$D_s^{\pm}$

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

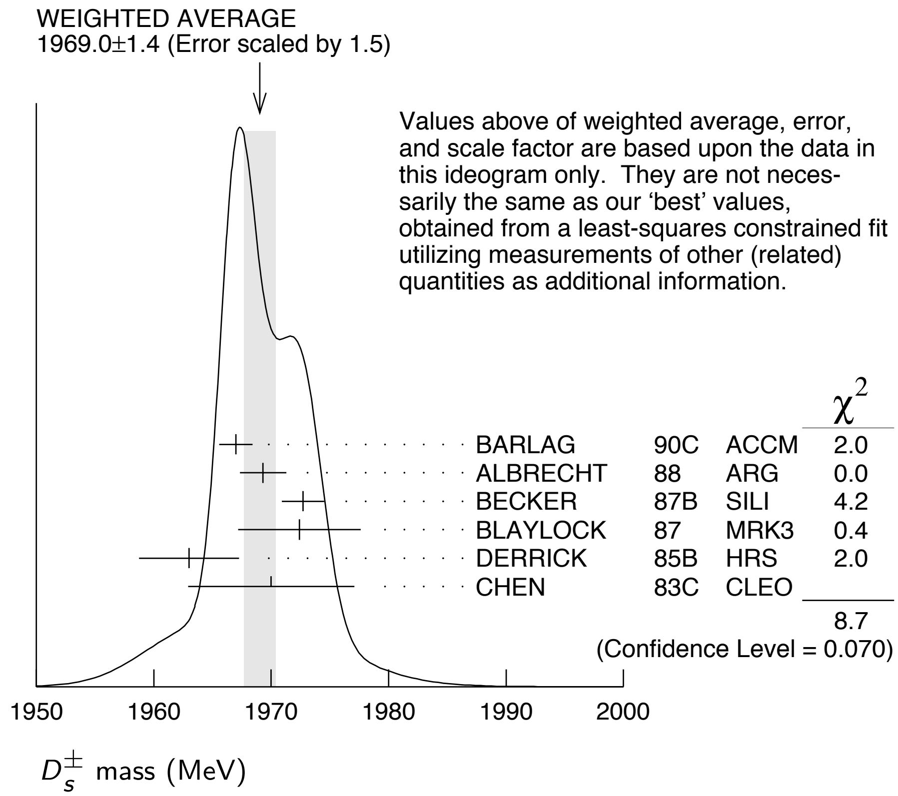
The angular distributions of the decays of the ϕ and $\overline{K}^*(892)^0$ in the $\phi\pi^+$ and $K^+\overline{K}^*(892)^0$ modes strongly indicate that the spin is zero. The parity given is that expected of a $c\overline{s}$ ground state.

$D_s^{\pm}$ MASS

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ 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
1968.49± 0.34 OUR FIT Error includes scale factor of 1.3.					
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}, and $D_s^{*\pm}$ mass and mass difference measurements.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
98.87±0.30 OUR FIT	Error includes scale factor of 1.4.				
98.85±0.25 OUR AVERAGE	Error includes scale factor of 1.1.				
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

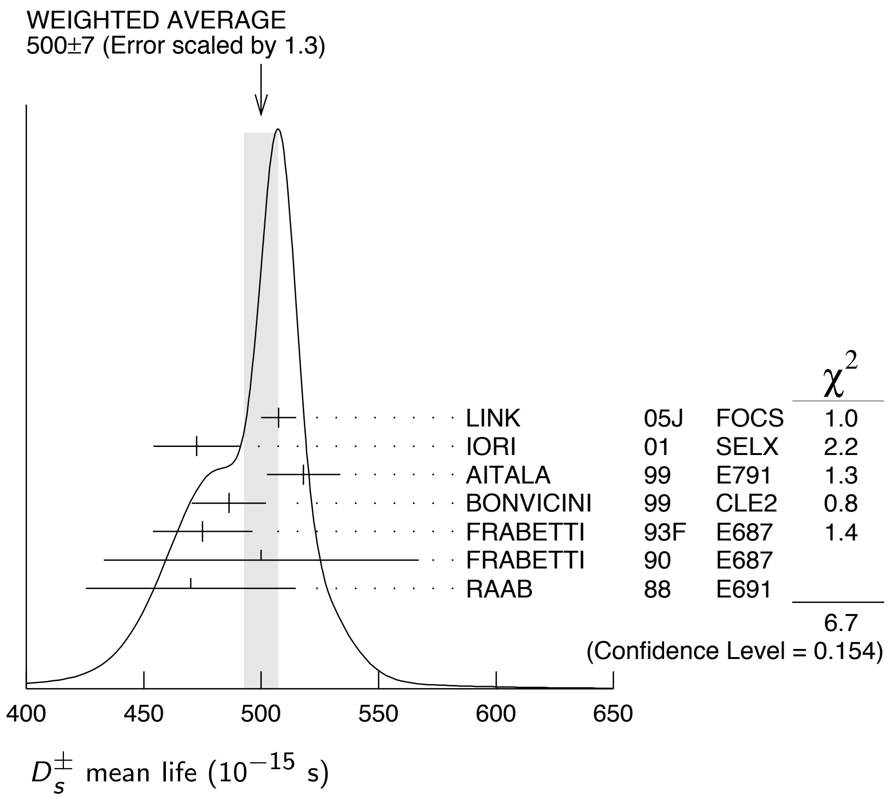
$D_s^\pm$ MEAN LIFE

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
500 ± 7 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
507.4± 5.5± 5.1	13.6k	LINK	05J	FOCS	$\Phi\pi^+$ and $\overline{K}^{*0}K^+$
472.5±17.2± 6.6	760	IORI	01	SELX	600 GeV Σ^-, π^-, p
518 ±14 ± 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	γ Be, $\phi \pi^+$
$500 \pm 60 \pm 30$	104	FRABETTI	90	E687	γ Be, $\phi \pi^+$
$470 \pm 40 \pm 20$	228	RAAB	88	E691	Photoproduction

[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)	Confidence level
	Inclusive modes		
Γ_1	K^- anything	$(13\ ^{+14}_{-12})$ %	
Γ_2	$\overline{K}^0$ anything + K^0 anything	(39 ± 28) %	
Γ_3	K^+ anything	$(20\ ^{+18}_{-14})$ %	
Γ_4	(non-$K\,\overline{K}$) anything	(64 ± 17) %	

Γ_5	η anything	[a]	(24 ± 4) %	
Γ_6	η' anything		(8.7 ± 2.1) %	
Γ_7	ϕ anything		(16.1 ± 1.6) %	
Γ_8	e^+ anything		$(8 {}^{+6}_{-5})$ %	

Leptonic and semileptonic modes

Γ_9	$e^+ \nu_e$		$< 1.3 \times 10^{-4}$	90%
Γ_{10}	$\mu^+ \nu_\mu$		$(6.2 \pm 0.6) \times 10^{-3}$	
Γ_{11}	$\tau^+ \nu_\tau$		(6.6 ± 0.6) %	
Γ_{12}	$\phi \ell^+ \nu_\ell$	[b]	(2.36 ± 0.26) %	
Γ_{13}	$\eta \ell^+ \nu_\ell + \eta'(958) \ell^+ \nu_\ell$	[b]	(3.9 ± 0.7) %	
Γ_{14}	$\eta \ell^+ \nu_\ell$	[b]	(2.9 ± 0.6) %	
Γ_{15}	$\eta'(958) \ell^+ \nu_\ell$	[b]	(1.02 ± 0.33) %	

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

Γ_{16}	$K^+ K^0_S$		(1.49 ± 0.09) %	
Γ_{17}	$K^+ K^- \pi^+$	[c]	(5.50 ± 0.28) %	
Γ_{18}	$\phi \pi^+$	[d,e]	(4.38 ± 0.35) %	
Γ_{19}	$\phi \pi^+, \phi \to K^+ K^-$	[d]	(2.18 ± 0.33) %	
Γ_{20}	$K^+ \overline{K}^*(892)^0$			
Γ_{21}	$K^+ \overline{K}^*(892)^0, \overline{K}^{*0} \to K^- \pi^+$		(2.6 ± 0.4) %	
Γ_{22}	$f_0(980) \pi^+, f_0 \to K^+ K^-$		$(6.0 \pm 2.4) \times 10^{-3}$	
Γ_{23}	$K^+ \overline{K}^*_0(1430)^0, \overline{K}^*_0 \to K^- \pi^+$		$(5.1 \pm 2.5) \times 10^{-3}$	
Γ_{24}	$f_0(1710) \pi^+, f_0 \to K^+ K^-$			
Γ_{25}	$K^+ K^- \pi^+$ nonresonant			
Γ_{26}	$K^0 \overline{K}^0 \pi^+$		—	
Γ_{27}	$K^*(892)^+ \overline{K}^0$	[e]	(5.3 ± 1.2) %	
Γ_{28}	$K^+ K^- \pi^+ \pi^0$		(5.6 ± 0.5) %	
Γ_{29}	$\phi \pi^+ \pi^0, \phi \to K^+ K^-$			
Γ_{30}	$\phi \rho^+, \phi \to K^+ K^-$		$(4.0 {}^{+1.1}_{-1.2})$ %	
Γ_{31}	$\phi \pi^+ \pi^0$ 3-body, $\phi \to K^+ K^-$		< 1.5 %	90%
Γ_{32}	$K^+ K^- \pi^+ \pi^0$ non-ϕ		< 11 %	90%
Γ_{33}	$K^0_S K^- \pi^+ \pi^+$		(1.64 ± 0.12) %	
Γ_{34}	$K^*(892)^+ \overline{K}^*(892)^0$	[e]	(7.0 ± 2.5) %	
Γ_{35}	$K^0 K^- 2\pi^+$ (non-$K^{*+} \overline{K}^{*0}$)		< 3.5 %	90%
Γ_{36}	$K^+ K^0_S \pi^+ \pi^-$		$(9.6 \pm 1.3) \times 10^{-3}$	
Γ_{37}	$K^+ K^- \pi^+ \pi^+ \pi^-$		$(8.8 \pm 1.6) \times 10^{-3}$	
Γ_{38}	$\phi \pi^+ \pi^+ \pi^-, \phi \to K^+ K^-$		$(5.9 \pm 1.1) \times 10^{-3}$	
Γ_{39}	$K^+ K^- \rho^0 \pi^+$ non-ϕ		$< 2.6 \times 10^{-4}$	90%
Γ_{40}	$\phi \rho^0 \pi^+, \phi \to K^+ K^-$		$(6.6 \pm 1.3) \times 10^{-3}$	

Γ_{41}	$\phi a_1(1260)^+$, $\phi \to K^+ K^-$, $a_1^+ \to \rho^0 \pi^+$		$(7.5 \pm 1.3) \times 10^{-3}$	
Γ_{42}	$K^+ K^- \pi^+ \pi^+ \pi^-$ nonresonant		$(9 \pm 7) \times 10^{-4}$	
Γ_{43}	$K^0_S K^0_S \pi^+ \pi^+ \pi^-$		$(8.4 \pm 3.5) \times 10^{-4}$	

Hadronic modes without K's

Γ_{44}	$\pi^+ \pi^0$		$< 6 \times 10^{-4}$	90%
Γ_{45}	$\pi^+ \pi^+ \pi^-$		(1.11 ± 0.08) %	
Γ_{46}	$\rho^0 \pi^+$		not seen	
Γ_{47}	$\pi^+ (\pi^+ \pi^-)_{S-\text{wave}}$	[f]	$(9.7 \pm 1.1) \times 10^{-3}$	
Γ_{48}	$f_0(980) \pi^+$, $f_0 \to \pi^+ \pi^-$			
Γ_{49}	$f_0(1370) \pi^+$, $f_0 \to \pi^+ \pi^-$			
Γ_{50}	$f_0(1500) \pi^+$, $f_0 \to \pi^+ \pi^-$			
Γ_{51}	$f_2(1270) \pi^+$, $f_2 \to \pi^+ \pi^-$		$(1.1 \pm 0.6) \times 10^{-3}$	
Γ_{52}	$\rho(1450)^0 \pi^+$, $\rho^0 \to \pi^+ \pi^-$		$(7 \pm 6) \times 10^{-4}$	
Γ_{53}	$\pi^+ \pi^+ \pi^-$ nonresonant			
Γ_{54}	$\pi^+ \pi^+ \pi^- \pi^0$		< 14 %	90%
Γ_{55}	$\eta \pi^+$	[e]	(1.58 ± 0.21) %	
Γ_{56}	$\omega \pi^+$	[e]	$(2.5 \pm 0.9) \times 10^{-3}$	
Γ_{57}	$3\pi^+ 2\pi^-$		$(8.0 \pm 0.9) \times 10^{-3}$	
Γ_{58}	$\pi^+ \pi^+ \pi^- \pi^0 \pi^0$		—	
Γ_{59}	$\eta \rho^+$	[e]	(13.0 ± 2.2) %	
Γ_{60}	$\eta \pi^+ \pi^0$ 3-body	[e]	< 5 %	90%
Γ_{61}	$3\pi^+ 2\pi^- \pi^0$		(4.9 ± 3.2) %	
Γ_{62}	$\eta'(958) \pi^+$	[e]	(3.8 ± 0.4) %	
Γ_{63}	$3\pi^+ 2\pi^- 2\pi^0$		—	
Γ_{64}	$\eta'(958) \rho^+$	[e]	(12.2 ± 2.0) %	
Γ_{65}	$\eta'(958) \pi^+ \pi^0$ 3-body	[e]	< 1.8 %	90%

Modes with one or three K's

Γ_{66}	$K^+ \pi^0$		$(8.2 \pm 2.2) \times 10^{-4}$	
Γ_{67}	$K^0_S \pi^+$		$(1.25 \pm 0.15) \times 10^{-3}$	
Γ_{68}	$K^+ \eta$		$(1.41 \pm 0.31) \times 10^{-3}$	
Γ_{69}	$K^+ \eta'(958)$		$(1.6 \pm 0.5) \times 10^{-3}$	
Γ_{70}	$K^+ \pi^+ \pi^-$		$(6.9 \pm 0.5) \times 10^{-3}$	
Γ_{71}	$K^+ \rho^0$		$(2.7 \pm 0.5) \times 10^{-3}$	
Γ_{72}	$K^+ \rho(1450)^0$, $\rho^0 \to \pi^+ \pi^-$		$(7.4 \pm 2.6) \times 10^{-4}$	
Γ_{73}	$K^*(892)^0 \pi^+$, $K^{*0} \to K^+ \pi^-$		$(1.50 \pm 0.26) \times 10^{-3}$	
Γ_{74}	$K^*(1410)^0 \pi^+$, $K^{*0} \to K^+ \pi^-$		$(1.30 \pm 0.31) \times 10^{-3}$	
Γ_{75}	$K^*(1430)^0 \pi^+$, $K^{*0} \to K^+ \pi^-$		$(5 \pm 4) \times 10^{-4}$	
Γ_{76}	$K^+ \pi^+ \pi^-$ nonresonant		$(1.1 \pm 0.4) \times 10^{-3}$	
Γ_{77}	$K^0_S \pi^+ \pi^+ \pi^-$		$(3.0 \pm 1.1) \times 10^{-3}$	
Γ_{78}	$K^+ K^+ K^-$		$(4.9 \pm 1.7) \times 10^{-4}$	
Γ_{79}	ϕK^+, $\phi \to K^+ K^-$		$< 2.8 \times 10^{-4}$	90%

Doubly Cabibbo-suppressed modes

Γ_{80}	$K^+ K^+ \pi^-$			$(2.9 \pm 1.1) \times 10^{-4}$	

Baryon-antibaryon mode

Γ_{81}	$p\overline{n}$			$(1.3 \pm 0.4) \times 10^{-3}$	

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

Γ_{82}	$\pi^+ e^+ e^-$		[g]	$< 2.7 \times 10^{-4}$	90%
Γ_{83}	$\pi^+ \mu^+ \mu^-$		[g]	$< 2.6 \times 10^{-5}$	90%
Γ_{84}	$K^+ e^+ e^-$	$C1$		$< 1.6 \times 10^{-3}$	90%
Γ_{85}	$K^+ \mu^+ \mu^-$	$C1$		$< 3.6 \times 10^{-5}$	90%
Γ_{86}	$K^*(892)^+ \mu^+ \mu^-$	$C1$		$< 1.4 \times 10^{-3}$	90%
Γ_{87}	$\pi^+ e^\pm \mu^\mp$	LF	[h]	$< 6.1 \times 10^{-4}$	90%
Γ_{88}	$K^+ e^\pm \mu^\mp$	LF	[h]	$< 6.3 \times 10^{-4}$	90%
Γ_{89}	$\pi^- e^+ e^+$	L		$< 6.9 \times 10^{-4}$	90%
Γ_{90}	$\pi^- \mu^+ \mu^+$	L		$< 2.9 \times 10^{-5}$	90%
Γ_{91}	$\pi^- e^+ \mu^+$	L		$< 7.3 \times 10^{-4}$	90%
Γ_{92}	$K^- e^+ e^+$	L		$< 6.3 \times 10^{-4}$	90%
Γ_{93}	$K^- \mu^+ \mu^+$	L		$< 1.3 \times 10^{-5}$	90%
Γ_{94}	$K^- e^+ \mu^+$	L		$< 6.8 \times 10^{-4}$	90%
Γ_{95}	$K^*(892)^- \mu^+ \mu^+$	L		$< 1.4 \times 10^{-3}$	90%
Γ_{96}	A dummy mode used by the fit.			(73.6 ± 1.3) %	

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

[b] For now, we average together measurements of the $X e^+ \nu_e$ and $X \mu^+ \nu_\mu$ branching fractions. This is the *average*, not the *sum*.

[c] 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.

[d] 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.

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

[f] This comes from a K-matrix parametrization of the $\pi^+\pi^-$ S-wave and is a sum over the $f_0(980)$, $f_0(1300)$, $f_0(1200–1600)$, $f_0(1500)$, and $f_0(1750)$. Not all of these correspond to particles in our Tables.

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

[*h*] The value is for the sum of the charge states or particle/antiparticle states indicated.

CONSTRAINED FIT INFORMATION

An overall fit to 12 branching ratios uses 15 measurements and one constraint to determine 11 parameters. The overall fit has a $\chi^2 = 2.1$ for 5 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_{10}	x_{16}	x_{17}	x_{18}	x_{28}	x_{33}	x_{45}	x_{55}	x_{62}	x_{70}
x_{16}	0									
x_{17}	0	77								
x_{18}	42	0	0							
x_{28}	0	43	49	0						
x_{33}	0	52	59	0	33					
x_{45}	0	41	46	0	25	31				
x_{55}	0	39	44	0	24	30	23			
x_{62}	0	47	53	0	32	37	28	28		
x_{70}	0	38	45	0	23	29	22	21	26	
x_{96}	−16	−71	−81	−30	−72	−59	−45	−52	−69	−41

D_s^+ BRANCHING RATIOS

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

Inclusive modes

$\Gamma(K^-\text{anything})/\Gamma_{total}$ **Γ_1/Γ**

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
$0.13^{+0.14}_{-0.12} \pm 0.02$	COFFMAN	91	MRK3	$e^+ e^-$ 4.14 GeV

$[\Gamma(\overline{K}^0\text{anything}) + \Gamma(K^0\text{anything})]/\Gamma_{total}$ **Γ_2/Γ**

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
$0.39^{+0.28}_{-0.27} \pm 0.04$	COFFMAN	91	MRK3	$e^+ e^-$ 4.14 GeV

$\Gamma(K^+ \text{anything})/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.20^{+0.18}_{-0.13}\pm0.04}$	COFFMAN	91	MRK3	e^+e^- 4.14 GeV

$\Gamma((\text{non-}K\overline{K})\text{ anything})/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.64±0.17±0.03	[3] COFFMAN	91	MRK3	e^+e^- 4.14 GeV

[3] COFFMAN 91 uses the direct measurements of the kaon content to determine this non-$K\overline{K}$ fraction. This number implies that a large fraction of D_s^+ decays involve η, η', and/or non-spectator decays.

$\Gamma(\eta \text{ anything})/\Gamma_{\text{total}}$ Γ_5/Γ

This ratio includes η particles from η' decays.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
23.5±3.1±2.0	674 ± 91	HUANG	06B	CLEO	e^+e^- at 4170 MeV

$\Gamma(\eta' \text{anything})/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.7±1.9±0.8	68 ± 15	HUANG	06B	CLEO	e^+e^- at 4170 MeV

$\Gamma(\phi \text{ anything})/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
16.1±1.2±1.1	398 ± 27	HUANG	06B	CLEO	e^+e^- at 4170 MeV

$\Gamma(e^+ \text{anything})/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.077^{+0.057}_{-0.043}{}^{+0.024}_{-0.021}}$	BAI	97	BES	$e^+e^- \rightarrow D_s^+ D_s^-$

Leptonic and semileptonic modes

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$\Gamma(e^+\nu_e)/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<1.3\times10^{-4}}$	90	PEDLAR	07A	CLEO	$e^+e^- \rightarrow D_s^+ D_s^{*-}$, 4170 MeV

$\Gamma(\mu^+\nu_\mu)/\Gamma_{\text{total}}$ Γ_{10}/Γ

See the note on "Decay Constants of Charged Pseudoscalar Mesons" in the D_s^+ Listings.

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.2 ±0.6 OUR FIT					
5.94±0.66±0.31	88	[4] PEDLAR	07A	CLEO	$e^+e^- \rightarrow D_s^+ D_s^{*-}$, 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.8 ±1.1 ±1.8	553	[5] HEISTER	02I	ALEP	Z decays

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

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

$\Gamma(\mu^+ \nu_\mu)/\Gamma(\phi \pi^+)$ — Γ_{10}/Γ_{18}

See the note on "Decay Constants of Charged Pseudoscalar Mesons" in the D_s^+ Listings.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.142±0.013 OUR FIT					
0.148±0.017 OUR AVERAGE					
0.143±0.018±0.006	489 ± 55	[6] AUBERT	07V	BABR	$e^+ e^- \approx \Upsilon(4S)$
0.173±0.023±0.035	182	[7] CHADHA	98	CLE2	$e^+ e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.23 ±0.06 ±0.04	18	[8] ALEXANDROV	00	BEAT	π^- nucleus, 350 GeV
0.245±0.052±0.074	39	[9] ACOSTA	94	CLE2	See CHADHA 98

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

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

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

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

$\Gamma(\mu^+ \nu_\mu)/\Gamma(\phi \ell^+ \nu_\ell)$ — Γ_{10}/Γ_{12}

$\Gamma(\phi \ell^+ \nu_\ell)$ is an average of $\Gamma(\phi e^+ \nu_e)$ and $\Gamma(\phi \mu^+ \nu_\mu)$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.16±0.06±0.03	23	[10] KODAMA	96	E653	π^- emulsion, 600 GeV

[10] KODAMA 96 obtains $f_{D_s} = (194 \pm 35 \pm 20 \pm 14)$ MeV from this measurement, using $\Gamma(D_s^+ \rightarrow \phi \ell^+ \nu)/\Gamma_{\text{total}} = 0.0188 \pm 0.0029$. The third error is from the uncertainty on $\phi \ell^+ \nu_\ell$ branching fraction.

$\Gamma(\tau^+ \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{11}/Γ

See the note on "Decay Constants of Charged Pseudoscalar Mesons" in the D_s^+ Listings.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6 ±0.6 OUR AVERAGE					
6.17±0.71±0.34	102	ECKLUND	08	CLEO	$e^+ e^- \rightarrow D_s^+ D_s^{*-}$, 4170 MeV

8.0 $\pm$1.3 $\pm$0.4	47	PEDLAR	07A	CLEO	$e^+e^- \rightarrow D_s^+ D_s^{*-}$, 4170 MeV
5.79$\pm$0.77$\pm$1.84	881	[11] HEISTER	02I	ALEP	Z decays
7.0 $\pm$2.1 $\pm$2.0	22	[12] ABBIENDI	01L	OPAL	$D_s^{*+} \rightarrow \gamma D_s^+$ from Z's
7.4 $\pm$2.8 $\pm$2.4	16	[13] ACCIARRI	97F	L3	$D_s^{*+} \rightarrow \gamma D_s^+$ from Z's

[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_{11}/Γ_{10}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
11.0$\pm$1.4$\pm$0.6	102	[14] ECKLUND	08	CLEO	$e^+e^- \rightarrow D_s^+ D_s^{*-}$, 4170 MeV

[14] 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.

$\Gamma(\phi\ell^+\nu_\ell)/\Gamma(\phi\pi^+)$ — Γ_{12}/Γ_{18}

For now, we average together measurements of the $\Gamma(\phi e^+\nu_e)/\Gamma(\phi\pi^+)$ and $\Gamma(\phi\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ ratios. See the end of the D_s^+ Listings for measurements of $D_s^+ \rightarrow \phi\ell^+\nu_\ell$ form-factor ratios.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.54 $\pm$0.04 OUR AVERAGE					
0.540$\pm$0.033$\pm$0.048	793	LINK	02J	FOCS	Uses $\phi\mu^+\nu_\mu$
0.54 $\pm$0.05 $\pm$0.04	367	BUTLER	94	CLE2	Uses $\phi e^+\nu_e$ and $\phi\mu^+\nu_\mu$
0.58 $\pm$0.17 $\pm$0.07	97	FRABETTI	93G	E687	Uses $\phi\mu^+\nu_\mu$
0.57 $\pm$0.15 $\pm$0.15	104	ALBRECHT	91	ARG	Uses $\phi e^+\nu_e$
0.49 $\pm$0.10 $^{+0.10}_{-0.14}$	54	ALEXANDER	90B	CLEO	Uses $\phi e^+\nu_e$ and $\phi\mu^+\nu_\mu$

$\Gamma(\eta\ell^+\nu_\ell)/\Gamma(\phi\ell^+\nu_\ell)$ — Γ_{14}/Γ_{12}

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.24$\pm$0.12$\pm$0.15	440	[15] BRANDENB...	95	CLE2	$e^+e^- \approx \Upsilon(4S)$

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

$\Gamma(\eta'(958)\ell^+\nu_\ell)/\Gamma(\phi\ell^+\nu_\ell)$ — Γ_{15}/Γ_{12}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.43$\pm$0.11$\pm$0.07	29	[16] BRANDENB...	95	CLE2	$e^+e^- \approx \Upsilon(4S)$

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

$\left[\Gamma(\eta \ell^+ \nu_\ell) + \Gamma(\eta'(958) \ell^+ \nu_\ell)\right] / \Gamma(\phi \ell^+ \nu_\ell)$ $\Gamma_{13}/\Gamma_{12} = (\Gamma_{14}+\Gamma_{15})/\Gamma_{12}$

Unseen decay modes of the resonances are included.

VALUE	DOCUMENT ID		TECN	COMMENT
1.67±0.17±0.17	[17] BRANDENB...	95	CLE2	$e^+e^- \approx \Upsilon(4S)$

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

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

$\Gamma(K^+ K^0_S)/\Gamma_{total}$ Γ_{16}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.49±0.09 OUR FIT				
1.49±0.07±0.05	[18] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[18] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(K^+ K^0_S)/\Gamma(\phi\pi^+)$ Γ_{16}/Γ_{18}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.58±0.16±0.10	68	ANJOS	90C	E691	γ Be
0.46±0.16±0.10		ADLER	89B	MRK3	e^+e^- 4.14 GeV
0.50±0.09±0.05		CHEN	89	CLEO	e^+e^- 10 GeV

$\Gamma(K^+ K^- \pi^+)/\Gamma_{total}$ Γ_{17}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.50±0.28 OUR FIT				
5.50±0.23±0.16	[19] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[19] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(\phi\pi^+)/\Gamma_{total}$ Γ_{18}/Γ

The results here are model-independent. For earlier, model-dependent results, see our PDG 06 edition. See also the header note in the next block of data.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.38±0.35 OUR FIT					
4.5 ±0.4 OUR AVERAGE					
4.62±0.36±0.51		[20] AUBERT	06N	BABR	e^+e^- at $\Upsilon(4S)$
4.81±0.52±0.38	212 ± 19	[21] AUBERT	05V	BABR	$e^+e^- \approx \Upsilon(4S)$
3.59±0.77±0.48		[22] ARTUSO	96	CLE2	e^+e^- at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.9\ {}^{+5.1}_{-1.9}\ {}^{+1.8}_{-1.1}$		[23] BAI	95C	BES	e^+e^- 4.03 GeV

[20] 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.

[21] 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.

[22] 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 $0.92 \pm 0.20 \pm 0.11$.

[23] 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_{19}/Γ_{17}

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	DOCUMENT ID		TECN	COMMENT
0.396±0.033±0.047	FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(K^+\overline{K}^*(892)^0, \overline{K}^{*0} \to K^-\pi^+)/\Gamma(K^+K^-\pi^+)$ — Γ_{21}/Γ_{17}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.478±0.046±0.040	FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(K^+\overline{K}^*(892)^0)/\Gamma(\phi\pi^+)$ — Γ_{20}/Γ_{18}

Unseen decay modes of the resonances are included. However, we now get branching fractions for resonant submodes of 3-body decays from Dalitz-plot analyses.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.85±0.34±0.20	9	ALVAREZ	90C	NA14	Photoproduction
0.84±0.30±0.22		ADLER	89B	MRK3	e^+e^- 4.14 GeV
1.05±0.17±0.12		CHEN	89	CLEO	e^+e^- 10 GeV
0.87±0.13±0.05	117	ANJOS	88	E691	Photoproduction
1.44±0.37	87	ALBRECHT	87F	ARG	e^+e^- 10 GeV

$\Gamma(f_0(980)\pi^+, f_0 \to K^+K^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{22}/Γ_{17}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.11±0.035±0.026	FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(f_0(1710)\pi^+, f_0 \to K^+K^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{24}/Γ_{17}

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.034±0.023±0.035	[24] FRABETTI	95B	E687	Dalitz fit, 701 evts

[24] In other words, FRABETTI 95B doesn't see this resonance.

$\Gamma(K^+\overline{K}_0^*(1430)^0, \overline{K}_0^* \to K^-\pi^+)/\Gamma(K^+K^-\pi^+)$ — Γ_{23}/Γ_{17}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.093±0.032±0.032	FRABETTI	95B	E687	Dalitz fit, 701 evts

$\Gamma(K^*(892)^+ \overline{K}^0)/\Gamma(\phi\pi^+)$ — Γ_{27}/Γ_{18}

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_{28}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.6 ±0.5 OUR FIT				
5.65±0.29±0.40	[25] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[25] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(\phi\rho^+,\ \phi\to K^+K^-)/\Gamma(\phi\pi^+,\phi\to K^+K^-)$ — Γ_{30}/Γ_{19}

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

$\Gamma(\phi\pi^+\pi^0\ \text{3-body},\ \phi\to K^+K^-)/\Gamma(\phi\pi^+,\phi\to K^+K^-)$ — Γ_{31}/Γ_{19}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.71	90	DAOUDI	92	CLE2	$e^+e^- \approx$ 10.5 GeV

$\Gamma(K^+K^-\pi^+\pi^0\ \text{non-}\phi)/\Gamma(\phi\pi^+)$ — Γ_{32}/Γ_{18}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.4	90	ANJOS	89E	E691	Photoproduction

$\Gamma(K^0_S K^-\pi^+\pi^+)/\Gamma_{total}$ — Γ_{33}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.64±0.12 OUR FIT				
1.64±0.10±0.07	[26] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[26] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(K^*(892)^+\overline{K}^*(892)^0)/\Gamma(\phi\pi^+)$ — Γ_{34}/Γ_{18}

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

$\Gamma(K^0K^-2\pi^+(\text{non-}K^{*+}\overline{K}^{*0}))/\Gamma(\phi\pi^+)$ — Γ_{35}/Γ_{18}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.80	90	ALBRECHT	92B	ARG	$e^+e^- \simeq$ 10.4 GeV

$\Gamma(K^+K^0_S\pi^+\pi^-)/\Gamma(K^0_S K^-\pi^+\pi^+)$ — Γ_{36}/Γ_{33}

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

$\Gamma(K^+K^-\pi^+\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{37}/Γ_{17}

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	γ Be, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\phi\pi^+\pi^+\pi^-,\ \phi\to K^+K^-)/\Gamma(\phi\pi^+,\phi\to K^+K^-)$ — Γ_{38}/Γ_{19}

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

$\Gamma(\phi\pi^+\pi^+\pi^-,\ \phi\to K^+K^-)/\Gamma(K^+K^-\pi^+\pi^+\pi^-)$ — Γ_{38}/Γ_{37}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.21±0.05±0.06	136	[27] LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

[27] This LINK 03D result is redundant with its $\Gamma(\phi\pi^+\pi^+\pi^-)/\Gamma(\phi\pi^+)$ result above.

$\Gamma(K^+K^-\rho^0\pi^+\ \text{non-}\phi)/\Gamma(K^+K^-\pi^+\pi^+\pi^-)$ — Γ_{39}/Γ_{37}

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

$\Gamma(\phi\rho^0\pi^+,\ \phi\to K^+K^-)/\Gamma(K^+K^-\pi^+\pi^+\pi^-)$ — Γ_{40}/Γ_{37}

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_{41}/Γ_{17}

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

$\Gamma(K^+K^-\pi^+\pi^+\pi^-\ \text{nonresonant})/\Gamma(K^+K^-\pi^+\pi^+\pi^-)$ — Γ_{42}/Γ_{37}

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.06±0.05	LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(K^0_S K^0_S\pi^+\pi^+\pi^-)/\Gamma(K^0_S K^-\pi^+\pi^+)$ — Γ_{43}/Γ_{33}

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

$\Gamma(\pi^+\pi^0)/\Gamma(K^+K^0_S)$ — Γ_{44}/Γ_{16}

This decay is forbidden by isospin conservation.

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<4.1	90	ADAMS	07A	CLEO	e^+e^-, E_{cm}=4.17 GeV

$\Gamma(\pi^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{45}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.11±0.08 OUR FIT				
1.11±0.07±0.04	[28] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[28] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(\pi^+\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{45}/Γ_{17}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.265\pm0.041\pm0.031$	98	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

$\Gamma(\pi^+\pi^+\pi^-)/\Gamma(\phi\pi^+)$ — Γ_{45}/Γ_{18}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.245\pm0.028{}^{+0.019}_{-0.012}$	848	AITALA	01A	E791	π^- nucleus, 500 GeV
$0.33\ \pm0.10\ \pm0.04$	29	ADAMOVICH	93	WA82	π^- 340 GeV
$0.44\ \pm0.10\ \pm0.04$	68	ANJOS	89	E691	Photoproduction

$\Gamma(\rho^0\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$ — Γ_{46}/Γ_{45}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
not seen		LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.058\pm0.023\pm0.037$		AITALA	01A	E791	Dalitz fit, 848 evts
<0.073	90	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

$\Gamma(\rho^0\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{46}/Γ_{18}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	90	ANJOS	89	E691	Photoproduction
<0.22	90	ALBRECHT	87G	ARG	e^+e^- 10 GeV

$\Gamma(\pi^+(\pi^+\pi^-)_{S-\text{wave}})/\Gamma(\pi^+\pi^+\pi^-)$ — Γ_{47}/Γ_{45}

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

VALUE	DOCUMENT ID		TECN	COMMENT
$0.8704\pm0.0560\pm0.0438$	[29] LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts

[29] 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.

$\Gamma(f_0(980)\pi^+, f_0\to\pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ — Γ_{48}/Γ_{45}

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.565\pm0.043\pm0.047$	AITALA	01A	E791	Dalitz fit, 848 evts
$1.074\pm0.140\pm0.043$	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

$\Gamma(f_0(1370)\pi^+, f_0\to\pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ — Γ_{49}/Γ_{45}

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.324\pm0.077\pm0.017$	AITALA	01A	E791	Dalitz fit, 848 evts

$\Gamma(f_0(1500)\pi^+, f_0 \to \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ Γ_{50}/Γ_{45}

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.274 \pm 0.114 \pm 0.019$	[30] FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

[30] 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 $f_0(1500)$.

$\Gamma(f_2(1270)\pi^+, f_2 \to \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ Γ_{51}/Γ_{45}

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

VALUE	DOCUMENT ID		TECN	COMMENT
$0.0974 \pm 0.0449 \pm 0.0294$	LINK	04	FOCS	Dalitz fit, 1475 $\pm$ 50 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.197 \pm 0.033 \pm 0.006$	AITALA	01A	E791	Dalitz fit, 848 evts
$0.123 \pm 0.056 \pm 0.018$	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

$\Gamma(\rho(1450)^0\pi^+, \rho^0 \to \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ Γ_{52}/Γ_{45}

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

VALUE	DOCUMENT ID		TECN	COMMENT
$0.0656 \pm 0.0343 \pm 0.0440$	LINK	04	FOCS	Dalitz fit, 1475 $\pm$ 50 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.044 \pm 0.021 \pm 0.002$	AITALA	01A	E791	Dalitz fit, 848 evts

$\Gamma(\pi^+\pi^+\pi^-$ nonresonant$)/\Gamma(\pi^+\pi^+\pi^-)$ Γ_{53}/Γ_{45}

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.005 \pm 0.014 \pm 0.017$		AITALA	01A	E791	π^- nucleus, 500 GeV
<0.269	90	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

$\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma(\phi\pi^+)$ Γ_{54}/Γ_{18}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.3	90	ANJOS	89E	E691	Photoproduction

$\Gamma(\eta\pi^+)/\Gamma_{total}$ Γ_{55}/Γ

Unseen decay modes of the η are included.

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.58 ± 0.21 OUR FIT				
$1.58 \pm 0.11 \pm 0.18$	[31] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[31] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+)$ Γ_{55}/Γ_{18}

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. • • •					
$0.48 \pm 0.03 \pm 0.04$	920	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
$0.54 \pm 0.09 \pm 0.06$	165	ALEXANDER	92	CLE2	See JESSOP 98

$\Gamma(\omega\pi^+)/\Gamma(\eta\pi^+)$ — Γ_{56}/Γ_{55}

Unseen decay modes of the resonances are included.

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

$\Gamma(3\pi^+2\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{57}/Γ_{17}

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

$\Gamma(\eta\rho^+)/\Gamma(\phi\pi^+)$ — Γ_{59}/Γ_{18}

Unseen decay modes of the resonances are included.

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

$\Gamma(\eta\pi^+\pi^0\text{ 3-body})/\Gamma(\phi\pi^+)$ — Γ_{60}/Γ_{18}

Unseen decay modes of the resonances are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.82	90	[32] DAOUDI	92	CLE2	See JESSOP 98

[32] We use the JESSOP 98 limit, even though the DAOUDI 92 limit, from the same experiment but with a much smaller data sample, is more restrictive.

$\Gamma(3\pi^+2\pi^-\pi^0)/\Gamma_{total}$ — Γ_{61}/Γ

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

$\Gamma(\eta'(958)\pi^+)/\Gamma_{total}$ — Γ_{62}/Γ

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

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
3.8 ±0.4 OUR FIT				
3.77±0.25±0.30	[33] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[33] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(\eta'(958)\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{62}/Γ_{18}

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±0.06±0.07	537	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
1.20±0.15±0.11	281	ALEXANDER	92	CLE2	See JESSOP 98
$2.5\pm1.0^{+1.5}_{-0.4}$	22	ALVAREZ	91	NA14	Photoproduction
2.5 ±0.5 ±0.3	215	ALBRECHT	90D	ARG	$e^+e^- \approx$ 10.4 GeV

$\Gamma(\eta'(958)\rho^+)/\Gamma(\phi\pi^+)$ — Γ_{64}/Γ_{18}

Unseen decay modes of the resonances are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
2.78±0.28±0.30	137	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.44\pm0.62^{+0.44}_{-0.46}$	68	AVERY	92	CLE2	See JESSOP 98

$\Gamma(\eta'(958)\pi^+\pi^0\ \text{3-body})/\Gamma(\phi\pi^+)$ — Γ_{65}/Γ_{18}

Unseen decay modes of the resonances are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.85	90	DAOUDI	92	CLE2	See JESSOP 98

Modes with one or three K's

$\Gamma(K^+\pi^0)/\Gamma(K^+K^0_S)$ — Γ_{66}/Γ_{16}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.5±1.3±0.7	141 ± 34	ADAMS	07A	CLEO	e^+e^-, $E_{\rm cm}$=4.17 GeV

$\Gamma(K^0_S\pi^+)/\Gamma(K^+K^0_S)$ — Γ_{67}/Γ_{16}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.4±0.9 OUR AVERAGE					
10.4±2.4±1.4	113 ± 26	LINK	08	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV
8.2±0.9±0.2	206 ± 22	ADAMS	07A	CLEO	e^+e^-, $E_{\rm cm}$=4.17 GeV

$\Gamma(K^+\eta)/\Gamma(\eta\pi^+)$ — Γ_{68}/Γ_{55}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.9±1.5±0.4	113 ± 18	ADAMS	07A	CLEO	e^+e^-, $E_{\rm cm}$=4.17 GeV

$\Gamma(K^+\eta'(958))/\Gamma(\eta'(958)\pi^+)$ — Γ_{69}/Γ_{62}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±1.3±0.3	28 ± 9	ADAMS	07A	CLEO	e^+e^-, $E_{\rm cm}$=4.17 GeV

$\Gamma(K^+\pi^+\pi^-)/\Gamma_{\rm total}$ — Γ_{70}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
0.69±0.05 OUR FIT				
0.69±0.05±0.03	[34] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

[34] ALEXANDER 08 uses single- and double-tagged events in an overall fit. The correlation matrix for the branching fractions is used in the fit.

$\Gamma(K^+\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{70}/Γ_{17}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.126±0.009 OUR FIT					
0.127±0.007±0.014	567 ± 31	LINK	04F	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

$\Gamma(K^+\pi^+\pi^-)/\Gamma(\phi\pi^+)$ — Γ_{70}/Γ_{18}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.28\pm0.06\pm0.05$	85	FRABETTI	95E	E687	γ Be, $\overline{E}_\gamma$= 220 GeV

$\Gamma(K^+\rho^0)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{71}/Γ_{70}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.3883±0.0531±0.0261	LINK	04F	FOCS	Dalitz fit, 567 evts

$\Gamma(K^+\rho(1450)^0, \rho^0\to\pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{72}/Γ_{70}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.1062±0.0351±0.0104	LINK	04F	FOCS	Dalitz fit, 567 evts

$\Gamma(K^*(892)^0\pi^+, K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{73}/Γ_{70}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.2164±0.0321±0.0114	LINK	04F	FOCS	Dalitz fit, 567 evts

$\Gamma(K^*(1410)^0\pi^+, K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{74}/Γ_{70}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.1882±0.0403±0.0122	LINK	04F	FOCS	Dalitz fit, 567 evts

$\Gamma(K^*(1430)^0\pi^+, K^{*0}\to K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{75}/Γ_{70}

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0765±0.0500±0.0170	LINK	04F	FOCS	Dalitz fit, 567 evts

$\Gamma(K^+\pi^+\pi^-\text{ nonresonant})/\Gamma(K^+\pi^+\pi^-)$ — Γ_{76}/Γ_{70}

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

$\Gamma(K^0_S\pi^+\pi^+\pi^-)/\Gamma(K^0_S K^-\pi^+\pi^+)$ — Γ_{77}/Γ_{33}

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

$\Gamma(K^+K^+K^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{78}/Γ_{17}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{8.95\pm2.12^{+2.24}_{-2.31}}$	31	LINK	02I	FOCS	γ nucleus, $\approx$ 180 GeV

$\Gamma(\phi K^+, \phi\to K^+K^-)/\Gamma(\phi\pi^+, \phi\to K^+K^-)$ — Γ_{79}/Γ_{19}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.013	90	FRABETTI	95F	E687	γ Be, $\overline{E}_\gamma\approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.071	90	ANJOS	92D	E691	γ Be, $\overline{E}_\gamma$ = 145 GeV

Doubly Cabibbo-suppressed modes

$\Gamma(K^+K^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{80}/Γ_{17}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0052±0.0017±0.0011	27 ± 9	LINK	05K	FOCS	<0.78%, CL = 90%

Baryon-antibaryon mode

$\Gamma(p\overline{n})/\Gamma_{total}$ — Γ_{81}/Γ

This is the only baryonic mode allowed kinematically.

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.30\pm0.36^{+0.12}_{-0.16}$	13.0 ± 3.6	ATHAR	08	CLEO	e^+e^-, $E_{cm}\approx 4170$ MeV

Rare or forbidden modes

$\Gamma(\pi^+e^+e^-)/\Gamma_{total}$ — Γ_{82}/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
$<2.7\times10^{-4}$	90	AITALA	99G	E791	π^-N 500 GeV

$\Gamma(\pi^+\mu^+\mu^-)/\Gamma_{total}$ — Γ_{83}/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%	EVTS	DOCUMENT ID		TECN	COMMENT
$<2.6\times10^{-5}$	90		LINK	03F	FOCS	γ nucleus, $\overline{E}_\gamma\approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<1.4\times10^{-4}$	90		AITALA	99G	E791	π^-N 500 GeV
$<4.3\times10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.6\times10^{-3}$	90	AITALA	99G	E791	π^-N 500 GeV

$\Gamma(K^+\mu^+\mu^-)/\Gamma_{total}$ — Γ_{85}/Γ

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

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<3.6\times10^{-5}$	90		LINK	03F	FOCS	γ nucleus, $\overline{E}_\gamma\approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<1.4\times10^{-4}$	90		AITALA	99G	E791	π^-N 500 GeV
$<5.9\times10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^*(892)^+\mu^+\mu^-)/\Gamma_{total}$ — Γ_{86}/Γ

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

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.4\times10^{-3}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(\pi^+ e^\pm \mu^\mp)/\Gamma_{total}$ Γ_{87}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.1 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^+ e^\pm \mu^\mp)/\Gamma_{total}$ Γ_{88}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.3 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(\pi^- e^+ e^+)/\Gamma_{total}$ Γ_{89}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.9 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(\pi^- \mu^+ \mu^+)/\Gamma_{total}$ Γ_{90}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<2.9 \times 10^{-5}$	90		LINK	03F	FOCS	γ nucleus, $\overline{E}_\gamma \approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<8.2 \times 10^{-5}$	90		AITALA	99G	E791	$\pi^- N$ 500 GeV
$<4.3 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(\pi^- e^+ \mu^+)/\Gamma_{total}$ Γ_{91}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.3 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^- e^+ e^+)/\Gamma_{total}$ Γ_{92}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.3 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^- \mu^+ \mu^+)/\Gamma_{total}$ Γ_{93}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-5}$	90		LINK	03F	FOCS	γ nucleus, $\overline{E}_\gamma \approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<1.8 \times 10^{-4}$	90		AITALA	99G	E791	$\pi^- N$ 500 GeV
$<5.9 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^- e^+ \mu^+)/\Gamma_{total}$ Γ_{94}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.8 \times 10^{-4}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV

$\Gamma(K^*(892)^- \mu^+ \mu^+)/\Gamma_{total}$ — Γ_{95}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.4 \times 10^{-3}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

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

This is the difference of the D_s^+ and D_s^- partial widths divided by the sum of the widths.

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

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.049 \pm 0.021 \pm 0.009$	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.003 \pm 0.011 \pm 0.008$	ALEXANDER	08	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
$-0.059 \pm 0.042 \pm 0.012$	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

$A_{CP}(K_S^0 K^\mp 2\pi^\pm)$ in $D_s^+ \to K_S^0 K^- 2\pi^+$, $D_s^- \to K_S^0 K^+ 2\pi^-$

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.007 \pm 0.036 \pm 0.011$	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.020 \pm 0.046 \pm 0.007$	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.082 \pm 0.052 \pm 0.008$	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.055 \pm 0.037 \pm 0.012$	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.02 \pm 0.29$	ADAMS	07A	CLEO	$e^+ e^-$, E_{cm}=4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.27 \pm 0.11$	ADAMS	07A	CLEO	$e^+ e^-$, E_{cm}=4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
+0.112±0.070±0.009	ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
−0.20±0.18	ADAMS	07A	CLEO	e^+e^-, E_{cm}=4.17 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
−0.17±0.37	ADAMS	07A	CLEO	e^+e^-, E_{cm}=4.17 GeV

$D_s^+ - D_s^-$ *T*-VIOLATING DECAY-RATE ASYMMETRIES

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

$C_T \equiv \vec{p}_{K^+} \cdot (\vec{p}_{\pi^+} \times \vec{p}_{\pi^-})$ is a *T*-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^-. $A_T \equiv [\Gamma(C_T > 0) - \Gamma(C_T < 0)] / [\Gamma(C_T > 0) + \Gamma(C_T < 0)]$ would, in the absence of strong phases, test for *T* violation in D_s^+ decays (the Γ's are partial widths). With $\overline{A}_T \equiv [\Gamma(-\overline{C}_T > 0) - \Gamma(-\overline{C}_T < 0)] / [\Gamma(-\overline{C}_T > 0) + \Gamma(-\overline{C}_T < 0)]$, the asymmetry $A_{Tviol} \equiv \frac{1}{2}(A_T - \overline{A}_T)$ tests for *T* violation even with nonzero strong phases.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.036±0.067±0.023	508 ± 34	LINK	05E	FOCS	γ A, $\overline{E}_{\gamma} \approx 180$ GeV

$D_s^+ \to \phi \ell^+ \nu_{\ell}$ FORM FACTORS

$r_2 \equiv A_2(0)/A_1(0)$ in $D_s^+ \to \phi \ell^+ \nu_{\ell}$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.32 ±0.24 OUR AVERAGE		Error includes scale factor of 1.2.			
0.713±0.202±0.284	793	LINK	04C	FOCS	$\phi\mu^+\nu_{\mu}$
1.57 ±0.25 ±0.19	271	AITALA	99D	E791	$\phi e^+\nu_e$, $\phi\mu^+\nu_{\mu}$
1.4 ±0.5 ±0.3	308	AVERY	94B	CLE2	$\phi e^+\nu_e$
1.1 ±0.8 ±0.1	90	FRABETTI	94F	E687	$\phi\mu^+\nu_{\mu}$
2.1 $^{+0.6}_{-0.5}$ ±0.2	19	KODAMA	93	E653	$\phi\mu^+\nu_{\mu}$

$r_v \equiv V(0)/A_1(0)$ in $D_s^+ \to \phi \ell^+ \nu_{\ell}$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.72 ±0.21 OUR AVERAGE					
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	$\phi\mu^+\nu_{\mu}$

Γ_L/Γ_T in $D_s^+ \rightarrow \phi \ell^+ \nu_\ell$

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	[35] FRABETTI	94F	E687	$\phi \mu^+ \nu_\mu$
0.54±0.21±0.10	19	[35] KODAMA	93	E653	$\phi \mu^+ \nu_\mu$

[35] FRABETTI 94F and KODAMA 93 evaluate Γ_L/Γ_T for a lepton mass of zero.

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ABBIENDI	01L	PL B516 236	G. Abbiendi et al.	(OPAL Collab.)
AITALA	01A	PRL 86 765	E.M. Aitala et al.	(FNAL E791 Collab.)
IORI	01	PL B523 22	M. Iori et al.	(FNAL SELEX Collab.)
LINK	01C	PRL 87 162001	J.M. Link et al.	(FNAL FOCUS Collab.)
ALEXANDROV	00	PL B478 31	Y. Alexandrov et al.	(CERN BEATRICE Collab.)
AITALA	99	PL B445 449	E.M. Aitala et al.	(FNAL E791 Collab.)
AITALA	99D	PL B450 294	E.M. Aitala et al.	(FNAL E791 Collab.)
AITALA	99G	PL B462 401	E.M. Aitala et al.	(FNAL E791 Collab.)
BONVICINI	99	PRL 82 4586	G. Bonvicini et al.	(CLEO Collab.)
CHADHA	98	PR D58 032002	M. Chada et al.	(CLEO Collab.)
JESSOP	98	PR D58 052002	C.P. Jessop et al.	(CLEO Collab.)
ACCIARRI	97F	PL B396 327	M. Acciarri et al.	(L3 Collab.)
BAI	97	PR D56 3779	J.Z. Bai et al.	(BES Collab.)
BALEST	97	PRL 79 1436	R. Balest et al.	(CLEO Collab.)
FRABETTI	97C	PL B401 131	P.L. Frabetti et al.	(FNAL E687 Collab.)
FRABETTI	97D	PL B407 79	P.L. Frabetti et al.	(FNAL E687 Collab.)
ARTUSO	96	PL B378 364	M. Artuso et al.	(CLEO Collab.)
KODAMA	96	PL B382 299	K. Kodama et al.	(FNAL E653 Collab.)
BAI	95C	PR D52 3781	J.Z. Bai et al.	(BES Collab.)
BRANDENB...	95	PRL 75 3804	G.W. Brandenburg et al.	(CLEO Collab.)
FRABETTI	95B	PL B351 591	P.L. Frabetti et al.	(FNAL E687 Collab.)
FRABETTI	95E	PL B359 403	P.L. Frabetti et al.	(FNAL E687 Collab.)
FRABETTI	95F	PL B363 259	P.L. Frabetti et al.	(FNAL E687 Collab.)
KODAMA	95	PL B345 85	K. Kodama et al.	(FNAL E653 Collab.)
ACOSTA	94	PR D49 5690	D. Acosta et al.	(CLEO Collab.)
AVERY	94B	PL B337 405	P. Avery et al.	(CLEO Collab.)
BROWN	94	PR D50 1884	D. Brown et al.	(CLEO Collab.)

BUTLER	94	PL B324 255	F. Butler *et al.*	(CLEO Collab.)
FRABETTI	94F	PL B328 187	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ADAMOVICH	93	PL B305 177	M.I. Adamovich *et al.*	(CERN WA82 Collab.)
FRABETTI	93F	PRL 71 827	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	93G	PL B313 253	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
KODAMA	93	PL B309 483	K. Kodama *et al.*	(FNAL E653 Collab.)
ALBRECHT	92B	ZPHY C53 361	H. Albrecht *et al.*	(ARGUS Collab.)
ALEXANDER	92	PRL 68 1275	J. Alexander *et al.*	(CLEO Collab.)
ANJOS	92D	PRL 69 2892	J.C. Anjos *et al.*	(FNAL E691 Collab.)
AVERY	92	PRL 68 1279	P. Avery *et al.*	(CLEO Collab.)
BARLAG	92C	ZPHY C55 383	S. Barlag *et al.*	(ACCMOR Collab.)
Also		ZPHY C48 29	S. Barlag *et al.*	(ACCMOR Collab.)
DAOUDI	92	PR D45 3965	M. Daoudi *et al.*	(CLEO 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.)
COFFMAN	91	PL B263 135	D.M. Coffman *et al.*	(Mark III Collab.)
ALBRECHT	90D	PL B245 315	H. Albrecht *et al.*	(ARGUS Collab.)
ALEXANDER	90B	PRL 65 1531	J. Alexander *et al.*	(CLEO Collab.)
ALVAREZ	90C	PL B246 261	M.P. Alvarez *et al.*	(CERN NA14/2 Collab.)
ANJOS	90C	PR D41 2705	J.C. Anjos *et al.*	(FNAL E691 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.)
ADLER	89B	PRL 63 1211	J. Adler *et al.*	(Mark III Collab.)
Also		PRL 63 2858 (erratum)	J. Adler *et al.*	(Mark III Collab.)
ANJOS	89	PRL 62 125	J.C. Anjos *et al.*	(FNAL E691 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.)
ALBRECHT	87F	PL B179 398	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	87G	PL B195 102	H. Albrecht *et al.*	(ARGUS Collab.)
BECKER	87B	PL B184 277	H. Becker *et al.*	(NA11 and NA32 Collab.)
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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