S-wave}$		$(2.6 \pm 0.4) \times 10^{-3}$	
Γ_{122}	$a_1(1260)^0\pi^+$, $a_1^0 \to (\rho\pi)_{S-wave}$		$(1.3 \pm 0.5) \times 10^{-3}$	
Γ_{123}	$\pi(1300)^0\pi^+$, $\pi^0 \to (\rho\pi)_{P-wave}$		$(2.4 \pm 0.7) \times 10^{-3}$	
Γ_{124}	$3\pi^+ 2\pi^-$		$(8.0 \pm 0.8) \times 10^{-3}$	
Γ_{125}	$2\pi^+\pi^- 2\pi^0$		—	
Γ_{126}	$\eta\rho^+$	[d]	(8.9 ± 0.8) %	
Γ_{127}	$\eta\pi^+\pi^0$		(9.10 ± 0.17) %	
Γ_{128}	$\eta(\pi^+\pi^0)_{P-wave}$		$(4.9 \pm 3.0) \times 10^{-3}$	
Γ_{129}	$a_0(980)^{+0}\pi^{0+}$, $a_0(980)^{+0} \to \eta\pi^{+0}$		(2.1 ± 0.4) %	
Γ_{130}	$\omega\pi^+\pi^0$	[d]	(2.8 ± 0.7) %	
Γ_{131}	$2\pi^+\pi^-\eta$		(3.08 ± 0.08) %	
Γ_{132}	$a_1(1260)^+\eta$, $a_1^+ \to \rho(770)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		(1.71 ± 0.14) %	

Γ_{133}	$a_1(1260)^+\eta$, $a_1^+ \to f_0(500)\pi^+$, $f_0 \to \pi^+\pi^-$		$(2.5 \pm 0.9) \times 10^{-3}$	
Γ_{134}	$a_0(980)^+\rho(770)^0$, $a_0^+ \to \eta\pi^+$		$(2.1 \pm 0.9) \times 10^{-3}$	
Γ_{135}	$\eta(1405)\pi^+$, $\eta \to a_0(980)^-\pi^+$, $a_0^- \to \eta\pi^-$		$(2.2 \pm 0.7) \times 10^{-4}$	
Γ_{136}	$\eta(1405)\pi^+$, $\eta \to a_0(980)^+\pi^-$, $a_0^+ \to \eta\pi^+$		$(2.2 \pm 0.7) \times 10^{-4}$	
Γ_{137}	$f_1(1420)\pi^+$, $f_1 \to a_0(980)^-\pi^+$, $a_0^- \to \eta\pi^-$		$(5.9 \pm 1.8) \times 10^{-4}$	
Γ_{138}	$f_1(1420)\pi^+$, $f_1 \to a_0(980)^+\pi^-$, $a_0^+ \to \eta\pi^+$		$(5.2 \pm 1.8) \times 10^{-4}$	
Γ_{139}	$3\pi^+2\pi^-\pi^0$		(4.9 ± 3.2) %	
Γ_{140}	$\omega 2\pi^+\pi^-$	[d]	(1.6 ± 0.5) %	
Γ_{141}	$\eta'(958)\pi^+$	[c,d]	(3.95 ± 0.08) %	
Γ_{142}	$3\pi^+2\pi^-2\pi^0$		—	
Γ_{143}	$\omega\eta\pi^+$	[d]	$(5.4 \pm 1.3) \times 10^{-3}$	
Γ_{144}	$\eta'(958)\rho^+$	[c,d]	(5.8 ± 1.5) %	
Γ_{145}	$\eta'(958)\pi^+\pi^0$		(6.14 ± 0.18) %	
Γ_{146}	$\eta'(958)\pi^+\pi^0$ nonresonant		< 5.1 %	CL=90%

Modes with one or three K's

Γ_{147}	$K^+\pi^0$		$(7.5 \pm 0.5) \times 10^{-4}$	
Γ_{148}	$K^0_S\pi^+$		$(1.22 \pm 0.04) \times 10^{-3}$	
Γ_{149}	$K^+\eta$	[d]	$(1.76 \pm 0.08) \times 10^{-3}$	
Γ_{150}	$K^+\omega$	[d]	$(9.9 \pm 1.5) \times 10^{-4}$	
Γ_{151}	$K^+\eta'(958)$	[d]	$(2.68 \pm 0.24) \times 10^{-3}$	
Γ_{152}	$K^+\pi^+\pi^-$		$(6.23 \pm 0.10) \times 10^{-3}$	
Γ_{153}	$K^+\rho^0$		$(2.18 \pm 0.25) \times 10^{-3}$	
Γ_{154}	$K^+\rho(1450)^0$, $\rho^0 \to \pi^+\pi^-$		$(7.3 \pm 1.7) \times 10^{-4}$	
Γ_{155}	$K^+f_0(500)$, $f_0 \to \pi^+\pi^-$		$(4.5 \pm 3.0) \times 10^{-4}$	
Γ_{156}	$K^+f_0(980)$, $f_0 \to \pi^+\pi^-$		$(2.8 \pm 1.1) \times 10^{-4}$	
Γ_{157}	$K^+f_0(1370)$, $f_0 \to \pi^+\pi^-$		$(1.2 \pm 0.6) \times 10^{-3}$	
Γ_{158}	$K^*(892)^0\pi^+$, $K^{*0} \to K^+\pi^-$		$(1.68 \pm 0.26) \times 10^{-3}$	
Γ_{159}	$K^*(1410)^0\pi^+$, $K^{*0} \to K^+\pi^-$		$(6 \pm 4) \times 10^{-4}$	
Γ_{160}	$K^*(1430)^0\pi^+$, $K^{*0} \to K^+\pi^-$		$(9.4 \pm 3.2) \times 10^{-4}$	
Γ_{161}	$K^+\pi^+\pi^-$ nonresonant		$(9.9 \pm 3.2) \times 10^{-4}$	
Γ_{162}	$K^0\pi^+\pi^0$			
Γ_{163}	$K^0_S\pi^+\pi^0$		$(5.09 \pm 0.22) \times 10^{-3}$	
Γ_{164}	$K^0_S\rho(770)^+$, $\rho^+ \to \pi^+\pi^0$		$(2.6 \pm 0.4) \times 10^{-3}$	
Γ_{165}	$K^0_S\rho(1450)^+$, $\rho^+ \to \pi^+\pi^0$		$(1.04 \pm 0.32) \times 10^{-3}$	

Γ_{166}	$K^*(892)^0\pi^+$, $K^{*0} \to K^0_S\pi^0$		$(4.3 \pm 1.2) \times 10^{-4}$	
Γ_{167}	$K^*(892)^+\pi^0$, $K^{*+} \to K^0_S\pi^+$		$(2.3 \pm 0.7) \times 10^{-4}$	
Γ_{168}	$K^*(1410)^0\pi^+$, $K^{*0} \to K^0_S\pi^0$		$(1.7 \pm 0.9) \times 10^{-4}$	
Γ_{169}	$K^0_S 2\pi^+\pi^-$		$(2.8 \pm 1.0) \times 10^{-3}$	
Γ_{170}	$K^+\pi^+\pi^-\pi^0$		$(9.7 \pm 0.6) \times 10^{-3}$	
Γ_{171}	$K^*(892)^0\rho^+$, $K^{*0} \to K^+\pi^-$		$(3.9 \pm 0.4) \times 10^{-3}$	
Γ_{172}	$K^*(892)^+\rho^0$, $K^{*+} \to K^+\pi^0$		$(4.2 \pm 1.2) \times 10^{-4}$	
Γ_{173}	$K_1(1270)^0\pi^+$, $K^0_1 \to K^+\rho^-$		$(3.9 \pm 1.3) \times 10^{-4}$	
Γ_{174}	$K_1(1400)^0\pi^+$, $K^0_1 \to K^*(890)^+\pi^-$, $K^{*+} \to K^+\pi^0$		$(5.4 \pm 0.9) \times 10^{-4}$	
Γ_{175}	$K_1(1400)^0\pi^+$, $K^0_1 \to K^*(890)^0\pi^0$, $K^{*0} \to K^+\pi^-$		$(5.9 \pm 1.0) \times 10^{-4}$	
Γ_{176}	$K^+a_1(1260)^0$, $a_1 \to \rho^+\pi^-$		$(1.8 \pm 1.1) \times 10^{-4}$	
Γ_{177}	$K^+a_1(1260)^0$, $a_1 \to \rho^-\pi^+$		$(1.8 \pm 1.1) \times 10^{-4}$	
Γ_{178}	$K^+\pi^+\pi^-\pi^0$ nonresonant		$(9.2 \pm 2.4) \times 10^{-4}$	
Γ_{179}	$(K^+\pi^0)_{P-wave}\rho^0$		$(1.01 \pm 0.21) \times 10^{-3}$	
Γ_{180}	$K^+\omega\pi^0$	[d]	$< 8.2 \times 10^{-3}$	CL=90%
Γ_{181}	$K^+\omega\pi^+\pi^-$	[d]	$< 5.4 \times 10^{-3}$	CL=90%
Γ_{182}	$K^+\omega\eta$	[d]	$< 7.9 \times 10^{-3}$	CL=90%
Γ_{183}	$2K^+K^-$		$(2.18 \pm 0.20) \times 10^{-4}$	
Γ_{184}	ϕK^+, $\phi \to K^+K^-$		$(8.9 \pm 2.0) \times 10^{-5}$	

Radiative decays

Γ_{185}	$\rho(770)^+\gamma$		$< 6.1 \times 10^{-4}$	CL=90%

Doubly Cabibbo-suppressed modes

Γ_{186}	$2K^+\pi^-$		$(1.293 \pm 0.027) \times 10^{-4}$	S=1.1
Γ_{187}	$K^+K^*(892)^0$, $K^{*0} \to K^+\pi^-$		$(6.1 \pm 3.4) \times 10^{-5}$	
Γ_{188}	$2K^+\pi^-\pi^0$		$< 1.7 \times 10^{-4}$	CL=90%

Baryon-antibaryon mode

Γ_{189}	$p\overline{n}$		$(1.22 \pm 0.11) \times 10^{-3}$	
Γ_{190}	$p\overline{p}e^+\nu_e$		$< 2.0 \times 10^{-4}$	CL=90%

$\Delta C = 1$ weak neutral current (*C1*) modes, Lepton family number (*LF*), or Lepton number (*L*) violating modes

Γ_{191}	$\pi^+e^+e^-$	[i]	$< 5.5 \times 10^{-6}$	CL=90%
Γ_{192}	$\pi^+\phi$, $\phi \to e^+e^-$	[j]	$(1.17 \pm 0.22) \times 10^{-5}$	
Γ_{193}	$\pi^+\pi^0e^+e^-$		$< 7.0 \times 10^{-5}$	CL=90%
Γ_{194}	$\rho^+\phi$, $\phi \to e^+e^-$		$(2.4 \pm 0.7) \times 10^{-5}$	

Γ_{195}	$\pi^+ \mu^+ \mu^-$		[i] <	1.8	$\times 10^{-7}$	CL=90%
Γ_{196}	$K^+ e^+ e^-$	C1	<	3.7	$\times 10^{-6}$	CL=90%
Γ_{197}	$K^+ \pi^0 e^+ e^-$		<	7.1	$\times 10^{-5}$	CL=90%
Γ_{198}	$K^0_S \pi^+ e^+ e^-$		<	8.1	$\times 10^{-5}$	CL=90%
Γ_{199}	$K^+ \mu^+ \mu^-$	C1	<	1.4	$\times 10^{-7}$	CL=90%
Γ_{200}	$K^*(892)^+ \mu^+ \mu^-$	C1	<	1.4	$\times 10^{-3}$	CL=90%
Γ_{201}	$\pi^+ e^+ \mu^-$	LF	<	1.1	$\times 10^{-6}$	CL=90%
Γ_{202}	$\pi^+ e^- \mu^+$	LF	<	9.4	$\times 10^{-7}$	CL=90%
Γ_{203}	$K^+ e^+ \mu^-$	LF	<	7.9	$\times 10^{-7}$	CL=90%
Γ_{204}	$K^+ e^- \mu^+$	LF	<	5.6	$\times 10^{-7}$	CL=90%
Γ_{205}	$\pi^- 2e^+$	L	<	1.4	$\times 10^{-6}$	CL=90%
Γ_{206}	$\pi^- 2\mu^+$	L	<	8.6	$\times 10^{-8}$	CL=90%
Γ_{207}	$\pi^- e^+ \mu^+$	L	<	6.3	$\times 10^{-7}$	CL=90%
Γ_{208}	$K^- 2e^+$	L	<	7.7	$\times 10^{-7}$	CL=90%
Γ_{209}	$K^- 2\mu^+$	L	<	2.6	$\times 10^{-8}$	CL=90%
Γ_{210}	$K^- e^+ \mu^+$	L	<	2.6	$\times 10^{-7}$	CL=90%
Γ_{211}	$K^*(892)^- 2\mu^+$	L	<	1.4	$\times 10^{-3}$	CL=90%

[a] This is the purely e^+ semileptonic branching fraction: the e^+ fraction from τ^+ decays has been subtracted off. The sum of our (non-τ) e^+ exclusive fractions — an $e^+ \nu_e$ with an η, η', ϕ, K^0, or K^{*0} — is 5.99 ± 0.31 %.

[b] This fraction includes η from η' decays.

[c] The sum of our exclusive η' fractions — $\eta' e^+ \nu_e$, $\eta' \mu^+ \nu_\mu$, $\eta' \pi^+$, $\eta' \rho^+$, and $\eta' K^+$ — is 11.8 ± 1.6%.

[d] This branching fraction includes all the decay modes of the final-state resonance.

[e] A test for $u\overline{u}$ or $d\overline{d}$ content in the D_s^+. Neither Cabibbo-favored nor Cabibbo-suppressed decays can contribute, and $\omega{-}\phi$ mixing is an unlikely explanation for any fraction above about 2×10^{-4}.

[f] The branching fraction for this mode may differ from the sum of the submodes that contribute to it, due to interference effects. See the relevant papers.

[g] We decouple the $D_s^+ \to \phi\pi^+$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+ \to \phi\pi^+$, $\phi \to K^+ K^-$ branching fraction obtained from the Dalitz-plot analysis of $D_s^+ \to K^+ K^- \pi^+$. That is, the ratio of these two branching fractions is not exactly the $\phi \to K^+ K^-$ branching fraction 0.491.

[h] This is the average of a model-independent and a K-matrix parametrization of the $\pi^+ \pi^-$ S-wave and is a sum over several f_0 mesons.

[*i*] This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

[*j*] This is *not* a test for the ΔC=1 weak neutral current, but leads to the $\pi^+ \ell^+ \ell^-$ final state.

FIT INFORMATION

An overall fit to 18 branching ratios uses 32 measurements to determine 12 parameters. The overall fit has a χ^2 = 12.1 for 20 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$.

x_{47}	11									
x_{68}	−1	1								
x_{77}	1	2	2							
x_{84}	0	1	1	1						
x_{94}	1	1	0	1	0					
x_{110}	0	0	0	0	0	0				
x_{111}	2	2	−1	0	0	0	1			
x_{150}	0	0	0	0	0	0	0	0		
x_{152}	0	2	1	1	1	0	0	0	0	
x_{170}	0	0	0	0	0	0	0	0	26	0
x_{186}	8	72	1	2	0	1	0	1	0	1
	x_{44}	x_{47}	x_{68}	x_{77}	x_{84}	x_{94}	x_{110}	x_{111}	x_{150}	x_{152}

x_{186}	0
	x_{170}

D_s^+ BRANCHING RATIOS

A number of older, now obsolete results have been omitted. They may be found in earlier editions.

Inclusive modes

$\Gamma(e^+ \text{semileptonic})/\Gamma_{\text{total}}$ — Γ_1/Γ

This is the purely e^+ semileptonic branching fraction: the e^+ fraction from τ^+ decays has been subtracted off.

VALUE (%)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
6.33±0.15 OUR AVERAGE					
6.30±0.13±0.10	17k	[1,2] ABLIKIM	21AC	BES3	$e^+ e^-$ at 4.178–4.230 GeV
6.52±0.39±0.15	0.5k	[3] ASNER	10	CLEO	$e^+ e^-$ at 3774 MeV

[1] ABLIKIM 21AC finds that the ratio of the D_s^+ and D^0 semielectronic widths is 0.790 ± 0.016 ± 0.020.

[2] ABLIKIM 21AC reports a value of $(6.30 \pm 0.13 \pm 0.09 \pm 0.04) \times 10^{-2}$, where the last uncertainty is an external systematic from B($D_s^+ \to \tau \nu$). We have added the systematic uncertainties in quadrature.

[3] Using the D_s^+ and D^0 lifetimes, ASNER 10 finds that the ratio of the D_s^+ and D^0 semileptonic widths is 0.828 ± 0.051 ± 0.025.

$\Gamma(\pi^+ \text{anything})/\Gamma_{\text{total}}$ — Γ_2/Γ

Events with two π^+'s count twice, etc. But π^+'s from $K_S^0 \to \pi^+\pi^-$ are not included.

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
119.3±1.2±0.7	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(\pi^- \text{anything})/\Gamma_{\text{total}}$ — Γ_3/Γ

Events with two π^-'s count twice, etc. But π^-'s from $K_S^0 \to \pi^+\pi^-$ are not included.

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
43.2±0.9±0.3	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(\pi^0 \text{ anything})/\Gamma_{\text{total}}$ — Γ_4/Γ

Events with two π^0's count twice, etc. But π^0's from $K_S^0 \to 2\pi^0$ are not included.

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
123.4±3.8±5.3	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(K^- \text{anything})/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
18.7±0.5±0.2	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(K^+ \text{anything})/\Gamma_{\text{total}}$ — Γ_6/Γ

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
28.9±0.6±0.3	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(K_S^0 \text{ anything})/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
19.0±1.0±0.4	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(\eta \text{ anything})/\Gamma_{\text{total}}$ — Γ_8/Γ

This ratio includes η particles from η' decays.

VALUE (%)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
29.9±2.2±1.7		DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
23.5±3.1±2.0	674 ± 91	HUANG	06B	CLEO	See DOBBS 09

$\Gamma(\omega \text{ anything})/\Gamma_{\text{total}}$ — Γ_9/Γ

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
6.1±1.4±0.3	DOBBS	09	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(\eta' \text{ anything})/\Gamma_{\text{total}}$ — Γ_{10}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
10.3±1.4 OUR AVERAGE	Error includes scale factor of 1.1.				
8.8±1.8±0.5	68	ABLIKIM	15Z	BES3	482 pb^{-1}, 4009 MeV
11.7±1.7±0.7		DOBBS	09	CLEO	e^+e^- at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8.7±1.9±0.8	68	HUANG	06B	CLEO	See DOBBS 09

$\Gamma(f_0(980) \text{ anything}, f_0 \to \pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{11}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(\phi \text{ anything})/\Gamma_{\text{total}}$ — Γ_{12}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
15.7±0.8±0.6		DOBBS	09	CLEO	e^+e^- at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
16.1±1.2±1.1	398 ± 27	HUANG	06B	CLEO	See DOBBS 09

$\Gamma(K^+K^- \text{ anything})/\Gamma_{\text{total}}$ — Γ_{13}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
15.8±0.6±0.3	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(K^0_S K^+ \text{ anything})/\Gamma_{\text{total}}$ — Γ_{14}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
5.8±0.5±0.1	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(K^0_S K^- \text{ anything})/\Gamma_{\text{total}}$ — Γ_{15}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1.9±0.4±0.1	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(2K^0_S \text{ anything})/\Gamma_{\text{total}}$ — Γ_{16}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1.7±0.3±0.1	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(2K^+ \text{ anything})/\Gamma_{\text{total}}$ — Γ_{17}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.26	90	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(2K^- \text{ anything})/\Gamma_{\text{total}}$ — Γ_{18}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.06	90	DOBBS	09	CLEO	e^+e^- at 4170 MeV

$\Gamma(2\pi^+\pi^- + \text{anything})/\Gamma_{\text{total}}$ — Γ_{19}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
32.81±0.35±0.63	25k	[1] ABLIKIM	23AV	BES3	e^+e^- at 4.178 GeV

[1] Charged pions from K^0_S meson decays are excluded from this measurement

Leptonic and semileptonic modes

See the related review(s):

Leptonic Decays of Charged Pseudoscalar Mesons

$\Gamma(e^+\nu_e)/\Gamma_{total}$ Γ_{20}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.83 × 10^{-4}	90	[1] ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.3 \times 10^{-4}$	90	DEL-AMO-SA...	10J	BABR	e^+e^-, 10.58 GeV
$<1.2 \times 10^{-4}$	90	ALEXANDER	09	CLEO	e^+e^- at 4170 MeV
$<1.3 \times 10^{-4}$	90	PEDLAR	07A	CLEO	See ALEXANDER 09

[1] ZUPANC 13 also gives the limit as $< 1.0 \times 10^{-4}$ at 95% CL.

$\Gamma(\mu^+\nu_\mu)/\Gamma_{total}$ Γ_{21}/Γ

See the note on "Decay Constants of Charged Pseudoscalar Mesons."

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.37 ±0.11 OUR AVERAGE					
5.47 ±0.26 ±0.16	0.5k	ABLIKIM	24CG	BES3	e^+e^- at 4.237–4.699 GeV
5.294±0.108±0.085	2.5k	ABLIKIM	23BR	BES3	e^+e^- at 4.128–4.226 GeV
5.17 ±0.75 ±0.21	69	[1] ABLIKIM	16O	BES3	e^+e^- at 4.009 GeV
5.31 ±0.28 ±0.20	490	[2] ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
6.02 ±0.38 ±0.34	270	[3] DEL-AMO-SA...	10J	BABR	e^+e^-, 10.58 GeV
5.65 ±0.45 ±0.17	230	ALEXANDER	09	CLEO	e^+e^- at 4.170 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.35 ±0.13 ±0.16	2.2k	[4] ABLIKIM	21BE	BES3	e^+e^-,4.178,4.226 GeV
5.49 ±0.16 ±0.15	1.1k	[4] ABLIKIM	19E	BES3	e^+e^- at 4.178 GeV
6.44 ±0.76 ±0.57	170	[5] WIDHALM	08	BELL	See ZUPANC 13
5.94 ±0.66 ±0.31	88	[6] PEDLAR	07A	CLEO	See ALEXANDER 09
6.8 ±1.1 ±1.8	553	[7] HEISTER	02I	ALEP	Z decays

[1] ABLIKIM 16O also reports that when constrained by the Standard Model ratio of $\Gamma(D_s^+ \to \tau^+\nu_\tau)/\Gamma(D_s^+ \to \mu^+\nu_\mu)$ = 9.76, the branching fraction is found to be $(0.495 \pm 0.067 \pm 0.026)$%. The constrained value is used to obtain the decay constant, $f_{D_s^+} = (241.0 \pm 16.3 \pm 6.6)$ MeV.

[2] ZUPANC 13 uses both $\mu^+\nu$ and $\tau^+\nu$ events to get $f_{D_s} = (255.5 \pm 4.2 \pm 5.1)$ MeV.

[3] DEL-AMO-SANCHEZ 10J uses $\mu^+\nu_\mu$ and $\tau^+\nu_\tau$ events together to get $f_{D_s} = (258.6 \pm 6.4 \pm 7.5)$ MeV.

[4] Superseded by ABLIKIM 23BR.

[5] WIDHALM 08 gets $f_{D_s} = (275 \pm 16 \pm 12)$ MeV from the branching fraction.

[6] PEDLAR 07A also fits μ^+ and τ^+ events together and gets an effective $\mu^+\nu_\mu$ branching fraction of $(6.38 \pm 0.59 \pm 0.33) \times 10^{-3}$

[7] This HEISTER 02I result is not actually an independent measurement of the absolute $\mu^+\nu_\mu$ branching fraction, but is in fact based on our $\phi\pi^+$ branching fraction of 3.6 ± 0.9%, so it cannot be included in our overall fit. HEISTER 02I combines its $D_s^+ \to \tau^+\nu_\tau$ and $\mu^+\nu_\mu$ branching fractions to get $f_{D_s} = (285 \pm 19 \pm 40)$ MeV.

$\Gamma(\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ Γ_{21}/Γ_{48}

See the note on "Decay Constants of Charged Pseudoscalar Mesons" above.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.143\pm0.018\pm0.006$	489 ± 55	[1] AUBERT	07V	BABR	$e^+e^- \approx \Upsilon(4S)$
$0.23\pm0.06\pm0.04$	18	[2] ALEXANDROV	00	BEAT	π^- nucleus, 350 GeV
$0.173\pm0.023\pm0.035$	182	[3] CHADHA	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
$0.245\pm0.052\pm0.074$	39	[4] ACOSTA	94	CLE2	See CHADHA 98

[1] AUBERT 07V gets $f_{D_s^+} = (283 \pm 17 \pm 16)$ MeV, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total}) = (4.71 \pm 0.46)\%$.

[2] ALEXANDROV 00 uses $f^2_D/f^2_{D_s} = 0.82 \pm 0.09$ from a lattice-gauge-theory calculation to get the relative numbers of $D^+ \to \mu^+\nu_\mu$ and $D_s^+ \to \mu^+\nu_\mu$ events. The present result leads to $f_{D_s} = (323 \pm 44 \pm 36)$ MeV.

[3] CHADHA 98 obtains $f_{D_s} = (280 \pm 19 \pm 28 \pm 34)$ MeV from this measurement, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total}) = 0.036 \pm 0.009$.

[4] ACOSTA 94 obtains $f_{D_s} = (344 \pm 37 \pm 52 \pm 42)$ MeV from this measurement, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total}) = 0.037 \pm 0.009$.

$\Gamma(\tau^+\nu_\tau)/\Gamma_{\text{total}}$ Γ_{22}/Γ

See the note on "Decay Constants of Charged Pseudoscalar Mesons" above.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
5.39±0.09 OUR AVERAGE					
$5.60\pm0.16\pm0.20$	2.8k	[1] ABLIKIM	24CG	BES3	e^+e^- at 4.237–4.699 GeV
$5.44\pm0.17\pm0.13$	2.4k	[2] ABLIKIM	23BP	BES3	e^+e^- at 4.128–4.226 GeV
$5.37\pm0.17\pm0.15$	2.3k	[3] ABLIKIM	23BX	BES3	e^+e^- at 4.128–4.226 GeV
$5.29\pm0.25\pm0.20$	1.7k	[4] ABLIKIM	21AF	BES3	e^+e^- at 4.178, 4.226 GeV
$5.27\pm0.10\pm0.12$	4.9k	[5] ABLIKIM	21AZ	BES3	e^+e^- at 4.178, 4.226 GeV
$3.28\pm1.83\pm0.37$	33	[6] ABLIKIM	16O	BES3	e^+e^- at 4.009 GeV
$5.70\pm0.21{}^{+0.31}_{-0.30}$	2.2k	[7] ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S)$, $\Upsilon(5S)$
$4.96\pm0.37\pm0.57$	748	[8] DEL-AMO-SA...	10J	BABR	$e^-\overline{\nu}_e\nu_\tau$, $\mu^-\overline{\nu}_\mu\nu_\tau$
$6.42\pm0.81\pm0.18$	126	[9] ALEXANDER	09	CLEO	$\tau^+ \to \pi^+\overline{\nu}_\tau$
$5.52\pm0.57\pm0.21$	155	[9] NAIK	09A	CLEO	$\tau^+ \to \rho^+\overline{\nu}_\tau$
$5.30\pm0.47\pm0.22$	181	[9] ONYISI	09	CLEO	$\tau^+ \to e^+\nu_e\overline{\nu}_\tau$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.21\pm0.25\pm0.17$	950	[10] ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV
$6.17\pm0.71\pm0.34$	102	[11] ECKLUND	08	CLEO	See ONYISI 09
$8.0\pm1.3\pm0.4$	47	[11] PEDLAR	07A	CLEO	See ALEXANDER 09
$5.79\pm0.77\pm1.84$	881	[12] HEISTER	02I	ALEP	Z decays
$7.0\pm2.1\pm2.0$	22	[13] ABBIENDI	01L	OPAL	$D_s^{*+} \to \gamma D_s^+$ from Z's
$7.4\pm2.8\pm2.4$	16	[14] ACCIARRI	97F	L3	$D_s^{*+} \to \gamma D_s^+$ from Z's

[1] ABLIKIM 24CG uses $\tau^+ \to (e^+\nu_e,\ \mu^+\nu_\nu,\ \pi^+,\ \rho^+)\overline{\nu}_\tau$ decays.

[2] ABLIKIM 23BP uses $\tau^+ \to \pi^+\overline{\nu}_\tau$ decays.

[3] ABLIKIM 23BX uses $\tau^+ \to \mu^+\nu_\mu\overline{\nu}_\tau$ decays.

[4] ABLIKIM 21AF uses $\tau^+ \to \pi^+\pi^0\overline{\nu}$ decays.

[5] ABLIKIM 21AZ uses $\tau^+ \to e^+\nu_e\overline{\nu}_\tau$ decays.

[6] ABLIKIM 16O also reports that when constrained by the Standard Model ratio of $\Gamma(D_s^+ \to \tau^+\nu_\tau)/\Gamma(D_s^+ \to \mu^+\nu_\mu) = 9.76$; the branching fraction is found to be $(4.83 \pm 0.65 \pm 0.26)$%.

[7] ZUPANC 13 uses both $\mu^+\nu$ and $\tau^+\nu$ events to get $f_{D_s} = (255.5 \pm 4.2 \pm 5.1)$ MeV.

[8] DEL-AMO-SANCHEZ 10J (with a small correction; see LEES 15D) uses $\mu^+\nu_\mu$ and $\tau^+\nu_\tau$ events together to get $f_{D_s} = (259.9 \pm 6.6 \pm 7.6)$ MeV.

[9] ALEXANDER 09, NAIK 09A, and ONYISI 09 use different τ decay modes and are independent. The three papers combined give $f_{D_s} = (259.7 \pm 7.8 \pm 3.4)$ MeV.

[10] ABLIKIM 21BE uses $\tau^+ \to \pi^+\overline{\nu}_\tau$ decays. When constrained by the Standard Model ratio of $\Gamma(D_s^+ \to \tau^+\nu_\tau)/\Gamma(D_s^+ \to \mu^+\nu_\mu) = 9.75$, the branching fraction is found to be $(5.22 \pm 0.10 \pm 0.14)$%. Superseded by ABLIKIM 23BP.

[11] ECKLUND 08 and PEDLAR 07A are independent: ECKLUND 08 uses $\tau^+ \to e^+\nu_e\overline{\nu}_\tau$ events, PEDLAR 07A uses $\tau^+ \to \pi^+\overline{\nu}_\tau$ events.

[12] HEISTER 02I combines its $D_s^+ \to \tau^+\nu_\tau$ and $\mu^+\nu_\mu$ branching fractions to get $f_{D_s} = (285 \pm 19 \pm 40)$ MeV.

[13] This ABBIENDI 01L value gives a decay constant f_{D_s} of $(286 \pm 44 \pm 41)$ MeV.

[14] The second ACCIARRI 97F error here combines in quadrature systematic (0.016) and normalization (0.018) errors. The branching fraction gives $f_{D_s} = (309 \pm 58 \pm 33 \pm 38)$ MeV.

$\Gamma(\tau^+\nu_\tau)/\Gamma(\mu^+\nu_\mu)$ — Γ_{22}/Γ_{21}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10.73 \pm 0.69 ^{+0.56}_{-0.53}$	2.2k/492	[1] ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
$11.0 \pm 1.4 \pm 0.6$	102	[2] ECKLUND	08	CLEO	See ONYISI 09

[1] This ZUPANC 13 ratio is not independent of the separate $\tau\nu$ and $\mu\nu$ fractions listed above.

[2] This ECKLUND 08 value also uses results from PEDLAR 07A, and it is not independent of other results in these Listings. Combined with earlier CLEO results, the decay constant f_{D_s} is $274 \pm 10 \pm 5$ MeV.

$\Gamma(\gamma e^+\nu_e)/\Gamma_{\text{total}}$ — Γ_{23}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-4}$	90	ABLIKIM	19AD	BES3	for $E_\gamma > 10$ MeV

$\Gamma(K^+K^-e^+\nu_e)/\Gamma(K^+K^-\pi^+)$ — Γ_{24}/Γ_{47}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.558 \pm 0.007 \pm 0.016$	[1] AUBERT	08AN	BABR	e^+e^- at $\Upsilon(4S)$

[1] This AUBERT 08AN ratio is only for the K^+K^- mass in the range 1.01–to–1.03 GeV in the numerator and 1.0095–to–1.0295 GeV in the denominator.

$\Gamma(K^0_S K^0_S e^+\nu_e)/\Gamma_{\text{total}}$ — Γ_{25}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.8 \times 10^{-4}$	90	ABLIKIM	22J	BES3	e^+e^- at 4.178-4.226 GeV

$\Gamma(\phi e^+ \nu_e)/\Gamma_{total}$ — Γ_{26}/Γ

See the end of the D_s^+ Listings for measurements of $D_s^+ \rightarrow \phi e^+ \nu_e$ form factors. Unseen decay modes of the ϕ are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.34±0.12 OUR AVERAGE	Error includes scale factor of 1.2.				
2.21±0.16±0.11	350	ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
2.26±0.45±0.09	26	ABLIKIM	18A	BES3	$e^+ e^-$ at 4009 MeV
2.14±0.17±0.08	207	HIETALA	15		Uses CLEO data
2.61±0.03±0.17	25k	AUBERT	08AN	BABR	$e^+ e^-$ at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.36±0.23±0.13	106	ECKLUND	09	CLEO	See HIETALA 15
2.29±0.37±0.11	45	YELTON	09	CLEO	See ECKLUND 09

$\Gamma(\phi e^+ \nu_e)/\Gamma(\phi \pi^+)$ — Γ_{26}/Γ_{48}

As noted in the comment column, most of these measurements use $\phi \mu^+ \nu_\mu$ events in addition to or instead of $\phi e^+ \nu_e$ events.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.540±0.033±0.048	793	LINK	02J	FOCS	Uses $\phi \mu^+ \nu_\mu$
0.54 ±0.05 ±0.04	367	BUTLER	94	CLE2	Uses $\phi e^+ \nu_e$ and $\phi \mu^+ \nu_\mu$
0.58 ±0.17 ±0.07	97	FRABETTI	93G	E687	Uses $\phi \mu^+ \nu_\mu$
0.57 ±0.15 ±0.15	104	ALBRECHT	91	ARG	Uses $\phi e^+ \nu_e$
0.49 ±0.10 $^{+0.10}_{-0.14}$	54	ALEXANDER	90B	CLEO	Uses $\phi e^+ \nu_e$ and $\phi \mu^+ \nu_\mu$

$\Gamma(\phi \mu^+ \nu_\mu)/\Gamma_{total}$ — Γ_{29}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.24±0.11 OUR AVERAGE					
2.25±0.09±0.07	1.7k	ABLIKIM	23BZ	BES3	$e^+ e^-$ at 4.128-4.226 GeV
1.94±0.53±0.09	22	ABLIKIM	18A	BES3	$e^+ e^-$ at 4.009 GeV

$\Gamma(\eta e^+ \nu_e)/\Gamma_{total}$ — Γ_{30}/Γ

Unseen decay modes of the η are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.27 ±0.06 OUR AVERAGE					
2.35 ±0.11 ±0.10	716	ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
2.255±0.039±0.051	4k	ABLIKIM	23BO	BES3	$e^+ e^-$ at 4128–4226 MeV
2.30 ±0.31 ±0.08	63	ABLIKIM	16T	BES3	$e^+ e^-$ at 4009 MeV
2.28 ±0.14 ±0.19	358	[1] HIETALA	15		Uses CLEO data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.323±0.063±0.063	1.8k	[2] ABLIKIM	19S	BES3	$e^+ e^-$ at 4178 MeV
2.48 ±0.29 ±0.13	82	YELTON	09	CLEO	See HIETALA 15

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.
[2] Superseded by ABLIKIM 23BO

$\Gamma(\eta e^+ \nu_e)/\Gamma(\phi e^+ \nu_e)$ — Γ_{30}/Γ_{26}

Unseen decay modes of the η and the ϕ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.24±0.12±0.15	440	[1] BRANDENB...	95	CLE2	See HIETALA 15

[1] BRANDENBURG 95 uses both e^+ and μ^+ events and makes a phase-space adjustment to use the μ^+ events as e^+ events.

$\Gamma(\eta'(958) e^+ \nu_e)/\Gamma_{total}$ Γ_{31}/Γ

Unseen decay modes of the $\eta'(958)$ are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.81 ±0.04 OUR AVERAGE					
0.82 ±0.09 ±0.04	134	ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
0.810±0.038±0.024	675	ABLIKIM	23BO	BES3	$e^+ e^-$ at 4128–4226 MeV
0.93 ±0.30 ±0.05	14	ABLIKIM	16T	BES3	$e^+ e^-$ at 4009 MeV
0.68 ±0.15 ±0.06	20	[1] HIETALA	15		Uses CLEO data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.824±0.073±0.027	261	[2] ABLIKIM	19S	BES3	$e^+ e^-$ at 4178 MeV
0.91 ±0.33 ±0.05	7.5	YELTON	09	CLEO	See HIETALA 15

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.
[2] Superseded by ABLIKIM 23BO

$\Gamma(\eta'(958) e^+ \nu_e)/\Gamma(\phi e^+ \nu_e)$ Γ_{31}/Γ_{26}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.43±0.11±0.07	29	[1] BRANDENB...	95	CLE2	See HIETALA 15

[1] BRANDENBURG 95 uses both e^+ and μ^+ events and makes a phase-space adjustment to use the μ^+ events as e^+ events.

$\Gamma(\eta \mu^+ \nu_\mu)/\Gamma_{total}$ Γ_{32}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.24 ±0.07 OUR AVERAGE					
2.235±0.051±0.052	3.1k	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV
2.42 ±0.46 ±0.11	44	ABLIKIM	18A	BES3	$e^+ e^-$ at 4.009 GeV

$\Gamma(\eta'(958) \mu^+ \nu_\mu)/\Gamma_{total}$ Γ_{33}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.80 ±0.06 OUR AVERAGE					
0.801±0.055±0.028	390	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV
1.06 ±0.54 ±0.07	10	ABLIKIM	18A	BES3	$e^+ e^-$ at 4.009 GeV

$\Gamma(\omega e^+ \nu_e)/\Gamma_{total}$ Γ_{34}/Γ

A test for $u\overline{u}$ or $d\overline{d}$ content in the D_s^+. Neither Cabibbo-favored nor Cabibbo-suppressed decays can contribute, and $\omega - \phi$ mixing is an unlikely explanation for any fraction above about 2×10^{-4}.

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	MARTIN	11	CLEO	$e^+ e^-$ at 4170 MeV

$\Gamma(K^0 e^+ \nu_e)/\Gamma_{total}$ Γ_{35}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.288±0.026 OUR AVERAGE		Error includes scale factor of 1.2.			
0.298±0.023±0.012	228	[1] ABLIKIM	24CH	BES3	$e^+ e^-$ at 4128–4226 MeV

0.24 ±0.04 ±0.01	51	ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
0.39 ±0.08 ±0.03	42	HIETALA	15		Uses CLEO data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.325±0.038±0.016	117	[1,2] ABLIKIM	19D	BES3	$e^+ e^-$ at 4178 MeV
0.37 ±0.10 ±0.02	14	YELTON	09	CLEO	See HIETALA 15

[1] K^0 reconstructed via $K^0 \to K^0_S \to \pi^+\pi^-$ decays.

[2] Superseded by ABLIKIM 24CH.

$\Gamma(K_1(1270)^0 e^+ \nu_e)/\Gamma_{total}$ — Γ_{27}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.1 × 10^{-4}	90	[1] ABLIKIM	23BS	BES3	$e^+ e^-$ at 4.128–4.226 GeV

[1] ABLIKIM 23BS uses $K_1(1270)^0 \to K^-\pi^+\pi^0$ decays.

$\Gamma(K^*(892)^0 e^+ \nu_e)/\Gamma_{total}$ — Γ_{36}/Γ

Unseen decay modes of the $K^*(892)^0$ are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.205±0.020 OUR AVERAGE					
0.19 ±0.03 ±0.01	65	ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
0.237±0.026±0.020	155	ABLIKIM	19D	BES3	$e^+ e^-$ at 4178 MeV
0.18 ±0.04 ±0.01	32	[1] HIETALA	15		$e^+ e^-$ at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.18 ±0.07 ±0.01	7.5	YELTON	09	CLEO	See HIETALA 15

[1] Uses CLEO data, but not authored by the CLEO collaboration

$\Gamma(f_0(500) e^+ \nu_e,\ f_0 \to \pi^0\pi^0)/\Gamma_{total}$ — Γ_{37}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.3 × 10^{-4}	90	ABLIKIM	22J	BES3	$e^+ e^-$ at 4.178-4.226 GeV

$\Gamma(f_0(500) e^+ \nu_e,\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{38}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.3 × 10^{-4}	90	ABLIKIM	24AT	BES3	$e^+ e^-$ at 4.128–4.226 GeV

$\Gamma(f_0(980) e^+ \nu_e,\ f_0 \to \pi^0\pi^0)/\Gamma_{total}$ — Γ_{39}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.9±1.4±0.4	55	[1] ABLIKIM	22J	BES3	$e^+ e^-$ at 4.178-4.226 GeV

[1] Assuming B($f_0 \to \pi^0\pi^0$) = 1/3 via the isospin limit, this result implies B($D_s^+ \to f_0(980) e^+ \nu_e$) = $(2.4 \pm 0.4) \times 10^{-3}$.

$\Gamma(f_0(980) e^+ \nu_e,\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ — Γ_{40}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.64±0.13 OUR AVERAGE					
1.72±0.13±0.10	0.4k	ABLIKIM	24AT	BES3	$e^+ e^-$ at 4128–4226 MeV
1.5 ±0.2 ±0.1	91	ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.3 ±0.3 ±0.1	42	[1] HIETALA	15		Uses CLEO data
2.0 ±0.3 ±0.1	44	ECKLUND	09	CLEO	See HIETALA 15
1.3 ±0.4 ±0.1	13	YELTON	09	CLEO	See ECKLUND 09

[1] HIETALA 15 uses a tighter cut on the reconstructed $\pi^+\pi^-$ mass ($\pm$60 MeV around the f^0) than ECKLUND 09. It finds that applying the same tight cut to both analyses gives consistent results.

$\Gamma(f_0(980)\mu^+\nu_\mu,\ f_0 \to K^+K^-)/\Gamma_{total}$ — Γ_{41}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.45 \times 10^{-4}$	90	[1] ABLIKIM	23BZ	BES3	e^+e^- at 4.128-4.226 GeV

[1] Partial wave analysis of 939 $D_s^+ \to K^+K^-\mu^+\nu_\mu$ events, assuming K^+K^- S-wave is 100% $f_0(980)$.

$\Gamma(a_0(980)^0 e^+\nu_e,\ a_0^0 \to \pi^0\eta)/\Gamma_{total}$ — Γ_{42}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-4}$	90	ABLIKIM	21Y	BES3	e^+e^- at 4.178–4.226 GeV

$\Gamma(\pi^0 e^+\nu_e)/\Gamma_{total}$ — Γ_{43}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.4 \times 10^{-5}$	90	ABLIKIM	22BH	BES3	6.32 fb^{-1} of e^+e^- at 4.178–4.226 GeV

$\Gamma(b_1(1235)^0 e^+\nu_e,\ b_1^0 \to \omega\pi^0)/\Gamma_{total}$ — Γ_{28}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.4 \times 10^{-4}$	90	ABLIKIM	23BS	BES3	e^+e^- at 4.128–4.226 GeV

Hadronic modes with a $K\overline{K}$ pair

$\Gamma(K^+K_S^0)/\Gamma_{total}$ — Γ_{44}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.500±0.014 OUR FIT					
1.503±0.015 OUR AVERAGE					
1.502±0.012±0.009		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
1.52 ±0.05 ±0.03		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.425±0.038±0.031	1.8k	[1] ABLIKIM	19AM	BES3	e^+e^- at 4178 MeV
1.49 ±0.07 ±0.05		[2] ALEXANDER	08	CLEO	See ONYISI 13

[1] Superseded by ABLIKIM 24BD.
[2] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(K^+K_S^0)/\Gamma(K^+K^-\pi^+)$ — Γ_{44}/Γ_{47}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
27.55±0.18±0.50	40k	ABLIKIM	20R	BES3	e^+e^-, 4178 $\sim$ 4226 MeV

$\Gamma(K^+K_L^0)/\Gamma_{total}$ — Γ_{45}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.485±0.039±0.046	2.3k	ABLIKIM	19AM	BES3	e^+e^- at 4178 MeV

$\Gamma(K^+\overline{K}^0)/\Gamma_{total}$ — Γ_{46}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.95±0.11±0.09	2.0k	[1] ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$

[1] ZUPANC 13 finds the $\overline{K}^0$ from its missing-mass squared, not from $K^0_S \to \pi^+\pi^-$. The DCS ($D_s^+ \to K^+ K^0$) contribution to this fraction is estimated to be an order of magnitude below the statistical uncertainty.

$\Gamma(K^+K^-\pi^+)/\Gamma_{total}$ Γ_{47}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
5.45±0.08 OUR FIT Error includes scale factor of 1.3.					
5.48±0.08 OUR AVERAGE Error includes scale factor of 1.1.					
5.49±0.04±0.07		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
5.55±0.14±0.13		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
5.06±0.15±0.21	4.1k	ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
5.78±0.20±0.30		DEL-AMO-SA...	10J	BABR	e^+e^-, 10.58 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.47±0.08±0.13	5.1k	[1] ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
5.50±0.23±0.16		[2] ALEXANDER	08	CLEO	See ONYISI 13

[1] Superseded by ABLIKIM 24BD.

[2] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(\phi\pi^+)/\Gamma_{total}$ Γ_{48}/Γ

The results here are model-independent. For earlier, model-dependent results, see our PDG 06 edition. We decouple the $D_s^+ \to \phi\pi^+$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+ \to \phi\pi^+$, $\phi \to K^+K^-$ branching fraction obtained from the Dalitz-plot analysis of $D_s^+ \to K^+K^-\pi^+$. That is, the ratio of these two branching fractions is not exactly the $\phi \to K^+K^-$ branching fraction 0.491.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
4.5 ±0.4 OUR AVERAGE					
4.62±0.36±0.51		[1] AUBERT	06N	BABR	e^+e^- at $\Upsilon(4S)$
4.81±0.52±0.38	212 ± 19	[2] AUBERT	05V	BABR	$e^+e^- \approx \Upsilon(4S)$
3.59±0.77±0.48		[3] ARTUSO	96	CLE2	e^+e^- at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.9\ {}^{+5.1}_{-1.9}\ {}^{+1.8}_{-1.1}$		[4] BAI	95C	BES	e^+e^- 4.03 GeV

[1] This AUBERT 06N measurement uses $\overline{B}^0 \to D_s^{(*)-} D^{(*)+}$ and $B^- \to D_s^{(*)-} D^{(*)0}$ decays, including some from other papers. However, the result is independent of AUBERT 05V.

[2] AUBERT 05V uses the ratio of $B^0 \to D^{*-} D_s^{*+}$ events seen in two different ways, in both of which the $D^{*-} \to \overline{D}^0\pi^-$ decay is fully reconstructed: (1) The $D_s^{*+} \to D_s^+\gamma$, $D_s^+ \to \phi\pi^+$ decay is fully reconstructed. (2) The number of events in the D_s^+ peak in the missing mass spectrum against the $D^{*-}\gamma$ is measured.

[3] ARTUSO 96 uses partially reconstructed $\overline{B}^0 \to D^{*+} D_s^{*-}$ decays to get a model-independent value for $\Gamma(D_s^- \to \phi\pi^-)/\Gamma(D^0 \to K^-\pi^+)$ of 0.92 ± 0.20 ± 0.11.

[4] BAI 95C uses $e^+e^- \to D_s^+ D_s^-$ events in which one or both of the $D_s^\pm$ are observed to obtain the first model-independent measurement of the $D_s^+ \to \phi\pi^+$ branching fraction, without assumptions about $\sigma(D_s^\pm)$. However, with only two "doubly-tagged" events, the statistical error is very large.

$\Gamma(\phi\pi^+,\ \phi\to K^+K^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{49}/Γ_{47}

This is the "fit fraction" from the Dalitz-plot analysis. We decouple the $D_s^+ \to \phi\pi^+$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+ \to \phi\pi^+$, $\phi\to K^+K^-$ branching fraction obtained from the Dalitz-plot analysis of $D_s^+ \to K^+K^-\pi^+$. That is, the ratio of these two branching fractions is not exactly the $\phi\to K^+K^-$ branching fraction 0.491.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
41.2±0.7 OUR AVERAGE					
40.5±0.7±0.9	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
41.4±0.8±0.5		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
42.2±1.6±0.3		MITCHELL	09A	CLEO	Dalitz fit, 12k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
39.6±3.3±4.7		FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(K^+\overline{K}^*(892)^0)/\Gamma(K^*(892)^+\overline{K}^0)$ — Γ_{50}/Γ_{67}

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.35^{+0.42}_{-0.23}\pm0.10}$	ABLIKIM	22AH	BES3	Dalitz plot fit to 990 $D_s^\pm \to K^\pm K_S\pi^0$ evts

$\Gamma(K^+\overline{K}^*(892)^0,\ \overline{K}^{*0}\to K^-\pi^+)/\Gamma(K^+K^-\pi^+)$ — Γ_{51}/Γ_{47}

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
47.9±0.6 OUR AVERAGE					
48.3±0.9±0.6	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
47.9±0.5±0.5		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
47.4±1.5±0.4		MITCHELL	09A	CLEO	Dalitz fit, 12k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
47.8±4.6±4.0		FRABETTI	95B	E687	Dalitz fit, 701 evts

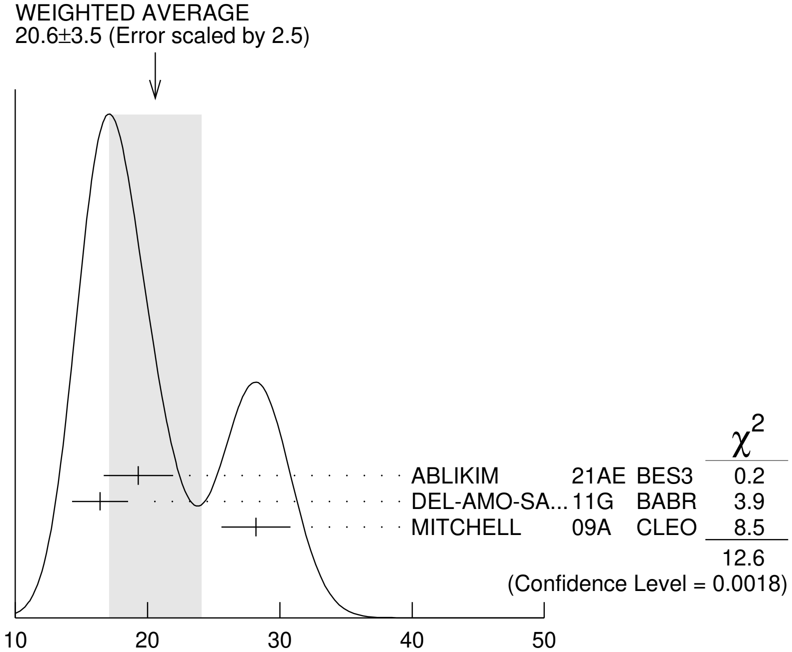
$\Gamma(K^+\overline{K}^*(892)^0,\ \overline{K}^{*0}\to K_S^0\pi^0)/\Gamma(K^+K_S^0\pi^0)$ — Γ_{52}/Γ_{60}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
32.7±2.2±1.9	ABLIKIM	22AH	BES3	Dalitz plot fit, 990 evts

$\Gamma(f_0(980)\pi^+,\ f_0\to K^+K^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{53}/Γ_{47}

This is the "fit fraction" from the Dalitz-plot analysis. This is likely a superposition of $D_s^+ \to f_0(980)\pi$ and $D_s^+ \to a_0(980)\pi$ which are indistinguishable in such an analysis.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
20.6±3.5 OUR AVERAGE Error includes scale factor of 2.5. See the ideogram below.					
19.3±1.7±2.0	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
16.4±0.7±2.0		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
28.2±1.9±1.8		MITCHELL	09A	CLEO	Dalitz fit, 12k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
11.0±3.5±2.6		FRABETTI	95B	E687	Dalitz fit, 701 evts

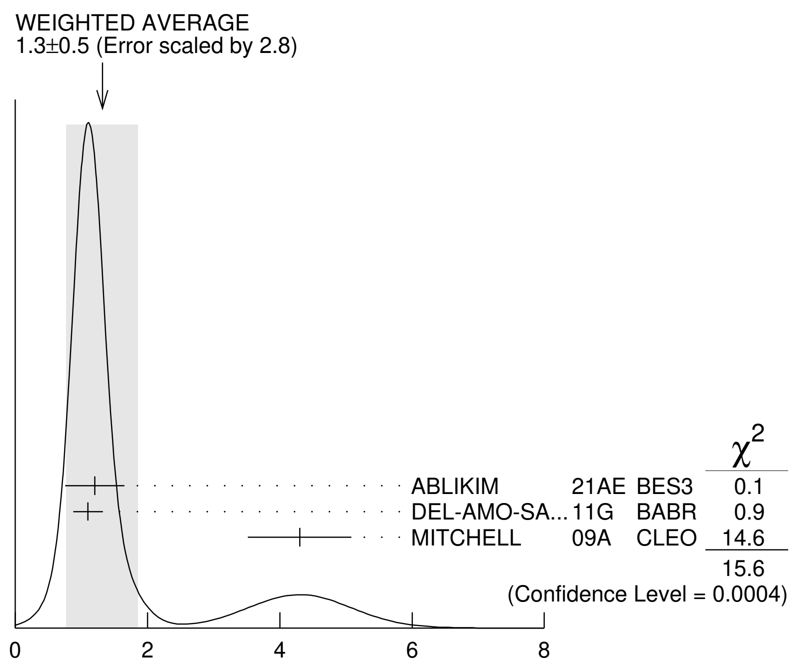


$\Gamma\Big(f_0(980)\pi^+,\ f_0 \to\ K^+K^-\Big)/\Gamma\Big(K^+K^-\pi^+\Big)$ (units 10^{-2})

$\Gamma\big(f_0(1370)\pi^+,\ f_0 \to K^+K^-\big)/\Gamma\big(K^+K^-\pi^+\big)$ Γ_{54}/Γ_{47}

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.3±0.5 OUR AVERAGE	Error includes scale factor of 2.8. See the ideogram below.				
1.2±0.4±0.2	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
1.1±0.1±0.2		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
4.3±0.6±0.5		MITCHELL	09A	CLEO	Dalitz fit, 12k evts



$\Gamma\Big(f_0(1370)\pi^+,\ f_0 \to\ K^+K^-\Big)/\Gamma\Big(K^+K^-\pi^+\Big)$ (units 10^{-2})

$\Gamma(f_0(1710)\pi^+,\ f_0 \to K^+K^-)/\Gamma(K^+K^-\pi^+)$ Γ_{55}/Γ_{47}

This is the "fit fraction" from the Dalitz-plot analysis. This is likely a superposition of $D_s^+ \to f_0(1710)\pi$ and $D_s^+ \to a_0(1710)\pi$ which are indistinguishable in such an analysis.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.5 OUR AVERAGE Error includes scale factor of 3.8.					
1.9±0.4±0.6	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
1.1±0.1±0.1		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
3.4±0.5±0.3		MITCHELL	09A	CLEO	Dalitz fit, 12k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.4±2.3±3.5		FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(a_0(980)^+\pi^0,\ a_0^+ \to K^+K^0_S)/\Gamma(K^+K^0_S\pi^0)$ Γ_{56}/Γ_{60}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
7.7±1.7±1.8	ABLIKIM	22AH	BES3	Dalitz plot fit, 990 evts

$\Gamma(a_0(1710)^+\pi^0,\ a_0^+ \to K^+K^0_S)/\Gamma(K^+K^0_S\pi^0)$ Γ_{57}/Γ_{60}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
23.6±3.4±2.0	[1] ABLIKIM	22AH	BES3	Dalitz plot fit, 990 evts

[1] ABLIKIM 22AH observe an a_0-like state with mass $m_{a_0} = 1.817 \pm 0.008 \pm 0.020$ GeV, and name the intermediate resonance $a_0(1817)$. We interpret this as the $a_0(1710)$ observed by LEES 21A.

$\Gamma(K^+\overline{K}^*_0(1430)^0,\ \overline{K}^*_0 \to K^-\pi^+)/\Gamma(K^+K^-\pi^+)$ Γ_{58}/Γ_{47}

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±0.5 OUR AVERAGE					
3.0±0.6±0.5	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
2.4±0.3±1.0		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
3.9±0.5±0.5		MITCHELL	09A	CLEO	Dalitz fit, 12k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.3±3.2±3.2		FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(K^+\overline{K}^*(1410)^0,\ \overline{K}^*_0 \to K^0_S\pi^0)/\Gamma(K^+K^0_S\pi^0)$ Γ_{59}/Γ_{60}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
6.0±1.4±1.3	ABLIKIM	22AH	BES3	Dalitz plot fit, 990 evts

$\Gamma(K^+K^0_S\pi^0)/\Gamma_{\rm total}$ Γ_{60}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.471±0.028 OUR AVERAGE					
1.47 ±0.02 ±0.02		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
1.52 ±0.09 ±0.20		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.46 ±0.06 ±0.05	990	[1] ABLIKIM	22AH	BES3	e^+e^- at 4.178-4.226 GeV

[1] Superseded by ABLIKIM 24BD.

$\Gamma(K^*(892)^+ K^0_S,\ K^{*+} \to K^+\pi^0)/\Gamma(K^+ K^0_S \pi^0)$ — Γ_{61}/Γ_{60}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
13.9±1.7±1.3	ABLIKIM	22AH	BES3	Dalitz plot fit, 990 evts

$\Gamma(2K^0_S\pi^+)/\Gamma_{total}$ — Γ_{62}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.732±0.014 OUR AVERAGE					
0.73 ±0.01 ±0.01		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
0.77 ±0.05 ±0.03		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.68 ±0.04 ±0.01	370	[1] ABLIKIM	22F	BES3	e^+e^-, 4.178–4.226 GeV

[1] Superseded by ABLIKIM 24BD.

$\Gamma(f_0(980)\pi^+,\ f_0 \to K^0_S K^0_S)/\Gamma_{total}$ — Γ_{63}/Γ

This is the "fit fraction" from the Dalitz-plot analysis. This is likely a superposition of $D_s^+ \to f_0(980)\pi$ and $D_s^+ \to a_0(980)\pi$ which are indistinguishable in such an analysis.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.8 × 10⁻⁴	90	[1] ABLIKIM	22F	BES3	Dalitz plot fit

[1] Based on isospin considerations, the authors interpret the suppression in the observed rate of this mode compared to $D_S^+ \to f_0(980)\pi^+$, $f_0 \to K^+K^-$ as likely due to the destructive interference between $a_0(980)$ and $f_0(980)$ in decays to $K^0_S K^0_S$.

$\Gamma(f_0(1710)\pi^+,\ f_0 \to K^0_S K^0_S)/\Gamma(2K^0_S\pi^+)$ — Γ_{64}/Γ_{62}

This is the "fit fraction" from the Dalitz-plot analysis. This is likely a superposition of $D_s^+ \to f_0(1710)\pi$ and $D_s^+ \to a_0(1700)\pi$ which are indistinguishable in such an analysis.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
46.3±4.0±1.2	ABLIKIM	22F	BES3	Dalitz plot fit, 400 evts

$\Gamma(K^*(892)^+ K^0_S,\ K^{*+} \to K^0_S\pi^+)/\Gamma(2K^0_S\pi^+)$ — Γ_{65}/Γ_{62}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
43.5±3.9±0.5	ABLIKIM	22F	BES3	Dalitz plot fit, 400 evts

$\Gamma(K^*(892)^+ \overline{K}^0)/\Gamma(\phi\pi^+)$ — Γ_{67}/Γ_{48}

Unseen decay modes of the resonances are included.

VALUE	DOCUMENT ID		TECN	COMMENT
1.20±0.21±0.13	CHEN	89	CLEO	e^+e^- 10 GeV

$\Gamma(K^+K^-\pi^+\pi^0)/\Gamma_{total}$ — Γ_{68}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
5.53±0.15 OUR FIT Error includes scale factor of 1.3.					
5.53±0.12 OUR AVERAGE					
5.50±0.05±0.11		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
6.37±0.21±0.56		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.42±0.10±0.17	3k	[1] ABLIKIM	21U	BES3	e^+e^-, 4.178–4.226 GeV
5.65±0.29±0.40		[2] ALEXANDER	08	CLEO	See ONYISI 13

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components. Superseded by ABLIKIM 24BD.
[2] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(\phi\rho^+)/\Gamma_{total}$ — Γ_{69}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.59±0.15±0.30	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components.

$\Gamma(\phi\rho^+)/\Gamma(\phi\pi^+)$ — Γ_{69}/Γ_{48}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.86\pm0.26^{+0.29}_{-0.40}}$	253	AVERY	92	CLE2	$e^+e^- \simeq 10.5$ GeV

$\Gamma(\overline{K}_1(1270)^0 K^+,\ \overline{K}_1(1270)^0 \rightarrow K^-\rho^+)/\Gamma_{total}$ — Γ_{70}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.57±0.05±0.04	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components.

$\Gamma(\overline{K}_1(1270)^0 K^+,\ \overline{K}_1(1270)^0 \rightarrow K^*(892)\pi)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.31±0.18±0.18	3k	[1,2] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components.
[2] $\overline{K}_1(1270)^0 \rightarrow K^*(892)\pi$ denotes a sum over $\overline{K}(892)^0\pi^0$ and $K(892)^-\pi^+$ final states, which are assumed to have relative branching ratio 1/2, as per isospin.

$\Gamma(\overline{K}_1(1400)^0 K^+,\ \overline{K}_1(1400)^0 \rightarrow K^*(892)\pi)/\Gamma_{total}$ — Γ_{72}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.98±0.27±0.32	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] $\overline{K}_1(1400)^0 \rightarrow K^*(892)\pi$ denotes a sum over $\overline{K}(892)^0\pi^0$ and $K(892)^-\pi^+$ final states, which are assumed to have relative branching ratio 1/2, as per isospin.

$\Gamma(a_0(980)^0\rho^+,\ a_0^0 \rightarrow K^+K^-)/\Gamma_{total}$ — Γ_{73}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.19±0.03±0.03	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components.

$\Gamma(f_1(1420)^0\pi^+,\ f_1(1420)^0 \rightarrow K^*(892)^\mp K^\pm)/\Gamma_{total}$ — Γ_{74}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.39±0.06±0.03	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components.

$\Gamma(f_1(1420)^0\pi^+,\ f_1^0 \rightarrow a_0(980)^0\pi^0,\ a_0^0 \rightarrow K^+K^-)/\Gamma_{total}$ — Γ_{75}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.04±0.01±0.01	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \rightarrow K^+ K^- \pi^+ \pi^0$ with 9 components.

$\Gamma(\eta(1475)\pi^+,\ \eta \to a_0(980)^0\pi^0,\ a_0^0 \to K^+K^-)/\Gamma_{total}$ — Γ_{76}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.07±0.02±0.02	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.

$\Gamma(K_S^0 K^- 2\pi^+)/\Gamma_{total}$ — Γ_{77}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.569±0.028 OUR FIT					
1.569±0.032 OUR AVERAGE Error includes scale factor of 1.2.					
1.56 ±0.02 ±0.02		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
1.69 ±0.07 ±0.08		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.46 ±0.05 ±0.05	1.3k	[1] ABLIKIM	21K	BES3	e^+e^-, 4.178–4.226 GeV
1.64 ±0.10 ±0.07		[2] ALEXANDER	08	CLEO	See ONYISI 13

[1] Superseded by ABLIKIM 24BD.
[2] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(K^+K^-K_S^0\pi^+)/\Gamma(K^+K_S^0\pi^+\pi^-)$ — Γ_{78}/Γ_{84}

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.36±0.15±0.04	645	MOON	23	BELL	980 fb^{-1} at $\sim \Upsilon(4S)$

$\Gamma(K^*(892)^+\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{79}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.64±0.23±0.27	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis of $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.

$\Gamma(K^*(892)^+\overline{K}^*(892)^0)/\Gamma(\phi\pi^+)$ — Γ_{79}/Γ_{48}

Unseen decay modes of the resonances are included.

VALUE	DOCUMENT ID		TECN	COMMENT
1.6±0.4±0.4	ALBRECHT	92B	ARG	$e^+e^- \simeq$ 10.4 GeV

$\Gamma(K^*(892)^+\overline{K}^*(892)^0)/\Gamma(K_S^0K^-2\pi^+)$ — Γ_{79}/Γ_{77}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
40.6±2.9±4.9	1.3k	[1,2] ABLIKIM	21K	BES3	e^+e^- at 4.178–4.226 GeV

[1] Predominantly S-wave, with a significant D-wave component.
[2] $D_s^+ \to K_S^0K^-2\pi^+$ amplitude analysis with 13 components.

$\Gamma(\eta(1475)K_S^0,\ \eta \to K^*(892)^0\pi^+,\ K^{*0} \to K^-\pi^+)/\Gamma(K_S^0K^-2\pi^+)$ — Γ_{80}/Γ_{77}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.6±0.2	1.3k	[1] ABLIKIM	21K	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to K_S^0K^-2\pi^+$ amplitude analysis with 13 components.

$\Gamma(\eta(1475)\pi^+,\ \eta \to \overline{K}^*(892)^+K^-,\ \overline{K}^{*+} \to K_S^0\pi^+)/\Gamma(K_S^0K^-2\pi^+)$ — Γ_{81}/Γ_{77}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.6±0.2	1.3k	[1] ABLIKIM	21K	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to K_S^0K^-2\pi^+$ amplitude analysis with 13 components.

$\Gamma(\eta(1475)\pi^+,\ \eta\to a_0(980)^-\pi^+,\ a_0^-\to K^0_S K^-)/\Gamma(K^0_S K^- 2\pi^+)$ Γ_{82}/Γ_{77}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
10.8±2.6±5.2	1.3k	[1] ABLIKIM	21K	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

$\Gamma(f_1(1285)\pi^+,\ f_1\to a_0(980)^-\pi^+,\ a_0^-\to K^0_S K^-)/\Gamma(K^0_S K^- 2\pi^+)$ Γ_{83}/Γ_{77}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.5±0.2	1.3k	[1] ABLIKIM	21K	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

$\Gamma(K^+ K^0_S \pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{84}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.934±0.022 OUR FIT				
0.935±0.022 OUR AVERAGE				
0.93 ±0.02 ±0.01	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
1.03 ±0.06 ±0.08	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$\Gamma(K^+ K^0_S \pi^+\pi^-)/\Gamma(K^0_S K^- 2\pi^+)$ Γ_{84}/Γ_{77}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.595±0.017 OUR FIT					
0.586±0.052±0.043	476	LINK	01C	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(K^+ K^- 2\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{85}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.60±0.47±0.38	309	ABLIKIM	22AB	BES3	e^+e^- at 4.178–4.226 GeV

$\Gamma(K^+ K^- 2\pi^+\pi^-)/\Gamma(K^+ K^-\pi^+)$ Γ_{85}/Γ_{47}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.160±0.027 OUR AVERAGE					
0.150±0.019±0.025	240	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
0.188±0.036±0.040	75	FRABETTI	97C	E687	γBe, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\phi 2\pi^+\pi^-)/\Gamma(\phi\pi^+)$ Γ_{86}/Γ_{48}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.269±0.027 OUR AVERAGE					
0.249±0.024±0.021	136	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
0.28 ±0.06 ±0.01	40	FRABETTI	97C	E687	γBe, $\overline{E}_\gamma \approx$ 200 GeV
0.58 ±0.21 ±0.10	21	FRABETTI	92	E687	γBe
0.42 ±0.13 ±0.07	19	ANJOS	88	E691	Photoproduction
1.11 ±0.37 ±0.28	62	ALBRECHT	85D	ARG	e^+e^- 10 GeV

$\Gamma(\phi\rho^0\pi^+,\ \phi\to K^+K^-)/\Gamma(K^+ K^- 2\pi^+\pi^-)$ Γ_{87}/Γ_{85}

VALUE	DOCUMENT ID		TECN	COMMENT
0.75±0.06±0.04	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(\phi a_1(1260)^+,\ \phi\to K^+K^-,\ a_1^+\to\rho^0\pi^+)/\Gamma(K^+ K^-\pi^+)$ Γ_{88}/Γ_{47}

VALUE	DOCUMENT ID		TECN	COMMENT
0.137±0.019±0.011	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(\phi a_1(1260)^+,\ \phi \to K^+K^-,\ a_1^+ \to \rho^0\pi^+)/\Gamma(K^+K^-2\pi^+\pi^-)$ — Γ_{88}/Γ_{85}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.781±0.029±0.016	235	ABLIKIM	22AB	BES3	e^+e^- at 4.178–4.226 GeV

$\Gamma(\phi 2\pi^+\pi^-\ \text{non-}\rho,\ \phi \to K^+K^-)/\Gamma(K^+K^-2\pi^+\pi^-)$ — Γ_{89}/Γ_{85}

VALUE	DOCUMENT ID		TECN	COMMENT
0.21±0.05±0.06	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(K^+K^-\rho^0\pi^+\ \text{non-}\phi)/\Gamma(K^+K^-2\pi^+\pi^-)$ — Γ_{90}/Γ_{85}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.03	90	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(K^+K^-2\pi^+\pi^-\ \text{nonresonant})/\Gamma(K^+K^-2\pi^+\pi^-)$ — Γ_{91}/Γ_{85}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.15 ±0.06 OUR AVERAGE					
0.218±0.029±0.08	235	ABLIKIM	22AB	BES3	e^+e^- at 4.178–4.226 GeV
0.10 ±0.06 ±0.05		LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(2K_S^0 2\pi^+\pi^-)/\Gamma(K_S^0 K^- 2\pi^+)$ — Γ_{92}/Γ_{77}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.051±0.015±0.015	37 ± 10	LINK	04D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

Pionic modes

$\Gamma(\pi^+\pi^0)/\Gamma_{total}$ — Γ_{93}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10^{-4}	90	[1] GUAN	21	BELL	$e^+e^- \approx \Upsilon(4,5S)$

[1] Uses B($D_s^+ \to \pi^+\phi,\ \phi \to K^+K^-$) = (2.24 ± 0.08)%.

$\Gamma(\pi^+\pi^0)/\Gamma(K^+K_S^0)$ — Γ_{93}/Γ_{44}

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.1	90	ADAMS	07A	CLEO	See MENDEZ 10

$\Gamma(2\pi^+\pi^-)/\Gamma_{total}$ — Γ_{94}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1.090±0.014 OUR FIT				
1.091±0.014 OUR AVERAGE				
1.09 ±0.01 ±0.01	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
1.11 ±0.04 ±0.04	ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.11 ±0.07 ±0.04	[1] ALEXANDER	08	CLEO	See ONYISI 13

[1] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(2\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ Γ_{94}/Γ_{47}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.200±0.004 OUR FIT	Error includes scale factor of 1.2.				
0.199±0.004±0.009	≈ 10.5k	AUBERT	09O	BABR	$e^+e^- \approx$ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.265±0.041±0.031	98	FRABETTI	97D	E687	γ Be ≈ 200 GeV

$\Gamma(\rho^0\pi^+)/\Gamma(2\pi^+\pi^-)$ Γ_{95}/Γ_{94}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.04 ±0.15 OUR AVERAGE				
1.038±0.054±0.097±0.11	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events
0.9 ±0.4 ±0.5	ABLIKIM	22BI	BES3	Dalitz fit, 11.1k events
1.8 ±0.5 ±1.0	AUBERT	09O	BABR	Dalitz fit, ≈ 10.5k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts
5.8 ±2.3 ±3.7	AITALA	01A	E791	Dalitz fit, 848 evts

[1] The last error reflects the uncertainty on the amplitude model.

$\Gamma(\omega\pi^+,\ \omega\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ Γ_{96}/Γ_{94}

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.60±0.16±0.34±0.16	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events

[1] The last error reflects the uncertainty on the amplitude model.

$\Gamma(\pi^+(\pi^+\pi^-)_{S-\text{wave}})/\Gamma(2\pi^+\pi^-)$ Γ_{97}/Γ_{94}

This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses 568 $D_s^+ \to 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
84.7 ±0.6 OUR AVERAGE				
84.97±0.14±0.30±0.63	[1,2] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events
84.2 ±0.8 ±1.2	[2] ABLIKIM	22BI	BES3	Dalitz fit, 11.1k events
83.0 ±0.9 ±1.9	[2] AUBERT	09O	BABR	Dalitz fit, ≈ 10.5k evts
87.04±5.60±4.38	[3] LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts

[1] The last error reflects the uncertainty due to the amplitude model.

[2] AAIJ 23AN, ABLIKIM 22BI, and AUBERT 09O give the amplitude and phase of the $\pi^+\pi^-$ S-wave in bins of $\pi^+\pi^-$ invariant-mass. (50 bins for AAIJ 23AN, 29 for ABLIKIM 22BI and AUBERT 09O.)

[3] LINK 04 borrows a K-matrix parametrization from ANISOVICH 03 of the full π-π S-wave isoscalar scattering amplitude to describe the $\pi^+\pi^-$ S-wave component of the $\pi^+\pi^+\pi^-$ state. The fit fraction given above is a sum over five f_0 mesons, the $f_0(980)$, $f_0(1300)$, $f_0(1200–1600)$, $f_0(1500)$, and $f_0(1750)$. See LINK 04 for details and discussion.

$\Gamma(f_0(980)\pi^+,\ f_0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ Γ_{98}/Γ_{94}

This is the "fit fraction" from the Dalitz-plot analysis. See above for the full $\pi^+(\pi^+\pi^-)_{S-wave}$ fit fraction.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.565±0.043±0.047	AITALA	01A	E791	Dalitz fit, 848 evts
1.074±0.140±0.043	FRABETTI	97D	E687	γ Be ≈ 200 GeV

$\Gamma\big(f_0(1370)\pi^+,\ f_0 \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ Γ_{99}/Γ_{94}

This is the "fit fraction" from the Dalitz-plot analysis. See above for the full $\pi^+(\pi^+\pi^-)_{S-wave}$ fit fraction.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.324 \pm 0.077 \pm 0.017$	AITALA	01A	E791	Dalitz fit, 848 evts

$\Gamma\big(f_0(1500)\pi^+,\ f_0 \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ Γ_{100}/Γ_{94}

This is the "fit fraction" from the Dalitz-plot analysis. See above for the full $\pi^+(\pi^+\pi^-)_{S-wave}$ fit fraction.

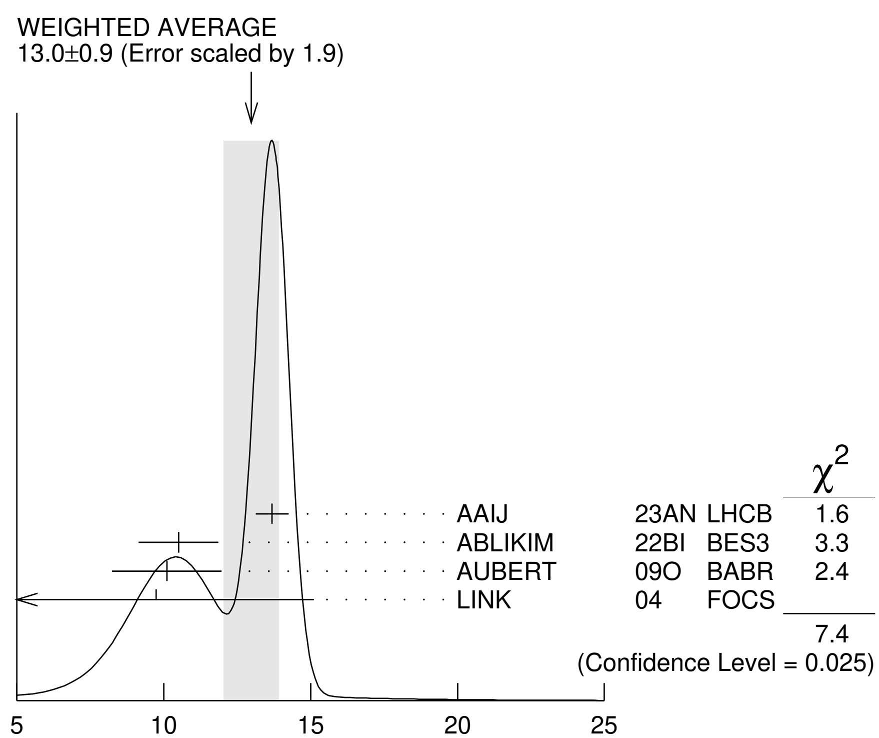
VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.274 \pm 0.114 \pm 0.019$	[1] FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

[1] FRABETTI 97D calls this mode $S(1475)\pi^+$, but finds the mass and width of this $S(1475)$ to be in excellent agreement with those of the $f_0(1500)$.

$\Gamma\big(f_2(1270)\pi^+,\ f_2 \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ Γ_{101}/Γ_{94}

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
13.0 ±0.9 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.			
$13.69 \pm 0.14 \pm 0.22 \pm 0.49$	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events
$10.5 \pm 0.8 \pm 1.1$	ABLIKIM	22BI	BES3	Dalitz fit, 11.1k events
$10.1 \pm 1.5 \pm 1.1$	AUBERT	09O	BABR	Dalitz fit, $\approx$ 10.5k evts
$9.74 \pm 4.49 \pm 2.94$	LINK	04	FOCS	Dalitz fit, 1475 $\pm$ 50 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$19.7 \pm 3.3 \pm 0.6$	AITALA	01A	E791	Dalitz fit, 848 evts
$12.3 \pm 5.6 \pm 1.8$	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV



$\Gamma\big(f_2(1270)\pi^+,\ f_2 \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ (units 10^{-2})

[1] The last error reflects the uncertainty on the amplitude model.

$\Gamma(f'_2(1525)^0\pi^+,\ f'_2\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ — Γ_{102}/Γ_{94}

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
5.28±0.70±1.50±0.87	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events

[1] The last error reflects the uncertainty on the amplitude model.

$\Gamma(\rho(1450)^0\pi^+,\ \rho^0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ — Γ_{103}/Γ_{94}

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.7 ±0.6 OUR AVERAGE				
3.86±0.15±0.14±2.0	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events
1.3 ±0.4 ±0.5	ABLIKIM	22BI	BES3	Dalitz fit, 11.1k events
2.3 ±0.8 ±1.7	AUBERT	09O	BABR	Dalitz fit, ≈ 10.5k evts
6.56±3.43±4.40	LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.4 ±2.1 ±0.2	AITALA	01A	E791	Dalitz fit, 848 evts

[1] The last error reflects the uncertainty on the amplitude model.

$\Gamma(\rho(1700)^0\pi^+,\ \rho^0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ — Γ_{104}/Γ_{94}

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.65±0.50±0.45±3.40	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events

[1] The last error reflects the uncertainty on the amplitude model.

$\Gamma(\pi^+2\pi^0)/\Gamma_{total}$ — Γ_{105}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.05 OUR AVERAGE	Error includes scale factor of 1.1.				
0.50±0.04±0.02	590	ABLIKIM	22Z	BES3	e^+e^- at 4.178–4.226 GeV
0.65±0.13±0.03	72 ± 16	NAIK	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(f_0(980)\pi^+,\ f_0\to\pi^0\pi^0)/\Gamma(\pi^+2\pi^0)$ — $\Gamma_{106}/\Gamma_{105}$

This is a "fit fraction" from an amplitude analysis.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
55.4±6.8±7.3	ABLIKIM	22Z	BES3	Dalitz plot fit, 440 evts

$\Gamma(f_0(1370)\pi^+,\ f_0\to\pi^0\pi^0)/\Gamma(\pi^+2\pi^0)$ — $\Gamma_{107}/\Gamma_{105}$

This is a "fit fraction" from an amplitude analysis.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
25.5±5.1±9.3	ABLIKIM	22Z	BES3	Dalitz plot fit, 440 evts

$\Gamma(f_2(1270)\pi^+,\ f_2\to\pi^0\pi^0)/\Gamma(\pi^+2\pi^0)$ — $\Gamma_{108}/\Gamma_{105}$

This is a "fit fraction" from an amplitude analysis.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
9.7±2.9±6.0	ABLIKIM	22Z	BES3	Dalitz plot fit, 440 evts

$\Gamma(2\pi^+\pi^-\pi^0)/\Gamma(\phi\pi^+)$ — Γ_{109}/Γ_{48}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.3	90	ANJOS	89E	E691	Photoproduction

$\Gamma(\omega\pi^+)/\Gamma_{total}$ — Γ_{110}/Γ

Unseen decay modes of the ω are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.193±0.030 OUR FIT					
0.181±0.032 OUR AVERAGE					
0.177±0.032±0.013	65 ± 12	ABLIKIM	19AH	BES3	e^+e^- at 4.178 GeV
0.21 ±0.09 ±0.01	6 ± 2.4	GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(\omega\pi^+)/\Gamma(\eta\pi^+)$ — $\Gamma_{110}/\Gamma_{111}$

Unseen decay modes of the resonances are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.114±0.018 OUR FIT				
0.16 ±0.04 ±0.03	BALEST	97	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\eta\pi^+)/\Gamma_{total}$ — Γ_{111}/Γ

Unseen decay modes of the η are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.686±0.027 OUR FIT					
1.689±0.027 OUR AVERAGE					
1.69 ±0.02 ±0.02		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
1.67 ±0.08 ±0.06		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.56 ±0.09 ±0.02	0.4k	[1,2] ABLIKIM	25A	BES3	e^+e^-, 4.128–4.226 GeV
1.82 ±0.14 ±0.07	0.8k	ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
1.58 ±0.11 ±0.18		[3] ALEXANDER	08	CLEO	See ONYISI 13

[1] Subsumed by ABLIKIM 24BD which uses both $\eta \to \pi^+\pi^-\pi^0$ and $\eta \to 2\gamma$ modes.

[2] ABLIKIM 25A reports $[\Gamma(D_s^+ \to \eta\pi^+)/\Gamma_{total}] \times [B(\eta \to \pi^+\pi^-\pi^0)] = (3.58 \pm 0.21 \pm 0.06) \times 10^{-3}$ which we divide by our best value $B(\eta \to \pi^+\pi^-\pi^0) = (23.02 \pm 0.25) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(\eta\pi^+)/\Gamma(K^+K^0_S)$ — Γ_{111}/Γ_{44}

Unseen decay modes of the η are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.124±0.021 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.236±0.043±0.063	2587 ± 89	MENDEZ	10	CLEO	See ONYISI 13

$\Gamma(\eta\pi^+)/\Gamma(K^+K^-\pi^+)$ — Γ_{111}/Γ_{47}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
31.94±0.33±0.49	19.5k	ABLIKIM	20R	BES3	e^+e^-, 4178 $\sim$ 4226 MeV

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{111}/Γ_{48}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.48±0.03±0.04	920	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
0.54±0.09±0.06	165	ALEXANDER	92	CLE2	See JESSOP 98

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+,\ \phi\to K^+K^-)$ — Γ_{111}/Γ_{49}

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
84.80±0.47±2.64	22k	GUAN	21	BELL	$e^+e^- \approx \Upsilon(4,5S)$

$\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})/\Gamma_{\text{total}}$ — Γ_{112}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.04±0.08±0.05	2.5k	ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

$\Gamma(f_0(1370)\rho^+,\ f_0\rho^+\to 2\pi^+\pi^-\pi^0)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{113}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
24.9±3.8±2.1	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(f_0(980)^0\rho^+,\ f_0^0\rho^+\to 2\pi^+\pi^-\pi^0)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{114}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±2.1±1.0	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(f_2(1270)^0\rho^+,\ f_2(1270)^0\rho^+\to 2\pi^+\pi^-\pi^0)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{115}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±1.7±0.6	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma((\rho^+\rho^0)_{S-wave}\to 2\pi^+\pi^-\pi^0)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{116}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±1.2±0.6	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma((\rho(1450)^+\rho^0)_{S-wave}\to 2\pi^+\pi^-\pi^0)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{117}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±1.3±0.8	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma((\rho^+\rho(1450)^0)_{P-wave}\to 2\pi^+\pi^-\pi^0)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{118}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±1.3±0.4	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(\phi\pi^+,\ \phi\to\rho\pi)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{119}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
24.9±1.2±0.4	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(\omega\pi^+,\ \omega\to\rho\pi)/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{120}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.9±0.8±0.3	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(a_1(1260)^+\pi^0,\ a_1^+\to(\rho^0\pi^+)_{S-wave})/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{121}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
12.5±1.6±1.0	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(a_1(1260)^0\pi^+,\ a_1^0\to(\rho\pi)_{S-wave})/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{122}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.3±1.9±1.2	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(\pi(1300)^0\pi^+,\ \pi^0\to(\rho\pi)_{P-wave})/\Gamma((2\pi^+\pi^-\pi^0)_{\text{non}-\eta})$ — $\Gamma_{123}/\Gamma_{112}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
11.7±2.3±2.2	2.5k	[1] ABLIKIM	25A	BES3	e^+e^- at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components.

$\Gamma(3\pi^+2\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{124}/Γ_{47}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.146±0.014 OUR AVERAGE					
0.145±0.011±0.010	671	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
0.158±0.042±0.031	37	FRABETTI	97C	E687	γBe, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\eta\rho^+)/\Gamma_{\text{total}}$ — Γ_{126}/Γ

Unseen decay modes of the η are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
8.9±0.6±0.5	328 ± 22	NAIK	09A	CLEO	$\eta\to 2\gamma$

$\Gamma(\eta\rho^+)/\Gamma(\phi\pi^+)$ — Γ_{126}/Γ_{48}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.98±0.20±0.39	447	JESSOP	98	CLE2	$e^+e^-\approx \Upsilon(4S)$
$2.86\pm0.38{}^{+0.36}_{-0.38}$	217	AVERY	92	CLE2	See JESSOP 98

$\Gamma(\eta\rho^+)/\Gamma(\eta\pi^+\pi^0)$ — $\Gamma_{126}/\Gamma_{127}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
78.3±5.0±2.1	1.2k	ABLIKIM	19BE	BES3	$\eta\pi^+\pi^0$ amplitude analysis

$\Gamma(\eta\pi^+\pi^0)/\Gamma_{\text{total}}$ — Γ_{127}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
9.10±0.17 OUR AVERAGE					
9.10±0.09±0.15		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
9.2 ±0.4 ±1.1		ONYISI	13	CLEO	e^+e^- at 4.17 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

9.50±0.28±0.41	2.6k	[1] ABLIKIM	19BE BES3	e^+e^- at 4.178 GeV

[1] Superseded by ABLIKIM 24BD.

$\Gamma(\eta(\pi^+\pi^0)_{P-wave})/\Gamma(\eta\pi^+\pi^0)$ — $\Gamma_{128}/\Gamma_{127}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
5.4±2.1±2.5	1.2k	ABLIKIM	19BE BES3	$\eta\pi^+\pi^0$ amplitude analysis

$\Gamma(a_0(980)^{+0}\pi^{0+},\ a_0(980)^{+0}\to\eta\pi^{+0})/\Gamma(\eta\pi^+\pi^0)$ — $\Gamma_{129}/\Gamma_{127}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
23.2±2.3±3.3	1.2k	[1] ABLIKIM	19BE BES3	$\eta\pi^+\pi^0$ amplitude analysis

[1] Coherent sum of $D_s^+ \to a_0^+\pi^0 \to \eta\pi^+\pi^0$ and $D_s^+ \to a_0^0\pi^+ \to \eta\pi^+\pi^0$. ABLIKIM 19BE find $a_0(980)^0-f(980)$ mixing effects negligibly small in this $D_s^+ \to \eta\pi^+\pi^0$ Dalitz plot analysis.

$\Gamma(\omega\pi^+\pi^0)/\Gamma_{total}$ — Γ_{130}/Γ

Unseen decay modes of the ω are included.

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
2.78±0.65±0.25	34 ± 7.9	GE	09A CLEO	e^+e^- at 4170 MeV

$\Gamma(2\pi^+\pi^-\eta)/\Gamma_{total}$ — Γ_{131}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
3.08±0.06±0.05		ABLIKIM	24BD BES3	e^+e^-, 4.128–4.226 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.12±0.13±0.09	2.1k	[1] ABLIKIM	21AR BES3	e^+e^-, 4.178–4.226 GeV

[1] Superseded by ABLIKIM 24BD.

$\Gamma(a_1(1260)^+\eta,\ a_1^+\to\rho(770)^0\pi^+,\ \rho^0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{132}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
55.4±3.9±2.0	[1] ABLIKIM	21AR BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(a_1(1260)^+\eta,\ a_1^+\to f_0(500)\pi^+,\ f_0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{133}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
8.1±1.9±2.1	[1] ABLIKIM	21AR BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(a_0(980)^+\rho(770)^0,\ a_0^+\to\eta\pi^+)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{134}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
6.7±2.5±1.5	[1] ABLIKIM	21AR BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(\eta(1405)\pi^+,\ \eta\to a_0(980)^-\pi^+,\ a_0^-\to\eta\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{135}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
0.7±0.2±0.1	[1] ABLIKIM	21AR BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(\eta(1405)\pi^+,\ \eta \to a_0(980)^+\pi^-,\ a_0^+ \to \eta\pi^+)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{136}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
0.7±0.2±0.1	[1] ABLIKIM	21AR	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(f_1(1420)\pi^+,\ f_1 \to a_0(980)^-\pi^+,\ a_0^- \to \eta\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{137}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.9±0.5±0.3	[1] ABLIKIM	21AR	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(f_1(1420)\pi^+,\ f_1 \to a_0(980)^+\pi^-,\ a_0^+ \to \eta\pi^+)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{138}/\Gamma_{131}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.7±0.5±0.3	[1] ABLIKIM	21AR	BES3	e^+e^- at 4.178–4.226 GeV

[1] $D_s^+ \to 2\pi^+\pi^-\eta$ amplitude analysis with 11 components.

$\Gamma(3\pi^+2\pi^-\pi^0)/\Gamma_{total}$ — Γ_{139}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.049^{+0.033}_{-0.030}}$	BARLAG	92C	ACCM	π^- 230 GeV

$\Gamma(\omega 2\pi^+\pi^-)/\Gamma_{total}$ — Γ_{140}/Γ

Unseen decay modes of the ω are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.45±0.09	29 ± 8.2	GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(\eta'(958)\pi^+)/\Gamma_{total}$ — Γ_{141}/Γ

Unseen decay modes of the $\eta'(958)$ are included.

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3.95±0.08 OUR AVERAGE				
3.95±0.04±0.07	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
3.94±0.15±0.20	ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.77±0.25±0.30	[1] ALEXANDER	08	CLEO	See ONYISI 13

[1] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(\eta'(958)\pi^+)/\Gamma(K^+K^0_S)$ — Γ_{141}/Γ_{44}

Unseen decay modes of the $\eta'(958)$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.654±0.088±0.139	1436 ± 47	MENDEZ	10	CLEO	See ONYISI 13

$\Gamma(\eta'(958)\pi^+)/\Gamma(K^+K^-\pi^+)$ — Γ_{141}/Γ_{47}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
69.4±0.8±3.8	9.9k	ABLIKIM	20R	BES3	e^+e^-, 4178 $\sim$ 4226 MeV

$\Gamma(\eta'(958)\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{141}/Γ_{48}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.03\pm0.06\pm0.07$	537	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
$1.20\pm0.15\pm0.11$	281	ALEXANDER	92	CLE2	See JESSOP 98
$2.5\ \pm1.0\ ^{+1.5}_{-0.4}$	22	ALVAREZ	91	NA14	Photoproduction
$2.5\ \pm0.5\ \pm0.3$	215	ALBRECHT	90D	ARG	$e^+e^- \approx 10.4$ GeV

$\Gamma(\omega\eta\pi^+)/\Gamma_{\text{total}}$ — Γ_{143}/Γ

Unseen decay modes of the ω and η are included.

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
5.4±1.2±0.4		78	ABLIKIM	23AL	BES3	e^+e^- at 4.128–4.226 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<21.3	90		GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(\eta'(958)\rho^+)/\Gamma_{\text{total}}$ — Γ_{144}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
5.8±1.4±0.4	ABLIKIM	15Z	BES3	482 pb^{-1}, 4009 MeV

$\Gamma(\eta'(958)\rho^+)/\Gamma(\phi\pi^+)$ — Γ_{144}/Γ_{48}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.78\pm0.28\pm0.30$	137	[1] JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
$3.44\pm0.62^{+0.44}_{-0.46}$	68	AVERY	92	CLE2	See JESSOP 98

[1] This JESSOP 98 fraction, when combined with other η' fractions, greatly overshoots the inclusive η' fraction. See the measurement just above, which fits nicely.

$\Gamma(\eta'(958)\rho^+)/\Gamma(\eta'(958)\pi^+\pi^0)$ — $\Gamma_{144}/\Gamma_{145}$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
≈ 1	395	[1] ABLIKIM	22AA	BES3	e^+e^- at 4.178–4.226 GeV

[1] Result of an amplitude analysis of $D_s^+ \to \pi^+\pi^0\eta'$ which found that $D_s^+ \to \rho^+\eta'$ is the dominant decay mode, with other contributions negligible. No uncertainty is assigned to this 100% fit fraction; however, the fit fractions of non-resonant contributions are shown to be below 1%.

$\Gamma(\eta'(958)\pi^+\pi^0)/\Gamma_{\text{total}}$ — Γ_{145}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
6.14±0.18 OUR AVERAGE					
$6.17\pm0.12\pm0.14$		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
$5.6\ \pm0.5\ \pm0.6$		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.15\pm0.25\pm0.18$	837	[1] ABLIKIM	22AA	BES3	e^+e^-, 4.178–4.226 GeV

[1] An amplitude analysis in the same publication finds that $D_s^+ \to \rho^+\eta'$ is the only statistically significant contribution to this decay. Superseded by ABLIKIM 24BD.

$\Gamma(\eta'(958)\pi^+\pi^0$ nonresonant$)/\Gamma_{total}$ — Γ_{146}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.1 \times 10^{-2}$	90	ABLIKIM	15Z	BES3	482 pb^{-1}, 4009 MeV

Modes with one or three K's

$\Gamma(K^+\pi^0)/\Gamma(K^+K^0_S)$ — Γ_{147}/Γ_{44}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±1.4±0.2	202 ± 70	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.5±1.3±0.7	141 ± 34	ADAMS	07A	CLEO	See MENDEZ 10

$\Gamma(K^+\pi^0)/\Gamma(K^+K^-\pi^+)$ — Γ_{147}/Γ_{47}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
13.73±0.90±0.33	2.3k	ABLIKIM	20R	BES3	e^+e^-, 4178 ∼ 4226 MeV

$\Gamma(K^+\pi^0)/\Gamma(\phi\pi^+, \phi\to K^+K^-)$ — Γ_{147}/Γ_{49}

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
3.28±0.23±0.13	12k	GUAN	21	BELL	$e^+e^- \approx \Upsilon(4,5S)$

$\Gamma(K^0_S\pi^+)/\Gamma(K^+K^0_S)$ — Γ_{148}/Γ_{44}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.12±0.28 OUR AVERAGE					
8.5 ±0.7 ±0.2	393 ± 33	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
8.03±0.24±0.19	17.6k±481	WON	09	BELL	e^+e^- at $\Upsilon(4S)$
10.4 ±2.4 ±1.4	113 ± 26	LINK	08	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8.2 ±0.9 ±0.2	206 ± 22	ADAMS	07A	CLEO	See MENDEZ 10

$\Gamma(K^0_S\pi^+)/\Gamma(K^+K^-\pi^+)$ — Γ_{148}/Γ_{47}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
20.35±0.62±0.42	2.7k	ABLIKIM	20R	BES3	e^+e^-, 4178 ∼ 4226 MeV

$\Gamma(K^+\eta)/\Gamma(K^+K^0_S)$ — Γ_{149}/Γ_{44}

Unseen decay modes of the η are included.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
11.8±2.2±0.6	222 ± 41	MENDEZ	10	CLEO	e^+e^- at 4170 MeV

$\Gamma(K^+\eta)/\Gamma(K^+K^-\pi^+)$ — Γ_{149}/Γ_{47}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.97±0.18±0.06	1.8k	ABLIKIM	20R	BES3	e^+e^-, 4178 ∼ 4226 MeV

$\Gamma(K^+\eta)/\Gamma(\phi\pi^+, \phi\to K^+K^-)$ — Γ_{149}/Γ_{49}

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
7.81±0.22±0.24	14k	GUAN	21	BELL	$e^+e^- \approx \Upsilon(4,5S)$

$\Gamma(K^+\eta)/\Gamma(\eta\pi^+)$ — $\Gamma_{149}/\Gamma_{111}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$8.9\pm1.5\pm0.4$	113 ± 18	ADAMS	07A	CLEO	See MENDEZ 10

$\Gamma(K^+\omega)/\Gamma_{\text{total}}$ — Γ_{150}/Γ

Unseen decay modes of the ω are included.

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
9.9±1.5 OUR FIT						
8.7±2.4±0.8		29	[1] ABLIKIM	19AH	BES3	e^+e^- at 4.178 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<24	90		GE	09A	CLEO	e^+e^- at 4170 MeV

[1] Evidence for mode at 4.4σ.

$\Gamma(K^+\omega)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{150}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
10.3±1.5 OUR FIT				
10.9±1.8±0.1	[1] ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

[1] ABLIKIM 22BL reports $[\Gamma(D_s^+ \to K^+\omega)/\Gamma(D_s^+ \to K^+\pi^+\pi^-\pi^0)] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = (9.7 \pm 1.5 \pm 0.6) \times 10^{-2}$ which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+\eta'(958))/\Gamma(K^+K_S^0)$ — Γ_{151}/Γ_{44}

Unseen decay modes of the $\eta'(958)$ are included.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
11.8±3.6±0.7	56 ± 17	MENDEZ	10	CLEO	e^+e^- at 4170 MeV

$\Gamma(K^+\eta'(958))/\Gamma(K^+K^-\pi^+)$ — Γ_{151}/Γ_{47}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.91±0.31±0.31	675	ABLIKIM	20R	BES3	e^+e^-, 4178 $\sim$ 4226 MeV

$\Gamma(K^+\eta'(958))/\Gamma(\eta'(958)\pi^+)$ — $\Gamma_{151}/\Gamma_{141}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.2\pm1.3\pm0.3$	28 ± 9	ADAMS	07A	CLEO	See MENDEZ 10

$\Gamma(K^+\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{152}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.23±0.10 OUR FIT					
6.22±0.10 OUR AVERAGE					
$6.20\pm0.09\pm0.06$		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
$6.54\pm0.33\pm0.25$		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.11\pm0.18\pm0.11$	1.3k	[1] ABLIKIM	22AC	BES3	e^+e^-, 4.178–4.226 GeV
$6.9\ \pm0.5\ \pm0.3$		[2] ALEXANDER	08	CLEO	See ONYISI 13

[1] Superseded by ABLIKIM 24BD.
[2] ALEXANDER 08 uses single- and double-tagged events in an overall fit.

$\Gamma(K^+\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{152}/Γ_{47}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.1142±0.0025 OUR FIT Error includes scale factor of 1.1.				
0.127 ±0.007 ±0.014	567 ± 31	LINK 04F	FOCS	γ A, $\overline{E}_\gamma \approx 180$ GeV

$\Gamma(K^+\rho^0)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{153}/\Gamma_{152}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
0.35 ±0.04 OUR AVERAGE			
0.321±0.037±0.037	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts
0.388±0.053±0.026	LINK 04F	FOCS	Dalitz plot fit, 567 evts

$\Gamma(K^+\rho(1450)^0,\ \rho^0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{154}/\Gamma_{152}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
0.117±0.028 OUR AVERAGE			
0.131±0.031±0.029	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts
0.106±0.035±0.010	LINK 04F	FOCS	Dalitz plot fit, 567 evts

$\Gamma(K^+f_0(500),\ f_0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{155}/\Gamma_{152}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
7.2±2.1±4.4	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts

$\Gamma(K^+f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{156}/\Gamma_{152}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
4.5±1.3±1.2	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts

$\Gamma(K^+f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{157}/\Gamma_{152}$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
19.9±2.9±9.3	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts

$\Gamma(K^*(892)^0\pi^+,\ K^{*0} \to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{158}/\Gamma_{152}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
0.27 ±0.04 OUR AVERAGE Error includes scale factor of 2.0.			
0.302 ±0.018 ±0.020	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts
0.2164±0.0321±0.0114	LINK 04F	FOCS	Dalitz plot fit, 567 evts

$\Gamma(K^*(1410)^0\pi^+,\ K^{*0} \to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{159}/\Gamma_{152}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
0.10 ±0.07 OUR AVERAGE Error includes scale factor of 2.7.			
0.045 ±0.021 ±0.025	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts
0.1882±0.0403±0.0122	LINK 04F	FOCS	Dalitz plot fit, 567 evts

$\Gamma(K^*(1430)^0\pi^+,\ K^{*0} \to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{160}/\Gamma_{152}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
0.15 ±0.05 OUR AVERAGE Error includes scale factor of 1.7.			
0.185 ±0.025 ±0.026	ABLIKIM 22AC	BES3	Dalitz plot fit, 1.3k evts
0.0765±0.0500±0.0170	LINK 04F	FOCS	Dalitz plot fit, 567 evts

$\Gamma(K^+\pi^+\pi^-\text{ nonresonant})/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{161}/\Gamma_{152}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID		TECN	COMMENT
0.1588±0.0492±0.0153	LINK	04F	FOCS	Dalitz fit, 567 evts

$\Gamma(K^0_S\pi^+\pi^0)/\Gamma_{\text{total}}$ — Γ_{163}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.09±0.22 OUR AVERAGE					
5.1 ±0.2 ±0.1		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
5.0 ±0.9 ±0.2	44	[1] NAIK	09A	CLEO	e^+e^- at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.43±0.30±0.15	666	[2] ABLIKIM	21AB	BES3	e^+e^-, 4.178–4.226 GeV

[1] NAIK 09A reports $B(D^+_s \to K^0\pi^+\pi^-) = (1.00 \pm 0.18 \pm 0.04) \times 10^{-2}$ which we have divided by 2.

[2] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component. Superseded by ABLIKIM 24BD.

$\Gamma(K^0_S\rho(770)^+,\ \rho^+\to\pi^+\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{164}/\Gamma_{163}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
50.2±7.2±3.9	666	[1] ABLIKIM	21AB	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component.

$\Gamma(K^0_S\rho(1450)^+,\ \rho^+\to\pi^+\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{165}/\Gamma_{163}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
20.4±4.3±4.4	666	[1] ABLIKIM	21AB	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component.

$\Gamma(K^*(892)^0\pi^+,\ K^{*0}\to K^0_S\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{166}/\Gamma_{163}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.4±2.2±0.9	666	[1] ABLIKIM	21AB	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component.

$\Gamma(K^*(892)^+\pi^0,\ K^{*+}\to K^0_S\pi^+)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{167}/\Gamma_{163}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±1.4±0.4	666	[1] ABLIKIM	21AB	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component.

$\Gamma(K^*(1410)^0\pi^+,\ K^{*0}\to K^0_S\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{168}/\Gamma_{163}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±1.6±0.5	666	[1] ABLIKIM	21AB	BES3	e^+e^- at 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component.

$\Gamma(K^0_S 2\pi^+\pi^-)/\Gamma(K^0_S K^- 2\pi^+)$ — Γ_{169}/Γ_{77}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.18±0.04±0.05	179 ± 36	LINK	08	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(K^+\pi^+\pi^-\pi^0)/\Gamma(K^+K^-\pi^+\pi^0)$ — Γ_{170}/Γ_{68}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
17.13±0.62±0.51	26k	LI	23G	BELL	e^+e^- at/near Υ(nS), n=1,...,5

$\Gamma(K^+\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{170}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
9.7 ±0.6 OUR FIT					
9.75±0.54±0.17	776	ABLIKIM	22BL	BES3	e^+e^- at 4.178–4.226 GeV

$\Gamma(K^*(892)^0\rho^+,\ K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{171}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
40.5±2.8±1.5	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K^*(892)^+\rho^0,\ K^{*+}\to K^+\pi^0)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{172}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
4.3±1.1±0.6	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K_1(1270)^0\pi^+,\ K_1^0\to K^+\rho^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{173}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
4.0±1.2±0.6	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K_1(1400)^0\pi^+,\ K_1^0\to K^*(890)^+\pi^-,\ K^{*+}\to K^+\pi^0)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{174}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.6±0.9±0.2	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K_1(1400)^0\pi^+,\ K_1^0\to K^*(890)^0\pi^0,\ K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{175}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
6.1±0.9±0.2	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K^+a_1(1260)^0,\ a_1\to\rho^+\pi^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{176}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.9±0.7±0.9	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K^+a_1(1260)^0,\ a_1\to\rho^-\pi^+)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{177}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.9±0.7±0.9	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K^+\pi^+\pi^-\pi^0\,\text{nonresonant})/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{178}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
9.5±2.2±0.9	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma\big((K^+\pi^0)_{P-wave}\rho^0\big)/\Gamma\big(K^+\pi^+\pi^-\pi^0\big)$ — $\Gamma_{179}/\Gamma_{170}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
10.4±2.0±0.6	ABLIKIM	22BL	BES3	PWA, 550 $D_s^\pm \to K^\pm\pi^\pm\pi^\mp\pi^0$

$\Gamma(K^+\omega\pi^0)/\Gamma_{\rm total}$ — Γ_{180}/Γ

Unseen decay modes of the ω are included.

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.82	90	GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(K^+\omega\pi^+\pi^-)/\Gamma_{\rm total}$ — Γ_{181}/Γ

Unseen decay modes of the ω are included.

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.54	90	GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(K^+\omega\eta)/\Gamma_{\rm total}$ — Γ_{182}/Γ

Unseen decay modes of the ω and η are included.

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.79	90	GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(2K^+K^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{183}/Γ_{47}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0 ±0.3 ±0.2	748 ± 60	DEL-AMO-SA..11G		BABR	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$8.95\pm2.12^{+2.24}_{-2.31}$	31	LINK	02I	FOCS	γ A, ≈ 180 GeV

$\Gamma(\phi K^+,\ \phi\to K^+K^-)/\Gamma(2K^+K^-)$ — $\Gamma_{184}/\Gamma_{183}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.41±0.08±0.03	DEL-AMO-SA..11G		BABR	$e^+e^- \approx \Upsilon(4S)$

Radiative decays

$\Gamma(\rho(770)^+\gamma)/\Gamma_{\rm total}$ — Γ_{185}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.1\times10^{-4}$	90	[1] ABLIKIM	24CT	BES3	e^+e^- at 4.128–4.226 GeV

[1] ABLIKIM 24CT reports an absolute branching fraction $(2.2\pm0.9\pm0.2)\times10^{-4}$ at 2.5σ significance.

Doubly Cabibbo-suppressed modes

$\Gamma(2K^+\pi^-)/\Gamma_{\rm total}$ — Γ_{186}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.293±0.027 OUR FIT Error includes scale factor of 1.1.					
$1.24\ ^{+0.28}_{-0.26}\ \pm0.06$	33^{+8}_{-7}	ABLIKIM	24AV	BES3	e^+e^- at 4.128–4.266 GeV

$\Gamma(2K^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{186}/Γ_{47}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.371±0.035 OUR FIT					
2.371±0.034 OUR AVERAGE					
2.372±0.024±0.025	67k	AAIJ	19G	LHCB	pp at 8 TeV

2.3 ± 0.3 ± 0.2	356 ± 52	DEL-AMO-SA..11G	BABR	$e^+ e^- \approx \Upsilon(4S)$
2.29 ± 0.28 ± 0.12	281 ± 34	KO 09	BELL	$e^+ e^-$ at $\Upsilon(4S)$
5.2 ± 1.7 ± 1.1	27 ± 9	LINK 05K	FOCS	$<0.78\%$, CL = 90%

$\Gamma(K^+ K^*(892)^0,\ K^{*0} \to K^+\pi^-)/\Gamma(2K^+\pi^-)$ $\Gamma_{187}/\Gamma_{186}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.47±0.22±0.15	DEL-AMO-SA..11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(2K^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{188}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.7 \times 10^{-4}$	90	ABLIKIM 24AV	BES3	$e^+ e^-$ at 4.128–4.266 GeV

Baryon-antibaryon mode

$\Gamma(p\overline{n})/\Gamma_{total}$ Γ_{189}/Γ

This is the only baryonic mode allowed kinematically.

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.22±0.11 OUR AVERAGE				
$1.21 \pm 0.10 \pm 0.05$	193 ± 17	ABLIKIM 19O	BES3	$e^+ e^-$, E_{cm}= 4178 MeV
$1.30 \pm 0.36^{+0.12}_{-0.16}$	13.0 ± 3.6	ATHAR 08	CLEO	$e^+ e^-$, $E_{cm} \approx$ 4170 MeV

$\Gamma(p\overline{p}e^+\nu_e)/\Gamma_{total}$ Γ_{190}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.0 \times 10^{-4}$	90	ABLIKIM 19BD	BES3	$e^+ e^-$ at 4178 MeV

Rare or forbidden modes

$\Gamma(\pi^+ e^+ e^-)/\Gamma_{total}$ Γ_{191}/Γ

This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 5.5 \times 10^{-6}$	90	AAIJ 21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<13 \times 10^{-6}$	90	LEES 11G	BABR	$e^+ e^- \approx \Upsilon(4S)$
$< 2.2 \times 10^{-5}$	90	[1] RUBIN 10	CLEO	$e^+ e^-$ at 4170 MeV
$<27 \times 10^{-5}$	90	AITALA 99G	E791	$\pi^- N$ 500 GeV

[1] This RUBIN 10 limit is for the $e^+ e^-$ mass in the continuum away from the $\phi(1020)$. See the next data block.

$\Gamma(\pi^+\phi,\ \phi \to e^+ e^-)/\Gamma_{total}$ Γ_{192}/Γ

This is *not* a test for the ΔC = 1 weak neutral current, but leads to the $\pi^+ e^+ e^-$ final state.

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.17^{+0.23}_{-0.21} \pm 0.03$	38	ABLIKIM 24CF	BES3	$e^+ e^-$ at 4.128–4.226 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.6\ ^{+0.8}_{-0.4}\ \pm 0.1$	3	RUBIN 10	CLEO	$e^+ e^-$ at 4.170 GeV

$\Gamma(\pi^+\pi^0 e^+ e^-)/\Gamma_{total}$ Γ_{193}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.0 × 10^{-5}	90	ABLIKIM	24CF	BES3	e^+e^- at 4.128–4.226 GeV

$\Gamma(\rho^+\phi,\ \phi\to e^+e^-)/\Gamma_{total}$ Γ_{194}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.44^{+0.67}_{-0.62}\pm0.16}$	38	ABLIKIM	24CF	BES3	e^+e^- at 4.128–4.226 GeV

$\Gamma(\pi^+\mu^+\mu^-)/\Gamma_{total}$ Γ_{195}/Γ

This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.8 × 10^{-7}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.1 × 10^{-7}	90	AAIJ	13AF	LHCB	pp at 7 TeV
<4.3 × 10^{-5}	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
<2.6 × 10^{-5}	90	LINK	03F	FOCS	γ A, $\overline{E}_\gamma\approx$ 180 GeV
<1.4 × 10^{-4}	90	AITALA	99G	E791	π^- N 500 GeV
<4.3 × 10^{-4}	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^+e^+e^-)/\Gamma_{total}$ Γ_{196}/Γ

A test for the ΔC=1 weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.7 × 10^{-6}	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.9 × 10^{-6}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
<5.2 × 10^{-5}	90	RUBIN	10	CLEO	e^+e^- at 4170 MeV
<1.6 × 10^{-3}	90	AITALA	99G	E791	π^- N 500 GeV

$\Gamma(K^+\pi^0 e^+e^-)/\Gamma_{total}$ Γ_{197}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.1 × 10^{-5}	90	ABLIKIM	24CF	BES3	e^+e^- at 4.128–4.226 GeV

$\Gamma(K^0_S\pi^+e^+e^-)/\Gamma_{total}$ Γ_{198}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.1 × 10^{-5}	90	ABLIKIM	24CF	BES3	e^+e^- at 4.128–4.226 GeV

$\Gamma(K^+\mu^+\mu^-)/\Gamma_{total}$ Γ_{199}/Γ

A test for the ΔC=1 weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 1.4 × 10^{-7}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21 × 10^{-6}	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
< 3.6 × 10^{-5}	90	LINK	03F	FOCS	γ A, $\overline{E}_\gamma\approx$ 180 GeV
< 1.4 × 10^{-4}	90	AITALA	99G	E791	π^- N 500 GeV
< 5.9 × 10^{-4}	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^*(892)^+ \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{200}/Γ

A test for the ΔC=1 weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.4 × 10^{-3}	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(\pi^+ e^+ \mu^-)/\Gamma_{total}$ — Γ_{201}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 1.1 × 10^{-6}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12 × 10^{-6}	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\pi^+ e^- \mu^+)/\Gamma_{total}$ — Γ_{202}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 9.4 × 10^{-7}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<20 × 10^{-6}	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(K^+ e^+ \mu^-)/\Gamma_{total}$ — Γ_{203}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 7.9 × 10^{-7}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14 × 10^{-6}	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(K^+ e^- \mu^+)/\Gamma_{total}$ — Γ_{204}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.6 × 10^{-7}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.7 × 10^{-6}	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\pi^- 2e^+)/\Gamma_{total}$ — Γ_{205}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 1.4 × 10^{-6}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 4.1 × 10^{-6}	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$
< 1.8 × 10^{-5}	90	RUBIN	10	CLEO	$e^+ e^-$ at 4170 MeV
<69 × 10^{-5}	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(\pi^- 2\mu^+)/\Gamma_{total}$ — Γ_{206}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.6 × 10^{-8}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<1.2 \times 10^{-7}$	90	AAIJ	13AF	LHCB	pp at 7 TeV
$<1.4 \times 10^{-5}$	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
$<2.9 \times 10^{-5}$	90	LINK	03F	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
$<8.2 \times 10^{-5}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
$<4.3 \times 10^{-4}$	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(\pi^- e^+ \mu^+)/\Gamma_{total}$ Γ_{207}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.3 \times 10^{-7}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<8.4 \times 10^{-6}$	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
$<7.3 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^- 2e^+)/\Gamma_{total}$ Γ_{208}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 7.7 \times 10^{-7}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 5.2 \times 10^{-6}$	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
$< 1.7 \times 10^{-5}$	90	RUBIN	10	CLEO	e^+e^- at 4170 MeV
$<63 \times 10^{-5}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^- 2\mu^+)/\Gamma_{total}$ Γ_{209}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.6 \times 10^{-8}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-5}$	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
$<1.3 \times 10^{-5}$	90	LINK	03F	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
$<1.8 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
$<5.9 \times 10^{-4}$	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^- e^+ \mu^+)/\Gamma_{total}$ Γ_{210}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.6 \times 10^{-7}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.1 \times 10^{-6}$	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
$<6.8 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^*(892)^- 2\mu^+)/\Gamma_{total}$ Γ_{211}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.4 \times 10^{-3}$	90	KODAMA	95	E653	π^- emulsion 600 GeV

$D_s^{\pm}$ Amplitude analyses

$D_s^+ \to K^+ K^- \pi^+$ partial wave analyses

Amplitude analyses of D_s^+ decays to the $K^+ K^- \pi^+$ final state, fitting simultaneously different partial wave components.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	18.6k	[1] ABLIKIM	21AE	BES3	$e^+ e^-$ at 4.178 GeV
seen	96k	[1] DEL-AMO-SA...	11G	BABR	$e^+ e^-$ at $\Upsilon(4S)$
seen	12k	[1] MITCHELL	09A	CLEO	$e^+ e^-$ at 4.17 GeV
seen	701	[2] FRABETTI	95B	E687	

[1] Amplitude analysis with 6 components.
[2] Amplitude analysis with 5 components.

$D_s^+ \to K^+ K_S \pi^0$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	990	[1] ABLIKIM	22AH	BES3	$e^+ e^-$ at 4.178-4.226 GeV

[1] Amplitude analysis with 5 components.

$D_s^+ \to 2\pi^+ \pi^-$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	0.7M	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events
	11.1k	[2] ABLIKIM	22BI	BES3	Dalitz fit
	10.5k	[2] AUBERT	09O	BABR	Dalitz fit
	1.5k	[3] LINK	04	FOCS	Dalitz fit
	848	[4] AITALA	01A	E791	Dalitz fit

[1] Amplitude analysis with 7 components, one of which is a model-independent $\pi^+ \pi^-$ S-wave parametrisation as complex numbers in 50 $\pi^+ \pi^-$ mass bins.
[2] Amplitude analysis with 4 components, one of which is a model-independent $\pi^+ \pi^-$ S-wave parametrisation as complex numbers in 29 $\pi^+ \pi^-$ mass bins.
[3] Amplitude analysis with 5 components.
[4] Amplitude analysis with 6 components.

$D_s^+ \to 2\pi^+ \pi^- \pi^0$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	2.5k	[1] ABLIKIM	25A	BES3	$e^+ e^-$ at 4.128–4.226 GeV

[1] Amplitude analysis with 11 components contributing to the $2\pi^+ \pi^- \pi^0{}_{non-\eta}$ final state.

$D_s^+ \to 2\pi^+ \pi^- \eta$ partial wave analyses

Amplitude analyses of D_s^+ decays to the $\pi^+ \pi^+ \pi^- \eta$ final state, fitting simultaneously different partial wave components.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	2.1k	[1] ABLIKIM	21AR	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] Amplitude analysis with 11 components.

$D_s^+ \to \pi^+ \pi^0 \eta'$ partial wave analyses.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	395	[1] ABLIKIM	22AA	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] The only significant contribution found in this analysis is $D_s^+ \to \rho^+ \eta'$.

$D_s^+ \rightarrow \pi^+ 2\pi^0$ partial wave analyses.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	440	ABLIKIM	22Z	BES3	$e^+ e^-$ at 4.178–4.226 GeV

$D_s^+ \rightarrow K^+ \pi^+ \pi^-$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	1.3k	[1] ABLIKIM	22AC	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] ABLIKIM 22AC uses an amplitude analysis with 8 components.

$D_s^+ \rightarrow K_S^0 \pi^+ \pi^0$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	666	[1] ABLIKIM	21AB	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component.

$D_s^+ \rightarrow K^+ \pi^+ \pi^- \pi^0$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	550	[1] ABLIKIM	22BL	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] Amplitude analysis with 11 components.

$D_s^+ \rightarrow 2K_S^0 \pi^+$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	400	[1] ABLIKIM	22F	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] Amplitude analysis with 2 components.

$D_s^+ \rightarrow (KS)^0 K^- 2\pi^+$ partial wave analyses

Amplitude analyses of D_s^+ decays to the $K_S^0 K^- 2\pi^+$ final state, fitting simultaneously different partial wave components.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	1.3k	[1] ABLIKIM	21K	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] Amplitude analysis with 13 components.

$D_s^+ \rightarrow K^- K^+ \pi^+ \pi^0$ partial wave analyses

Amplitude analyses of D_s^+ decays to the $K^- K^+ \pi^+ \pi^0$ final state, fitting simultaneously different partial wave components.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	3k	[1] ABLIKIM	21U	BES3	$e^+ e^-$ at 4.178–4.226 GeV

[1] ABLIKIM 21U uses an amplitude analysis with 9 components.

$D_s^+ \rightarrow K^- K^+ 2\pi^+ \pi^-$ partial wave analyses

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	309	ABLIKIM	22AB	BES3	$e^+ e^-$ at 4.178–4.226 GeV

$D_s^+ - D_s^-$ CP-VIOLATING DECAY-RATE ASYMMETRIES

This is the difference between D_s^+ and D_s^- partial widths for the decay to state f, divided by the sum of the widths:
$A_{CP}(f) = [\Gamma(D_s^+ \to f) - \Gamma(D_s^- \to \overline{f})] / [\Gamma(D_s^+ \to f) + \Gamma(D_s^- \to \overline{f})]$.

$A_{CP}(\mu^\pm\nu)$ in $D_s^+ \to \mu^+\nu$, $D_s^- \to \mu^-\overline{\nu}_\mu$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
−0.2±2.5 OUR AVERAGE					
−1.2±2.5±1.0	2.2k	ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV
4.8±6.1		ALEXANDER	09	CLEO	e^+e^- at 4170 MeV

$A_{CP}(\tau^\pm\nu)$ in $D_s^+ \to \tau^+\nu_\tau$, $D_s^- \to \tau^-\overline{\nu}_\tau$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±4.8±1.0	950	[1] ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV

[1] ABLIKIM 21BE also reports that when constrained by the Standard Model ratio of $\Gamma(D_s^+ \to \tau^+\nu_\tau)/\Gamma(D_s^+ \to \mu^+\nu_\mu) = 9.75$, the result is $(-0.1 \pm 1.9 \pm 1.0)$%.

$A_{CP}(K^\pm K^0_S)$ in $D_s^\pm \to K^\pm K^0_S$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.07±0.24 OUR AVERAGE					
0.29±0.50±0.21		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
−0.05±0.23±0.24	288k	[1] LEES	13E	BABR	e^+e^- at $\Upsilon(4S)$
0.12±0.36±0.22		KO	10	BELL	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.6 ±2.8 ±0.6	1.8k	[2] ABLIKIM	19AM	BES3	e^+e^- at 4178 MeV
2.6 ±1.5 ±0.6		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
4.7 ±1.8 ±0.9	4.0k	MENDEZ	10	CLEO	See ONYISI 13
4.9 ±2.1 ±0.9		ALEXANDER	08	CLEO	See MENDEZ 10

[1] LEES 13E finds that after subtracting the contribution due to $K^0 - \overline{K}^0$ mixing, the CP asymmetry is $(+0.28 \pm 0.23 \pm 0.24)$%.
[2] Superseded by ABLIKIM 24BD.

$A_{CP}(K^\pm K^0_L)$ in $D_s^\pm \to K^\pm K^0_L$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−1.1±2.6±0.6	2.3k	ABLIKIM	19AM	BES3	e^+e^- at 4178 MeV

$A_{CP}(K^+K^-\pi^\pm)$ in $D_s^\pm \to K^+K^-\pi^\pm$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.35±0.34 OUR AVERAGE				
0.48±0.26±0.24	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
−0.5 ±0.8 ±0.4	ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.3 ±1.1 ±0.8	ALEXANDER	08	CLEO	See ONYISI 13

$A_{CP}(\phi\pi^\pm)$ in $D_s^\pm \to \phi\pi^\pm$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−0.38±0.26±0.08	ABAZOV	14B	D0	$p\overline{p}$ at 1.96 TeV

$A_{CP}(K^{\pm} K^0_S \pi^0)$ in $D^{\pm}_s \rightarrow K^{\pm} K^0_S \pi^0$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−0.9 ±1.9 OUR AVERAGE				
−0.85±1.97±0.46	ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
−1.6 ±6.0 ±1.1	ONYISI	13	CLEO	$e^+ e^-$ at 4.17 GeV

$A_{CP}(2K^0_S \pi^{\pm})$ in $D^{\pm}_s \rightarrow 2K^0_S \pi^{\pm}$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1.3 ±1.6 OUR AVERAGE				
1.14±1.58±0.44	ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
3.1 ±5.2 ±0.6	ONYISI	13	CLEO	$e^+ e^-$ at 4.17 GeV

$A_{CP}(K^+ K^- \pi^{\pm} \pi^0)$ in $D^{\pm}_s \rightarrow K^+ K^- \pi^{\pm} \pi^0$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−0.6 ±0.9 OUR AVERAGE				
−0.66±0.91±0.33	ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
0.0 ±2.7 ±1.2	ONYISI	13	CLEO	$e^+ e^-$ at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−5.9 ±4.2 ±1.2	ALEXANDER	08	CLEO	See ONYISI 13

$A_{CP}(K^{\pm} K^0_S \pi^+ \pi^-)$ in $D^{\pm}_s \rightarrow K^{\pm} K^0_S \pi^+ \pi^-$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.7 ±2.9 OUR AVERAGE Error includes scale factor of 1.3.				
2.00±2.37±0.70	ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
−5.7 ±5.3 ±0.9	ONYISI	13	CLEO	$e^+ e^-$ at 4.17 GeV

$A_{CP}(K^0_S K^{\mp} 2\pi^{\pm})$ in $D^{+}_s \rightarrow K^0_S K^{\mp} 2\pi^{\pm}$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.7 ±1.8 OUR AVERAGE Error includes scale factor of 1.3.				
−0.24±1.05±1.07	ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
4.1 ±2.7 ±0.9	ONYISI	13	CLEO	$e^+ e^-$ at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.7 ±3.6 ±1.1	ALEXANDER	08	CLEO	See ONYISI 13

$A_{CP}(\pi^+ \pi^- \pi^{\pm})$ in $D^{\pm}_s \rightarrow \pi^+ \pi^- \pi^{\pm}$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−0.9 ±1.1 OUR AVERAGE				
−0.88±1.17±0.38	ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
−0.7 ±3.0 ±0.6	ONYISI	13	CLEO	$e^+ e^-$ at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.0 ±4.6 ±0.7	ALEXANDER	08	CLEO	See ONYISI 13

$A_{CP}(\pi^{\pm} \eta)$ in $D^{\pm}_s \rightarrow \pi^{\pm} \eta$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.24±0.29 OUR AVERAGE					
−0.44±0.89±0.19		ABLIKIM	24BD	BES3	$e^+ e^-$, 4.128–4.226 GeV
0.32±0.51±0.12	136k	AAIJ	23E	LHCB	6 fb^{-1}, pp at 13 TeV, $\eta \rightarrow \gamma \pi \pi$
0.8 ±0.7 ±0.5	38k	AAIJ	21U	LHCB	pp at 13 TeV
0.2 ±0.3 ±0.3	22k	GUAN	21	BELL	$e^+ e^- \approx \Upsilon(4,5S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.1 ±3.0 ±0.8		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
−4.6 ±2.9 ±0.3	2.5k	MENDEZ	10	CLEO	See ONYISI 13
−8.2 ±5.2 ±0.8		ALEXANDER	08	CLEO	See MENDEZ 10

$A_{CP}(\pi^\pm\pi^+\pi^-\eta)$ in $D_s^\pm \to \pi^\pm\pi^+\pi^-\eta$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2.42±2.85±0.78	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV

$A_{CP}(\pi^\pm\eta')$ in $D_s^\pm \to \pi^\pm\eta'$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
−0.08±0.17 OUR AVERAGE	Error includes scale factor of 1.2.				
−0.59±0.76±0.20		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
0.01±0.12±0.08	1M	AAIJ	23E	LHCB	6 fb^{-1}, pp at 13 TeV, $\eta \to \gamma\pi\pi$
−0.82±0.36±0.35	152k	AAIJ	17AF	LHCB	pp at 7, 8 TeV
−2.2 ±2.2 ±0.6		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−6.1 ±3.0 ±0.3	1.4k	MENDEZ	10	CLEO	See ONYISI 13
−5.5 ±3.7 ±1.2		ALEXANDER	08	CLEO	See MENDEZ 10

$A_{CP}(\eta\pi^\pm\pi^0)$ in $D_s^\pm \to \eta\pi^\pm\pi^0$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.9 ±1.5 OUR AVERAGE				
1.05±1.45±0.62	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
−0.5 ±3.9 ±2.0	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$A_{CP}(\eta'\pi^\pm\pi^0)$ in $D_s^\pm \to \eta'\pi^\pm\pi^0$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−1.5 ±2.5 OUR AVERAGE				
−1.60±2.57±0.64	ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
−0.4 ±7.4 ±1.9	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$A_{CP}(K^\pm\pi^0)$ in $D_s^\pm \to K^\pm\pi^0$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2 ± 4 OUR AVERAGE	Error includes scale factor of 1.2.				
− 0.8± 3.9±1.2	2.8k	AAIJ	21U	LHCB	pp at 7, 8, 13 TeV
6.4± 4.4±1.1	12k	GUAN	21	BELL	$e^+e^- \approx \Upsilon(4,5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−26.6±23.8±0.9	202	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
2 ±29		ADAMS	07A	CLEO	See MENDEZ 10

$A_{CP}(\overline{K}^0/K^0\pi^\pm)$ in $D_s^+ \to \overline{K}^0\pi^+$, $D_s^- \to K^0\pi^-$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.4 ±0.5 OUR AVERAGE					
0.38±0.46±0.17	121k	[1] AAIJ	14BD	LHCB	pp at 7, 8 TeV
0.3 ±2.0 ±0.3	14k	LEES	13E	BABR	e^+e^- at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.61±0.83±0.14	26k	AAIJ	13W	LHCB	See AAIJ 14BD

[1] AAIJ 14BD reports its result as $A_{CP}(D_s^\pm \to K_S^0 K^\pm)$ with CP-violation effects in the $K^0 - \overline{K}^0$ system subtracted. It also measures $A_{CP}(D^\pm \to \overline{K}^0/K^0 K^\pm) + A_{CP}(D_s^\pm \to \overline{K}^0/K^0 \pi^\pm) = (0.41 \pm 0.49 \pm 0.26)\%$.

$A_{CP}(K_S^0 \pi^\pm)$ in $D_s^\pm \to K_S^0 \pi^\pm$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.20± 0.18 OUR AVERAGE					
0.16± 0.17±0.05	721k	AAIJ	19T	LHCB	pp at 7, 8, 13 TeV
0.6 ± 2.0 ±0.3	14k	LEES	13E	BABR	e^+e^- at $\Upsilon(4S)$
5.45± 2.50±0.33		KO	10	BELL	$e^+e^- \approx \Upsilon(4S)$
16.3 ± 7.3 ±0.3	0.4k	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
27 ±11		ADAMS	07A	CLEO	See MENDEZ 10

$A_{CP}(K^\pm \pi^+ \pi^-)$ in $D_s^\pm \to K^\pm \pi^+ \pi^-$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.2 ±1.9 OUR AVERAGE					
1.81±2.01±0.45		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
4.5 ±4.8 ±0.6		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.3 ±3.0 ±1.3	1.3k	[1] ABLIKIM	22AC	BES3	e^+e^-, 4.178–4.226 GeV
11.2 ±7.0 ±0.9		ALEXANDER	08	CLEO	See ONYISI 13

[1] Superseded by ABLIKIM 24BD.

$A_{CP}(K_S^0 \pi^+ \pi^0)$ in $D_s^\pm \to K_S^0 \pi^\pm \pi^0$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
−2.17±4.65±1.10		ABLIKIM	24BD	BES3	e^+e^-, 4.128–4.226 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.7 ±5.5 ±0.9	666	[1] ABLIKIM	21AB	BES3	e^+e^-, 4.178–4.226 GeV

[1] ABLIKIM 21AB uses an amplitude analysis with 5 resonant modes plus one background component. Superseded by ABLIKIM 24BD.

$A_{CP}(K^\pm \pi^+ \pi^- \pi^0)$ in $D_s^\pm \to K^\pm \pi^+ \pi^- \pi^0$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6±5.4±0.7	776	ABLIKIM	22BL	BES3	e^+e^- at 4.178–4.226 GeV

$A_{CP}(K^\pm \eta)$ in $D_s^\pm \to K^\pm \eta$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.8± 1.9 OUR AVERAGE					
0.9± 3.7±1.1	2.5k	AAIJ	21U	LHCB	pp at 13 TeV
2.1± 2.1±0.4	14k	GUAN	21	BELL	$e^+e^- \approx \Upsilon(4,5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.3±15.2±0.9	222	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
−20 ±18		ADAMS	07A	CLEO	See MENDEZ 10

$A_{CP}(K^\pm \eta'(958))$ in $D_s^\pm \to K^\pm \eta'(958)$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±18.9±0.9	56 ± 17	MENDEZ	10	CLEO	e^+e^- at 4170 MeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

-17 ± 37		ADAMS 07A	CLEO	See MENDEZ 10

$D_s^{\pm}$ χ^2 TESTS OF *CP*-VIOLATION (*CPV*)

We list model-independent searches for local *CP* violation in phase-space distributions of multi-body decays.

Most of these searches divide phase space (Dalitz plot for 3-body decays, five-dimensional equivalent for 4-body decays) into bins, and perform a χ^2 test comparing normalised yields N_i, $\overline{N}_i$ in *CP*-conjugate bin pairs i: $\chi^2 = \Sigma_i (N_i - \alpha\,\overline{N}_i)/\sigma(N_i - \alpha\,\overline{N}_i)$. The factor $\alpha = (\Sigma_i N_i)/(\Sigma_i \overline{N}_i)$ removes the dependence on phase-space-integrated rate asymmetries. The result is used to obtain the probability (p-value) to obtain the measured χ^2 or larger under the assumption of CP conservation [AUBERT 08AO, BEDIAGA 09]. Alternative methods obtain p-values from other test variables based on unbinned analyses [WILLIAMS 11, AAIJ 14C]. Results can be combined using Fisher's method [MOSTELLER 48].

Local *CPV* in $D_s^{\pm} \to K^+ K^- K^{\pm}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.133	970k	AAIJ 23L	LHCB	χ^2

CP VIOLATING ASYMMETRIES OF *P*-ODD (*T*-ODD) MOMENTS

$A_{Tviol}(K_S^0 K^{\pm}\pi^+\pi^-)$ in $D_s^{\pm} \to K_S^0 K^{\pm}\pi^+\pi^-$

$C_T \equiv \vec{p}_{K^+} \cdot (\vec{p}_{\pi^+} \times \vec{p}_{\pi^-})$ is a parity-odd correlation of the K^+, π^+, and π^- momenta for the D_s^+. $\overline{C}_T \equiv \vec{p}_{K^-} \cdot (\vec{p}_{\pi^-} \times \vec{p}_{\pi^+})$ is the corresponding quantity for the D_s^-. Then
$A_T \equiv [\Gamma(C_T > 0) - \Gamma(C_T < 0)] \,/\, [\Gamma(C_T > 0) + \Gamma(C_T < 0)]$, and
$\overline{A}_T \equiv [\Gamma(-\overline{C}_T > 0) - \Gamma(-\overline{C}_T < 0)] \,/\, [\Gamma(-\overline{C}_T > 0) + \Gamma(-\overline{C}_T < 0)]$, and
$A_{Tviol} \equiv \frac{1}{2}(A_T - \overline{A}_T)$. C_T and $\overline{C}_T$ are commonly referred to as *T*-odd moments, because they are odd under *T* reversal. However, the *T*-conjugate process $K_S^0 K^{\pm}\pi^+\pi^- \to D_s^{\pm}$ is not accessible, while the *P*-conjugate process is.

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
-8 ± 6 OUR AVERAGE				
$-4.6 \pm 6.3 \pm 3.8$	70k	MOON 23	BELL	980 fb^{-1} at $\sim \Upsilon(4S)$
$-13.6 \pm 7.7 \pm 3.4$	29.8k	LEES 11E	BABR	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-36 \pm 67 \pm 23$	508	LINK 05E	FOCS	γ A, $\overline{E}_\gamma \approx 180$ GeV

D_s^+ Semileptonic Form Factors and Decay Constants

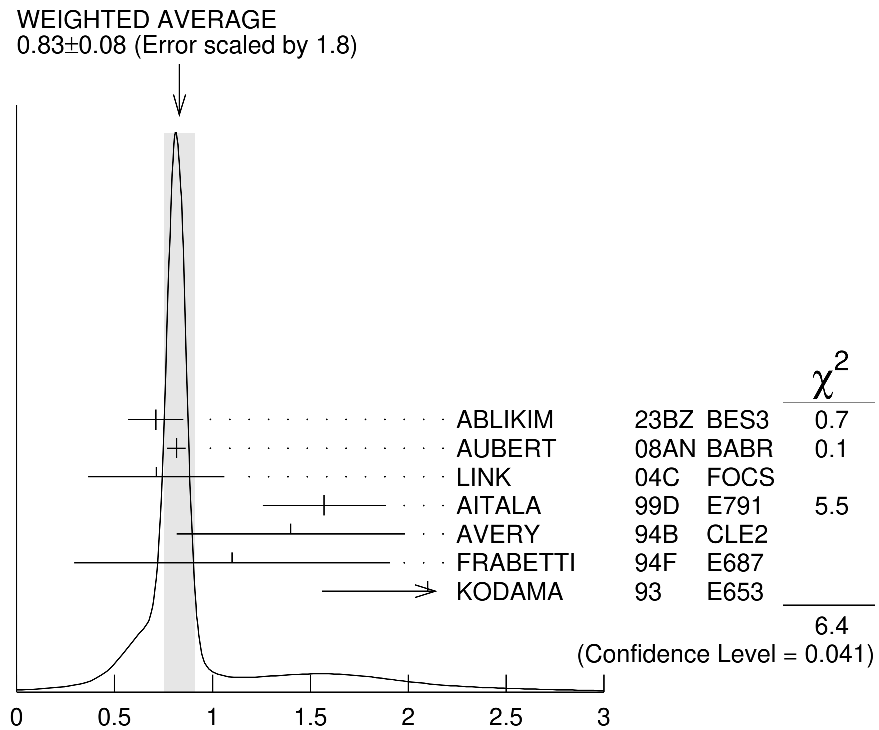
$r_2 \equiv A_2(0)/A_1(0)$ in $D_s^+ \to \phi \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.83 ± 0.08 OUR AVERAGE		Error includes scale factor of 1.8.		See the ideogram below.
$0.71 \pm 0.14 \pm 0.02$		[1] ABLIKIM 23BZ	BES3	$D_s^+ \to K^+ K^- \mu^+ \nu_\mu$
$0.816 \pm 0.036 \pm 0.030$	25k	[2] AUBERT 08AN	BABR	$\phi e^+ \nu_e$

0.713±0.202±0.284	793	LINK	04C FOCS	$\phi\mu^+\nu_\mu$
1.57 ±0.25 ±0.19	271	AITALA	99D E791	$\phi e^+\nu_e$, $\phi\mu^+\nu_\mu$
1.4 ±0.5 ±0.3	308	AVERY	94B CLE2	$\phi e^+\nu_e$
1.1 ±0.8 ±0.1	90	FRABETTI	94F E687	$\phi\mu^+\nu_\mu$
2.1 $^{+0.6}_{-0.5}$ ±0.2	19	KODAMA	93 E653	$\phi\mu^+\nu_\mu$

[1] Partial wave analysis of 939 $D_s^+ \to K^+K^-\mu^+\nu_\mu$ events.

[2] To compare with previous measurements, this AUBERT 08AN value is from a fit that fixes the pole masses at $m_A = 2.5$ GeV/c^2 and $m_V = 2.1$ GeV/c^2. A simultaneous fit to r_2, r_v, r_0 (a significant s-wave contribution) and m_A, gives $r_2 = 0.763 \pm 0.071 \pm 0.065$.



$r_2 \equiv A_2(0)/A_1(0)$ in $D_s^+ \to \phi\ell^+\nu_\ell$

$r_v \equiv V(0)/A_1(0)$ in $D_s^+ \to \phi\ell^+\nu_\ell$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
1.76 ±0.07 OUR AVERAGE		Error includes scale factor of 1.1.		
1.58 ±0.17 ±0.02		[1] ABLIKIM	23BZ BES3	$D_s^+ \to K^+K^-\mu^+\nu_\mu$
1.807±0.046±0.065	25k	[2] AUBERT	08AN BABR	$\phi e^+\nu_e$
1.549±0.250±0.148	793	LINK	04C FOCS	$\phi\mu^+\nu_\mu$
2.27 ±0.35 ±0.22	271	AITALA	99D E791	$\phi e^+\nu_e$, $\phi\mu^+\nu_\mu$
0.9 ±0.6 ±0.3	308	AVERY	94B CLE2	$\phi e^+\nu_e$
1.8 ±0.9 ±0.2	90	FRABETTI	94F E687	$\phi\mu^+\nu_\mu$
2.3 $^{+1.1}_{-0.9}$ ±0.4	19	KODAMA	93 E653	$\phi\mu^+\nu_\mu$

[1] Partial wave analysis of 939 $D_s^+ \to K^+K^-\mu^+\nu_\mu$ events.

[2] To compare with previous measurements, this AUBERT 08AN value is from a fit that fixes the pole masses at $m_A = 2.5$ GeV/c^2 and $m_V = 2.1$ GeV/c^2. A simultaneous fit to r_2, r_v, r_0 (a significant s-wave contribution) and m_A, gives $r_v = 1.849 \pm 0.060 \pm 0.095$.

Γ_L/Γ_T in $D_s^+ \to \phi \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.18 OUR AVERAGE					
1.0 ±0.3 ±0.2	308	AVERY	94B	CLE2	$\phi e^+ \nu_e$
1.0 ±0.5 ±0.1	90	[1] FRABETTI	94F	E687	$\phi \mu^+ \nu_\mu$
0.54±0.21±0.10	19	[1] KODAMA	93	E653	$\phi \mu^+ \nu_\mu$

[1] FRABETTI 94F and KODAMA 93 evaluate Γ_L/Γ_T for a lepton mass of zero.

$f_+(0)\left|V_{cs}\right|$ in $D_s^+ \to \eta e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.449 ±0.009 OUR AVERAGE					
0.430 ±0.021 ±0.016	716	[1] ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
0.4519±0.0071±0.0065	4k	ABLIKIM	23BO	BES3	$e^+ e^-$ at 4128–4226 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.4455±0.0053±0.0044	1.8k	[2] ABLIKIM	19S	BES3	$e^+ e^-$ at 4178 MeV

[1] Using a two parameter fit in the z expansion .
[2] Superseded by ABLIKIM 23BO

$f_+(0)\left|V_{cs}\right|$ in $D_s^+ \to \eta \mu^+ \nu_\mu$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.452±0.010±0.007	3.1k	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV

$r_1 \equiv a_1/a_0$ in $D_s^+ \to \eta \mu^+ \nu_\mu$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−2.9±0.6±0.2	3.1k	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV

$\langle A^{\eta}_{FB} \rangle$ in $D_s^+ \to \eta \mu^+ \nu_\mu$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−5.9±3.1±0.5	3.1k	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV

$f_+(0)\left|V_{cs}\right|$ in $D_s^+ \to \eta' e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.527±0.024 OUR AVERAGE					
0.542±0.062±0.023	134	[1] ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
0.525±0.024±0.009	675	ABLIKIM	23BO	BES3	$e^+ e^-$ at 4128–4226 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.477±0.049±0.011	261	[2] ABLIKIM	19S	BES3	$e^+ e^-$ at 4178 MeV

[1] Using a two parameter fit in the z expansion.
[2] Superseded by ABLIKIM 23BO

$r_1 \equiv a_1/a_0$ in $D_s^+ \to \eta' \mu^+ \nu_\mu$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−10.8±5.3±1.4	390	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV

$\langle A^{\eta'}_{FB} \rangle$ in $D_s^+ \to \eta' \mu^+ \nu_\mu$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$-6.4 \pm 7.9 \pm 0.6$	390	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV

$f_+(0) \left|V_{cs}\right|$ in $D_s^+ \to \eta' \mu^+ \nu_\mu$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.504 \pm 0.037 \pm 0.012$	390	ABLIKIM	24AQ	BES3	$e^+ e^-$, 4.128–4.266 GeV

$f_+(0) \left|V_{cs}\right|$ in $D_s^+ \to f_0(980) e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.504 \pm 0.017 \pm 0.035$	0.4k	[1] ABLIKIM	24AT	BES3	$e^+ e^-$ at 4128–4226 MeV

[1] From an analysis of $D_s^+ \to \pi^+ \pi^- e^+ \mu_e$ decays. ABLIKIM 24AT uses a simple pole parametrization of the hadronic form factor and the Flatte' formula for describing the $f_0(980)$ decay.

$f_+(0) \left|V_{cd}\right|$ in $D_s^+ \to K^0 e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.145 ± 0.010 OUR AVERAGE					
$0.143 \pm 0.011 \pm 0.003$	228	[1] ABLIKIM	24CH	BES3	$e^+ e^-$ at 4128–4226 MeV
$0.152 \pm 0.022 \pm 0.005$	51	[1] ABLIKIM	24CI	BES3	$e^+ e^-$ at 4237–4699 MeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.162 \pm 0.019 \pm 0.003$	117	[1,2] ABLIKIM	19D	BES3	$K^0_S e^+ \nu_e$

[1] Using a two parameter fit in the z expansion.

[2] Superseded by ABLIKIM 24CH.

$r_v \equiv V(0)/A_1(0)$ in $D_s^+ \to K^*(892)^0 e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$1.67 \pm 0.34 \pm 0.16$	155	ABLIKIM	19D	BES3	$e^+ e^-$ at 4178 MeV

$r_2 \equiv A_2(0)/A_1(0)$ in $D_s^+ \to K^*(892)^0 e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.77 \pm 0.28 \pm 0.07$	155	ABLIKIM	19D	BES3	$e^+ e^-$ at 4178 MeV

$f_{D_s^+} \left|V_{cs}\right|$ in $D_s^+ \to \mu^+ \nu_\mu$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
242.7 ± 3.0 OUR AVERAGE					
$246.5 \pm 5.9 \pm 3.6 \pm 0.5$	0.5k	[1] ABLIKIM	24CG	BES3	$e^+ e^-$ at 4.237–4.699 GeV
$241.8 \pm 2.5 \pm 2.2$	2.5k	ABLIKIM	23BR	BES3	$e^+ e^-$ at 4.128–4.226 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$243.1 \pm 3.0 \pm 3.6 \pm 1.0$	2.2K	[2,3] ABLIKIM	21BE	BES3	$e^+ e^-$ at 4.178, 4.226 GeV
$246.2 \pm 3.6 \pm 3.5$	1.1k	[3] ABLIKIM	19E	BES3	$e^+ e^-$ at 4.178 GeV

[1] The third uncertainty is due to the uncertainty of the D_s^+ lifetime.

[2] The third uncertainty is dominated by the uncertainty of the D_s^+ lifetime.

[3] Superseded by ABLIKIM 23BR.

$f_{D_s^+}\,|V_{cs}|$ in $D_s^+ \to \tau^+ \nu_\tau$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
247.5±2.3 OUR AVERAGE					
252.7±3.6±4.5±0.6	2.8k	[1] ABLIKIM	24CG	BES3	e^+e^- at 4.237–4.699 GeV
248.3±3.9±3.1±1.0	2.4k	[2] ABLIKIM	23BP	BES3	e^+e^- at 4.128–4.226 GeV
246.7±3.9±3.6	2.3k	[3] ABLIKIM	23BX	BES3	e^+e^- at 4.128–4.226 GeV
251.6±5.9±4.9	1.7k	[4] ABLIKIM	21AF	BES3	e^+e^- at 4.178, 4.226 GeV
244.4±2.3±2.9	4.9k	[5] ABLIKIM	21AZ	BES3	e^+e^- at 4.178, 4.226 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
243.0±5.8±4.0±1.0	950	[6,7] ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV

[1] ABLIKIM 24CG uses $\tau^+ \to (e^+\nu_e,\ \mu^+\nu_\nu,\ \pi^+,\ \rho^+)\overline{\nu}_\tau$ decays. The third uncertainty is due to the uncertainty of the D_s^+ lifetime.

[2] ABLIKIM 23BP uses $\tau^+ \to \pi^+\overline{\nu}_\tau$ decays. The third uncertainty is due to the input parameters, mainly the D_s^+ lifetime.

[3] ABLIKIM 23BX uses $\tau^+ \to \mu^+\nu_\mu\overline{\nu}_\tau$ decays.

[4] ABLIKIM 21AF uses $\tau^+ \to \pi^+\pi^0\overline{\nu}$ decays.

[5] ABLIKIM 21AZ uses $\tau^+ \to e^+\nu_e\overline{\nu}_\tau$ decays.

[6] ABLIKIM 21BE uses $\tau^+ \to \pi^+\overline{\nu}_\tau$ decays. When constrained by the Standard Model ratio of $\Gamma(D_s^+ \to \tau^+\nu_\tau)/\Gamma(D_s^+ \to \mu^+\nu_\mu) = 9.75$, the result is $243.2 \pm 2.3 \pm 3.3 \pm 1.0$.

[7] The third uncertainty is dominated by the uncertainty of the D_s^+ lifetime. Superseded by ABLIKIM 23BP.

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