NODE=S034

$D_s^\pm$

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

NODE=S034

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

NODE=S034205

NODE=S034205

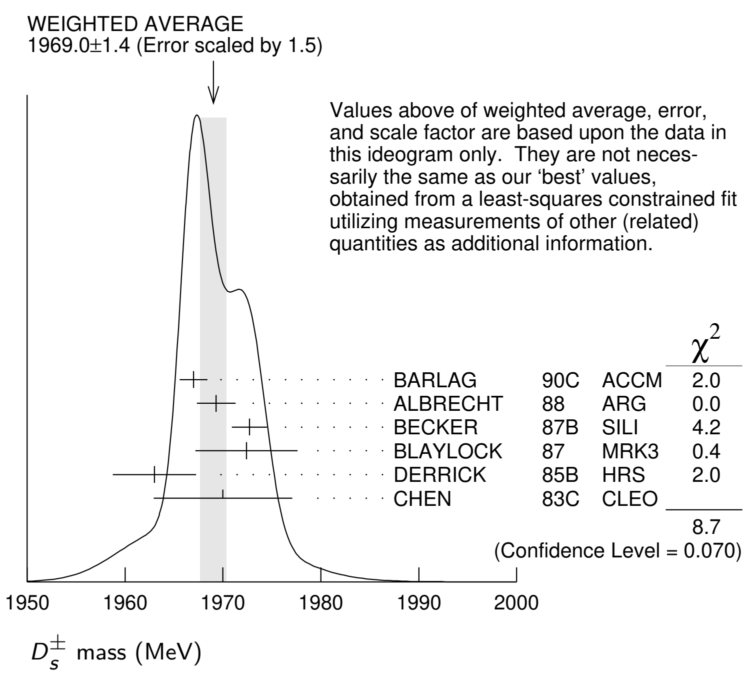
The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements. Measurements of the $D_s^\pm$ mass with an error greater than 10 MeV are omitted from the fit and average. A number of early measurements have been omitted altogether.

NODE=S034M

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).

NODE=S034M;LINKAGE=D



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

NODE=S034208

NODE=S034208

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

NODE=S034DM

$D_s^\pm$ MEAN LIFE

NODE=S034210

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

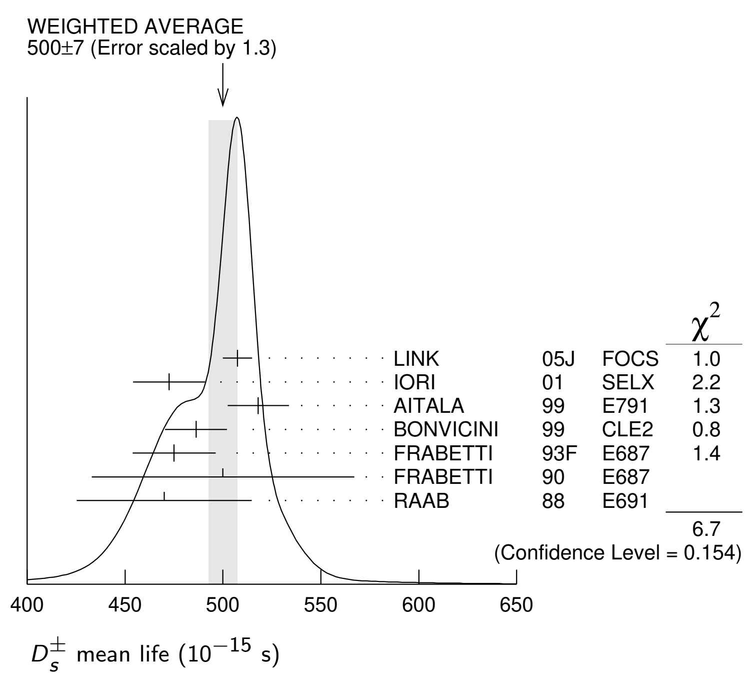
NODE=S034210

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
$486.3\pm15.0^{+4.9}_{-5.1}$	2167	[2] BONVICINI	99	CLE2	$e^+e^- \approx \Upsilon(4S)$
475 ±20 ± 7	900	FRABETTI	93F	E687	γBe, $\phi\pi^+$
500 ±60 ±30	104	FRABETTI	90	E687	γBe, $\phi\pi^+$
470 ±40 ±20	228	RAAB	88	E691	Photoproduction

NODE=S034T

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

NODE=S034T;LINKAGE=BV



D_s^+ DECAY MODES

NODE=S034215;NODE=S034

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.

NODE=S034

Mode	Fraction (Γ_i/Γ)	Confidence level

Inclusive modes

NODE=S034;CLUMP=D

Γ_1	K^- anything		$(13 \; {}^{+14}_{-12})$ %		DESIG=32
Γ_2	$\overline{K}^0$ anything + K^0 anything		(39 ± 28) %		DESIG=34
Γ_3	K^+ anything		$(20 \; {}^{+18}_{-14})$ %		DESIG=33
Γ_4	(non-$K \overline{K}$) anything		(64 ± 17) %		DESIG=35
Γ_5	η anything	[a]	(24 ± 4) %		DESIG=2
Γ_6	η' anything		(8.7 ± 2.1) %		DESIG=117
Γ_7	ϕ anything		(16.1 ± 1.6) %		DESIG=92
Γ_8	e^+ anything		$(8 \; {}^{+6}_{-5})$ %		DESIG=25

Leptonic and semileptonic modes

NODE=S034;CLUMP=C

Γ_9	$e^+ \nu_e$		$< 1.3 \times 10^{-4}$	90%	DESIG=118
Γ_{10}	$\mu^+ \nu_\mu$		$(6.3 \pm 0.5) \times 10^{-3}$		DESIG=7
Γ_{11}	$\tau^+ \nu_\tau$		(6.6 ± 0.6) %		DESIG=89
Γ_{12}	$K^+ K^- e^+ \nu_e$				DESIG=125
Γ_{13}	$\phi e^+ \nu_e$		(2.61 ± 0.17) %		DESIG=30
Γ_{14}	$\eta \ell^+ \nu_\ell$ + $\eta'(958) \ell^+ \nu_\ell$	[b]	(4.4 ± 0.7) %		DESIG=85
Γ_{15}	$\eta \ell^+ \nu_\ell$	[b]	(3.2 ± 0.5) %		DESIG=86
Γ_{16}	$\eta'(958) \ell^+ \nu_\ell$	[b]	(1.12 ± 0.35) %		DESIG=87

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

NODE=S034;CLUMP=A

Γ_{17}	$K^+ K^0_S$		(1.49 ± 0.09) %		DESIG=22
Γ_{18}	$K^+ K^- \pi^+$	[c]	(5.50 ± 0.28) %		DESIG=40
Γ_{19}	$\phi \pi^+$	[d,e]	(4.39 ± 0.34) %		DESIG=6
Γ_{20}	$\phi \pi^+$, $\phi \to K^+ K^-$	[d]	(2.18 ± 0.33) %		DESIG=114
Γ_{21}	$K^+ \overline{K}^*(892)^0$				DESIG=9
Γ_{22}	$K^+ \overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^- \pi^+$		(2.6 ± 0.4) %		DESIG=115
Γ_{23}	$f_0(980) \pi^+$, $f_0 \to K^+ K^-$		$(6.0 \pm 2.4) \times 10^{-3}$		DESIG=79
Γ_{24}	$K^+ \overline{K}^*_0(1430)^0$, $\overline{K}^*_0 \to K^- \pi^+$		$(5.1 \pm 2.5) \times 10^{-3}$		DESIG=80
Γ_{25}	$f_0(1710) \pi^+$, $f_0 \to K^+ K^-$				DESIG=88
Γ_{26}	$K^+ K^- \pi^+$ nonresonant				DESIG=11
Γ_{27}	$K^0 \overline{K}^0 \pi^+$		—		DESIG=46;OUR EVAL; → NOT CHECKED ←
Γ_{28}	$K^*(892)^+ \overline{K}^0$	[e]	(5.3 ± 1.2) %		DESIG=24
Γ_{29}	$K^+ K^- \pi^+ \pi^0$		(5.6 ± 0.5) %		DESIG=41
Γ_{30}	$\phi \pi^+ \pi^0$, $\phi \to K^+ K^-$				DESIG=20
Γ_{31}	$\phi \rho^+$, $\phi \to K^+ K^-$		$(4.0 \; {}^{+1.1}_{-1.2})$ %		DESIG=5
Γ_{32}	$\phi \pi^+ \pi^0$ 3-body, $\phi \to K^+ K^-$		< 1.5 %	90%	DESIG=63
Γ_{33}	$K^+ K^- \pi^+ \pi^0$ non-ϕ		< 11 %	90%	DESIG=21
Γ_{34}	$K^0_S K^- \pi^+ \pi^+$		(1.64 ± 0.12) %		DESIG=26
Γ_{35}	$K^*(892)^+ \overline{K}^*(892)^0$	[e]	(7.0 ± 2.5) %		DESIG=27
Γ_{36}	$K^0 K^- 2\pi^+$ (non-$K^{*+} \overline{K}^{*0}$)		< 3.5 %	90%	DESIG=44
Γ_{37}	$K^+ K^0_S \pi^+ \pi^-$		$(9.6 \pm 1.3) \times 10^{-3}$		DESIG=43
Γ_{38}	$K^+ K^- \pi^+ \pi^+ \pi^-$		$(8.8 \pm 1.6) \times 10^{-3}$		DESIG=42
Γ_{39}	$\phi \pi^+ \pi^+ \pi^-$, $\phi \to K^+ K^-$		$(5.9 \pm 1.1) \times 10^{-3}$		DESIG=8
Γ_{40}	$K^+ K^- \rho^0 \pi^+$ non-ϕ		$< 2.6 \times 10^{-4}$	90%	DESIG=104
Γ_{41}	$\phi \rho^0 \pi^+$, $\phi \to K^+ K^-$		$(6.6 \pm 1.3) \times 10^{-3}$		DESIG=105
Γ_{42}	$\phi a_1(1260)^+$, $\phi \to K^+ K^-$, $a_1^+ \to \rho^0 \pi^+$		$(7.5 \pm 1.3) \times 10^{-3}$		DESIG=106
Γ_{43}	$K^+ K^- \pi^+ \pi^+ \pi^-$ nonresonant		$(9 \pm 7) \times 10^{-4}$		DESIG=107
Γ_{44}	$K^0_S K^0_S \pi^+ \pi^+ \pi^-$		$(8.4 \pm 3.5) \times 10^{-4}$		DESIG=112

Hadronic modes without K's

NODE=S034;CLUMP=B

Γ_{45}	$\pi^+\pi^0$		$< 6 \times 10^{-4}$	90%	DESIG=119
Γ_{46}	$\pi^+\pi^+\pi^-$		(1.11 ± 0.08) %		DESIG=15
Γ_{47}	$\rho^0\pi^+$		not seen		DESIG=10;OUR EVAL; → NOT CHECKED ←
Γ_{48}	$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$	[f]	$(9.7 \pm 1.1) \times 10^{-3}$		DESIG=113
Γ_{49}	$f_0(980)\pi^+$, $f_0 \to \pi^+\pi^-$				DESIG=14
Γ_{50}	$f_0(1370)\pi^+$, $f_0 \to \pi^+\pi^-$				DESIG=102
Γ_{51}	$f_0(1500)\pi^+$, $f_0 \to \pi^+\pi^-$				DESIG=91
Γ_{52}	$f_2(1270)\pi^+$, $f_2 \to \pi^+\pi^-$		$(1.1 \pm 0.6) \times 10^{-3}$		DESIG=90
Γ_{53}	$\rho(1450)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		$(7 \pm 6) \times 10^{-4}$		DESIG=103
Γ_{54}	$\pi^+\pi^+\pi^-$ nonresonant				DESIG=16
Γ_{55}	$\pi^+\pi^+\pi^-\pi^0$		< 15 %	90%	DESIG=18
Γ_{56}	$\eta\pi^+$	[e]	(1.58 ± 0.21) %		DESIG=1
Γ_{57}	$\omega\pi^+$	[e]	$(2.5 \pm 0.9) \times 10^{-3}$		DESIG=19
Γ_{58}	$3\pi^+2\pi^-$		$(8.0 \pm 0.9) \times 10^{-3}$		DESIG=17
Γ_{59}	$\pi^+\pi^+\pi^-\pi^0\pi^0$		—		DESIG=57;OUR EVAL; → NOT CHECKED ←
Γ_{60}	$\eta\rho^+$	[e]	(13.1 ± 2.2) %		DESIG=58
Γ_{61}	$\eta\pi^+\pi^0$ 3-body	[e]	< 5 %	90%	DESIG=64
Γ_{62}	$3\pi^+2\pi^-\pi^0$		(4.9 ± 3.2) %		DESIG=59
Γ_{63}	$\eta'(958)\pi^+$	[e]	(3.8 ± 0.4) %		DESIG=13
Γ_{64}	$3\pi^+2\pi^-2\pi^0$		—		DESIG=61;OUR EVAL; → NOT CHECKED ←
Γ_{65}	$\eta'(958)\rho^+$	[e]	(12.2 ± 2.0) %		DESIG=62
Γ_{66}	$\eta'(958)\pi^+\pi^0$ 3-body	[e]	< 1.8 %	90%	DESIG=65

Modes with one or three K's

NODE=S034;CLUMP=K

Γ_{67}	$K^+\pi^0$	$(8.2 \pm 2.2) \times 10^{-4}$		DESIG=120
Γ_{68}	$K^0_S\pi^+$	$(1.25 \pm 0.15) \times 10^{-3}$		DESIG=23
Γ_{69}	$K^+\eta$	$(1.41 \pm 0.31) \times 10^{-3}$		DESIG=121
Γ_{70}	$K^+\eta'(958)$	$(1.6 \pm 0.5) \times 10^{-3}$		DESIG=122
Γ_{71}	$K^+\pi^+\pi^-$	$(6.9 \pm 0.5) \times 10^{-3}$		DESIG=45
Γ_{72}	$K^+\rho^0$	$(2.7 \pm 0.5) \times 10^{-3}$		DESIG=82
Γ_{73}	$K^+\rho(1450)^0$, $\rho^0 \to \pi^+\pi^-$	$(7.4 \pm 2.6) \times 10^{-4}$		DESIG=108
Γ_{74}	$K^*(892)^0\pi^+$, $K^{*0} \to K^+\pi^-$	$(1.50 \pm 0.26) \times 10^{-3}$		DESIG=83
Γ_{75}	$K^*(1410)^0\pi^+$, $K^{*0} \to K^+\pi^-$	$(1.30 \pm 0.31) \times 10^{-3}$		DESIG=109
Γ_{76}	$K^*(1430)^0\pi^+$, $K^{*0} \to K^+\pi^-$	$(5 \pm 4) \times 10^{-4}$		DESIG=110
Γ_{77}	$K^+\pi^+\pi^-$ nonresonant	$(1.1 \pm 0.4) \times 10^{-3}$		DESIG=111
Γ_{78}	$K^0_S\pi^+\pi^+\pi^-$	$(3.0 \pm 1.1) \times 10^{-3}$		DESIG=123
Γ_{79}	$K^+K^+K^-$	$(4.9 \pm 1.7) \times 10^{-4}$		DESIG=67
Γ_{80}	ϕK^+, $\phi \to K^+K^-$	$< 2.8 \times 10^{-4}$	90%	DESIG=66

Doubly Cabibbo-suppressed modes

NODE=S034;CLUMP=F

Γ_{81}	$K^+K^+\pi^-$	$(2.9 \pm 1.1) \times 10^{-4}$	DESIG=116

Baryon-antibaryon mode

NODE=S034;CLUMP=G

Γ_{82}	$p\overline{n}$	$(1.3 \pm 0.4) \times 10^{-3}$	DESIG=124

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

NODE=S034;CLUMP=E

Γ_{83}	$\pi^+e^+e^-$		[g]	$< 2.7 \times 10^{-4}$	90%	DESIG=93
Γ_{84}	$\pi^+\mu^+\mu^-$		[g]	$< 2.6 \times 10^{-5}$	90%	DESIG=73
Γ_{85}	$K^+e^+e^-$	C1		$< 1.6 \times 10^{-3}$	90%	DESIG=94
Γ_{86}	$K^+\mu^+\mu^-$	C1		$< 3.6 \times 10^{-5}$	90%	DESIG=74
Γ_{87}	$K^*(892)^+\mu^+\mu^-$	C1		$< 1.4 \times 10^{-3}$	90%	DESIG=75
Γ_{88}	$\pi^+e^\pm\mu^\mp$	LF	[h]	$< 6.1 \times 10^{-4}$	90%	DESIG=95
Γ_{89}	$K^+e^\pm\mu^\mp$	LF	[h]	$< 6.3 \times 10^{-4}$	90%	DESIG=96
Γ_{90}	$\pi^-e^+e^+$	L		$< 6.9 \times 10^{-4}$	90%	DESIG=97
Γ_{91}	$\pi^-\mu^+\mu^+$	L		$< 2.9 \times 10^{-5}$	90%	DESIG=76
Γ_{92}	$\pi^-e^+\mu^+$	L		$< 7.3 \times 10^{-4}$	90%	DESIG=98
Γ_{93}	$K^-e^+e^+$	L		$< 6.3 \times 10^{-4}$	90%	DESIG=99
Γ_{94}	$K^-\mu^+\mu^+$	L		$< 1.3 \times 10^{-5}$	90%	DESIG=77
Γ_{95}	$K^-e^+\mu^+$	L		$< 6.8 \times 10^{-4}$	90%	DESIG=100
Γ_{96}	$K^*(892)^-\mu^+\mu^+$	L		$< 1.4 \times 10^{-3}$	90%	DESIG=78

Γ_{97}	A dummy mode used by the fit.	(73.6 ± 1.3) %	CLUMP=Z;DESIG=72

[a] This fraction includes η from η' decays. LINKAGE=EFR

[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*. LINKAGE=DS2

[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. LINKAGE=SDQ

[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. LINKAGE=DBF

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

[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. LINKAGE=KMP

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

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

CONSTRAINED FIT INFORMATION

An overall fit to 12 branching ratios uses 16 measurements and one constraint to determine 11 parameters. The overall fit has a $\chi^2 = 2.1$ for 6 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_{10}	x_{17}	x_{18}	x_{19}	x_{29}	x_{34}	x_{46}	x_{56}	x_{63}	x_{71}
x_{17}	0									
x_{18}	0	77								
x_{19}	36	0	0							
x_{29}	0	43	49	0						
x_{34}	0	52	59	0	33					
x_{46}	0	41	46	0	25	31				
x_{56}	0	39	44	0	24	30	23			
x_{63}	0	47	53	0	32	37	28	28		
x_{71}	0	38	45	0	23	29	22	21	26	
x_{97}	−14	−71	−81	−29	−72	−59	−46	−52	−69	−41

D_s^+ BRANCHING RATIOS NODE=S034220

A number of older, now obsolete results have been omitted. They may be found in earlier editions. NODE=S034220

Inclusive modes NODE=S034305

$\Gamma(K^- \text{anything})/\Gamma_{\text{total}}$ Γ_1/Γ NODE=S034R34

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

NODE=S034R34

$[\Gamma(\overline{K}^0 \text{anything}) + \Gamma(K^0 \text{anything})]/\Gamma_{\text{total}}$ Γ_2/Γ NODE=S034R36

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

NODE=S034R36

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

NODE=S034R35
NODE=S034R35

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

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

NODE=S034R37
NODE=S034R37

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.

NODE=S034R37;LINKAGE=A

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

NODE=S034R02

This ratio includes η particles from η' decays.

NODE=S034R02
NODE=S034R02

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

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

NODE=S034R03
NODE=S034R03

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

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

NODE=S034R84
NODE=S034R84

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

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

NODE=S034R28
NODE=S034R28

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

Leptonic and semileptonic modes

NODE=S034310

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=S034310

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

NODE=S034R04
NODE=S034R04

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

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

NODE=S034R7

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

NODE=S034R7
NODE=S034R7

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.3 ±0.5 OUR FIT					
6.1 ±0.6 OUR AVERAGE					
6.44±0.76±0.57	169 ± 18	[4] WIDHALM	08	BELL	$e^+e^- \approx \Upsilon(4S)$
5.94±0.66±0.31	88	[5] PEDLAR	07A	CLEO	$e^+e^- \to D_s^+ D_s^{*-}$, 4.17 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.8 ±1.1 ±1.8	553	[6] HEISTER	02I	ALEP	Z decays

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

NODE=S034R7;LINKAGE=WI

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

NODE=S034R7;LINKAGE=PE

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

NODE=S034R7;LINKAGE=BQ

$\Gamma(\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ Γ_{10}/Γ_{19}

NODE=S034R50

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

NODE=S034R50
NODE=S034R50

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.143±0.013 OUR FIT					
0.148±0.017 OUR AVERAGE					
0.143±0.018±0.006	489 ± 55	[7] AUBERT	07V	BABR	$e^+e^- \approx \Upsilon(4S)$
0.173±0.023±0.035	182	[8] 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	[9] ALEXANDROV	00	BEAT	π^- nucleus, 350 GeV
0.245±0.052±0.074	39	[10] ACOSTA	94	CLE2	See CHADHA 98

[7] AUBERT 07V gets $f_{D_s^+} = (283 \pm 17 \pm 16)$ MeV, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total}) = (4.71 \pm 0.46)\%$. NODE=S034R50;LINKAGE=AU

[8] CHADHA 98 obtains $f_{D_s} = (280 \pm 19 \pm 28 \pm 34)$ MeV from this measurement, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total}) = 0.036 \pm 0.009$. NODE=S034R50;LINKAGE=B

[9] 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 $D^+ \to \mu^+\nu_\mu$ and $D_s^+ \to \mu^+\nu_\mu$ events. The present result leads to $f_{D_s} = (323 \pm 44 \pm 36)$ MeV. NODE=S034R50;LINKAGE=C

[10] ACOSTA 94 obtains $f_{D_s} = (344 \pm 37 \pm 52 \pm 42)$ MeV from this measurement, using $\Gamma(D_s^+ \to \phi\pi^+)/\Gamma(\text{total}) = 0.037 \pm 0.009$. NODE=S034R50;LINKAGE=A

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

NODE=S034R76

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

NODE=S034R76

NODE=S034R76

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6 ±0.6 OUR AVERAGE					
$6.17 \pm 0.71 \pm 0.34$	102	ECKLUND	08	CLEO	$e^+e^- \to D_s^+ D_s^{*-}$, 4170 MeV
$8.0 \pm 1.3 \pm 0.4$	47	PEDLAR	07A	CLEO	$e^+e^- \to D_s^+ D_s^{*-}$, 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	$D_s^{*+} \to \gamma D_s^+$ from Z's
$7.4 \pm 2.8 \pm 2.4$	16	[13] ACCIARRI	97F	L3	$D_s^{*+} \to \gamma D_s^+$ from Z's

[11] HEISTER 02I combines its $D_s^+ \to \tau^+\nu_\tau$ and $\mu^+\nu_\mu$ branching fractions to get $f_{D_s} = (285 \pm 19 \pm 40)$ MeV. NODE=S034R76;LINKAGE=BQ

[12] This ABBIENDI 01L value gives a decay constant f_{D_s} of $(286 \pm 44 \pm 41)$ MeV. NODE=S034R76;LINKAGE=B

[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. NODE=S034R76;LINKAGE=A

$\Gamma(\tau^+\nu_\tau)/\Gamma(\mu^+\nu_\mu)$ — Γ_{11}/Γ_{10}

NODE=S034S20
NODE=S034S20

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	$e^+e^- \to D_s^+ D_s^{*-}$, 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. NODE=S034S20;LINKAGE=EU

$\Gamma(K^+K^-e^+\nu_e)/\Gamma(K^+K^-\pi^+)$ — Γ_{12}/Γ_{18}

NODE=S034S23
NODE=S034S23

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.558 \pm 0.007 \pm 0.016$	[15] AUBERT	08AN	BABR	e^+e^- at $\Upsilon(4S)$

[15] This AUBERT 08AN ratio is only for the K^+K^- mass (in both numerator and denominator) in the range 1.0095–to–1.0295 GeV. NODE=S034S23;LINKAGE=AU

$\Gamma(\phi e^+\nu_e)/\Gamma_{\text{total}}$ — Γ_{13}/Γ

NODE=S034S22

See the end of the D_s^+ Listings for measurements of $D_s^+ \to \phi e^+\nu_e$ form factors.

NODE=S034S22
NODE=S034S22

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.61 \pm 0.03 \pm 0.17$	(25 ± 0.5)k	AUBERT	08AN	BABR	e^+e^- at $\Upsilon(4S)$

$\Gamma(\phi e^+\nu_e)/\Gamma(\phi\pi^+)$ — Γ_{13}/Γ_{19}

NODE=S034R29

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.

NODE=S034R29

NODE=S034R29

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.540 \pm 0.033 \pm 0.048$	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 $\phi\mu^+\nu_\mu$

$\Gamma(\eta \ell^+ \nu_\ell)/\Gamma(\phi e^+ \nu_e)$ — Γ_{15}/Γ_{13}

NODE=S034R71

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

NODE=S034R71
NODE=S034R71

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.24±0.12±0.15	440	[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.

NODE=S034R71;LINKAGE=A

$\Gamma(\eta'(958) \ell^+ \nu_\ell)/\Gamma(\phi e^+ \nu_e)$ — Γ_{16}/Γ_{13}

NODE=S034R72

Unseen decay modes of the resonances are included.

NODE=S034R72
NODE=S034R72

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.43±0.11±0.07	29	[17] BRANDENB...	95	CLE2	$e^+ e^- \approx \Upsilon(4S)$

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

NODE=S034R72;LINKAGE=A

$\left[\Gamma(\eta \ell^+ \nu_\ell) + \Gamma(\eta'(958) \ell^+ \nu_\ell)\right]/\Gamma(\phi e^+ \nu_e)$ — $\Gamma_{14}/\Gamma_{13} = (\Gamma_{15}+\Gamma_{16})/\Gamma_{13}$

NODE=S034R49

Unseen decay modes of the resonances are included.

NODE=S034R49
NODE=S034R49

VALUE	DOCUMENT ID		TECN	COMMENT
1.67±0.17±0.17	[18] BRANDENB...	95	CLE2	$e^+ e^- \approx \Upsilon(4S)$

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

NODE=S034R49;LINKAGE=C

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

NODE=S034315

$\Gamma(K^+ K^0_S)/\Gamma_{\text{total}}$ — Γ_{17}/Γ

NODE=S034S01
NODE=S034S01

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.49±0.09 OUR FIT				
1.49±0.07±0.05	[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.

NODE=S034S01;LINKAGE=AL

$\Gamma(K^+ K^0_S)/\Gamma(\phi \pi^+)$ — Γ_{17}/Γ_{19}

NODE=S034R25
NODE=S034R25

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

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

NODE=S034S02
NODE=S034S02

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.50±0.28 OUR FIT				
5.50±0.23±0.16	[20] ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

NODE=S034S02;LINKAGE=AL

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

NODE=S034R6

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.

NODE=S034R6

NODE=S034R6

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.39±0.34 OUR FIT					
4.5 ±0.4 OUR AVERAGE					
4.62±0.36±0.51		[21] AUBERT	06N	BABR	$e^+ e^-$ at $\Upsilon(4S)$
4.81±0.52±0.38	212 ± 19	[22] AUBERT	05V	BABR	$e^+ e^- \approx \Upsilon(4S)$
3.59±0.77±0.48		[23] ARTUSO	96	CLE2	$e^+ e^-$ at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.9\ {}^{+5.1}_{-1.9}\ {}^{+1.8}_{-1.1}$		[24] BAI	95C	BES	$e^+ e^-$ 4.03 GeV

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

NODE=S034R6;LINKAGE=AE

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

NODE=S034R6;LINKAGE=AU

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

NODE=S034R6;LINKAGE=G

[24] 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. NODE=S034R6;LINKAGE=F

$\Gamma(\phi\pi^+, \phi\to K^+K^-)/\Gamma(K^+K^-\pi^+)$ Γ_{20}/Γ_{18}

NODE=S034R63

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. NODE=S034R63

NODE=S034R63

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_{22}/Γ_{18}

NODE=S034R64

This is the "fit fraction" from the Dalitz-plot analysis. NODE=S034R64

NODE=S034R64

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_{21}/Γ_{19}

NODE=S034R11

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. NODE=S034R11

NODE=S034R11

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_{23}/Γ_{18}

NODE=S034R65

This is the "fit fraction" from the Dalitz-plot analysis. NODE=S034R65

NODE=S034R65

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_{25}/Γ_{18}

NODE=S034R66

This is the "fit fraction" from the Dalitz-plot analysis. NODE=S034R66

NODE=S034R66

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.034±0.023±0.035	[25] FRABETTI	95B	E687	Dalitz fit, 701 evts

[25] In other words, FRABETTI 95B doesn't see this resonance. NODE=S034R66;LINKAGE=A

$\Gamma(K^+\overline{K}_0^*(1430)^0, \overline{K}_0^*\to K^-\pi^+)/\Gamma(K^+K^-\pi^+)$ Γ_{24}/Γ_{18}

NODE=S034R67

This is the "fit fraction" from the Dalitz-plot analysis. NODE=S034R67

NODE=S034R67

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_{28}/Γ_{19}

NODE=S034R27

Unseen decay modes of the resonances are included. NODE=S034R27

NODE=S034R27

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_{29}/Γ

NODE=S034S03

NODE=S034S03

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.6 ±0.5 OUR FIT				
5.65±0.29±0.40	[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. NODE=S034S03;LINKAGE=AL

$\Gamma(\phi\rho^+, \phi\to K^+K^-)/\Gamma(\phi\pi^+, \phi\to K^+K^-)$ Γ_{31}/Γ_{20}

NODE=S034R31

NODE=S034R31

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

$\Gamma(\phi\pi^+\pi^0\,\text{3-body},\ \phi\to K^+K^-)/\Gamma(\phi\pi^+,\ \phi\to K^+K^-)$ — Γ_{32}/Γ_{20}

NODE=S034R39
NODE=S034R39

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_{33}/Γ_{19}

NODE=S034R24
NODE=S034R24

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

$\Gamma(K^0_S K^-\pi^+\pi^+)/\Gamma_{\text{total}}$ — Γ_{34}/Γ

NODE=S034S15
NODE=S034S15

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.64±0.12 OUR FIT				
1.64±0.10±0.07	[27] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

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

NODE=S034S15;LINKAGE=AL

$\Gamma(K^*(892)^+\overline{K}^*(892)^0)/\Gamma(\phi\pi^+)$ — Γ_{35}/Γ_{19}

NODE=S034R38

Unseen decay modes of the resonances are included.

NODE=S034R38
NODE=S034R38

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_{36}/Γ_{19}

NODE=S034R42
NODE=S034R42

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_{37}/Γ_{34}

NODE=S034R97
NODE=S034R97

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_{38}/Γ_{18}

NODE=S034R78
NODE=S034R78

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

$\Gamma(\phi\pi^+\pi^+\pi^-,\ \phi\to K^+K^-)/\Gamma(\phi\pi^+,\ \phi\to K^+K^-)$ — Γ_{39}/Γ_{20}

NODE=S034R9
NODE=S034R9

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_{39}/Γ_{38}

NODE=S034S4
NODE=S034S4

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	[28] LINK	03D	FOCS	γ A, $\overline{E}_\gamma \approx$ 180 GeV

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

NODE=S034S4;LINKAGE=A

$\Gamma(K^+K^-\rho^0\pi^+\,\text{non-}\phi)/\Gamma(K^+K^-\pi^+\pi^+\pi^-)$ — Γ_{40}/Γ_{38}

NODE=S034R99
NODE=S034R99

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_{41}/Γ_{38}

NODE=S034S1
NODE=S034S1

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_{42}/Γ_{18}

NODE=S034S2
NODE=S034S2

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_{43}/Γ_{38}

NODE=S034S3
NODE=S034S3

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_{44}/Γ_{34}

NODE=S034S12
NODE=S034S12

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

NODE=S034320

$\Gamma(\pi^+ \pi^0)/\Gamma(K^+ K^0_S)$ — Γ_{45}/Γ_{17}

NODE=S034R05

This decay is forbidden by isospin conservation.

NODE=S034R05
NODE=S034R05

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_{46}/Γ

NODE=S034S16
NODE=S034S16

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.11±0.08 OUR FIT				
1.11±0.07±0.04	[29] ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

NODE=S034S16;LINKAGE=AL

$\Gamma(\pi^+ \pi^+ \pi^-)/\Gamma(K^+ K^- \pi^+)$ — Γ_{46}/Γ_{18}

NODE=S034R80
NODE=S034R80

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.265±0.041±0.031	98	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

$\Gamma(\pi^+ \pi^+ \pi^-)/\Gamma(\phi \pi^+)$ — Γ_{46}/Γ_{19}

NODE=S034R16
NODE=S034R16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.245 \pm 0.028 ^{+0.019}_{-0.012}$	848	AITALA	01A	E791	π^- nucleus, 500 GeV
0.33 ±0.10 ±0.04	29	ADAMOVICH	93	WA82	π^- 340 GeV
0.44 ±0.10 ±0.04	68	ANJOS	89	E691	Photoproduction

$\Gamma(\rho^0 \pi^+)/\Gamma(\pi^+ \pi^+ \pi^-)$ — Γ_{47}/Γ_{46}

NODE=S034R85
NODE=S034R85

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±0.023±0.037		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_{47}/Γ_{19}

NODE=S034R12
NODE=S034R12

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

$\Gamma(\pi^+ (\pi^+ \pi^-)_{S-wave})/\Gamma(\pi^+ \pi^+ \pi^-)$ — Γ_{48}/Γ_{46}

NODE=S034S13

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

NODE=S034S13
NODE=S034S13

VALUE	DOCUMENT ID		TECN	COMMENT
0.8704±0.0560±0.0438	[30] LINK	04	FOCS	Dalitz fit, 1475 ± 50 evts

[30] 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.

NODE=S034S13;LINKAGE=LI

$\Gamma(f_0(980)\pi^+, f_0 \to \pi^+ \pi^-)/\Gamma(\pi^+ \pi^+ \pi^-)$ — Γ_{49}/Γ_{46}

NODE=S034R83

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

NODE=S034R83
NODE=S034R83

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 $\approx$ 200 GeV

$\Gamma(f_0(1370)\pi^+, f_0 \to \pi^+ \pi^-)/\Gamma(\pi^+ \pi^+ \pi^-)$ — Γ_{50}/Γ_{46}

NODE=S034R95

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

NODE=S034R95
NODE=S034R95

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

$\Gamma(f_0(1500)\pi^+, f_0 \to \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ Γ_{51}/Γ_{46}

NODE=S034R82

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

NODE=S034R82
NODE=S034R82

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.274 \pm 0.114 \pm 0.019$	[31] FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

[31] 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 $f_0(1500)$.

NODE=S034R82;LINKAGE=A

$\Gamma(f_2(1270)\pi^+, f_2 \to \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$ Γ_{52}/Γ_{46}

NODE=S034R81

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

NODE=S034R81
NODE=S034R81

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_{53}/Γ_{46}

NODE=S034R96

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

NODE=S034R96
NODE=S034R96

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_{54}/Γ_{46}

NODE=S034R86

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

NODE=S034R86
NODE=S034R86

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_{55}/Γ_{19}

NODE=S034R21
NODE=S034R21

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

$\Gamma(\eta\pi^+)/\Gamma_{total}$ Γ_{56}/Γ

NODE=S034S17

Unseen decay modes of the η are included.

NODE=S034S17
NODE=S034S17

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.58 ± 0.21 OUR FIT				
$1.58 \pm 0.11 \pm 0.18$	[32] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

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

NODE=S034S17;LINKAGE=AL

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+)$ Γ_{56}/Γ_{19}

NODE=S034R2

Unseen decay modes of the resonances are included.

NODE=S034R2
NODE=S034R2

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_{57}/Γ_{56}

NODE=S034R79

Unseen decay modes of the resonances are included.

NODE=S034R79
NODE=S034R79

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

$\Gamma(3\pi^+2\pi^-)/\Gamma(K^+K^-\pi^+)$ Γ_{58}/Γ_{18}

NODE=S034R77
NODE=S034R77

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

$\Gamma(\eta\rho^+)/\Gamma(\phi\pi^+)$ — Γ_{60}/Γ_{19}

NODE=S034R32

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_{61}/Γ_{19}

NODE=S034R40

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	[33] DAOUDI	92	CLE2	See JESSOP 98

[33] 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.

NODE=S034R40;LINKAGE=A

$\Gamma(3\pi^+2\pi^-\pi^0)/\Gamma_{total}$ — Γ_{62}/Γ

NODE=S034R54

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_{63}/Γ

NODE=S034S18

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	[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.

NODE=S034S18;LINKAGE=AL

$\Gamma(\eta'(958)\pi^+)/\Gamma(\phi\pi^+)$ — Γ_{63}/Γ_{19}

NODE=S034R15

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_{65}/Γ_{19}

NODE=S034R33

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_{66}/Γ_{19}

NODE=S034R41

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

NODE=S034323

$\Gamma(K^+\pi^0)/\Gamma(K^+K^0_S)$ — Γ_{67}/Γ_{17}

NODE=S034R06

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

$\Gamma(K^0_S\pi^+)/\Gamma(K^+K^0_S)$ — Γ_{68}/Γ_{17}

NODE=S034R07

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_{cm}=4.17 GeV

$\Gamma(K^+\eta)/\Gamma(\eta\pi^+)$ — Γ_{69}/Γ_{56}

NODE=S034R08
NODE=S034R08

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

$\Gamma(K^+\eta'(958))/\Gamma(\eta'(958)\pi^+)$ — Γ_{70}/Γ_{63}

NODE=S034R09
NODE=S034R09

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

$\Gamma(K^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{71}/Γ

NODE=S034S19
NODE=S034S19

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
0.69±0.05 OUR FIT				
0.69±0.05±0.03	[35] ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

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

NODE=S034S19;LINKAGE=AL

$\Gamma(K^+\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ — Γ_{71}/Γ_{18}

NODE=S034S05
NODE=S034S05

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_{71}/Γ_{19}

NODE=S034R68
NODE=S034R68

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.28±0.06±0.05	85	FRABETTI	95E	E687	γBe, $\overline{E}_\gamma$= 220 GeV

$\Gamma(K^+\rho^0)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{72}/Γ_{71}

NODE=S034S06

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

NODE=S034S06
NODE=S034S06

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_{73}/Γ_{71}

NODE=S034S07

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

NODE=S034S07
NODE=S034S07

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_{74}/Γ_{71}

NODE=S034S08

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

NODE=S034S08
NODE=S034S08

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_{75}/Γ_{71}

NODE=S034S09

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

NODE=S034S09
NODE=S034S09

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_{76}/Γ_{71}

NODE=S034S10

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

NODE=S034S10
NODE=S034S10

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

$\Gamma(K^+\pi^+\pi^-$ nonresonant$)/\Gamma(K^+\pi^+\pi^-)$ — Γ_{77}/Γ_{71}

NODE=S034S11

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

NODE=S034S11
NODE=S034S11

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_{78}/Γ_{34}

NODE=S034S04
NODE=S034S04

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_{79}/Γ_{18}

NODE=S034R98
NODE=S034R98

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

$\Gamma(\phi K^+,\ \phi \to K^+ K^-)/\Gamma(\phi \pi^+,\phi \to K^+ K^-)$ — Γ_{80}/Γ_{20}

NODE=S034R46
NODE=S034R46

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

Doubly Cabibbo-suppressed modes

NODE=S034327

$\Gamma(K^+ K^+ \pi^-)/\Gamma(K^+ K^- \pi^+)$ — Γ_{81}/Γ_{18}

NODE=S034R01
NODE=S034R01

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

Baryon-antibaryon mode

NODE=S034329

$\Gamma(p\overline{n})/\Gamma_{total}$ — Γ_{82}/Γ

NODE=S034S21

This is the only baryonic mode allowed kinematically.

NODE=S034S21
NODE=S034S21

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

NODE=S034325

$\Gamma(\pi^+ e^+ e^-)/\Gamma_{total}$ — Γ_{83}/Γ

NODE=S034R87

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

NODE=S034R87

NODE=S034R87

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7 \times 10^{-4}$	90	AITALA	99G	E791	π^- N 500 GeV

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

NODE=S034R57

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

NODE=S034R57

NODE=S034R57

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<2.6 \times 10^{-5}$	90		LINK	03F	FOCS	γ nucleus,$\overline{E}_\gamma\approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<1.4 \times 10^{-4}$	90		AITALA	99G	E791	π^- N 500 GeV
$<4.3 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

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

NODE=S034R88

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

NODE=S034R88

NODE=S034R88

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.6 \times 10^{-3}$	90	AITALA	99G	E791	π^- N 500 GeV

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

NODE=S034R58

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

NODE=S034R58

NODE=S034R58

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<3.6 \times 10^{-5}$	90		LINK	03F	FOCS	γ nucleus,$\overline{E}_\gamma\approx$ 180 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<1.4 \times 10^{-4}$	90		AITALA	99G	E791	π^- N 500 GeV
$<5.9 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^*(892)^+ \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{87}/Γ

NODE=S034R59

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

NODE=S034R59

NODE=S034R59

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

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

NODE=S034R89

A test of lepton-family-number conservation.

NODE=S034R89
NODE=S034R89

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

$\Gamma(K^+ e^\pm \mu^\mp)/\Gamma_{total}$ — Γ_{89}/Γ

NODE=S034R90

A test of lepton-family-number conservation.

NODE=S034R90
NODE=S034R90

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

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

NODE=S034R91

A test of lepton-number conservation.

NODE=S034R91
NODE=S034R91

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

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

NODE=S034R60

A test of lepton-number conservation.

NODE=S034R60
NODE=S034R60

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.9 × 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_{92}/Γ

NODE=S034R92

A test of lepton-number conservation.

NODE=S034R92
NODE=S034R92

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

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

NODE=S034R93

A test of lepton-number conservation.

NODE=S034R93
NODE=S034R93

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

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

NODE=S034R61

A test of lepton-number conservation.

NODE=S034R61
NODE=S034R61

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.3 × 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_{95}/Γ

NODE=S034R94

A test of lepton-number conservation.

NODE=S034R94
NODE=S034R94

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

$\Gamma(K^*(892)^- \mu^+ \mu^+)/\Gamma_{total}$ Γ_{96}/Γ

NODE=S034R62

A test of lepton-number conservation.

NODE=S034R62
NODE=S034R62

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

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

NODE=S034245

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

NODE=S034245

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

NODE=S034A05
NODE=S034A05

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

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

NODE=S034A06
NODE=S034A06

VALUE	DOCUMENT ID		TECN	COMMENT
+0.003±0.011±0.008	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

NODE=S034A07
NODE=S034A07

VALUE	DOCUMENT ID		TECN	COMMENT
−0.059±0.042±0.012	ALEXANDER	08	CLEO	$e^+ e^-$ at 4.17 GeV

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

NODE=S034A08
NODE=S034A08

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

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

NODE=S034A09
NODE=S034A09

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

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

NODE=S034A10
NODE=S034A10

VALUE	DOCUMENT ID		TECN	COMMENT
−0.082±0.052±0.008	ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

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

NODE=S034A11
NODE=S034A11

VALUE	DOCUMENT ID		TECN	COMMENT
−0.055±0.037±0.012	ALEXANDER	08	CLEO	e^+e^- at 4.17 GeV

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

NODE=S034A01
NODE=S034A01

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

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

NODE=S034A02
NODE=S034A02

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

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

NODE=S034A12
NODE=S034A12

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 $D_s^\pm \to K^\pm\eta$

NODE=S034A03
NODE=S034A03

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 $D_s^\pm \to K^\pm\eta'(958)$

NODE=S034A04
NODE=S034A04

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

NODE=S034242

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

NODE=S034TV0

NODE=S034TV0

$C_T \equiv \vec{p}_{K^+}\cdot(\vec{p}_{\pi^+}\times\vec{p}_{\pi^-})$ 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.

NODE=S034TV0

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

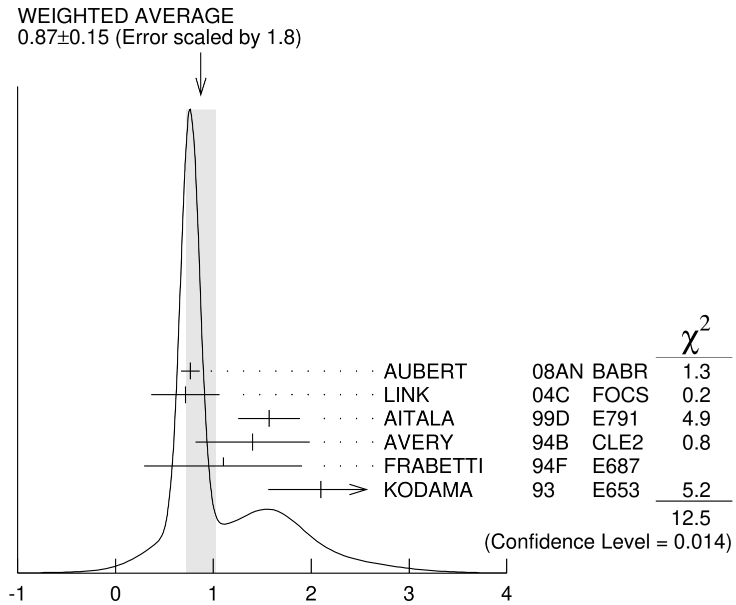
$D_s^+ \to \phi\ell^+\nu_\ell$ FORM FACTORS

NODE=S034260

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

NODE=S034FR2
NODE=S034FR2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.87 ±0.15 OUR AVERAGE		Error includes scale factor of 1.8. See the ideogram below.			
0.763±0.071±0.065		AUBERT	08AN	BABR	$\phi e^+\nu_e$
0.713±0.202±0.284	793	LINK	04C	FOCS	$\phi\mu^+\nu_\mu$
1.57 ±0.25 ±0.19	271	AITALA	99D	E791	$\phi e^+\nu_e$, $\phi\mu^+\nu_\mu$
1.4 ±0.5 ±0.3	308	AVERY	94B	CLE2	$\phi e^+\nu_e$
1.1 ±0.8 ±0.1	90	FRABETTI	94F	E687	$\phi\mu^+\nu_\mu$
2.1 $^{+0.6}_{-0.5}$ ±0.2	19	KODAMA	93	E653	$\phi\mu^+\nu_\mu$



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

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

NODE=S034FRV
NODE=S034FRV

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.82 ±0.11 OUR AVERAGE		Error includes scale factor of 1.2.			
1.849±0.060±0.095		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	$\phi \mu^+ \nu_\mu$

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

NODE=S034GLT
NODE=S034GLT

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	[36] FRABETTI	94F	E687	$\phi \mu^+ \nu_\mu$
0.54±0.21±0.10	19	[36] KODAMA	93	E653	$\phi \mu^+ \nu_\mu$

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

NODE=S034GLT;LINKAGE=BB

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