$D_s^{\pm}$

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

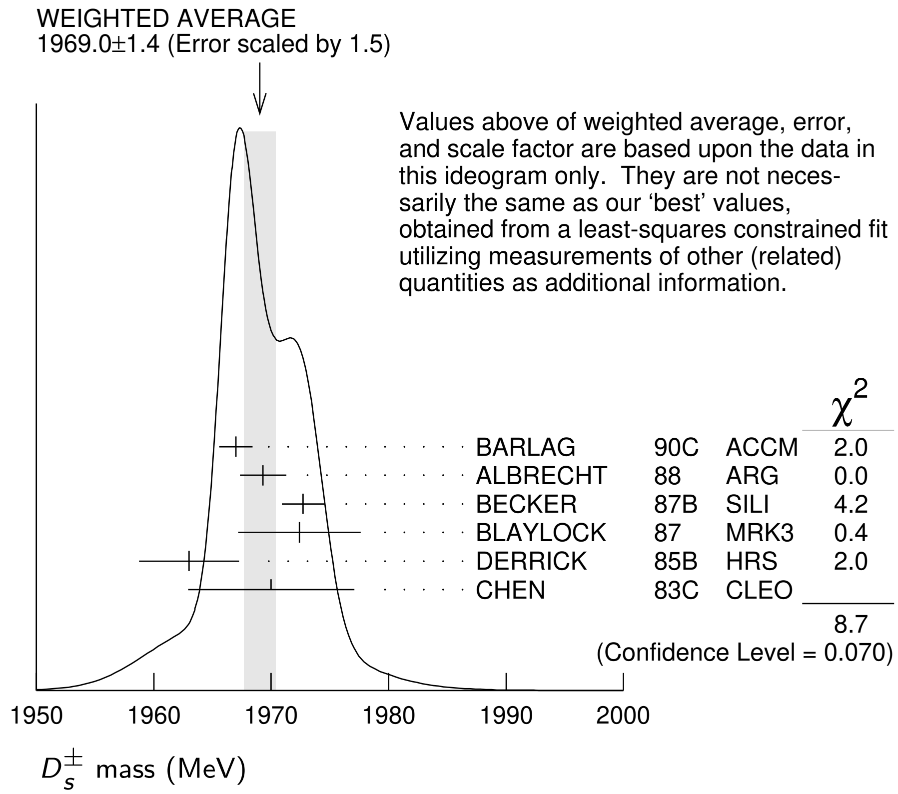
The angular distributions of the decays of the ϕ and $\overline{K}^*(892)^0$ in the $\phi\pi^+$ and $K^+\overline{K}^*(892)^0$ modes strongly indicate that the spin is zero. The parity given is that expected of a $c\overline{s}$ ground state.

$D_s^{\pm}$ 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.

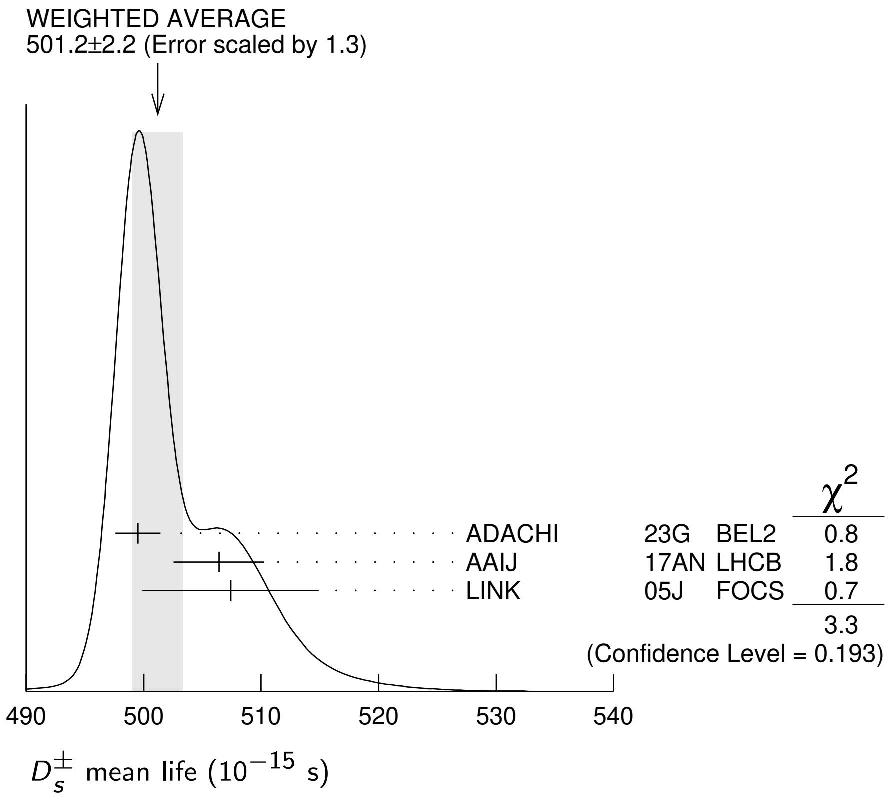
VALUE (10^{-15} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
501.2± 2.2 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
499.5± 1.7± 0.9	116k	ADACHI	23G	BEL2	$D_s^+ \to \phi\pi^+$
506.4± 3.0± 1.7±1.7		[1] AAIJ	17AN	LHCB	pp at 7, 8 TeV
507.4± 5.5± 5.1	13.6k	LINK	05J	FOCS	$\Phi\pi^+$ 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}	$\mu^+\nu_\mu$		$(5.35 \pm 0.12) \times 10^{-3}$	
Γ_{22}	$\tau^+\nu_\tau$		(5.36 ± 0.10) %	
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]	(2.39 ± 0.16) %	S=1.3
Γ_{27}	$K_1(1270)^0 e^+\nu_e$		$< 4.1 \times 10^{-4}$	CL=90%
Γ_{28}	$b_1(1235)^0 e^+\nu_e$, $b_1^0 \to \omega\pi^0$		$< 6.4 \times 10^{-4}$	CL=90%
Γ_{29}	$\phi\mu^+\nu_\mu$		(2.24 ± 0.11) %	
Γ_{30}	$\eta e^+\nu_e + \eta'(958)e^+\nu_e$	[d]	(3.03 ± 0.24) %	
Γ_{31}	$\eta e^+\nu_e$	[d]	(2.26 ± 0.06) %	
Γ_{32}	$\eta'(958)e^+\nu_e$	[d]	$(8.0 \pm 0.4) \times 10^{-3}$	
Γ_{33}	$\eta\mu^+\nu_\mu$		(2.4 ± 0.5) %	
Γ_{34}	$\eta'(958)\mu^+\nu_\mu$		(1.1 ± 0.5) %	
Γ_{35}	$\omega e^+\nu_e$	[e]	$< 2.0 \times 10^{-3}$	CL=90%
Γ_{36}	$K^0 e^+\nu_e$		$(3.4 \pm 0.4) \times 10^{-3}$	
Γ_{37}	$K^*(892)^0 e^+\nu_e$	[d]	$(2.15 \pm 0.28) \times 10^{-3}$	S=1.1
Γ_{38}	$f_0(500)e^+\nu_e$, $f_0 \to \pi^0\pi^0$		$< 7.3 \times 10^{-4}$	CL=90%
Γ_{39}	$f_0(980)e^+\nu_e$, $f_0 \to \pi^0\pi^0$		$(7.9 \pm 1.5) \times 10^{-4}$	
Γ_{40}	$f_0(980)e^+\nu_e$, $f_0 \to \pi^+\pi^-$			
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}	$K^+ K^0_S$		(1.450 ± 0.035) %	
Γ_{45}	$K^+ K^0_L$		(1.49 ± 0.06) %	
Γ_{46}	$K^+ \overline{K}^0$		(2.95 ± 0.14) %	
Γ_{47}	$K^+ K^- \pi^+$	[f]	(5.37 ± 0.10) %	S=1.1
Γ_{48}	$\phi\pi^+$	[d,g]	(4.5 ± 0.4) %	
Γ_{49}	$\phi\pi^+$, $\phi\to K^+K^-$	[g]	(2.21 ± 0.06) %	
Γ_{50}	$K^+\overline{K}^*(892)^0$		$(12.7\ ^{+4.0}_{-3.1})$ %	
Γ_{51}	$K^+\overline{K}^*(892)^0$, $\overline{K}^{*0}\to K^-\pi^+$		(2.58 ± 0.06) %	
Γ_{52}	$K^+\overline{K}^*(892)^0$, $\overline{K}^{*0}\to K^0_S\pi^0$		$(4.8\pm0.5)\times10^{-3}$	
Γ_{53}	$f_0(980)\pi^+$, $f_0\to K^+K^-$		(1.11 ± 0.19) %	
Γ_{54}	$f_0(1370)\pi^+$, $f_0\to K^+K^-$		$(7.1\pm2.9)\times10^{-4}$	
Γ_{55}	$f_0(1710)\pi^+$, $f_0\to K^+K^-$		$(6.7\pm2.8)\times10^{-4}$	
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}	$K^+\overline{K}^*_0(1430)^0$, $\overline{K}^*_0\to K^-\pi^+$		$(1.76\pm0.25)\times10^{-3}$	
Γ_{59}	$K^+\overline{K}^*(1410)^0$, $\overline{K}^*_0\to K^0_S\pi^0$		$(8.8\pm2.8)\times10^{-4}$	
Γ_{60}	$K^+K^0_S\pi^0$		(1.47 ± 0.07) %	
Γ_{61}	$K^*(892)^+K^0_S$, $K^{*+}\to K^+\pi^0$		$(2.04\pm0.33)\times10^{-3}$	
Γ_{62}	$2K^0_S\pi^+$		$(7.1\pm0.4)\times10^{-3}$	S=1.3
Γ_{63}	$f_0(980)\pi^+$, $f_0\to K^0_SK^0_S$		$<1.8\times10^{-4}$	CL=90%
Γ_{64}	$f_0(1710)\pi^+$, $f_0\to K^0_SK^0_S$		$(3.3\pm0.4)\times10^{-3}$	
Γ_{65}	$K^*(892)^+K^0_S$, $K^{*+}\to K^0_S\pi^+$		$(3.09\pm0.33)\times10^{-3}$	
Γ_{66}	$K^0\overline{K}^0\pi^+$		—	
Γ_{67}	$K^*(892)^+\overline{K}^0$	[d]	(5.4 ± 1.2) %	
Γ_{68}	$K^+K^-\pi^+\pi^0$		(5.50 ± 0.24) %	S=1.3
Γ_{69}	$\phi\rho^+$	[d]	(5.59 ± 0.34) %	
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 ± 0.25) %	
Γ_{72}	$\overline{K}_1(1400)^0K^+$, $\overline{K}_1(1400)^0\to K^*(892)\pi$		(2.0 ± 0.4) %	
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}	$f_1(1420)^0\pi^+$, $f_1(1420)^0 \to a_0(980)^0\pi^0$, $a_0(980)^0 \to K^+K^-$		(4.0 ±1.4) $\times 10^{-4}$	
Γ_{76}	$\eta(1475)\pi^+$, $\eta(1475) \to a_0(980)^0\pi^0$, $a_0(980)^0 \to K^+K^-$		(7.0 ±2.8) $\times 10^{-4}$	
Γ_{77}	$K^0_S K^- 2\pi^+$		(1.53 ±0.08) %	S=1.5
Γ_{78}	$K^+K^-K^0_S\pi^+$		(1.29 ±0.18) $\times 10^{-4}$	
Γ_{79}	$K^*(892)^+\overline{K}^*(892)^0$	[d]	(5.64 ±0.35) %	
Γ_{80}	$\eta(1475)K^0_S$, $\eta \to K^*(892)^0\pi^+$, $K^{*0} \to K^-\pi^+$		(3.4 ±1.0) $\times 10^{-4}$	
Γ_{81}	$\eta(1475)\pi^+$, $\eta \to \overline{K}^*(892)^+K^-$, $\overline{K}^{*+} \to K^0_S\pi^+$		(3.4 ±1.0) $\times 10^{-4}$	
Γ_{82}	$\eta(1475)\pi^+$, $\eta \to a_0(980)^-\pi^+$, $a_0^- \to K^0_S K^-$		(1.7 ±0.9) $\times 10^{-3}$	
Γ_{83}	$f_1(1285)\pi^+$, $f_1 \to a_0(980)^-\pi^+$, $a_0^- \to K^0_S K^-$		(3.4 ±0.8) $\times 10^{-4}$	
Γ_{84}	$K^+K^0_S\pi^+\pi^-$		(9.5 ±0.8) $\times 10^{-3}$	S=1.1
Γ_{85}	$K^+K^-2\pi^+\pi^-$		(6.6 ±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 ±0.7) $\times 10^{-3}$	
Γ_{88}	$\phi a_1(1260)^+$, $\phi \to K^+K^-$, $a_1^+ \to \rho^0\pi^+$		(7.4 ±1.2) $\times 10^{-3}$	
Γ_{89}	$\phi 2\pi^+\pi^-$ non-ρ, $\phi \to K^+K^-$		(1.4 ±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 ±0.4) $\times 10^{-3}$	
Γ_{92}	$2K^0_S 2\pi^+\pi^-$		(7.8 ±3.3) $\times 10^{-4}$	

Hadronic modes without K's

Γ_{93}	$\pi^+\pi^0$		< 1.2 $\times 10^{-4}$	CL=90%
Γ_{94}	$2\pi^+\pi^-$		(1.08 ±0.04) %	
Γ_{95}	$\rho^0\pi^+$		(1.12 ±0.17) $\times 10^{-4}$	
Γ_{96}	$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$	[h]	(9.12 ±0.35) $\times 10^{-3}$	
Γ_{97}	$f_0(980)\pi^+$, $f_0 \to \pi^+\pi^-$			
Γ_{98}	$f_0(1370)\pi^+$, $f_0 \to \pi^+\pi^-$			
Γ_{99}	$f_0(1500)\pi^+$, $f_0 \to \pi^+\pi^-$			
Γ_{100}	$f_2(1270)\pi^+$, $f_2 \to \pi^+\pi^-$		(1.40 ±0.11) $\times 10^{-3}$	
Γ_{101}	$f_2'(1525)^0\pi^+$, $f_2' \to \pi^+\pi^-$		(5.7 ±2.0) $\times 10^{-6}$	

Γ_{102}	$\rho(1450)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		$(1.8 \pm 0.6) \times 10^{-4}$	
Γ_{103}	$\rho(1700)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		$(4 \pm 4) \times 10^{-5}$	
Γ_{104}	$\pi^+ 2\pi^0$		$(5.2 \pm 0.5) \times 10^{-3}$	S=1.1
Γ_{105}	$f_0(980)\pi^+$, $f_0 \to \pi^0\pi^0$		$(2.9 \pm 0.6) \times 10^{-3}$	
Γ_{106}	$f_0(1370)\pi^+$, $f_0 \to \pi^0\pi^0$		$(1.3 \pm 0.6) \times 10^{-3}$	
Γ_{107}	$f_2(1270)\pi^+$, $f_2 \to \pi^0\pi^0$		$(5.0 \pm 3.5) \times 10^{-4}$	
Γ_{108}	$2\pi^+\pi^-\pi^0$		—	
Γ_{109}	$\eta\pi^+$	[d]	(1.67 ± 0.09) %	S=1.1
Γ_{110}	$\omega\pi^+$	[d]	$(1.92 \pm 0.30) \times 10^{-3}$	
Γ_{111}	$\omega\pi^+$, $\omega \to \pi^+\pi^-$		$(3.9 \pm 0.5) \times 10^{-5}$	
Γ_{112}	$3\pi^+ 2\pi^-$		$(7.8 \pm 0.8) \times 10^{-3}$	
Γ_{113}	$2\pi^+\pi^- 2\pi^0$		—	
Γ_{114}	$\eta\rho^+$	[d]	(8.9 ± 0.8) %	
Γ_{115}	$\eta\pi^+\pi^0$		(9.5 ± 0.5) %	
Γ_{116}	$\eta(\pi^+\pi^0)_{P-wave}$		$(5.1 \pm 3.1) \times 10^{-3}$	
Γ_{117}	$a_0(980)^{+0}\pi^{0+}$, $a_0(980)^{+0} \to \eta\pi^{+0}$		(2.2 ± 0.4) %	
Γ_{118}	$\omega\pi^+\pi^0$	[d]	(2.8 ± 0.7) %	
Γ_{119}	$2\pi^+\pi^-\eta$		(3.12 ± 0.16) %	
Γ_{120}	$a_1(1260)^+\eta$, $a_1^+ \to \rho(770)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		(1.73 ± 0.16) %	
Γ_{121}	$a_1(1260)^+\eta$, $a_1^+ \to f_0(500)\pi^+$, $f_0 \to \pi^+\pi^-$		$(2.5 \pm 0.9) \times 10^{-3}$	
Γ_{122}	$a_0(980)^+\rho(770)^0$, $a_0^+ \to \eta\pi^+$		$(2.1 \pm 0.9) \times 10^{-3}$	
Γ_{123}	$\eta(1405)\pi^+$, $\eta(1405) \to a_0(980)^-\pi^+$, $a_0^- \to \eta\pi^-$		$(2.2 \pm 0.7) \times 10^{-4}$	
Γ_{124}	$\eta(1405)\pi^+$, $\eta(1405) \to a_0(980)^+\pi^-$, $a_0^+ \to \eta\pi^+$		$(2.2 \pm 0.7) \times 10^{-4}$	
Γ_{125}	$f_1(1420)\pi^+$, $f_1 \to a_0(980)^-\pi^+$, $a_0^- \to \eta\pi^-$		$(5.9 \pm 1.8) \times 10^{-4}$	
Γ_{126}	$f_1(1420)\pi^+$, $f_1 \to a_0(980)^+\pi^-$, $a_0^+ \to \eta\pi^+$		$(5.3 \pm 1.8) \times 10^{-4}$	
Γ_{127}	$3\pi^+ 2\pi^-\pi^0$		(4.9 ± 3.2) %	
Γ_{128}	$\omega 2\pi^+\pi^-$	[d]	(1.6 ± 0.5) %	
Γ_{129}	$\eta'(958)\pi^+$	[c,d]	(3.94 ± 0.25) %	
Γ_{130}	$3\pi^+ 2\pi^- 2\pi^0$		—	
Γ_{131}	$\omega\eta\pi^+$	[d]	$(5.4 \pm 1.3) \times 10^{-3}$	
Γ_{132}	$\eta'(958)\rho^+$	[c,d]	(5.8 ± 1.5) %	
Γ_{133}	$\eta'(958)\pi^+\pi^0$		(6.08 ± 0.29) %	
Γ_{134}	$\eta'(958)\pi^+\pi^0$ nonresonant		< 5.1 %	CL=90%

Modes with one or three K's

Γ_{135}	$K^+ \pi^0$		$(7.4 \pm 0.5) \times 10^{-4}$	
Γ_{136}	$K^0_S \pi^+$		$(1.09 \pm 0.05) \times 10^{-3}$	
Γ_{137}	$K^+ \eta$	[d]	$(1.73 \pm 0.08) \times 10^{-3}$	
Γ_{138}	$K^+ \omega$	[d]	$(9.9 \pm 1.5) \times 10^{-4}$	
Γ_{139}	$K^+ \eta'(958)$	[d]	$(2.64 \pm 0.24) \times 10^{-3}$	
Γ_{140}	$K^+ \pi^+ \pi^-$		$(6.20 \pm 0.19) \times 10^{-3}$	
Γ_{141}	$K^+ \rho^0$		$(2.17 \pm 0.25) \times 10^{-3}$	
Γ_{142}	$K^+ \rho(1450)^0, \ \rho^0 \to \pi^+ \pi^-$		$(7.2 \pm 1.7) \times 10^{-4}$	
Γ_{143}	$K^+ f_0(500), \ f_0 \to \pi^+ \pi^-$		$(4.5 \pm 3.0) \times 10^{-4}$	
Γ_{144}	$K^+ f_0(980), \ f_0 \to \pi^+ \pi^-$		$(2.8 \pm 1.1) \times 10^{-4}$	
Γ_{145}	$K^+ f_0(1370), \ f_0 \to \pi^+ \pi^-$		$(1.2 \pm 0.6) \times 10^{-3}$	
Γ_{146}	$K^*(892)^0 \pi^+, \ K^{*0} \to K^+ \pi^-$		$(1.67 \pm 0.26) \times 10^{-3}$	
Γ_{147}	$K^*(1410)^0 \pi^+, \ K^{*0} \to K^+ \pi^-$		$(6 \pm 4) \times 10^{-4}$	
Γ_{148}	$K^*(1430)^0 \pi^+, \ K^{*0} \to K^+ \pi^-$		$(9.3 \pm 3.1) \times 10^{-4}$	
Γ_{149}	$K^+ \pi^+ \pi^-$ nonresonant		$(9.9 \pm 3.2) \times 10^{-4}$	
Γ_{150}	$K^0 \pi^+ \pi^0$			
Γ_{151}	$K^0_S \pi^+ \pi^0$		$(5.38 \pm 0.32) \times 10^{-3}$	
Γ_{152}	$K^0_S \rho(770)^+, \ \rho^+ \to \pi^+ \pi^0$		$(2.7 \pm 0.5) \times 10^{-3}$	
Γ_{153}	$K^0_S \rho(1450)^+, \ \rho^+ \to \pi^+ \pi^0$		$(1.10 \pm 0.34) \times 10^{-3}$	
Γ_{154}	$K^*(892)^0 \pi^+, \ K^{*0} \to K^0_S \pi^0$		$(4.5 \pm 1.3) \times 10^{-4}$	
Γ_{155}	$K^*(892)^+ \pi^0, \ K^{*+} \to K^0_S \pi^+$		$(2.5 \pm 0.8) \times 10^{-4}$	
Γ_{156}	$K^*(1410)^0 \pi^+, \ K^{*0} \to K^0_S \pi^0$		$(1.8 \pm 0.9) \times 10^{-4}$	
Γ_{157}	$K^0_S 2\pi^+ \pi^-$		$(2.8 \pm 1.0) \times 10^{-3}$	
Γ_{158}	$K^+ \pi^+ \pi^- \pi^0$		$(9.7 \pm 0.6) \times 10^{-3}$	
Γ_{159}	$K^*(892)^0 \rho^+, \ K^{*0} \to K^+ \pi^-$		$(3.9 \pm 0.4) \times 10^{-3}$	
Γ_{160}	$K^*(892)^+ \rho^0, \ K^{*+} \to K^+ \pi^0$		$(4.2 \pm 1.2) \times 10^{-4}$	
Γ_{161}	$K_1(1270)^0 \pi^+, \ K^0_1 \to K^+ \rho^-$		$(3.9 \pm 1.3) \times 10^{-4}$	
Γ_{162}	$K_1(1400)^0 \pi^+, \ K^0_1 \to K^*(890)^+ \pi^-, \ K^{*+} \to K^+ \pi^0$		$(5.4 \pm 0.9) \times 10^{-4}$	
Γ_{163}	$K_1(1400)^0 \pi^+, \ K^0_1 \to K^*(890)^0 \pi^0, \ K^{*0} \to K^+ \pi^-$		$(5.9 \pm 1.0) \times 10^{-4}$	
Γ_{164}	$K^+ a_1(1260)^0, \ a_1 \to \rho^+ \pi^-$		$(1.8 \pm 1.1) \times 10^{-4}$	
Γ_{165}	$K^+ a_1(1260)^0, \ a_1 \to \rho^- \pi^+$		$(1.8 \pm 1.1) \times 10^{-4}$	
Γ_{166}	$K^+ \pi^+ \pi^- \pi^0$ nonresonant		$(9.2 \pm 2.4) \times 10^{-4}$	
Γ_{167}	$(K^+ \pi^0)_{P-wave} \rho^0$		$(1.01 \pm 0.21) \times 10^{-3}$	
Γ_{168}	$K^+ \omega \pi^0$	[d]	$< 8.2 \times 10^{-3}$	CL=90%

Γ_{169}	$K^+\omega\pi^+\pi^-$		[d] $<$ 5.4	$\times 10^{-3}$	CL=90%
Γ_{170}	$K^+\omega\eta$		[d] $<$ 7.9	$\times 10^{-3}$	CL=90%
Γ_{171}	$2K^+K^-$		(2.15 $\pm$0.20)	$\times 10^{-4}$	
Γ_{172}	ϕK^+, $\phi \to K^+K^-$		(8.8 $\pm$2.0)	$\times 10^{-5}$	

Doubly Cabibbo-suppressed modes

Γ_{173}	$2K^+\pi^-$		(1.274$\pm$0.031)	$\times 10^{-4}$	
Γ_{174}	$K^+K^*(892)^0$, $K^{*0} \to K^+\pi^-$		(6.0 $\pm$3.4)	$\times 10^{-5}$	

Baryon-antibaryon mode

Γ_{175}	$p\overline{n}$		(1.22 $\pm$0.11)	$\times 10^{-3}$	
Γ_{176}	$p\overline{p}e^+\nu_e$		$<$ 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_{177}	$\pi^+e^+e^-$		[i] $<$ 5.5	$\times 10^{-6}$	CL=90%
Γ_{178}	$\pi^+\phi$, $\phi \to e^+e^-$		[j] (6 $^{+8}_{-4}$)	$\times 10^{-6}$	
Γ_{179}	$\pi^+\mu^+\mu^-$		[i] $<$ 1.8	$\times 10^{-7}$	CL=90%
Γ_{180}	$K^+e^+e^-$	*C1*	$<$ 3.7	$\times 10^{-6}$	CL=90%
Γ_{181}	$K^+\mu^+\mu^-$	*C1*	$<$ 1.4	$\times 10^{-7}$	CL=90%
Γ_{182}	$K^*(892)^+\mu^+\mu^-$	*C1*	$<$ 1.4	$\times 10^{-3}$	CL=90%
Γ_{183}	$\pi^+e^+\mu^-$	*LF*	$<$ 1.1	$\times 10^{-6}$	CL=90%
Γ_{184}	$\pi^+e^-\mu^+$	*LF*	$<$ 9.4	$\times 10^{-7}$	CL=90%
Γ_{185}	$K^+e^+\mu^-$	*LF*	$<$ 7.9	$\times 10^{-7}$	CL=90%
Γ_{186}	$K^+e^-\mu^+$	*LF*	$<$ 5.6	$\times 10^{-7}$	CL=90%
Γ_{187}	π^-2e^+	*L*	$<$ 1.4	$\times 10^{-6}$	CL=90%
Γ_{188}	$\pi^-2\mu^+$	*L*	$<$ 8.6	$\times 10^{-8}$	CL=90%
Γ_{189}	$\pi^-e^+\mu^+$	*L*	$<$ 6.3	$\times 10^{-7}$	CL=90%
Γ_{190}	K^-2e^+	*L*	$<$ 7.7	$\times 10^{-7}$	CL=90%
Γ_{191}	$K^-2\mu^+$	*L*	$<$ 2.6	$\times 10^{-8}$	CL=90%
Γ_{192}	$K^-e^+\mu^+$	*L*	$<$ 2.6	$\times 10^{-7}$	CL=90%
Γ_{193}	$K^*(892)^-2\mu^+$	*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 16 branching ratios uses 25 measurements to determine 11 parameters. The overall fit has a $\chi^2 = 12.7$ for 14 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, $x_i \equiv \Gamma_i/\Gamma_{total}$.

x_{47}	27									
x_{68}	8	0								
x_{77}	24	4	14							
x_{84}	18	3	12	45						
x_{94}	17	33	1	6	4					
x_{109}	1	15	−8	−15	−12	6				
x_{110}	0	1	0	−1	0	0	4			
x_{138}	0	0	0	0	0	0	0	0		
x_{140}	7	3	4	8	6	2	−4	0	0	
x_{158}	0	0	0	0	0	0	0	0	26	0
	x_{44}	x_{47}	x_{68}	x_{77}	x_{84}	x_{94}	x_{109}	x_{110}	x_{138}	x_{140}

See the related review(s):

D_s^+ Branching Fractions

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

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

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

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

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

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

$\Gamma(2\pi^+\pi^- + \text{anything})/\Gamma_{total}$ 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
5.35 ±0.12 OUR AVERAGE					
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 4170 MeV
• • • 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 4178 MeV
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 ± 6.4 ± 7.5) MeV.

[4] Superseded by ABLIKIM 23BR.

[5] WIDHALM 08 gets f_{D_s} = (275 ± 16 ± 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 ± 0.59 ± 0.33) × 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 ± 19 ± 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±0.018±0.006	489 ± 55	[1] AUBERT	07V	BABR	$e^+e^- \approx \Upsilon(4S)$
0.23 ±0.06 ±0.04	18	[2] ALEXANDROV	00	BEAT	π^- nucleus, 350 GeV
0.173±0.023±0.035	182	[3] CHADHA	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
0.245±0.052±0.074	39	[4] ACOSTA	94	CLE2	See CHADHA 98

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

[2] ALEXANDROV 00 uses $f_D^2/f_{D_s}^2$ = 0.82 ± 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 ± 44 ± 36) MeV.

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

[4] ACOSTA 94 obtains f_{D_s} = (344 ± 37 ± 52 ± 42) MeV from this measurement, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total})$ = 0.037 ± 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
5.36±0.10 OUR AVERAGE					
5.44±0.17±0.13	2.4k	[1] ABLIKIM	23BP	BES3	e^+e^- at 4.128–4.226 GeV
5.37±0.17±0.15	2.3k	[2] ABLIKIM	23BX	BES3	e^+e^- at 4.128–4.226 GeV
5.29±0.25±0.20	1.7k	[3] ABLIKIM	21AF	BES3	e^+e^- at 4.178, 4.226 GeV
5.27±0.10±0.12	4.9k	[4] ABLIKIM	21AZ	BES3	e^+e^- at 4.178, 4.226 GeV
3.28±1.83±0.37	33	[5] ABLIKIM	16O	BES3	e^+e^- at 4.009 GeV
$5.70\pm0.21^{+0.31}_{-0.30}$	2.2k	[6] ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S)$, $\Upsilon(5S)$
4.96±0.37±0.57	748	[7] DEL-AMO-SA...	10J	BABR	$e^-\overline{\nu}_e\nu_\tau$, $\mu^-\overline{\nu}_\mu\nu_\tau$
6.42±0.81±0.18	126	[8] ALEXANDER	09	CLEO	$\tau^+ \to \pi^+\overline{\nu}_\tau$
5.52±0.57±0.21	155	[8] NAIK	09A	CLEO	$\tau^+ \to \rho^+\overline{\nu}_\tau$
5.30±0.47±0.22	181	[8] 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±0.25±0.17	950	[9] ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV

$6.17\pm0.71\pm0.34$	102	[10] ECKLUND	08	CLEO	See ONYISI 09
$8.0\ \pm1.3\ \pm0.4$	47	[10] PEDLAR	07A	CLEO	See ALEXANDER 09
$5.79\pm0.77\pm1.84$	881	[11] HEISTER	02I	ALEP	Z decays
$7.0\ \pm2.1\ \pm2.0$	22	[12] ABBIENDI	01L	OPAL	$D_s^{*+} \rightarrow \gamma D_s^+$ from Z's
$7.4\ \pm2.8\ \pm2.4$	16	[13] ACCIARRI	97F	L3	$D_s^{*+} \rightarrow \gamma D_s^+$ from Z's

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

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

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

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

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

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

[7] 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.

[8] 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.

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

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

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

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

[13] 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. • • •					
$10.73\pm0.69^{+0.56}_{-0.53}$	2.2k/492	[1] ZUPANC	13	BELL	$e^+ e^-$ at $\Upsilon(4S), \Upsilon(5S)$
$11.0\ \pm1.4\ \pm0.6$	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.

$\Gamma(\gamma e^+ \nu_e)/\Gamma_{total}$ 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.

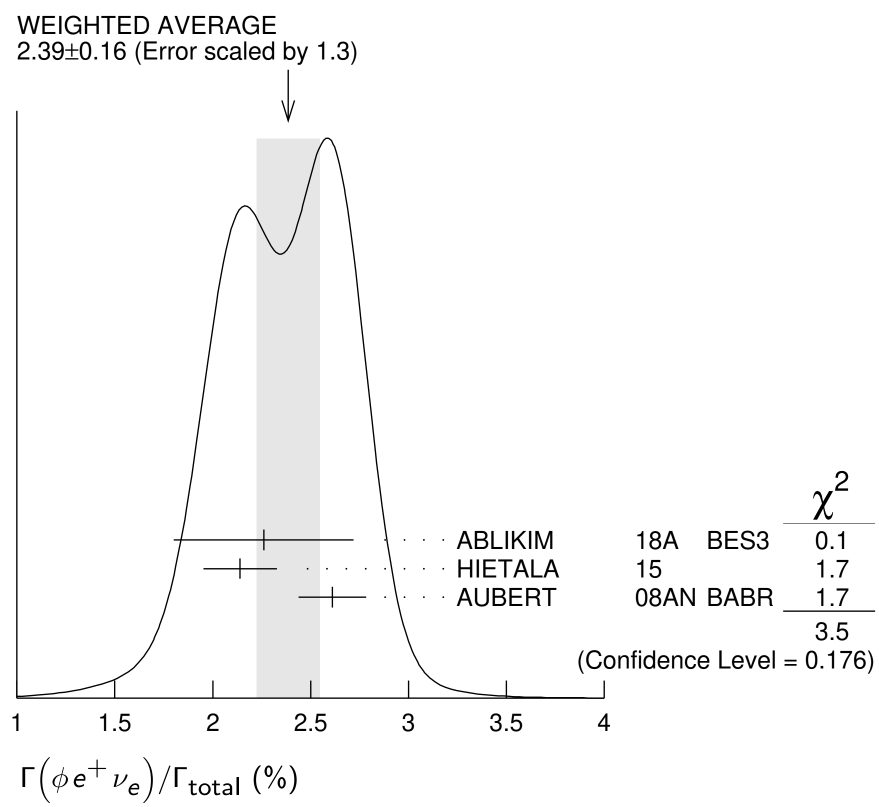
$\Gamma(K^0_S K^0_S e^+ \nu_e)/\Gamma_{total}$ Γ_{25}/Γ

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 $D_s^+ \to \phi e^+ \nu_e$ form factors. Unseen decay modes of the ϕ are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.39±0.16 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
$2.26 \pm 0.45 \pm 0.09$	26	ABLIKIM	18A	BES3	$e^+ e^-$ at 4.009 GeV
$2.14 \pm 0.17 \pm 0.08$	207	HIETALA	15		Uses CLEO data
$2.61 \pm 0.03 \pm 0.17$	25k	AUBERT	08AN	BABR	$e^+ e^-$ at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.36 \pm 0.23 \pm 0.13$	106	ECKLUND	09	CLEO	See HIETALA 15
$2.29 \pm 0.37 \pm 0.11$	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. • • •					
$0.540\pm0.033\pm0.048$	793	LINK	02J	FOCS	Uses $\phi\mu^+\nu_\mu$
$0.54\pm0.05\pm0.04$	367	BUTLER	94	CLE2	Uses $\phi e^+\nu_e$ and $\phi\mu^+\nu_\mu$
$0.58\pm0.17\pm0.07$	97	FRABETTI	93G	E687	Uses $\phi\mu^+\nu_\mu$
$0.57\pm0.15\pm0.15$	104	ALBRECHT	91	ARG	Uses $\phi e^+\nu_e$
$0.49\pm0.10{}^{+0.10}_{-0.14}$	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					
$2.25\pm0.09\pm0.07$	1.7k	ABLIKIM	23BZ	BES3	e^+e^- at 4.128-4.226 GeV
$1.94\pm0.53\pm0.09$	22	ABLIKIM	18A	BES3	e^+e^- at 4.009 GeV

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

Unseen decay modes of the η are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.26 ±0.06 OUR AVERAGE					
$2.255\pm0.039\pm0.051$	4k	ABLIKIM	23BO	BES3	e^+e^- at 4128–4226 MeV
$2.30\pm0.31\pm0.08$	63	ABLIKIM	16T	BES3	e^+e^- at 4.009 GeV
$2.28\pm0.14\pm0.19$	358	[1] HIETALA	15		Uses CLEO data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.323\pm0.063\pm0.063$	1.8k	[2] ABLIKIM	19S	BES3	e^+e^- at 4178 MeV
$2.48\pm0.29\pm0.13$	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_{31}/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. • • •					
$1.24\pm0.12\pm0.15$	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_{32}/Γ

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.80 ±0.04 OUR AVERAGE					
$0.810\pm0.038\pm0.024$	675	ABLIKIM	23BO	BES3	e^+e^- at 4128–4226 MeV
$0.93\pm0.30\pm0.05$	14	ABLIKIM	16T	BES3	e^+e^- at 4009 MeV
$0.68\pm0.15\pm0.06$	20	[1] HIETALA	15		Uses CLEO data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.824\pm0.073\pm0.027$	261	[2] ABLIKIM	19S	BES3	e^+e^- at 4178 MeV
$0.91\pm0.33\pm0.05$	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_{32}/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. • • •					
$0.43 \pm 0.11 \pm 0.07$	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.

$[\Gamma(\eta e^+ \nu_e) + \Gamma(\eta'(958) e^+ \nu_e)]/\Gamma(\phi e^+ \nu_e)$ — $\Gamma_{30}/\Gamma_{26} = (\Gamma_{31}+\Gamma_{32})/\Gamma_{26}$

Unseen decay modes of the resonances are included.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.67 \pm 0.17 \pm 0.17$	[1] BRANDENB...	95	CLE2	See HIETALA 15

[1] This BRANDENBURG 95 data is redundant with data in previous blocks.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$2.42 \pm 0.46 \pm 0.11$	44	ABLIKIM	18A	BES3	$e^+ e^-$ at 4.009 GeV

$\Gamma(\eta'(958) \mu^+ \nu_\mu)/\Gamma_{\text{total}}$ — Γ_{34}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$1.06 \pm 0.54 \pm 0.07$	10	ABLIKIM	18A	BES3	$e^+ e^-$ at 4.009 GeV

$\Gamma(\omega e^+ \nu_e)/\Gamma_{\text{total}}$ — Γ_{35}/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

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.34 ± 0.04 OUR AVERAGE					
$0.325 \pm 0.038 \pm 0.016$	117	[1] ABLIKIM	19D	BES3	$e^+ e^-$ at 4178 MeV
$0.39 \pm 0.08 \pm 0.03$	42	HIETALA	15		Uses CLEO data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.37 \pm 0.10 \pm 0.02$	14	YELTON	09	CLEO	See HIETALA 15

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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.1 \times 10^{-4}$	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_{37}/Γ

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.215±0.028 OUR AVERAGE	Error includes scale factor of 1.1.				
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 4.170 GeV
• • • 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_{38}/Γ

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

$\Gamma(f_0(980) e^+ \nu_e,\ f_0 \to \pi^0 \pi^0)/\Gamma_{total}$ — 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 (%)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.13±0.03±0.01	42	[1] HIETALA	15		Uses CLEO data
0.20±0.03±0.01	44	ECKLUND	09	CLEO	See HIETALA 15
0.13±0.04±0.01	13	YELTON	09	CLEO	See ECKLUND 09

[1] HIETALA 15 uses a tighter cut on the reconstructed $\pi^+ \pi^-$ mass (±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 × 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 × 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 × 10^−5	90	ABLIKIM	22BH	BES3	6.32 fb^{-1} of $e^+ e^-$ at 4.178–4.226 GeV

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

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.450±0.035 OUR FIT					
1.46 ±0.05 OUR AVERAGE Error includes scale factor of 1.2.					
1.425±0.038±0.031	1.8k	ABLIKIM	19AM	BES3	e^+e^- at 4178 MeV
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. • • •					
1.49 ±0.07 ±0.05		[1] ALEXANDER	08	CLEO	See ONYISI 13

[1] 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

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

$\Gamma(K^+ \overline{K}^0)/\Gamma_{\rm total}$ — 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 $K_S^0 \to \pi^+\pi^-$. The DCS ($D_s^+ \to K^+ K^0$) contribution to this fraction is estimated to be an order of magnitude below the statistical uncertainty.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
5.37±0.10 OUR FIT Error includes scale factor of 1.1.					
5.45±0.11 OUR AVERAGE Error includes scale factor of 1.1.					
5.47±0.08±0.13	5.1k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 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. • • •					
5.50±0.23±0.16		[1] ALEXANDER	08	CLEO	See ONYISI 13

[1] 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					
$4.62\pm0.36\pm0.51$		[1] AUBERT	06N	BABR	e^+e^- at $\Upsilon(4S)$
$4.81\pm0.52\pm0.38$	212 ± 19	[2] AUBERT	05V	BABR	$e^+e^- \approx \Upsilon(4S)$
$3.59\pm0.77\pm0.48$		[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 $0.92 \pm 0.20 \pm 0.11$.

[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					
$40.5\pm0.7\pm0.9$	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
$41.4\pm0.8\pm0.5$		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
$42.2\pm1.6\pm0.3$		MITCHELL	09A	CLEO	Dalitz fit, 12k evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$39.6\pm3.3\pm4.7$		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

$\Gamma\big(K^+\overline{K}^*(892)^0,\ \overline{K}^{*0}\to K^-\pi^+\big)/\Gamma\big(K^+K^-\pi^+\big)$ 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

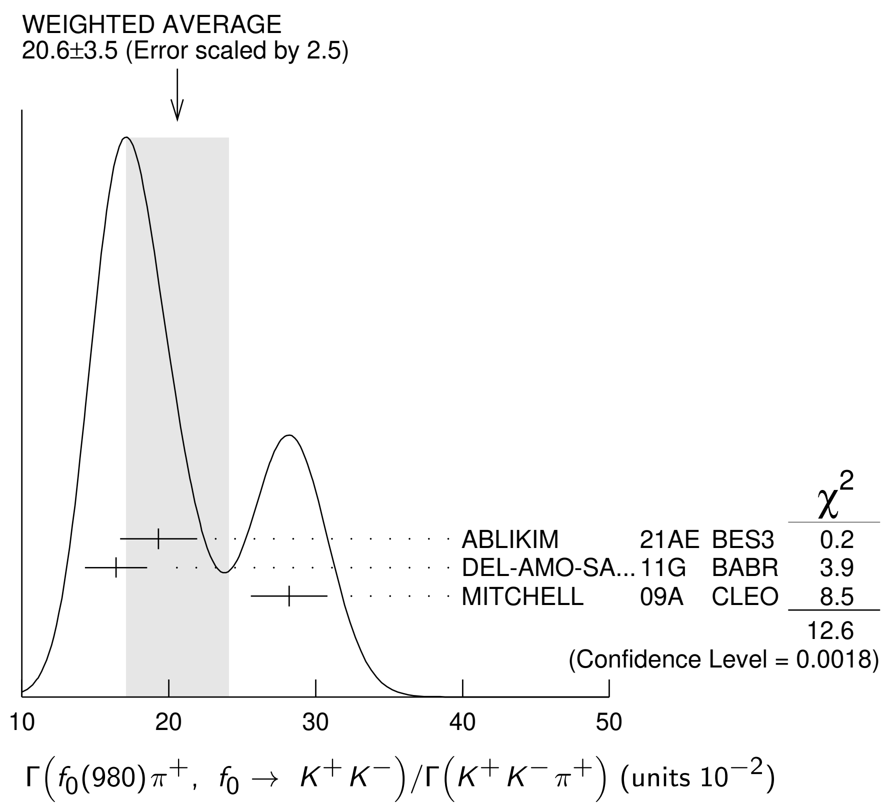
$\Gamma\big(K^+\overline{K}^*(892)^0,\ \overline{K}^{*0}\to K^0_S\pi^0\big)/\Gamma\big(K^+K^0_S\pi^0\big)$ Γ_{52}/Γ_{60}

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

$\Gamma\big(f_0(980)\pi^+,\ f_0\to K^+K^-\big)/\Gamma\big(K^+K^-\pi^+\big)$ 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.

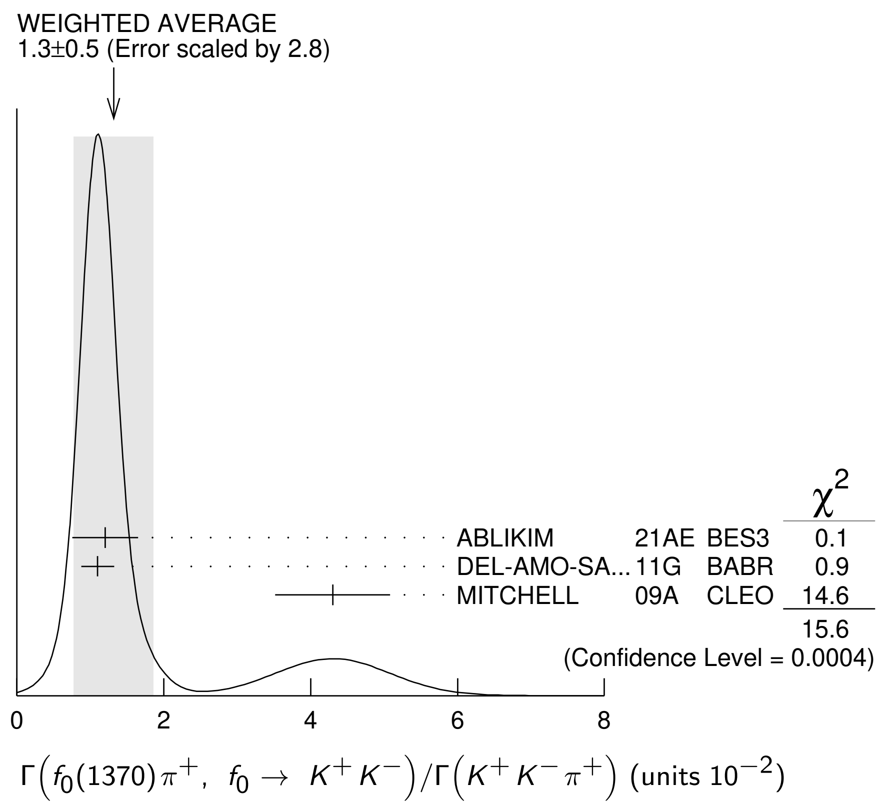
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
20.6±3.5 OUR AVERAGE	Error includes scale factor of 2.5. See the ideogram below.				
19.3±1.7±2.0	18.6k	ABLIKIM	21AE	BES3	e^+e^- at 4.178 GeV
16.4±0.7±2.0		DEL-AMO-SA...	11G	BABR	Dalitz fit, 96k evts
28.2±1.9±1.8		MITCHELL	09A	CLEO	Dalitz fit, 12k 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



$\Gamma\big(f_0(1370)\pi^+,\ f_0 \to K^+K^-\big)/\Gamma\big(K^+K^-\pi^+\big)$ 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



$\Gamma\big(f_0(1710)\pi^+,\ f_0 \to K^+K^-\big)/\Gamma\big(K^+K^-\pi^+\big)$ 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

$\Gamma\big(a_0(980)^+\pi^0,\ a_0^+ \to K^+K_S^0\big)/\Gamma\big(K^+K_S^0\pi^0\big)$ 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

$\Gamma(a_0(1710)^+\pi^0,\ a_0^+ \to K^+ K_S^0)/\Gamma(K^+ K_S^0 \pi^0)$ $\quad\Gamma_{57}/\Gamma_{60}$

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.

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

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

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

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

$\Gamma(K^+ K_S^0 \pi^0)/\Gamma_{\text{total}}$ $\quad\Gamma_{60}/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.47±0.07 OUR AVERAGE					
1.46±0.06±0.05	990	ABLIKIM	22AH	BES3	e^+e^- at 4.178-4.226 GeV
1.52±0.09±0.20		ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$\Gamma(K^*(892)^+ K_S^0,\ K^{*+} \to K^+\pi^0)/\Gamma(K^+ K_S^0 \pi^0)$ $\quad\Gamma_{61}/\Gamma_{60}$

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

$\Gamma(2K_S^0\pi^+)/\Gamma_{\text{total}}$ $\quad\Gamma_{62}/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.71±0.04 OUR AVERAGE	Error includes scale factor of 1.3.				
0.68±0.04±0.01	370	ABLIKIM	22F	BES3	e^+e^- at 4.178–4.226 GeV
0.77±0.05±0.03		ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$\Gamma(f_0(980)\pi^+,\ f_0 \to K_S^0 K_S^0)/\Gamma_{\text{total}}$ $\quad\Gamma_{63}/\Gamma$

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 $K_S^0 K_S^0$.

$\Gamma(f_0(1710)\pi^+,\ f_0 \to K^0_S K^0_S)/\Gamma(2K^0_S\pi^+)$ — 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
5.50±0.24 OUR FIT	Error includes scale factor of 1.3.				
5.51±0.28 OUR AVERAGE	Error includes scale factor of 1.5.				
5.42±0.10±0.17	3k	[1] ABLIKIM	21U	BES3	e^+e^- at 4.178–4.226 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. • • •					
5.65±0.29±0.40		[2] ALEXANDER	08	CLEO	See ONYISI 13

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

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

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

$\Gamma(\overline{K}_1(1270)^0K^+,\ \overline{K}_1(1270)^0 \to K^-\rho^+)/\Gamma_{total}$ — 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 $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.

$\Gamma(\overline{K}_1(1270)^0K^+,\ \overline{K}_1(1270)^0 \to K^*(892)\pi)/\Gamma_{total}$ — 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 $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.
[2] $\overline{K}_1(1270)^0 \to K^*(892)\pi$ 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.

$\Gamma(\overline{K}_1(1400)^0 K^+,\ \overline{K}_1(1400)^0 \to K^*(892)\pi)/\Gamma_{total}$ — 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] $\overline{K}_1(1400)^0 \to K^*(892)\pi$ 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.

$\Gamma(a_0(980)^0\rho^+,\ a_0^0 \to K^+K^-)/\Gamma_{total}$ — 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 $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.

$\Gamma(f_1(1420)^0\pi^+,\ f_1(1420)^0 \to K^*(892)^\mp K^\pm)/\Gamma_{total}$ — 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 $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.

$\Gamma(f_1(1420)^0\pi^+,\ f_1(1420)^0 \to a_0(980)^0\pi^0,\ a_0(980)^0 \to K^+K^-)/\Gamma_{total}$ — 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 $D_s^+ \to K^+K^-\pi^+\pi^0$ with 9 components.

$\Gamma(\eta(1475)\pi^+,\ \eta(1475) \to a_0(980)^0\pi^0,\ a_0(980)^0 \to K^+K^-)/\Gamma_{total}$ — 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
1.53±0.08 OUR FIT Error includes scale factor of 1.5.					
1.53±0.11 OUR AVERAGE Error includes scale factor of 1.8.					
1.46±0.05±0.05	1.3k	ABLIKIM	21K	BES3	e^+e^- at 4.178–4.226 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. • • •					
1.64±0.10±0.07		[1] ALEXANDER	08	CLEO	See ONYISI 13

[1] 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

$\Gamma(K^*(892)^+ \overline{K}^*(892)^0)/\Gamma(K^0_S K^- 2\pi^+)$ — 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] $D_s^+ \rightarrow K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

$\Gamma(\eta(1475) K^0_S,\ \eta \rightarrow K^*(892)^0 \pi^+,\ K^{*0} \rightarrow K^- \pi^+)/\Gamma(K^0_S K^- 2\pi^+)$ — 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] $D_s^+ \rightarrow K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

$\Gamma(\eta(1475)\pi^+,\ \eta \rightarrow \overline{K}^*(892)^+ K^-,\ \overline{K}^{*+} \rightarrow K^0_S \pi^+)/\Gamma(K^0_S K^- 2\pi^+)$ — 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] $D_s^+ \rightarrow K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

$\Gamma(\eta(1475)\pi^+,\ \eta \rightarrow a_0(980)^- \pi^+,\ a_0^- \rightarrow K^0_S K^-)/\Gamma(K^0_S K^- 2\pi^+)$ — 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] $D_s^+ \rightarrow K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

$\Gamma(f_1(1285)\pi^+,\ f_1 \rightarrow a_0(980)^- \pi^+,\ a_0^- \rightarrow K^0_S K^-)/\Gamma(K^0_S K^- 2\pi^+)$ — 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] $D_s^+ \rightarrow K^0_S K^- 2\pi^+$ amplitude analysis with 13 components.

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

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.95±0.08 OUR FIT Error includes scale factor of 1.1.				
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
0.62 ±0.05 OUR FIT					
0.586±0.052±0.043	476	LINK	01C	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

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

$\Gamma(\pi^+\pi^0)/\Gamma_{\text{total}}$ 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
1.08±0.04 OUR FIT				
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
0.201±0.007 OUR FIT					
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_{111}/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.

$\Gamma(\pi^+(\pi^+\pi^-)_{S-wave})/\Gamma(2\pi^+\pi^-)$ — Γ_{96}/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_{97}/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

$\Gamma(f_0(1370)\pi^+,\ f_0 \to \pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ — 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. • • •				
0.324±0.077±0.017	AITALA	01A	E791	Dalitz fit, 848 evts

$\Gamma(f_0(1500)\pi^+,\ f_0 \to \pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ — 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. • • •				
0.274±0.114±0.019	[1] FRABETTI	97D	E687	γ Be ≈ 200 GeV

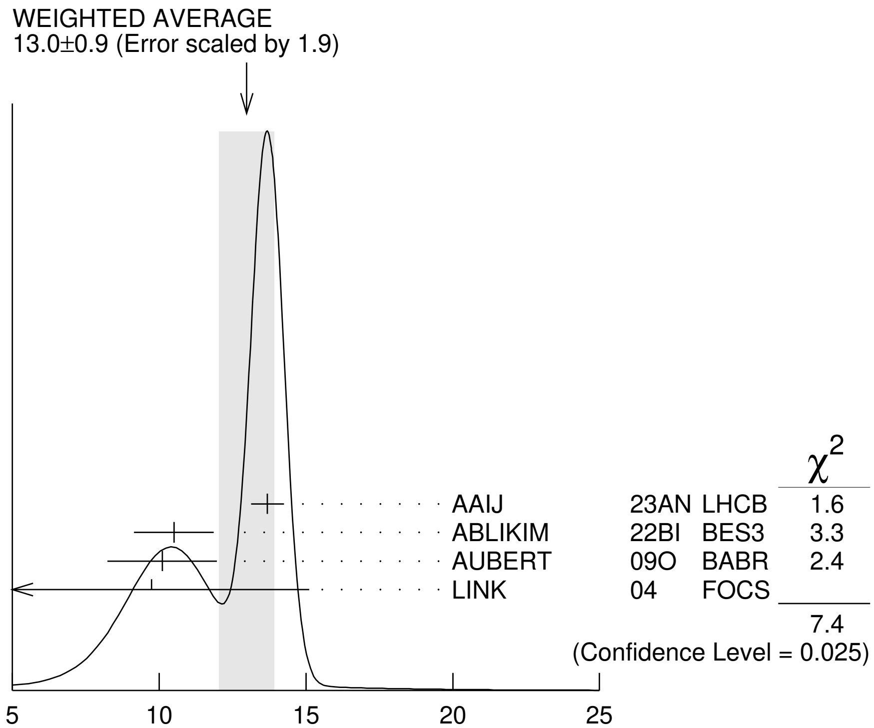
[1] FRABETTI 97D calls this mode $S(1475)\pi^+$, but finds the mass and width of this $S(1475)$ to be in excellent agreement with those of the $f_0(1500)$.

$\Gamma(f_2(1270)\pi^+,\ f_2 \to \pi^+\pi^-)/\Gamma(2\pi^+\pi^-)$ — Γ_{100}/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±0.14±0.22±0.49	[1] AAIJ	23AN	LHCB	Dalitz fit, 0.7M events
10.5 ±0.8 ±1.1	ABLIKIM	22BI	BES3	Dalitz fit, 11.1k events
10.1 ±1.5 ±1.1	AUBERT	09O	BABR	Dalitz fit, ≈ 10.5k evts
9.74±4.49±2.94	LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •				
19.7 ±3.3 ±0.6	AITALA	01A	E791	Dalitz fit, 848 evts
12.3 ±5.6 ±1.8	FRABETTI	97D	E687	γ Be ≈ 200 GeV

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



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

$\Gamma\big(f_2'(1525)^0\pi^+,\ f_2' \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ Γ_{101}/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.

$\Gamma\big(\rho(1450)^0\pi^+,\ \rho^0 \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ Γ_{102}/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.

$\Gamma\big(\rho(1700)^0\pi^+,\ \rho^0 \to \pi^+\pi^-\big)/\Gamma\big(2\pi^+\pi^-\big)$ Γ_{103}/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_{104}/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

$\Gamma(f_0(980)\pi^+,\ f_0 \to \pi^0\pi^0)/\Gamma(\pi^+ 2\pi^0)$ — $\Gamma_{105}/\Gamma_{104}$

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

$\Gamma(f_0(1370)\pi^+,\ f_0 \to \pi^0\pi^0)/\Gamma(\pi^+ 2\pi^0)$ — $\Gamma_{106}/\Gamma_{104}$

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

$\Gamma(f_2(1270)\pi^+,\ f_2 \to \pi^0\pi^0)/\Gamma(\pi^+ 2\pi^0)$ — $\Gamma_{107}/\Gamma_{104}$

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_{108}/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

$\Gamma(\eta\pi^+)/\Gamma_{total}$ — Γ_{109}/Γ

Unseen decay modes of the η are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.67±0.09 OUR FIT	Error includes scale factor of 1.1.				
1.71±0.08 OUR AVERAGE					
1.67±0.08±0.06		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
1.82±0.14±0.07	0.8k	ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.58±0.11±0.18		[1] ALEXANDER	08	CLEO	See ONYISI 13

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

$\Gamma(\eta\pi^+)/\Gamma(K^+K^0_S)$ — Γ_{109}/Γ_{44}

Unseen decay modes of the η are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.15 ±0.07 OUR FIT	Error includes scale factor of 1.1.				
• • • 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_{109}/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 ∼ 4226 MeV

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{109}/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. • • •					
$0.48\pm0.03\pm0.04$	920	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
$0.54\pm0.09\pm0.06$	165	ALEXANDER	92	CLE2	See JESSOP 98

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+,\ \phi\to K^+K^-)$ — Γ_{109}/Γ_{49}

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

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

Unseen decay modes of the ω are included.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.192±0.030 OUR FIT					
0.181±0.032 OUR AVERAGE					
$0.177\pm0.032\pm0.013$	65 ± 12	ABLIKIM	19AH	BES3	e^+e^- at 4.178 GeV
$0.21\ \pm0.09\ \pm0.01$	6 ± 2.4	GE	09A	CLEO	e^+e^- at 4170 MeV

$\Gamma(\omega\pi^+)/\Gamma(\eta\pi^+)$ — $\Gamma_{110}/\Gamma_{109}$

Unseen decay modes of the resonances are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.115±0.018 OUR FIT				
0.16 ±0.04 ±0.03	BALEST	97	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(3\pi^+2\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{112}/Γ_{47}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.146±0.014 OUR AVERAGE					
$0.145\pm0.011\pm0.010$	671	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
$0.158\pm0.042\pm0.031$	37	FRABETTI	97C	E687	γBe, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\eta\rho^+)/\Gamma_{total}$ — Γ_{114}/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_{114}/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. • • •					
$2.98\pm0.20\pm0.39$	447	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
$2.86\pm0.38^{+0.36}_{-0.38}$	217	AVERY	92	CLE2	See JESSOP 98

$\Gamma(\eta\rho^+)/\Gamma(\eta\pi^+\pi^0)$ — $\Gamma_{114}/\Gamma_{115}$

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

$\Gamma(\eta\pi^+\pi^0)/\Gamma_{total}$ — Γ_{115}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
9.5 ±0.5 OUR AVERAGE					
9.50±0.28±0.41	2.6k	ABLIKIM	19BE	BES3	e^+e^- at 4.178 GeV
9.2 ±0.4 ±1.1		ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$\Gamma(\eta(\pi^+\pi^0)_{P-wave})/\Gamma(\eta\pi^+\pi^0)$ — $\Gamma_{116}/\Gamma_{115}$

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

$\Gamma(a_0(980)^{+0}\pi^{0+},\ a_0(980)^{+0}\to\eta\pi^{+0})/\Gamma(\eta\pi^+\pi^0)$ — $\Gamma_{117}/\Gamma_{115}$

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_{118}/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_{119}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.12±0.13±0.09	2.1k	ABLIKIM	21AR	BES3	e^+e^- at 4.178–4.226 GeV

$\Gamma(a_1(1260)^+\eta,\ a_1^+\to\rho(770)^0\pi^+,\ \rho^0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{120}/\Gamma_{119}$

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.

$\Gamma(a_1(1260)^+\eta,\ a_1^+\to f_0(500)\pi^+,\ f_0\to\pi^+\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{121}/\Gamma_{119}$

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.

$\Gamma(a_0(980)^+\rho(770)^0,\ a_0^+\to\eta\pi^+)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{122}/\Gamma_{119}$

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.

$\Gamma(\eta(1405)\pi^+,\ \eta(1405)\to a_0(980)^-\pi^+,\ a_0^-\to\eta\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{123}/\Gamma_{119}$

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.

$\Gamma(\eta(1405)\pi^+,\ \eta(1405) \to a_0(980)^+\pi^-,\ a_0^+ \to \eta\pi^+)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{124}/\Gamma_{119}$

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.

$\Gamma(f_1(1420)\pi^+,\ f_1 \to a_0(980)^-\pi^+,\ a_0^- \to \eta\pi^-)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{125}/\Gamma_{119}$

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.

$\Gamma(f_1(1420)\pi^+,\ f_1 \to a_0(980)^+\pi^-,\ a_0^+ \to \eta\pi^+)/\Gamma(2\pi^+\pi^-\eta)$ — $\Gamma_{126}/\Gamma_{119}$

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_{127}/Γ

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

$\Gamma(\omega 2\pi^+\pi^-)/\Gamma_{total}$ — Γ_{128}/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_{129}/Γ

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

VALUE (%)	DOCUMENT ID		TECN	COMMENT
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_{129}/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_{129}/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 ∼ 4226 MeV

$\Gamma(\eta'(958)\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{129}/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

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

$\Gamma(\eta'(958)\rho^+)/\Gamma_{total}$ — Γ_{132}/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_{132}/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.

$\Gamma(\eta'(958)\rho^+)/\Gamma(\eta'(958)\pi^+\pi^0)$ — $\Gamma_{132}/\Gamma_{133}$

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%.

$\Gamma(\eta'(958)\pi^+\pi^0)/\Gamma_{total}$ — Γ_{133}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
6.08±0.29 OUR AVERAGE					
$6.15\pm0.25\pm0.18$	837	[1] ABLIKIM	22AA	BES3	e^+e^- at 4.178–4.226 GeV
$5.6\ \pm0.5\ \pm0.6$		ONYISI	13	CLEO	e^+e^- at 4.17 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.

$\Gamma(\eta'(958)\pi^+\pi^0 \text{ nonresonant})/\Gamma_{total}$ — Γ_{134}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.1 × 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_{135}/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_{135}/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_{135}/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_{136}/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_{136}/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_{137}/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_{137}/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_{137}/Γ_{49}

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

$\Gamma(K^+\eta)/\Gamma(\eta\pi^+)$ — $\Gamma_{137}/\Gamma_{109}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8.9±1.5±0.4	113 ± 18	ADAMS	07A	CLEO	See MENDEZ 10

$\Gamma(K^+\omega)/\Gamma_{total}$ — Γ_{138}/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.

$\Gamma(K^+\omega)/\Gamma(K^+\pi^+\pi^-\pi^0)$ — $\Gamma_{138}/\Gamma_{158}$

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_{139}/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_{139}/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

$\Gamma(K^+\eta'(958))/\Gamma(\eta'(958)\pi^+)$ — $\Gamma_{139}/\Gamma_{129}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.2±1.3±0.3	28 ± 9	ADAMS	07A	CLEO	See MENDEZ 10

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.20±0.19 OUR FIT					
6.20±0.19 OUR AVERAGE					
6.11±0.18±0.11	1.3k	ABLIKIM	22AC	BES3	e^+e^- at 4.178–4.226 GeV
6.54±0.33±0.25		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.9 ±0.5 ±0.3		[1] ALEXANDER	08	CLEO	See ONYISI 13

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

$\Gamma(K^+\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{140}/Γ_{47}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.115±0.004 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

$\Gamma(K^+\rho^0)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{141}/\Gamma_{140}$

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

$\Gamma(K^+\rho(1450)^0,\ \rho^0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{142}/\Gamma_{140}$

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

$\Gamma(K^+ f_0(500),\ f_0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{143}/\Gamma_{140}$

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

$\Gamma(K^+ f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{144}/\Gamma_{140}$

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

$\Gamma(K^+ f_0(1370),\ f_0 \to \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{145}/\Gamma_{140}$

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

$\Gamma(K^*(892)^0\pi^+,\ K^{*0} \to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{146}/\Gamma_{140}$

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

$\Gamma(K^*(1410)^0\pi^+,\ K^{*0} \to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{147}/\Gamma_{140}$

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

$\Gamma(K^*(1430)^0\pi^+,\ K^{*0} \to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{148}/\Gamma_{140}$

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

$\Gamma(K^+\pi^+\pi^-$ nonresonant$)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{149}/\Gamma_{140}$

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

$\Gamma(K^0_S\pi^+\pi^0)/\Gamma_{total}$ — Γ_{151}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.38±0.32 OUR AVERAGE					
5.43±0.30±0.15	666	[1] ABLIKIM	21AB	BES3	e^+e^- at 4.178–4.226 GeV
5.0 ±0.9 ±0.2	44	[2] NAIK	09A	CLEO	e^+e^- at 4170 MeV

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

[2] 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.

$\Gamma(K^0_S\rho(770)^+,\ \rho^+ \to \pi^+\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{152}/\Gamma_{151}$

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.

$\Gamma(K^0_S\rho(1450)^+,\ \rho^+ \to \pi^+\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{153}/\Gamma_{151}$

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.

$\Gamma(K^*(892)^0\pi^+,\ K^{*0} \to K^0_S\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{154}/\Gamma_{151}$

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.

$\Gamma(K^*(892)^+\pi^0,\ K^{*+} \to K^0_S\pi^+)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{155}/\Gamma_{151}$

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.

$\Gamma(K^*(1410)^0\pi^+,\ K^{*0} \to K^0_S\pi^0)/\Gamma(K^0_S\pi^+\pi^0)$ — $\Gamma_{156}/\Gamma_{151}$

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_{157}/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_{158}/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

$\Gamma(K^+\pi^+\pi^-\pi^0)/\Gamma_{total}$ **Γ_{158}/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

$\Gamma(K^*(892)^0\rho^+,\ K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{159}/\Gamma_{158}$**

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

$\Gamma(K^*(892)^+\rho^0,\ K^{*+}\to K^+\pi^0)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{160}/\Gamma_{158}$**

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

$\Gamma(K_1(1270)^0\pi^+,\ K_1^0\to K^+\rho^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{161}/\Gamma_{158}$**

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

$\Gamma(K_1(1400)^0\pi^+,\ K_1^0\to K^*(890)^+\pi^-,\ K^{*+}\to K^+\pi^0)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{162}/\Gamma_{158}$**

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

$\Gamma(K_1(1400)^0\pi^+,\ K_1^0\to K^*(890)^0\pi^0,\ K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{163}/\Gamma_{158}$**

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

$\Gamma(K^+a_1(1260)^0,\ a_1\to\rho^+\pi^-)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{164}/\Gamma_{158}$**

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

$\Gamma(K^+a_1(1260)^0,\ a_1\to\rho^-\pi^+)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{165}/\Gamma_{158}$**

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

$\Gamma(K^+\pi^+\pi^-\pi^0$ nonresonant$)/\Gamma(K^+\pi^+\pi^-\pi^0)$ **$\Gamma_{166}/\Gamma_{158}$**

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

$\Gamma\big((K^+\pi^0)_{P-wave}\rho^0\big)/\Gamma\big(K^+\pi^+\pi^-\pi^0\big)$ — $\Gamma_{167}/\Gamma_{158}$

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

$\Gamma\big(K^+\omega\pi^0\big)/\Gamma_{\text{total}}$ — Γ_{168}/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

$\Gamma\big(K^+\omega\pi^+\pi^-\big)/\Gamma_{\text{total}}$ — Γ_{169}/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

$\Gamma\big(K^+\omega\eta\big)/\Gamma_{\text{total}}$ — Γ_{170}/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

$\Gamma\big(2K^+K^-\big)/\Gamma\big(K^+K^-\pi^+\big)$ — Γ_{171}/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

$\Gamma\big(\phi K^+,\ \phi\to K^+K^-\big)/\Gamma\big(2K^+K^-\big)$ — $\Gamma_{172}/\Gamma_{171}$

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

Doubly Cabibbo-suppressed modes

$\Gamma\big(2K^+\pi^-\big)/\Gamma\big(K^+K^-\pi^+\big)$ — Γ_{173}/Γ_{47}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
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%

$\Gamma\big(K^+K^*(892)^0,\ K^{*0}\to K^+\pi^-\big)/\Gamma\big(2K^+\pi^-\big)$ — $\Gamma_{174}/\Gamma_{173}$

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

Baryon-antibaryon mode

$\Gamma\big(p\overline{n}\big)/\Gamma_{\text{total}}$ — Γ_{175}/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±0.10±0.05	193 ± 17	ABLIKIM	19O	BES3	e^+e^-, E_{cm}= 4178 MeV
$1.30\pm0.36^{+0.12}_{-0.16}$	13.0 ± 3.6	ATHAR	08	CLEO	e^+e^-, $E_{\text{cm}}\approx$ 4170 MeV

$\Gamma(p\overline{p}e^+\nu_e)/\Gamma_{total}$ — Γ_{176}/Γ

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

Rare or forbidden modes

$\Gamma(\pi^+e^+e^-)/\Gamma_{total}$ — Γ_{177}/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 × 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_{178}/Γ

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$(6^{+8}_{-4}\pm1) \times 10^{-6}$	3	RUBIN	10	CLEO	e^+e^- at 4170 MeV

$\Gamma(\pi^+\mu^+\mu^-)/\Gamma_{total}$ — Γ_{179}/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. • • •					
$<4.1 \times 10^{-7}$	90	AAIJ	13AF	LHCB	pp at 7 TeV
$<4.3 \times 10^{-5}$	90	LEES	11G	BABR	$e^+e^- \approx \Upsilon(4S)$
$<2.6 \times 10^{-5}$	90	LINK	03F	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
$<1.4 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
$<4.3 \times 10^{-4}$	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^+e^+e^-)/\Gamma_{total}$ — Γ_{180}/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. • • •					
$<4.9 \times 10^{-6}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
$<5.2 \times 10^{-5}$	90	RUBIN	10	CLEO	e^+e^- at 4170 MeV
$<1.6 \times 10^{-3}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^+\mu^+\mu^-)/\Gamma_{total}$ — Γ_{181}/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. • • •

$<21 \times 10^{-6}$	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$
$< 3.6 \times 10^{-5}$	90	LINK	03F	FOCS	γ A, $\overline{E}_{\gamma} \approx$ 180 GeV
$< 1.4 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
$< 5.9 \times 10^{-4}$	90	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^*(892)^+ \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{182}/Γ

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

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

$\Gamma(\pi^+ e^+ \mu^-)/\Gamma_{total}$ — Γ_{183}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 1.1 \times 10^{-6}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp

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

$<12 \times 10^{-6}$	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\pi^+ e^- \mu^+)/\Gamma_{total}$ — Γ_{184}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 9.4 \times 10^{-7}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp

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

$<20 \times 10^{-6}$	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(K^+ e^+ \mu^-)/\Gamma_{total}$ — Γ_{185}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 7.9 \times 10^{-7}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp

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

$<14 \times 10^{-6}$	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(K^+ e^- \mu^+)/\Gamma_{total}$ — Γ_{186}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.6 \times 10^{-7}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp

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

$<9.7 \times 10^{-6}$	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\pi^- 2e^+)/\Gamma_{total}$ — Γ_{187}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 1.4 \times 10^{-6}$	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp

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

$< 4.1 \times 10^{-6}$	90	LEES	11G	BABR	$e^+ e^- \approx \Upsilon(4S)$
$< 1.8 \times 10^{-5}$	90	RUBIN	10	CLEO	$e^+ e^-$ at 4170 MeV
$<69 \times 10^{-5}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(\pi^- 2\mu^+)/\Gamma_{total}$ — Γ_{188}/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_{189}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.3 × 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_{190}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 7.7 × 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_{191}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.6 × 10^{-8}	90	AAIJ	21T	LHCB	1.6 fb^{-1} pp
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-5}$	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_{192}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.6 × 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_{193}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.4 × 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.

$D_s^+ \to 2\pi^+ \pi^- \eta$ 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 $D_s^+ \to \rho^+ \eta'$.

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

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

$D_s^+ \to K^+\pi^+\pi^-$ 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 .

$D_s^+ \to K_S^0\pi^+\pi^0$ 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.

$D_s^+ \to K^+\pi^+\pi^-\pi^0$ 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.

$D_s^+ \to 2K_S^0\pi^+$ 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.

$D_s^+ \to (KS)^0 K^- 2\pi^+$ 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.

$D_s^+ \to K^-K^+\pi^+\pi^0$ 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.

$D_s^+ \to K^-K^+2\pi^+\pi^-$ 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 $(-0.1 \pm 1.9 \pm 1.0)$%.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.09±0.26 OUR AVERAGE					
0.6 ±2.8 ±0.6	1.8k	ABLIKIM	19AM	BES3	e^+e^- at 4178 MeV
−0.05±0.23±0.24	288k	[1] LEES	13E	BABR	e^+e^- at $\Upsilon(4S)$
2.6 ±1.5 ±0.6		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
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. • • •					
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 $(+0.28 \pm 0.23 \pm 0.24)$%.

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

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
−0.5±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

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

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−1.6±6.0±1.1	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

$A_{CP}(2K^0_S\pi^\pm)$ in $D_s^\pm \to 2K^0_S\pi^\pm$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3.1±5.2±0.6	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

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

VALUE (%)	DOCUMENT ID		TECN	COMMENT
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 $D_s^\pm \to K^\pm K^0_S\pi^+\pi^-$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−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 $D_s^+ \to K^0_S K^\mp 2\pi^\pm$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
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 $D_s^\pm \to \pi^+\pi^-\pi^\pm$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−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 $D_s^\pm \to \pi^\pm\eta$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.31 OUR AVERAGE					
0.32±0.51±0.12	136k	AAIJ	23E	LHCB	6 fb^{-1}, pp at 13 TeV, $\eta \to \gamma\pi\pi$
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

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
−0.06±0.22 OUR AVERAGE Error includes scale factor of 1.6.					
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 $D_s^{\pm} \rightarrow \eta\pi^{\pm}\pi^0$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−0.5±3.9±2.0	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

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

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−0.4±7.4±1.9	ONYISI	13	CLEO	e^+e^- at 4.17 GeV

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

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 $D_s^+ \rightarrow \overline{K}^0\pi^+$, $D_s^- \rightarrow K^0\pi^-$

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 $A_{CP}(D_s^{\pm} \rightarrow K_S^0 K^{\pm})$ with CP-violation effects in the $K^0 - \overline{K}^0$ system subtracted. It also measures $A_{CP}(D^{\pm} \rightarrow \overline{K}^0/K^0 K^{\pm}) + A_{CP}(D_s^{\pm} \rightarrow \overline{K}^0/K^0\pi^{\pm}) = (0.41 \pm 0.49 \pm 0.26)\%$.

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

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 $D_s^{\pm} \rightarrow K^{\pm}\pi^+\pi^-$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
3.7±2.7 OUR AVERAGE					
3.3±3.0±1.3	1.3k	ABLIKIM	22AC	BES3	e^+e^- at 4.178–4.226 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. • • •					
11.2±7.0±0.9		ALEXANDER	08	CLEO	See ONYISI 13

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.7±5.5±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.

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

$A_{Tviol}(K^0_S K^\pm \pi^+ \pi^-)$ in $D^\pm_s \to K^0_S K^\pm \pi^+ \pi^-$

$C_T \equiv \vec{p}_{K^+} \cdot (\vec{p}_{\pi^+} \times \vec{p}_{\pi^-})$ 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 $K^0_S K^\pm \pi^+ \pi^- \to D^\pm_s$ is not accessible, while the *P*-conjugate process is.

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$-$ 8 $\pm$ 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

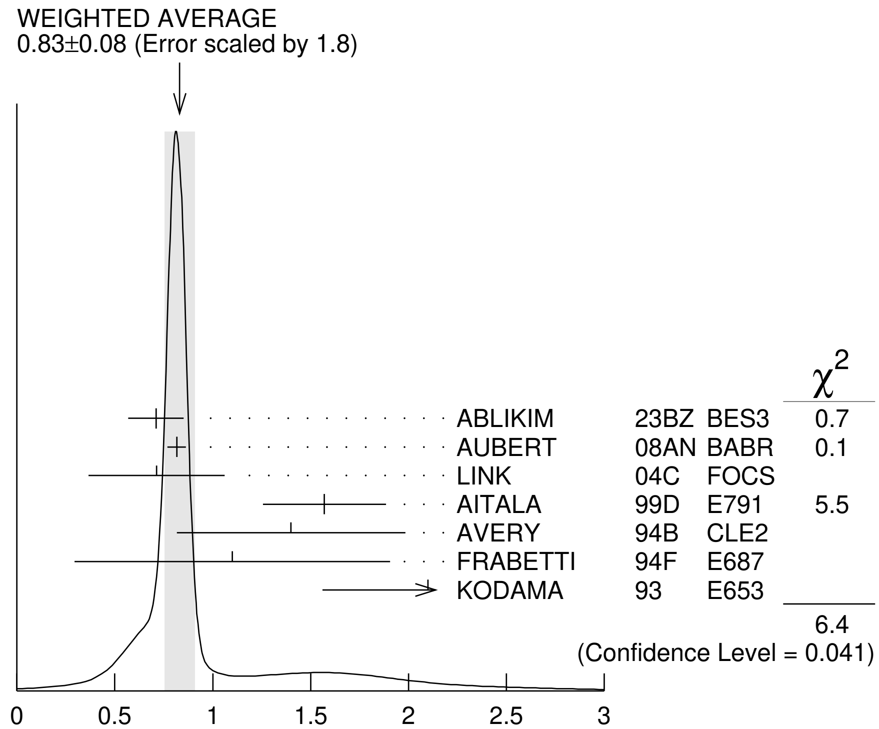
D^+_s Semileptonic Form Factors and Decay Constants

$r_2 \equiv A_2(0)/A_1(0)$ in $D^+_s \to \phi \ell^+ \nu_\ell$

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.83 $\pm$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$\pm$0.202$\pm$0.284	793	LINK	04C	FOCS	$\phi \mu^+ \nu_\mu$
1.57 $\pm$0.25 $\pm$0.19	271	AITALA	99D	E791	$\phi e^+ \nu_e$, $\phi \mu^+ \nu_\mu$
1.4 $\pm$0.5 $\pm$0.3	308	AVERY	94B	CLE2	$\phi e^+ \nu_e$
1.1 $\pm$0.8 $\pm$0.1	90	FRABETTI	94F	E687	$\phi \mu^+ \nu_\mu$
2.1 $^{+0.6}_{-0.5}$ $\pm$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.

$f_+(0)\,|V_{cs}|$ in $D_s^+ \rightarrow \eta e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
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	[1] ABLIKIM	19S	BES3	e^+e^- at 4178 MeV

[1] Superseded by ABLIKIM 23BO

$f_+(0)\,|V_{cs}|$ in $D_s^+ \rightarrow \eta' e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
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	[1] ABLIKIM	19S	BES3	e^+e^- at 4178 MeV

[1] Superseded by ABLIKIM 23BO

$f_+(0)|V_{cd}|$ in $D_s^+ \rightarrow K^0 e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.162±0.019±0.003	117	[1] ABLIKIM	19D	BES3	$K_S^0 e^+ \nu_e$

[1] Using a two parameter fit in the z expansion.

$r_V \equiv V(0)/A_1(0)$ in $D_s^+ \rightarrow K^*(892)^0 e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.67±0.34±0.16	155	ABLIKIM	19D	BES3	e^+e^- at 4178 MeV

$r_2 \equiv A_2(0)/A_1(0)$ in $D_s^+ \rightarrow K^*(892)^0 e^+ \nu_e$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.77±0.28±0.07	155	ABLIKIM	19D	BES3	e^+e^- at 4178 MeV

$f_{D_s^+}\,|V_{cs}|$ in $D_s^+ \rightarrow \mu^+ \nu_\mu$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
241.8±2.5±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±3.0±3.6±1.0	2.2K	[1,2] ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV
246.2±3.6±3.5	1.1k	[2] ABLIKIM	19E	BES3	e^+e^- at 4178 MeV

[1] The third uncertainty is dominated by the uncertainty of the D_s^+ lifetime.

[2] Superseded by ABLIKIM 23BR.

$f_{D_s^+}\,|V_{cs}|$ in $D_s^+ \rightarrow \tau^+ \nu_\tau$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
246.6±2.5 OUR AVERAGE					
248.3±3.9±3.1±1.0	2.4k	[1] ABLIKIM	23BP	BES3	e^+e^- at 4.128–4.226 GeV
246.7±3.9±3.6	2.3k	[2] ABLIKIM	23BX	BES3	e^+e^- at 4.128–4.226 GeV
251.6±5.9±4.9	1.7k	[3] ABLIKIM	21AF	BES3	e^+e^- at 4.178, 4.226 GeV
244.4±2.3±2.9	4.9k	[4] 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	[5,6] ABLIKIM	21BE	BES3	e^+e^- at 4.178, 4.226 GeV

[1] ABLIKIM 23BP uses $\tau^+ \to \pi^+ \overline{\nu}_\tau$ decays. The third uncertainty is due to the input parameters, mainly the D_s^+ lifetime.

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

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

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

[5] 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 $243.2 \pm 2.3 \pm 3.3 \pm 1.0$.

[6] The third uncertainty is dominated by the uncertainty of the D_s^+ lifetime. Superseded by ABLIKIM 23BP.

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ABLIKIM	23AL	PR D107 052010	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	23AV	PR D108 032001	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	23BO	PR D108 092003	M. Ablikim et al.	(BESIII Collab.)
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ABLIKIM	22AA	JHEP 2204 058	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	22AB	JHEP 2207 051	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	22AC	JHEP 2208 196	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	22AH	PRL 129 182001	M. Ablikim et al.	(BESIII Collab.)
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ABLIKIM	22BI	PR D106 112006	M. Ablikim et al.	(BESIII Collab.)
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ABLIKIM	19D	PRL 122 061801	M. Ablikim et al.	(BESIII Collab.)
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ABLIKIM	19O	PR D99 031101	M. Ablikim et al.	(BESIII Collab.)
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AAIJ	14C	PL B728 585	R. Aaij *et al.*	(LHCb Collab.)
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AAIJ	13V	JHEP 1306 065	R. Aaij *et al.*	(LHCb Collab.)
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BARLAG	92C	ZPHY C55 383	S. Barlag *et al.*	(ACCMOR Collab.)
Also		ZPHY C48 29	S. Barlag *et al.*	(ACCMOR Collab.)
FRABETTI	92	PL B281 167	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ALBRECHT	91	PL B255 634	H. Albrecht *et al.*	(ARGUS Collab.)
ALVAREZ	91	PL B255 639	M.P. Alvarez *et al.*	(CERN NA14/2 Collab.)
ALBRECHT	90D	PL B245 315	H. Albrecht *et al.*	(ARGUS Collab.)
ALEXANDER	90B	PRL 65 1531	J. Alexander *et al.*	(CLEO Collab.)
BARLAG	90C	ZPHY C46 563	S. Barlag *et al.*	(ACCMOR Collab.)
FRABETTI	90	PL B251 639	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ANJOS	89E	PL B223 267	J.C. Anjos *et al.*	(FNAL E691 Collab.)
CHEN	89	PL B226 192	W.Y. Chen *et al.*	(CLEO Collab.)
ALBRECHT	88	PL B207 349	H. Albrecht *et al.*	(ARGUS Collab.)
ANJOS	88	PRL 60 897	J.C. Anjos *et al.*	(FNAL E691 Collab.)
RAAB	88	PR D37 2391	J.R. Raab *et al.*	(FNAL E691 Collab.)
BECKER	87B	PL B184 277	H. Becker *et al.*	(NA11 and NA32 Collabs.)
BLAYLOCK	87	PRL 58 2171	G.T. Blaylock *et al.*	(Mark III Collab.)
USHIDA	86	PRL 56 1767	N. Ushida *et al.*	(FNAL E531 Collab.)
ALBRECHT	85D	PL 153B 343	H. Albrecht *et al.*	(ARGUS Collab.)
DERRICK	85B	PRL 54 2568	M. Derrick *et al.*	(HRS Collab.)
AIHARA	84D	PRL 53 2465	H. Aihara *et al.*	(TPC Collab.)
ALTHOFF	84	PL 136B 130	M. Althoff *et al.*	(TASSO Collab.)
BAILEY	84	PL 139B 320	R. Bailey *et al.*	(ACCMOR Collab.)
CHEN	83C	PRL 51 634	A. Chen *et al.*	(CLEO Collab.)
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