$$D_s^\pm$$

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

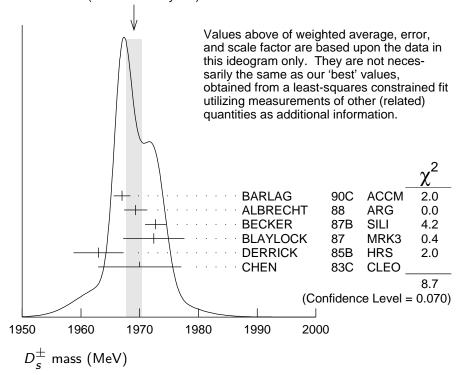
The angular distributions of the decays of the ϕ and $\overline{K}^*(892)^0$ in the $\phi\pi^+$ and $K^+\overline{K}^*(892)^0$ modes strongly indicate that the spin is zero. The parity given is that expected of a $c\overline{s}$ ground state.

D_s^{\pm} MASS

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1968.28± 0.10 OUR FI	Т				
1969.0 \pm 1.4 OUR AV	ERAGE	Error includes sca	le fac	tor of 1.	5. See the ideogram
below.					
$1967.0 \pm 1.0 \pm 1.0$	54	BARLAG	90 C	ACCM	π^- Cu 230 GeV
1969.3 \pm 1.4 \pm 1.4		ALBRECHT	88	ARG	e ⁺ e ⁻ 9.4–10.6 GeV
1972.7 \pm 1.5 \pm 1.0	21	BECKER	87 B	SILI	200 GeV π , K , p
1972.4 \pm 3.7 \pm 3.7	27	BLAYLOCK	87	MRK3	$e^{+}e^{-}$ 4.14 GeV
$1963 \pm \ 3 \pm \ 3$	30	DERRICK	85 B	HRS	e^+e^- 29 GeV
$1970 \pm \ 5 \pm \ 5$	104	CHEN	83 C	CLEO	e^+e^- 10.5 GeV
• • • We do not use the	e following	g data for averages	s, fits,	limits, e	etc. • • •
1968.3 \pm 0.7 \pm 0.7	290	¹ ANJOS	88	E691	Photoproduction
1980 ± 15	6	USHIDA	86	EMUL	u wideband
1973.6 \pm 2.6 \pm 3.0	163	ALBRECHT	85 D	ARG	e^+e^- 10 GeV
$1948 \pm 28 \pm 10$	65	AIHARA	84 D	TPC	e^+e^- 29 GeV
$1975 \pm 9 \pm 10$	49	ALTHOFF	84	TASS	$e^{+}e^{-}$ 14–25 GeV
1975 \pm 4	3	BAILEY	84	ACCM	hadron $^+$ Be $ ightarrow \phi \pi^+$ X
¹ ANJOS 88 enters the	e fit via <i>m</i>	$n_{D_s^\pm} - m_{D^\pm}$ (see	belov	v).	

WEIGHTED AVERAGE 1969.0±1.4 (Error scaled by 1.5)



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

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

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

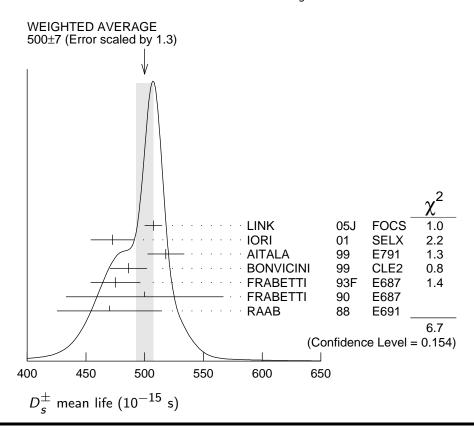
Ds MEAN LIFE

Measurements with an error greater than $100\times10^{-15}\,\mathrm{s}$ or with fewer than 100 events have been omitted from the Listings.

<u>VALUE</u> (10^{-15} s)	EVTS	DOCUMENT I	D	TECN	COMMENT
500 \pm 7 OUR AVER	AGE Error	includes scale	factor of	1.3. Se	e the ideogram below.
$507.4 \pm 5.5 \pm 5.1$	13.6k	LINK	05 J	FOCS	$m{\phi}\pi^+$ and $\overline{\emph{K}}{}^{*0}\emph{K}^+$
$472.5 \pm 17.2 \pm 6.6$	760	IORI	01	SELX	600 GeV Σ^- , π^- , p
518 ± 14 ± 7	1662	AITALA	99	E791	π^- nucleus, 500 GeV
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$486.3 \pm 15.0 {+\atop -}4.9$	2167	¹ BONVICINI	99	CLE2	$e^+e^-pprox ~ \Upsilon(4S)$
475 ± 20 \pm 7	900	FRABETTI	93F	E687	γ Be, $\phi\pi^+$
500 ± 60 ± 30	104	FRABETTI	90	E687	γ Be, $\phi\pi^+$
470 \pm 40 \pm 20	228	RAAB	88	E691	Photoproduction

 $^{^1}$ BONVICINI 99 obtains 1.19 \pm 0.04 for the ratio of $D_{\it S}^+$ 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	F	raction (Γ_i/Γ)	Scale factor/ Confidence level
Γ ₃ Γ ₄	e^+ semileptonic π^+ anything π^- anything π^0 anything K^- anything K^+ anything K^0_S anything η anything	Inclusive mode [a]	(6.5 ±0.4) % (119.3 ±1.4) % (43.2 ±0.9) % (123 ±7) % (18.7 ±0.5) % (28.9 ±0.7) % (19.0 ±1.1) % (29.9 ±2.8) %	
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\Gamma_9
         \omega anything
                                                                      (6.1 \pm 1.4)\%
\Gamma_{10} \eta anything \Gamma_{11} f_0(980) anything, f_0 \rightarrow \pi^+\pi^-
                                                             [c] ( 10.3 \pm 1.4 ) %
                                                                                                             S = 1.1
                                                              < 1.3
                                                                                                          CL=90%
\Gamma_{12} \phi anything
                                                                   ( 15.7 \pm 1.0 ) %
\Gamma_{13} K^+K^- anything
                                                                   (15.8 \pm 0.7)\%
\Gamma_{14} K_S^0 K^+ anything
                                                                  (5.8 \pm 0.5)\%
\Gamma_{15} K_S^{0}K^{-} anything
                                                                   (1.9 \pm 0.4)\%
\Gamma_{16} 2K_S^0 anything
                                                                     (1.70\pm0.32)\%
\Gamma_{17} 2K^+ anything
                                                                    < 2.6 \times 10^{-3}
                                                                                                          CL=90%
\Gamma_{18} 2K^- anything
                                                                                          \times 10<sup>-4</sup>
                                                                                                          CL=90%
                                 Leptonic and semileptonic modes
\Gamma_{19} e^+ \nu_e
                                                                    < 8.3 \times 10^{-5}
                                                                                                          CL=90%
\Gamma_{20}^{-1} \mu^+\nu_{\mu}
                                                                      (5.50\pm0.23)\times10^{-3}
\Gamma_{21} \quad \tau^+ \nu_{\tau}
                                                                      (5.48\pm0.23)\%
\Gamma_{22} \quad K^+ K^- e^+ \nu_e
\Gamma_{23} \qquad \phi e^+ \nu_e \\ \Gamma_{24} \qquad \eta e^+ \nu_e + \eta'(958) e^+ \nu_e
                                                              [d] (2.39\pm0.23)\%
                                                                                                             S=1.8
                                                              [d] (2.96\pm0.29)\%
\Gamma_{25} \qquad \eta \, e^{+\nu_{e}}
                                                              [d] (2.29\pm0.19)\%
\Gamma_{26}^{-3} \eta'(958)e^+\nu_e
                                                              [d] (7.4 \pm 1.4) \times 10^{-3}
\Gamma_{27} \quad \omega \, e^+ \, \nu_e
                                                               [e] < 2.0 	 \times 10^{-3}
                                                                                                          CL=90%
\Gamma_{28} K^0 e^+ \nu_e
                                                              (3.9 \pm 0.9) \times 10^{-3}
\Gamma_{29} \quad K^*(892)^0 e^+ \nu_e
                                                              [d] (1.8 \pm 0.4) \times 10^{-3}
\Gamma_{30} f_0(980) e^+ \nu_e, f_0 \rightarrow \pi^+ \pi^-
                                  Hadronic modes with a K\overline{K} pair
\begin{array}{ccc} \Gamma_{31} & \mathcal{K}^+ \mathcal{K}^0_S \\ \Gamma_{32} & \mathcal{K}^+ \overline{\mathcal{K}}^0 \end{array}
                                                                      (1.50\pm0.05)\%
                                                                      (2.95\pm0.14)\%
\Gamma_{33}^- K^+K^-\pi^+
                                                               [f] (5.45\pm0.17)\%
                                                                                                             S = 1.2
\Gamma_{34} \phi \pi^+
                                                            [d,g] ( 4.5 ±0.4)%
\Gamma_{35} \phi \pi^+, \phi \to K^+ K^-

\Gamma_{36} K^+ \overline{K}^* (892)^0, \overline{K}^{*0} \to
                                                          [g] (2.27\pm0.08)\%
                                                                      (2.61\pm0.09)\%
\Gamma_{37} \qquad f_0(980)\pi^+, f_0 \rightarrow K^+K^-
                                                                (1.15\pm0.32)\%
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```
\Gamma_{47} \quad K_{S}^{0} K^{-} 2\pi^{+}
                                                                                             (1.67\pm0.10)\%
         K^*(892)^+ \overline{K}^*(892)^0
                                                                                  [d] (7.2 \pm 2.6)\%
\Gamma_{49} \quad K^+ K^0_S \pi^+ \pi^-
                                                                                            (1.03\pm0.10)\%
\Gamma_{50} K^{+}K^{-}2\pi^{+}\pi^{-}
                                                                                            (8.7 \pm 1.5) \times 10^{-3}
\Gamma_{51} \qquad \phi 2\pi^{+}\pi^{-}
\Gamma_{52} \qquad K^{+}K^{-}\rho^{0}\pi^{+} non-\phi
\Gamma_{53} \qquad \phi \rho^{0}\pi^{+}, \quad \phi \to K^{+}K^{-}
                                                                                  [d] (1.21\pm0.16)\%
                                                                               < 2.6 \times 10^{-4} ( 6.5 \pm 1.3 ) \times 10^{-3}
                                                                                                                                            CL=90%
          \phi a_1(1260)^+, \phi \rightarrow K^+K^-, a_1^+ \rightarrow \rho^0\pi^+

K^+K^-2\pi^+\pi^- nonresonant
                                                                                           (7.5 \pm 1.2) \times 10^{-3}
                                                                                            (9 \pm 7) \times 10^{-4}
\Gamma_{56} \quad 2K_{S}^{0} \, 2\pi^{+} \, \pi^{-}
```

Hadronic modes without K's

Modes with one or three K's

Doubly Cabibbo-suppressed modes

$$\Gamma_{102} \ 2K^{+}\pi^{-} \ (1.27\pm0.13)\times10^{-4} \ \Gamma_{103} \ K^{+}K^{*}(892)^{0}, K^{*0} \rightarrow (6.0 \pm3.4)\times10^{-5} \ K^{+}\pi^{-}$$

Baryon-antibaryon mode

$$\Gamma_{104} \ \ p \, \overline{n}$$
 (1.3 ±0.4) × 10⁻³

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

Γ_{105}	$\pi^+e^+e^-$				$\times 10^{-5}$	
Γ_{106}	$\pi^+\phi$, $\phi ightarrow e^+e^-$		[<i>j</i>] ($6 \begin{array}{c} +8 \\ -4 \end{array}$	$) \times 10^{-6}$	
	$\pi^+\mu^+\mu^-$		[i]	4.1	\times 10 ⁻⁷	CL=90%
Γ_{108}	$K^+e^+e^-$	C1	<	3.7	\times 10 ⁻⁶	CL=90%
Γ_{109}	$K^+\mu^+\mu^-$	C1	<	2.1	\times 10 ⁻⁵	CL=90%
Γ_{110}	$K^*(892)^+ \mu^+ \mu^-$	C1	<	1.4	\times 10 ⁻³	CL=90%
Γ_{111}	$\pi^+e^+\mu^-$	LF	<	1.2	\times 10 ⁻⁵	CL=90%
Γ_{112}	$\pi^+e^-\mu^+$	LF	<	2.0	\times 10 ⁻⁵	CL=90%
Γ_{113}	$\mathcal{K}^+e^+\mu^-$	LF	<	1.4	\times 10 ⁻⁵	CL=90%
Γ_{114}	$K^+e^-\mu^+$	LF	<	9.7	\times 10 ⁻⁶	CL=90%

$\Gamma_{115} \pi^{-}2e^{+}$	L	<	4.1	$\times 10^{-6}$	CL=90%
$\Gamma_{116} \pi^{-} 2 \mu^{+}$	L	<	1.2	\times 10 ⁻⁷	CL=90%
$\Gamma_{117} \ \pi^- e^+ \mu^+$	L	<	8.4	\times 10 ⁻⁶	CL=90%
$\Gamma_{118} \ K^{-}2e^{+}$	L	<	5.2	\times 10 ⁻⁶	CL=90%
$\Gamma_{119} \ \ K^- 2 \mu^+$	L	<	1.3	$\times 10^{-5}$	CL=90%
$\Gamma_{120}~~K^-e^+\mu^+$	L	<	6.1	\times 10 ⁻⁶	CL=90%
$\Gamma_{121} \ K^*(892)^- 2\mu^+$	L	<	1.4	\times 10 ⁻³	CL=90%

- [a] This is the purely e^+ semileptonic branching fraction: the e^+ fraction from τ^+ decays has been subtracted off. The sum of our (non- τ) e^+ exclusive fractions an $e^+\nu_e$ with an $\eta,\,\eta',\,\phi,\,K^0,\,K^{*0}$, or $f_0(980)$ is $7.0\pm0.4~\%$
- [b] This fraction includes η from η' decays.
- [c] Two times (to include μ decays) the $\eta' \, e^+ \, \nu_e$ branching fraction, plus the $\eta' \, \pi^+$, $\eta' \, \rho^+$, and $\eta' \, K^+$ fractions, is (18.6 \pm 2.3)%, which considerably exceeds the inclusive η' fraction of (11.7 \pm 1.8)%. Our best guess is that the $\eta' \, \rho^+$ fraction, (12.5 \pm 2.2)%, is too large.
- [d] This branching fraction includes all the decay modes of the final-state resonance.
- [e] A test for $u\overline{u}$ or $d\overline{d}$ content in the D_s^+ . Neither Cabibbo-favored nor Cabibbo-suppressed decays can contribute, and $\omega-\phi$ mixing is an unlikely explanation for any fraction above about 2×10^{-4} .
- [f] The branching fraction for this mode may differ from the sum of the submodes that contribute to it, due to interference effects. See the relevant papers.
- [g] We decouple the $D_s^+ \to \phi \pi^+$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+ \to \phi \pi^+$, $\phi \to K^+ K^-$ branching fraction obtained from the Dalitz-plot analysis of $D_s^+ \to K^+ K^- \pi^+$. That is, the ratio of these two branching fractions is not exactly the $\phi \to K^+ K^-$ branching fraction 0.491.
- [h] This is the average of a model-independent and a K-matrix parametrization of the $\pi^+\pi^-$ S-wave and is a sum over several f_0 mesons.
- [i] This mode is not a useful test for a $\Delta C=1$ weak neutral current because both quarks must change flavor in this decay.
- [j] This is *not* a test for the $\Delta C=1$ weak neutral current, but leads to the $\pi^+\ell^+\ell^-$ final state.

CONSTRAINED FIT INFORMATION

An overall fit to 14 branching ratios uses 20 measurements and one constraint to determine 12 parameters. The overall fit has a $\chi^2=8.6$ for 9 degrees of freedom.

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

<i>×</i> 25	0									
<i>x</i> 26	0	0								
<i>x</i> 31	0	0	0							
<i>x</i> 33	0	0	0	56						
× ₄₅	0	0	0	15	27					
×47	0	0	0	35	34	11				
×58	0	0	0	36	55	16	22			
×68	0	0	0	16	1	-2	7	-1		
×69	0	0	0	2	0	0	1	0	11	
<i>x</i> ₈₈	0	0	0	21	20	3	12	10	11	1
	<i>x</i> ₂₃	<i>x</i> ₂₅	<i>x</i> ₂₆	<i>x</i> ₃₁	<i>x</i> 33	<i>x</i> ₄₅	×47	×58	^x 68	<i>x</i> ₆₉

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D_c⁺ BRANCHING RATIOS

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

----- Inclusive modes -----

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

Γ1 /Γ

This is the purely e^+ semileptonic branching fraction: the e^+ fraction from τ^+ decays has been subtracted off. The sum of our (non- τ) e^+ exclusive fractions — an $e^+\nu_e$ with an $\eta,~\eta',~\phi,~K^0,~K^{*0},~K^{*0},$ or $f_0(980)$ — is 6.90 \pm 0.4 %

$VALUE$ (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.52±0.39±0.15	536 ± 29	1 ASNER	10	CLEO	$e^{+}e^{-}$ at 3774 MeV

 $^{^1}$ Using the D_s^+ and D^0 lifetimes, ASNER 10 finds that the ratio of the D_s^+ and D^0 semileptonic widths is 0.828 \pm 0.051 \pm 0.025.

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

Γ2/Γ

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

$VALUE$ (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
119.3±1.2±0.7	DOBBS	09	CLEO	e^+e^- at 4170 MeV

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$\Gamma(\pi^- \text{ anything})/\Gamma_{\rm t}$	otal					Γ_3/Γ
	o π^- 's count	t twice, etc. B	ut π^-	's from	$K_S^0 \rightarrow \pi^+\pi^-$	are not
included. <i>VALUE</i> (units 10 ⁻²)		DOCUMENT ID		TECN	COMMENT	
43.2±0.9±0.3					$e^{+}e^{-}$ at 4170) MeV
$\Gamma(\pi^0 \text{ anything})/\Gamma_{t}$	-4-1					Γ ₄ /Γ
		wice, etc. But π	-0's fro	om K_c^0	$ ightarrow 2\pi^{0}$ are not	-,
VALUE (units 10^{-2})		DOCUMENT ID				
123.4±3.8±5.3					$e^{+}e^{-}$ at 4170) MeV
$\Gamma(K^-$ anything)/ Γ	total					Γ ₅ /Γ
VALUE (units 10^{-2})	LOLAI	DOCUMENT ID		TFCN	COMMENT	٠,
18.7±0.5±0.2		DOBBS	09		$e^{+}e^{-}$ at 4170	
						Г. /Г
$\Gamma(K^+ \text{ anything})/\Gamma_0$	total	DOCUMENT ID		TECN	COMMENT	Γ ₆ /Γ
$VALUE \text{ (units } 10^{-2}\text{)}$ 28.9±0.6±0.3		DOCUMENT ID DOBBS	09		$\frac{COMMENT}{e^+e^-}$ at 4170	
		DOBBS	09	CLLO	e e at 4170) iviev
$\Gamma(K_S^0 \text{ anything})/\Gamma$	total					Γ_7/Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$19.0 \pm 1.0 \pm 0.4$		DOBBS	09	CLEO	e ⁺ e ⁻ at 4170) MeV
$\Gamma(\eta \text{ anything})/\Gamma_{\text{tot}}$	tal					Γ_8/Γ
, , , , , , , , , , , , , , , , , , , ,		s from η' decays				-,
, , , , , , , , , , , , , , , , , , , ,	$ ext{des } \eta ext{ particles}$	DOCUMENT	ID	<u>TECN</u>	COMMENT	
This ratio include VALUE (units 10 ⁻²) 29.9±2.2±1.7	des η particles <i>EVTS</i>	DOBBS	<i>ID</i> 09	9 CLEC	O e^+e^- at 41	70 MeV
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use	des η particles $\frac{EVTS}{}$ the following	DOCUMENT DOBBS data for average	Oses, fits,	9 CLEC	O e^+e^- at 41 etc. \bullet \bullet	
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use	des η particles $\frac{EVTS}{}$ the following	DOBBS	Oses, fits,	9 CLEC	O e^+e^- at 41 etc. \bullet \bullet	
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use	des η particles $\frac{EVTS}{}$ the following 674 ± 91	DOCUMENT DOBBS data for average	Oses, fits,	9 CLEC	O e^+e^- at 41 etc. \bullet \bullet	
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5 \pm 3.1 \pm 2.0$	des η particles $\frac{EVTS}{}$ the following 674 ± 91	DOCUMENT DOBBS data for average	09 es, fits, 00	9 CLEC limits, 6 6B CLEC	O e^+e^- at 41 etc. \bullet \bullet	09
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{to}$	des η particles $\frac{EVTS}{}$ the following 674 ± 91	DOCUMENT DOBBS data for average HUANG	09 es, fits, 00	9 CLEC limits, 6 6B CLEC	O e ⁺ e ⁻ at 41 etc. • • • O See DOBBS	⁰⁹ Г₉/Г
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5 \pm 3.1 \pm 2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{to}$ $VALUE$ (units 10^{-2})	des η particles $\frac{EVTS}{}$ the following 674 ± 91	DOCUMENT DOBBS data for average HUANG DOCUMENT ID	09 es, fits, 00	9 CLEC limits, 6 6B CLEC	O e ⁺ e ⁻ at 41 etc. • • • O See DOBBS COMMENT	⁰⁹ Г₉/Г
This ratio include $VALUE$ (units 10^{-2}) 29.9±2.2±1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{to}$ $VALUE$ (units 10^{-2}) 6.1±1.4±0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{to}$	des η particles $\frac{EVTS}{}$ the following 674 ± 91	DOCUMENT DOBBS data for average HUANG DOCUMENT ID	09 es, fits, 00	9 CLEC limits, 6 6B CLEC	e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-$ at 4170	09 Γ 9/Γ 0 MeV
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER	the following 674 ± 91 tal $EVTS$ $EVTS$	DOCUMENT ID DOBBS data for average HUANG DOCUMENT ID DOBBS DOCUMENT ID ncludes scale face	09 09	9 CLEC limits, 6 6B CLEC TECN CLEO	O e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$	Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$	des η particles $\frac{EVTS}{}$ the following 674 ± 91 tal $\frac{EVTS}{}$	DOCUMENT ID DOBBS DOCUMENT ID DOBBS DOCUMENT ID COCUMENT ID DOCUMENT ID COCUMENT ID COCU	09 09 09	9 CLEC limits, 6 6B CLEC CLEO CLEO TECN CLEO TECN 1.1. BES3	o e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$ 482 pb ⁻¹ , 400	09 Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ
This ratio include $VALUE$ (units 10^{-2}) 29.9 ± 2.2 ± 1.7 • • • We do not use $23.5 \pm 3.1 \pm 2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{to}$ $VALUE$ (units 10^{-2}) 6.1 ± 1.4 ± 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{to}$ $VALUE$ (units 10^{-2}) 10.3 ± 1.4 OUR AVER $8.8 \pm 1.8 \pm 0.5$ $11.7 \pm 1.7 \pm 0.7$	the following 674 ± 91 tal $EVTS$	DOCUMENT ID DOBBS DOCUMENT ID DOBBS DOCUMENT ID Cludes scale factors ABLIKIM DOBBS	09 09 ctor of 15z 09	9 CLEC limits, 6 6B CLEC TECN CLEO TECN 1.1. BES3 CLEO	O $e^{+}e^{-}$ at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^{+}e^{-}}$ at 4170 $\frac{COMMENT}{e^{+}e^{-}}$ 482 pb ⁻¹ , 400 $e^{+}e^{-}$ at 4170	09 Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$	the following 674 ± 91 tal $EVTS$	DOCUMENT DOBBS data for average HUANG DOCUMENT ID DOBBS DOCUMENT ID ncludes scale fact ABLIKIM DOBBS data for average	09 ctor of 15z 09 es, fits, fits,	9 CLEC limits, 6 6B CLEC CLEO CLEO TECN 1.1. BES3 CLEO limits, 6	O $e^{+}e^{-}$ at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^{+}e^{-}}$ at 4170 $\frac{COMMENT}{e^{+}e^{-}}$ 482 pb ⁻¹ , 400 $e^{+}e^{-}$ at 4170	09 Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ 09 MeV 0 MeV
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$ 11.7 $\pm1.7\pm0.7$ • • • We do not use $8.7\pm1.9\pm0.8$	the following 674 ± 91 tal EVTS $EVTS$	DOCUMENT DOBBS data for average HUANG DOCUMENT ID DOBBS DOCUMENT ID ncludes scale fact ABLIKIM DOBBS data for average HUANG	09 ctor of 15z 09 es, fits, fits,	9 CLEC limits, 6 6B CLEC CLEO CLEO TECN 1.1. BES3 CLEO limits, 6	e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$ 482 pb ⁻¹ , 400 e ⁺ e ⁻ at 4170 etc. • • •	Γ9/Γ 0 MeV Γ10/Γ 09 MeV 0 MeV 0 MeV
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$ 11.7 \pm 1.7 ±0.7 • • • We do not use $8.7\pm1.9\pm0.8$ $\Gamma(f_0(980) \text{ anything})$	the following 674 ± 91 tal EVTS the following 674 ± 91 tal EVTS AGE Error in 68 the following 68 68 68 68	DOCUMENT DOBBS data for average HUANG DOCUMENT ID DOBBS DOCUMENT ID ncludes scale fact ABLIKIM DOBBS data for average HUANG T—)/\(\Gamma_{total}\)	09 ctor of 15z 09 es, fits, fits,	9 CLEC limits, 6 6B CLEC CLEO CLEO CLEO CLEO	O e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$ 482 pb ⁻¹ , 400 e^+e^- at 4170 etc. • • • See DOBBS 0	09 Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ 09 MeV 0 MeV
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$ 11.7 $\pm1.7\pm0.7$ • • • We do not use $8.7\pm1.9\pm0.8$ $\Gamma(f_0(980) \text{ anything})$ $VALUE$ (units 10^{-2})	the following 674 ± 91 tal $EVTS$	DOCUMENT ID DOBBS DOCUMENT ID DOBBS DOCUMENT ID DOBBS DOCUMENT ID ncludes scale fact ABLIKIM DOBBS data for average HUANG T—)/Ftotal DOCUMENT ID	09 ctor of 15z 09 es, fits, 06B	9 CLEC limits, 6 6B CLEC TECN CLEO Imits, 6 CLEO TECN CLEO	O e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$ 482 pb ⁻¹ , 400 e^+e^- at 4170 etc. • • See DOBBS 0	Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ 09 MeV 0 MeV 9 Γ ₁₁ /Γ
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{to}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$ 11.7 \pm 1.7 ±0.7 • • • We do not use $8.7\pm1.9\pm0.8$ $\Gamma(f_0(980) \text{ anything})$	the following 674 ± 91 tal EVTS the following 674 ± 91 tal EVTS AGE Error in 68 the following 68 68 68 68	DOCUMENT DOBBS data for average HUANG DOCUMENT ID DOBBS DOCUMENT ID ncludes scale fact ABLIKIM DOBBS data for average HUANG T—)/\(\Gamma_{total}\)	09 ctor of 15z 09 es, fits, fits,	9 CLEC limits, 6 6B CLEC TECN CLEO Imits, 6 CLEO TECN CLEO	O e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$ 482 pb ⁻¹ , 400 e^+e^- at 4170 etc. • • • See DOBBS 0	Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ 09 MeV 0 MeV 9 Γ ₁₁ /Γ
This ratio include $VALUE$ (units 10^{-2}) 29.9 \pm 2.2 \pm 1.7 • • • We do not use $23.5\pm3.1\pm2.0$ $\Gamma(\omega \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 6.1 \pm 1.4 \pm 0.3 $\Gamma(\eta' \text{ anything})/\Gamma_{\text{tot}}$ $VALUE$ (units 10^{-2}) 10.3 \pm 1.4 OUR AVER $8.8\pm1.8\pm0.5$ 11.7 $\pm1.7\pm0.7$ • • • We do not use $8.7\pm1.9\pm0.8$ $\Gamma(f_0(980) \text{ anything})$ $VALUE$ (units 10^{-2})	the following 674 ± 91 tal EVTS AGE Error i 68 the following 68 $5, f_0 \rightarrow \pi^+ \pi$ $\frac{CL\%}{90}$	DOCUMENT ID DOBBS DOCUMENT ID DOBBS DOCUMENT ID DOBBS DOCUMENT ID ncludes scale fact ABLIKIM DOBBS data for average HUANG T—)/Ftotal DOCUMENT ID	09 ctor of 15z 09 es, fits, 06B	9 CLEC limits, 6 6B CLEC CLEO CLEO CLEO CLEO CLEO CLEO	O e^+e^- at 41 etc. • • • O See DOBBS $\frac{COMMENT}{e^+e^-}$ at 4170 $\frac{COMMENT}{e^+e^-}$ 482 pb ⁻¹ , 400 e^+e^- at 4170 etc. • • See DOBBS 0	Γ ₉ /Γ 0 MeV Γ ₁₀ /Γ 09 MeV 0 MeV 9 Γ ₁₁ /Γ

$\Gamma(\phi \text{ anything})/\Gamma_{\text{tota}}$	1					Γ ₁₂ /Γ
VALUE (units 10^{-2})		DOCUMENT I	'D	TECN	COMMENT	,
15.7±0.8±0.6		·			e^+e^- at 41	70 MeV
• • • We do not use th	e following o					
		HUANG				09
$\Gamma(K^+K^-\text{ anything})$	/Γ _{total}					Γ ₁₃ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$15.8 \pm 0.6 \pm 0.3$		DOBBS	09	CLEO	e^+e^- at 4170	MeV
$\Gamma(K_S^0K^+ \text{ anything})$						Γ ₁₄ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$5.8 \pm 0.5 \pm 0.1$		DOBBS	09	CLEO	e ⁺ e ⁻ at 4170	MeV
$\Gamma(K_S^0 K^- \text{ anything})$	Γ _{total}					Γ ₁₅ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$1.9 \pm 0.4 \pm 0.1$		DOBBS	09	CLEO	e^+e^- at 4170	MeV
$\Gamma(2K_S^0 \text{ anything})/\Gamma_0$	otal					Γ ₁₆ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$1.7 \pm 0.3 \pm 0.1$		DOBBS	09	CLEO	$e^{+}e^{-}$ at 4170	MeV
$\Gamma(2K^+ \text{ anything})/\Gamma_t$	otal					Γ ₁₇ /Γ
VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT	
<0.26	90	DOBBS	09	CLEO	$e^{+}e^{-}$ at 4170	MeV
$\Gamma(2K^-\text{ anything})/\Gamma_t$						Γ ₁₈ /Γ
VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT	
<0.06	90	DOBBS	09	CLEO	e ⁺ e ⁻ at 4170	MeV
A REVIEW GOES		and semilepto Check our				5
$\Gamma(e^+ u_e)/\Gamma_{ m total}$						Γ ₁₉ /Γ
VALUE		DOCUMENT ID		TECN	COMMENT	
$< 0.83 \times 10^{-4}$		^L ZUPANC			e^+e^- at Υ (4.	$S), \Upsilon(5S)$
• • • We do not use th	e following o	data for averages	s, fits,	limits, e	etc. • • •	
$< 2.3 \times 10^{-4}$		DEL-AMO-SA.				
$<1.2 \times 10^{-4}$		ALEXANDER				
<1.3 × 10 ⁻⁴		PEDLAR	_		See ALEXAND	EK 09
¹ ZUPANC 13 also gi	es the limit	$as < 1.0 \times 10^-$	4 at 9	95% CL.		

 $\Gamma(\mu^+
u_\mu)/\Gamma_{ ext{total}}$ See the note on "Decay Constants of Charged Pseudoscalar Mesons" above.

$VALUE$ (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.50±0.23 OUR A	VERAGE				
$4.95 \pm 0.67 \pm 0.26$	69	¹ ABLIKIM			e^+e^- at 4.009 GeV
$5.31\!\pm\!0.28\!\pm\!0.20$	492 ± 26				e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
$6.02\!\pm\!0.38\!\pm\!0.34$	275 ± 17	³ DEL-AMO-SA.	10 J	BABR	$e^{+}e^{-}$, 10.58 GeV
$5.65 \!\pm\! 0.45 \!\pm\! 0.17$	235 ± 14	ALEXANDER	09	CLEO	e^+e^- at 4170 MeV
• • • We do not u	se the following	data for averages	fite	limits o	otc • • •

• • • We do not use the following data for averages, fits, limits, etc. • • • $6.44 \pm 0.76 \pm 0.57$ 169 ± 18 ⁴ WIDHALM 08 BELL See ZUPANC 13

 $5.94\pm0.66\pm0.31$ 88 5 PEDLAR 07A CLEO See ALEXANDER 09 $6.8\ \pm1.1\ \pm1.8$ 553 6 HEISTER 02I ALEP Z decays

 1 ABLIKIM 160 value is constrained by the Standard Model ratio of $\Gamma(D_s^+ \to \tau^+ \nu_\tau)/\Gamma(D_s^+ \to \mu^+ \nu_\mu) = 9.76;$ the unconstrained value is $(0.517 \pm 0.075 \pm 0.021)\%.$ The constrained value is used to obtain the decay constant, f $_{D_s^+} = (241.0 \pm 16.3 \pm 6.6)$ MeV

MeV. ² ZUPANC 13 uses both $\mu^+\nu$ and $\tau^+\nu$ events to get $f_{D_S}=(255.5\pm4.2\pm5.1)$ MeV.

 $\Gamma(\mu^+
u_\mu)/\Gamma(\phi\pi^+)$ Γ_{20}/Γ_{34}

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

<u>EVTS</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>

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

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

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

 $^{^5}$ 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 $^{-3}$

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 \pm 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.

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

^{(4.71} \pm 0.46)%. 2 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.

³CHADHA 98 obtains $f_{D_s}=(280\pm19\pm28\pm34)$ MeV from this measurement, using $\Gamma(D_s^+\to\phi\pi^+)/\Gamma({\rm total})=0.036\pm0.009.$

 $[\]Gamma(D_s^+ \to \phi \pi^+)/\Gamma(\text{total}) = 0.036 \pm 0.009.$ 4 ACOSTA 94 obtains $f_{D_s} = (344 \pm 37 \pm 52 \pm 42)$ MeV from this measurement, using $\Gamma(D_s^+ \to \phi \pi^+)/\Gamma(\text{total}) = 0.037 \pm 0.009.$

 $\Gamma(\tau^+\nu_{\tau})/\Gamma_{\text{total}}$ Γ_{21}/Γ See the note on "Decay Constants of Charged Pseudoscalar Mesons" above.

$VALUE$ (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
5.48±0.23 OUR A	VERAGE			
$4.83\!\pm\!0.65\!\pm\!0.26$	33	$^{ m 1}$ ABLIKIM	160 BES3	e^+e^- at 4.009 GeV
$5.70 \!\pm\! 0.21 \!+\! 0.31 \\ -0.30$	2.2k	² ZUPANC	13 BELL	e^+e^- at $arUpsilon(4S), \ arUpsilon(5S)$
$4.96\!\pm\!0.37\!\pm\!0.57$	748 ± 53	³ DEL-AMO-SA.	.10J BABR	$e^-\overline{ u}_e u_ au$, $\mu^-\overline{ u}_\mu u_ au$
$6.42\!\pm\!0.81\!\pm\!0.18$	126 ± 16	⁴ ALEXANDER		,
$5.52\!\pm\!0.57\!\pm\!0.21$	155 ± 17	⁴ NAIK		$ au^+ ightarrow ho^+ \overline{ u}_{ au}$
$5.30\!\pm\!0.47\!\pm\!0.22$	181 ± 16	⁴ ONYISI	09 CLEO	$ au^+ ightarrow e^+ u_e \overline{ u}_{ au}$
 • • We do not ι 	ise the followin	g data for average	s, fits, limits	, etc. • • •
$6.17\!\pm\!0.71\!\pm\!0.34$	102	⁵ ECKLUND	08 CLEO	See ONYISI 09
$8.0 \pm 1.3 \pm 0.4$	47	⁵ PEDLAR	07A CLEO	See ALEXANDER 09
$5.79 \pm 0.77 \pm 1.84$	881	⁶ HEISTER	02ı ALEP	Z decays
$7.0\ \pm 2.1\ \pm 2.0$	22	⁷ ABBIENDI	01L OPAL	$D_{\mathbf{S}}^{*+} \rightarrow \gamma D_{\mathbf{S}}^{+}$ from Z's
$7.4 \pm 2.8 \pm 2.4$	16	⁸ ACCIARRI	97F L3	$D_s^{*+} \rightarrow \gamma D_s^+$ from Z's

 $[\]tau^+ \nu_{\tau})/\Gamma(D_s^+ \to \mu^+ \nu_{\mu}) = 9.76$; the unconstrained value is $(3.28 \pm 1.83 \pm 0.37)\%$.

$\Gamma(au^+ u_ au)/\Gamma(\mu^+ u_\mu)$ DOCUMENT ID TECN COMMENT

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

$$10.73 \pm 0.69 ^{+0.56}_{-0.53}$$
 $2.2 \text{k}/492$ 1 ZUPANC 13 BELL $e^{+}e^{-}$ at $\Upsilon(4S), \Upsilon(5S)$ $11.0 \pm 1.4 \pm 0.6$ 102 2 ECKLUND 08 CLEO See ONYISI 09

 $^{^2}$ ZUPANC 13 uses both $\mu^+\nu$ and $\tau^+\nu$ events to get ${\it f}_{D_{\rm S}}=$ (255.5 \pm 4.2 \pm 5.1) MeV.

 $^{^3}$ DEL-AMO-SANCHEZ 10J (with a small correction; see LEES 15D) uses $\mu^+
u_\mu$ and $au^+
u_{ au}$ events together to get $f_{D_c} = (259.9 \pm 6.6 \pm 7.6)$ MeV.

 $^{^4}$ ALEXANDER 09, NAIK 09A, and ONYISI 09 use different τ decay modes and are independent. The three papers combined give $f_{D_{\rm S}}=$ (259.7 \pm 7.8 \pm 3.4) MeV.

⁵ ECKLUND 08 and PEDLAR 07A are independent: ECKLUND 08 uses $au^+ o e^+
u_e \overline{
u}_{ au}$ events, PEDLAR 07A uses $\tau^+ \rightarrow ~\pi^+ \overline{\nu}_{\tau}$ events.

 $^{^6}$ HEISTER 021 combines its $D_s^+
ightarrow ~ au^+
u_ au$ and $\mu^+
u_\mu$ branching fractions to get $f_{D_s} =$ (285 \pm 19 \pm 40) MeV.

⁷ This ABBIENDI 01L value gives a decay constant $f_{D_{\rm c}}$ of (286 \pm 44 \pm 41) MeV.

 $^{^8}$ The second ACCIARRI 97F error here combines in quadrature systematic (0.016) and normalization (0.018) errors. The branching fraction gives $f_{D_s} = (309 \pm 58 \pm 33 \pm 38)$

¹This ZUPANC 13 ratio is not independent of the separate au
u and $\mu
u$ fractions listed

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

 $\Gamma(K^+K^-e^+\nu_e)/\Gamma(K^+K^-\pi^+)$ Γ_{22}/Γ_{33} D<u>OCUMENT ID</u> TECN COMMENT • • • We do not use the following data for averages, fits, limits, etc. • • • ¹ AUBERT 08AN BABR e^+e^- at $\Upsilon(4S)$ $0.558 \pm 0.007 \pm 0.016$ 1 This AUBERT 08AN ratio is only for the $K^{+}K^{-}$ mass in the range 1.01–to–1.03 GeV in the numerator and 1.0095-to-1.0295 GeV in the denominator. $\Gamma(\phi e^+ \nu_e) / \Gamma_{\text{total}}$ Γ_{23}/Γ See the end of the D_s^+ Listings for measurements of $D_s^+ o \phi e^+ \nu_e$ form factors. Unseen decay modes of the ϕ are included. VALUE (units 10^{-2}) DOCUMENT ID TECN COMMENT 2.39 ± 0.23 OUR FIT Error includes scale factor of 1.8. **2.39** \pm **0.23 OUR AVERAGE** Error includes scale factor of 1.8. $2.14 \!\pm\! 0.17 \!\pm\! 0.08$ 207 **HIETALA** Uses CLEO data 08AN BABR e^+e^- at $\Upsilon(4S)$ $2.61 \pm 0.03 \pm 0.17$ 25k **AUBERT** • • We do not use the following data for averages, fits, limits, etc. $2.36 \pm 0.23 \pm 0.13$ 106 **ECKLUND** CLEO See HIETALA 15 $2.29 \pm 0.37 \pm 0.11$ 45 YELTON CLEO See ECKLUND 09 $\Gamma(\phi e^+ \nu_e) / \Gamma(\phi \pi^+)$ Γ_{23}/Γ_{34} 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. TECN COMMENT DOCUMENT ID • • • We do not use the following data for averages, fits, limits, etc. • • • $0.540 \pm 0.033 \pm 0.048$ LINK 02J FOCS Uses $\phi \mu^+ \nu_{\mu}$ Uses $\phi e^+ \nu_e^{'}$ and $\phi \mu^+ \nu_\mu$ $0.54 \pm 0.05 \pm 0.04$ 367 BUTLER $0.58 \pm 0.17 \pm 0.07$ 97 **FRABETTI** 93G E687 Uses $\phi \mu^+ \nu_{\mu}$ Uses $\phi e^+ \nu_e$ $0.57 \pm 0.15 \pm 0.15$ ARG **ALBRECHT** 91 104 $0.49 \pm 0.10 \ ^{+0.10}_{-0.14}$ ALEXANDER 90B CLEO Uses $\phi e^+ \nu_e$ and $\phi \mu^+ \nu_\mu$ 54 Γ_{25}/Γ $\Gamma(\eta e^+ \nu_e) / \Gamma_{\text{total}}$ Unseen decay modes of the η are included. VALUE (units 10^{-2}) DOCUMENT ID **EVTS** TECN 2.29 ± 0.19 OUR FIT 2.29 ± 0.19 OUR AVERAGE $e^{+}e^{-}$ at 4.009 GeV $2.30 \pm 0.31 \pm 0.08$ **ABLIKIM** 63 358 **HIETALA** 15 Uses CLEO data $2.28 \pm 0.14 \pm 0.19$ • • We do not use the following data for averages, fits, limits, etc. $2.48 \pm 0.29 \pm 0.13$ 82 YELTON CLEO See HIETALA 15 $\Gamma(\eta e^+ \nu_e) / \Gamma(\phi e^+ \nu_e)$ Γ_{25}/Γ_{23} Unseen decay modes of the η and the ϕ are included. **EVTS DOCUMENT ID** TECN COMMENT **0.95±0.12 OUR FIT** Error includes scale factor of 1.3. • • • We do not use the following data for averages, fits, limits, etc. • • • ¹ BRANDENB... 95 CLE2 See HIETALA 15 $1.24 \pm 0.12 \pm 0.15$ 440 1 BRANDENBURG 95 uses both e^{+} and μ^{+} events and makes a phase-space adjustment to use the μ^+ events as e^+ events.

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$\Gamma(\eta'(958)e^+\nu_e)/\Gamma$		/(050)			Γ ₂₆ /Γ
Unseen decay m $VALUE$ (units 10^{-2})		$\eta'(958)$ are included and $\eta'(958)$ are includ	ded.	TECN	COMMENT
0.74±0.14 OUR FIT	EVIS	DOCUMENT ID		TECN	COMMENT
0.74±0.14 OUR AVER	RAGE				
$0.93 \pm 0.30 \pm 0.05$		ABLIKIM	16T	BES3	e^+e^- at 4170 MeV
$0.68\!\pm\!0.15\!\pm\!0.06$	20	HIETALA	15		Uses CLEO data
• • • We do not use t	the following	g data for average	s, fits,	limits,	etc. ● ●
$0.91 \pm 0.33 \pm 0.05$	7.5	YELTON	09	CLEO	See HIETALA 15
VALUE E	odes of the EVTS	resonances are in DOCUMENT ID	TE		Γ ₂₆ /Γ ₂₃
0.31±0.07 OUR FIT					
• • • We do not use t		-			
$0.43 \pm 0.11 \pm 0.07$	29 1	BRANDENB 95	5 CL	E2 Se	e HIETALA 15
1 BRANDENBURG to use the μ^+ even			nts and	d makes	a phase-space adjustment
		(e) $/\Gamma(\phi e^+ \nu_e)$ resonances are in <u>DOCUMENT ID</u>	cluded	l.	$\Gamma_{23} = (\Gamma_{25} + \Gamma_{26})/\Gamma_{23}$ $COMMENT$
• • • We do not use t	he following	g data for average	s, fits,	limits,	etc. • • •
$1.67\!\pm\!0.17\!\pm\!0.17$		¹ BRANDENB	. 95	CLE2	See HIETALA 15
¹ This BRANDENBU	JRG 95 dat	a is redundant wi	th dat	a in prev	ious blocks.
$\Gamma(\omega e^+ u_e)/\Gamma_{ m total}$				•	Γ ₂₇ /Γ
A test for $u\overline{u}$ of	ys can cont	cribute, and $\tilde{\omega}$ $-$	Neith ϕ mix	er Cabib ing is a	obo-favored nor Cabibbo- n unlikely explanation for
VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	MARTIN	11	CLEO	e^+e^- at 4170 MeV
$\Gamma(K^0 e^+ u_e)/\Gamma_{ m total}$					Γ ₂₈ /Γ
VALUE (units 10^{-2})	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT
$0.39\pm0.08\pm0.03$	42	HIETALA	15		Uses CLEO data
• • • We do not use t	the following	g data for average	s, fits,	limits,	etc. • • •
$0.37\!\pm\!0.10\!\pm\!0.02$	14	YELTON	09	CLEO	See HIETALA 15
$\Gamma(K^*(892)^0 e^+ \nu_e)$		$K^*(892)^0$ are inc	·luded		Γ ₂₉ /Γ
_	EVTS	DOCUMENT ID			COMMENT
0.18±0.04±0.01	32	HIETALA	15		Uses CLEO data
• • • We do not use t				limits,	
$0.18\!\pm\!0.07\!\pm\!0.01$	7.5	YELTON	09		See HIETALA 15

 $\Gamma(f_0(980)e^+\nu_e, f_0 \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$

 Γ_{30}/Γ

$VALUE$ (units 10^{-2})	EVTS	DOCUMENT ID)	TECN	COMMENT	_
\bullet \bullet We do not use t	he followin	g data for averag	es, fits	, limits, o	etc. • • •	
$0.13\!\pm\!0.03\!\pm\!0.01$	42	$^{ m 1}$ HIETALA	15		Uses CLEO data	
$0.20\!\pm\!0.03\!\pm\!0.01$	44	ECKLUND	09	CLEO	See HIETALA 15	
$0.13\!\pm\!0.04\!\pm\!0.01$	13	YELTON	09	CLEO	See ECKLUND 09	

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

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

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

 Γ_{31}/Γ

VALUE (units 10^{-2}) DOCUMENT ID **TECN** 1.50 ± 0.05 OUR FIT

 $1.52\pm0.05\pm0.03$ **ONYISI**

13 CLEO $e^{+}e^{-}$ at 4.17 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • • ¹ ALEXANDER 08 CLEO See ONYISI 13 $1.49\!\pm\!0.07\!\pm\!0.05$

 $\Gamma(K^{+}\overline{K}^{0})/\Gamma_{\text{total}}$

 Γ_{32}/Γ

$VALUE$ (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.95±0.11±0.09	2.0k	¹ ZUPANC 13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$

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

$\Gamma(K^+K^-\pi^+)/\Gamma_{\text{total}}$ VALUE (units 10^{-2})

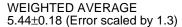
 Γ_{33}/Γ

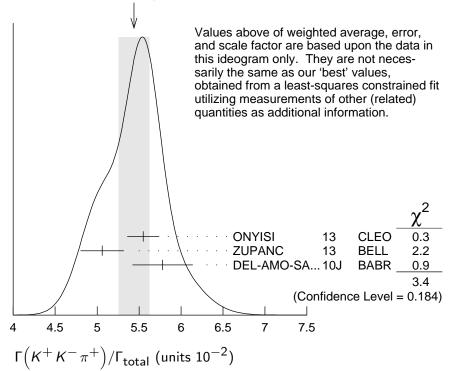
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$VALUE$ (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.45±0.17 OUR FIT	Error inclu	des scale factor c	of 1.2.		
5.44 ± 0.18 OUR AVER	RAGE Erro	or includes scale f	actor	of 1.3. S	See the ideogram below.
$5.55\!\pm\!0.14\!\pm\!0.13$					e^+e^- at 4.17 GeV
$5.06\!\pm\!0.15\!\pm\!0.21$	4.1k	ZUPANC	13	BELL	e^+e^- at $\Upsilon(4S), \Upsilon(5S)$
$5.78\!\pm\!0.20\!\pm\!0.30$		DEL-AMO-SA	10 J	BABR	$e^{+}e^{-}$, 10.58 GeV
\bullet \bullet We do not use t	he following	g data for average	es, fits	s, limits,	etc. • • •
$5.50 \pm 0.23 \pm 0.16$		¹ ALEXANDER	80	CLEO	See ONYISI 13

 $^{^{}m 1}$ ALEXANDER 08 uses single- and double-tagged events in an overall fit.

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





 $\Gamma(\phi\pi^+)/\Gamma_{\text{total}}$

 Γ_{34}/Γ

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

,		O		
$VALUE$ (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
4.5 ±0.4 OUR AV	ERAGE			
$4.62\!\pm\!0.36\!\pm\!0.51$		$^{ m 1}$ AUBERT	06N BABR	e^+e^- at $\varUpsilon(4S)$
$4.81\!\pm\!0.52\!\pm\!0.38$	212 ± 19	² AUBERT		$e^+e^-pprox \ \varUpsilon(4S)$
$3.59\!\pm\!0.77\!\pm\!0.48$		³ ARTUSO	96 CLE2	e^+e^- at \varUpsilon (4 S)
● ● ● We do not use	e the following	data for averages,	fits, limits, et	tc. • • •

$$3.9 \ ^{+5.1}_{-1.9} \ ^{+1.8}_{-1.1}$$
 BAI 95C BES e^+e^- 4.03 GeV

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

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

the missing mass spectrum against the $D^{*-}\gamma$ is measured. 3 ARTUSO 96 uses partially reconstructed $\overline B{}^0 \to D^{*+}D_s^{*-}$ decays to get a model-independent value for $\Gamma(D_s^- \to \phi\pi^-)/\Gamma(D^0 \to K^-\pi^+)$ of $0.92 \pm 0.20 \pm 0.11$. ⁴ BAI 95C uses $e^+e^- o D_{_S}^+D_{_S}^-$ events in which one or both of the $D_{_S}^\pm$ are observed to obtain the first model-independent measurement of the $D_s^+ o \phi \pi^+$ branching fraction, without assumptions about $\sigma(D_s^{\pm})$. However, with only two "doubly-tagged" events, the statistical error is very large.

 $\Gamma(\phi\pi^+, \phi \rightarrow K^+K^-)/\Gamma(K^+K^-\pi^+)$

This is the "fit fraction" from the Dalitz-plot analysis. We decouple the $D_{s}^{+}
ightarrow \phi \pi^{+}$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+ o \phi \pi^+$, $\phi o K^+ K^-$ 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 41.6±0.8 OUR AVERAGE $41.4 \pm 0.8 \pm 0.5$ DEL-AMO-SA...11G BABR Dalitz fit, 96k±369 evts $42.2\pm1.6\pm0.3$ MITCHELL 09A CLEO Dalitz fit, 12k evts • • We do not use the following data for averages, fits, limits, etc. $39.6 \pm 3.3 \pm 4.7$ **FRABETTI** 95B E687 Dalitz fit. 701 evts $\Gamma(K^+\overline{K}^*(892)^0, \overline{K}^{*0} \rightarrow K^-\pi^+)/\Gamma(K^+K^-\pi^+)$ Γ_{36}/Γ_{33} This is the "fit fraction" from the Dalitz-plot analysis. VALUE (%) DOCUMENT ID TECN COMMENT 47.8±0.6 OUR AVERAGE DEL-AMO-SA..11G BABR Dalitz fit, $96k \pm 369$ evts $47.9 \pm 0.5 \pm 0.5$ $47.4 \pm 1.5 \pm 0.4$ MITCHELL 09A CLEO Dalitz fit, 12k evts • We do not use the following data for averages, fits, limits, etc. $47.8 \pm 4.6 \pm 4.0$ **FRABETTI** 95B E687 Dalitz fit, 701 evts $\Gamma(f_0(980)\pi^+, f_0 \to K^+K^-)/\Gamma(K^+K^-\pi^+)$ Γ_{37}/Γ_{33} This is the "fit fraction" from the Dalitz-plot analysis. DOCUMENT ID 21 ±6 OUR AVERAGE Error includes scale factor of 3.5. $16.4 \pm 0.7 \pm 2.0$ DEL-AMO-SA...11G BABR Dalitz fit, 96k±369 evts 09A CLEO Dalitz fit, 12k evts $28.2 \pm 1.9 \pm 1.8$ MITCHELL ullet ullet We do not use the following data for averages, fits, limits, etc. ullet ulletFRABETTI 95B E687 Dalitz fit, 701 evts $\Gamma(f_0(1370)\pi^+, f_0 \to K^+K^-)/\Gamma(K^+K^-\pi^+)$ This is the "fit fraction" from the Dalitz-plot analysis. Γ_{38}/Γ_{33} DOCUMENT ID TECN **1.3±0.8 OUR AVERAGE** Error includes scale factor of 3.9. $1.1 \pm 0.1 \pm 0.2$ DEL-AMO-SA..11G BABR Dalitz fit, 96k±369 evts $4.3\pm0.6\pm0.5$ 09A CLEO Dalitz fit, 12k evts $\Gamma(f_0(1710)\pi^+, f_0 \to K^+K^-)/\Gamma(K^+K^-\pi^+)$ Γ_{39}/Γ_{33} This is the "fit fraction" from the Dalitz-plot analysis. DOCUMENT ID **1.2±0.5 OUR AVERAGE** Error includes scale factor of 3.8. $1.1\!\pm\!0.1\!\pm\!0.1$ DEL-AMO-SA..11G BABR Dalitz fit, 96k±369 evts $3.4 \pm 0.5 \pm 0.3$ MITCHELL 09A CLEO Dalitz fit, 12k evts

 $3.4 \pm 2.3 \pm 3.5$

95B E687

Dalitz fit, 701 evts

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

$\Gamma(K^+\overline{K}_0^*(1430)^0,\overline{K}_0^*)$						Γ_{40}/Γ_{33}
	action" fr	om the Dalitz-plot DOCUMENT ID	-)/// <i>/ENT</i>	
<u>VALUE (%)</u> 3.4±0.7 OUR AVERAG	F Frror				OMMENT	
$2.4\pm0.3\pm1.0$	L LIIOI	DEL-AMO-SA11			alitz fit 96k	+369 evts
$3.9 \pm 0.5 \pm 0.5$			DA CI		alitz fit, 30k alitz fit, 12k	
● • We do not use th	e followir		_			
9.3±3.2±3.2		FRABETTI 95			alitz fit, 701	evts
$\Gamma (K^+ K_S^0 \pi^0) / \Gamma_{\text{total}}$						Γ ₄₁ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$1.52\pm0.09\pm0.20$		ONYISI	13	CLEO	e^+e^- at 4	4.17 GeV
$\Gamma(2K_S^0\pi^+)/\Gamma_{ m total}$						Γ ₄₂ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$0.77 \pm 0.05 \pm 0.03$		ONYISI	13	CLEO	e^+e^- at 4	4.17 GeV
$\Gamma(K^*(892)^+\overline{K}^0)/\Gamma($		·	.111			Γ_{44}/Γ_{34}
VALUE	des of the	e resonances are inc DOCUMENT ID			COMMENT	
1.20±0.21±0.13	_	CHEN			$e^{+}e^{-}$ 10	
$\Gamma(K^+K^-\pi^+\pi^0)/\Gamma_{\rm t}$	otal					Γ ₄₅ /Γ
$VALUE$ (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
6.3 ±0.6 OUR FIT						
$6.37 \pm 0.21 \pm 0.56$		ONYISI	13	CLEO	e^+e^- at 4	4.17 GeV
• • • We do not use th	e followir	ng data for averages	s, fits,	limits, e	etc. • • •	
$5.65\!\pm\!0.29\!\pm\!0.40$		¹ ALEXANDER	80	CLEO	See ONYIS	SI 13
$^{ m 1}$ ALEXANDER 08 us	es single-	and double-tagged	even	ts in an	overall fit.	
$\Gamma(\phi ho^+)/\Gamma(\phi\pi^+)$						Γ_{46}/Γ_{34}
VALUE	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT	
$1.86 \pm 0.26 ^{+0.29}_{-0.40}$	253	AVERY	92	CLE2	$e^+e^-\simeq$	10.5 GeV
$\Gamma(K_S^0 K^- 2\pi^+)/\Gamma_{\text{tot}}$	al					Γ ₄₇ /Γ
<i>VALUE</i> (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
1.67±0.10 OUR FIT						
$1.69 \pm 0.07 \pm 0.08$		ONYISI	13	CLEO	e^+e^- at 4	4.17 GeV
• • • We do not use th	e followir	ng data for averages	s, fits,	limits, e	etc. • • •	
$1.64 \pm 0.10 \pm 0.07$		¹ ALEXANDER	08	CLEO	See ONYIS	SI 13
¹ ALEXANDER 08 us	es single-	and double-tagged	even	ts in an	overall fit.	
Γ(<i>K</i> *(892) ⁺ <i>K</i> *(892) ⁰)/Γ(¢	(π^+)				Γ_{48}/Γ_{34}
	des of the	e resonances are inc				
VALUE		DOCUMENT ID			<u>COMMENT</u>	
$1.6 \pm 0.4 \pm 0.4$		ALBRECHT	92 B	ARG	$e^+e^- \simeq$	10.4 GeV

$\frac{\Gamma(K^+ K_S^0 \pi^+ \pi^-)}{VALUE \text{ (units } 10^{-2})}$	F _{total}				COMMENT	Г ₄₉ /Г
$1.03\pm0.06\pm0.08$		ONYISI	13	CLEO	e ⁺ e ⁻ at 4	.17 GeV
$\Gamma(K^+K^0_S\pi^+\pi^-)/V$		-2π ⁺) <u>DOCUMENT IL</u>	<u>) T</u>	ECN C	OMMENT	Γ ₄₉ /Γ ₄₇
$0.586 \pm 0.052 \pm 0.043$	476	LINK	01C F	OCS γ	A, $\overline{\it E}_{\gamma} \approx ~18$	30 GeV
$\Gamma(K^+K^-2\pi^+\pi^-)$ VALUE	<u>EVTS</u>	•	T ID	<u>TECN</u>	<u>COMMENT</u>	Γ ₅₀ /Γ ₃₃
0.160 ± 0.027 OUR AV $0.150\pm0.019\pm0.025$	240	LINK	03 D	FOCS	γ A, \overline{E}_{γ} $pprox$	180 GeV
$0.130\pm0.013\pm0.023$ $0.188\pm0.036\pm0.040$		FRABETT			γ Be, $\overline{E}_{\gamma} \approx$	
$\Gamma(\phi 2\pi^+\pi^-)/\Gamma(\phi \pi^-)$	τ ⁺)					Γ_{51}/Γ_{34}
VALUE E		DOCUMENT ID	TEC	COL	MENT	
0.269 ± 0.027 OUR AV		LINUZ	005 50	CC 4	- 100	\ C \ \ (
$0.249 \pm 0.024 \pm 0.021$		LINK			$\overline{E}_{\gamma} \approx 180$	
$0.28 \pm 0.06 \pm 0.01$	40	FRABETTI	97C E68		e, $\overline{E}_{\gamma} \approx 20$	0 GeV
$0.58 \pm 0.21 \pm 0.10$	21	FRABETTI	92 E68	,		
$0.42 \pm 0.13 \pm 0.07$	19	ANJOS	88 E69		otoproduction	1
1 11 0 27 0 20						
$1.11 \pm 0.37 \pm 0.28$	62	ALBRECHT	85D AR	G e	e ⁻ 10 GeV	
$\Gamma(K^+K^- ho^0\pi^+$ nor	n-φ)/Γ($K^+K^-2\pi^+\pi$	-)			Γ_{52}/Γ_{50}
	n-φ)/Γ(K ⁺ K ⁻ 2π ⁺ π	- -)	<u>TECN</u>	<u>COMMENT</u>	
$\Gamma(K^+K^-\rho^0\pi^+ \text{ nor} \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^0\pi^+, \phi \to K^-\rho^0\pi^+)$	n- φ)/Γ(<u>CL%</u> 90	K ⁺ K ⁻ 2π ⁺ π <u>DOCUMENT</u> LINK Γ(K ⁺ K ⁻ 2π ⁺	03D - π-)	<u>TECN</u> FOCS	$rac{\mathit{COMMENT}}{\gamma}$ A, \overline{E}_{γ} $pprox$	
$\Gamma(K^+K^-\rho^0\pi^+\text{nor}$ $\frac{\text{VALUE}}{\text{<0.03}}$	n- φ)/Γ(<u>CL%</u> 90	K+ K-2π+π <u>DOCUMENT</u> LINK Γ(K+ K-2π+ <u>DOCUMENT</u>	03D - π-)	TECN FOCS	<u>COMMENT</u>	180 GeV Γ ₅₃ /Γ ₅₀
$\Gamma(K^{+}K^{-}\rho^{0}\pi^{+} \text{ not} \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^{0}\pi^{+}, \phi \rightarrow K^{-})$ $VALUE$ $0.75\pm0.06\pm0.04$ $\Gamma(\phi a_{1}(1260)^{+}, \phi \rightarrow K^{-})$	n-φ)/Γ($K^+K^-2\pi^+\pi^ \frac{DOCUMENT}{LINK}$ $\Gamma(K^+K^-2\pi^+)$ $\frac{DOCUMENT}{LINK}$ K^- , $a_1^+ \rightarrow \rho^0 \pi^0$	03D -π-) -π-) -π-) -π-) -π-) -π-) -π-)	TECN FOCS TECN FOCS	$rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{T}{\gamma}$	180 GeV Γ ₅₃ /Γ ₅₀
$\Gamma(K^{+}K^{-}\rho^{0}\pi^{+} \text{ not} \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^{0}\pi^{+}, \phi \rightarrow K^{-}\frac{VALUE}{0.75\pm0.06\pm0.04}$ $\Gamma(\phi a_{1}(1260)^{+}, \phi \rightarrow VALUE$	n-φ)/Γ($K^+K^-2\pi^+\pi$ DOCUMENT LINK $\Gamma(K^+K^-2\pi^+)$ DOCUMENT LINK K^- , $a_1^+ \rightarrow \rho^0 \pi$	03D -π-) 03D -π-) 03D -π-) (7 ID 03D -π-)/Γ (κ	TECN FOCS TECN FOCS TECN	$rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{\pi^+)}{COMMENT}$	180 GeV Γ ₅₃ /Γ ₅₀ 180 GeV Γ ₅₄ /Γ ₃₃
$\Gamma(K^{+}K^{-}\rho^{0}\pi^{+} \text{ not} \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^{0}\pi^{+}, \phi \rightarrow K^{-})$ $VALUE$ $0.75\pm0.06\pm0.04$ $\Gamma(\phi a_{1}(1260)^{+}, \phi \rightarrow K^{-})$	n-φ)/Γ($K^+K^-2\pi^+\pi^ \frac{DOCUMENT}{LINK}$ $\Gamma(K^+K^-2\pi^+)$ $\frac{DOCUMENT}{LINK}$ K^- , $a_1^+ \rightarrow \rho^0 \pi^0$	03D -π-) 03D -π-) 03D -π-) (7 ID 03D -π-)/Γ (κ	TECN FOCS TECN FOCS TECN	$rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{T}{\gamma}$	180 GeV Γ ₅₃ /Γ ₅₀ 180 GeV Γ ₅₄ /Γ ₃₃
$\Gamma(K^{+}K^{-}\rho^{0}\pi^{+} \text{ not } \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^{0}\pi^{+}, \phi \rightarrow K^{-})$ $VALUE$ $0.75\pm0.06\pm0.04$ $\Gamma(\phi a_{1}(1260)^{+}, \phi - \frac{VALUE}{0.137\pm0.019\pm0.011}$ $\Gamma(K^{+}K^{-}2\pi^{+}\pi^{-})$	n-φ)/Γ($K^+K^-2\pi^+\pi$ DOCUMENT LINK $\Gamma(K^+K^-2\pi^+)$ DOCUMENT LINK K^- , $a_1^+ \rightarrow \rho^0 \pi$ LINK ant)/ $\Gamma(K^+K^-)$	(7.0) (7.10) $(7$	TECN FOCS TECN FOCS TECN FOCS	$rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} \approx$ $rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} \approx$ π^+) $\frac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} \approx$	180 GeV Γ ₅₃ /Γ ₅₀ 180 GeV Γ ₅₄ /Γ ₃₃ 180 GeV Γ ₅₅ /Γ ₅₀
$\Gamma(K^{+}K^{-}\rho^{0}\pi^{+} \text{ not} \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^{0}\pi^{+}, \phi \rightarrow K^{-})$ $VALUE$ $0.75\pm0.06\pm0.04$ $\Gamma(\phi a_{1}(1260)^{+}, \phi - VALUE)$ $0.137\pm0.019\pm0.011$	n-φ)/Γ($K^+K^-2\pi^+\pi$ DOCUMENT LINK $\Gamma(K^+K^-2\pi^+)$ DOCUMENT LINK K^- , $a_1^+ \rightarrow \rho^0 \pi$ LINK ant)/ $\Gamma(K^+K^-)$	(7.0) (7.10) $(7$	TECN FOCS TECN FOCS TECN FOCS	$rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} pprox rac{\pi^+)}{COMMENT}$	180 GeV Γ ₅₃ /Γ ₅₀ 180 GeV Γ ₅₄ /Γ ₃₃ 180 GeV Γ ₅₅ /Γ ₅₀
$\Gamma(K^{+}K^{-}\rho^{0}\pi^{+} \text{ not } \frac{VALUE}{<0.03}$ $\Gamma(\phi\rho^{0}\pi^{+}, \phi \rightarrow K^{-})$ $VALUE$ $0.75\pm0.06\pm0.04$ $\Gamma(\phi a_{1}(1260)^{+}, \phi - \frac{VALUE}{0.137\pm0.019\pm0.011}$ $\Gamma(K^{+}K^{-}2\pi^{+}\pi^{-})$ $VALUE$	$\begin{array}{c} \text{n-}\phi)/\Gamma(\\ \underline{CL\%}\\ 90 \\ + K^-)/\Gamma \\ \rightarrow K^+K \\ \text{nonreson} \\ (K_S^0K^-) \\ \underline{EVTS} \end{array}$	$K^+K^-2\pi^+\pi$ DOCUMENT LINK $\Gamma(K^+K^-2\pi^+)$ DOCUMENT LINK $A^+ \rightarrow \rho^0 \alpha$ DOCUMENT LINK $A^+ \rightarrow \rho^0 \alpha$ LINK $A^+ \rightarrow \rho^0 \alpha$ LINK $A^- \rightarrow A^+ \rightarrow \rho^0 \alpha$ LINK $A^- \rightarrow A^+ \rightarrow \rho^0 \alpha$ $A^+ \rightarrow \rho^0 \alpha$	03D (-π-) (TECN FOCS TECN FOCS TECN FOCS TECN FOCS	$rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} \approx$ $rac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} \approx$ π^+) $\frac{COMMENT}{\gamma}$ A, $\overline{E}_{\gamma} \approx$	180 GeV Γ ₅₃ /Γ ₅₀ 180 GeV Γ ₅₄ /Γ ₃₃ 180 GeV Γ ₅₅ /Γ ₅₀ 180 GeV Γ ₅₆ /Γ ₄₇

Pionic modes —

			- Pionic mode	es —			
	$\Gamma(\pi^+\pi^0)/\Gamma(K^+K^0_S)$						Γ_{57}/Γ_{31}
• • • We do not use the following data for averages, fits, limits, etc. • • • • • • • • • • • • • • • • • • •	VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	<2.3	90	MENDEZ	10	CLEO	$e^{+}e^{-}$ at 4170) MeV
	• • • We do not use the	following o	data for average	s, fits,	limits, e	etc. • • •	
VALUE (DOCUMENT ID) 1.09±0.05 OUR FIT 1.11±0.04±0.04 1.01±0.04±0.04 1.11±0.04±0.04 1.11±0.04±0.04 1.11±0.04±0.04 1.11±0.07±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±0.04 1.11±	<4.1	90	ADAMS	07A	CLEO	See MENDEZ	10
1.09±0.05 OUR FIT Error includes scale factor of 1.1. 1.11±0.04±0.04 ONYISI 13 CLEO e ⁺ e ⁻ at 4.17 GeV • • • We do not use the following data for averages, fits, limits, etc. • • • 1.11±0.07±0.04	$\Gamma(2\pi^+\pi^-)/\Gamma_{ m total}$						Γ ₅₈ /Γ
1.11±0.04±0.04 • • • We do not use the following data for averages, fits, limits, etc. • • 1.11±0.07±0.04 1 ALEXANDER 08 CLEO See ONYISI 13 1 ALEXANDER 08 uses single- and double-tagged events in an overall fit. $\Gamma(2\pi^+\pi^-)/\Gamma(K^+K^-\pi^+)$ $EVTS$ 0.201±0.007 OUR FIT 0.199±0.004±0.009 ○ * * * * * * * * * * * * * * * * * *					TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • • 1.11 \pm 0.07 \pm 0.04 1 ALEXANDER 08 CLEO See ONYISI 13 1 ALEXANDER 08 uses single- and double-tagged events in an overall fit. $\Gamma(2\pi^+\pi^-)/\Gamma(K^+K^-\pi^+) \qquad \qquad \Gamma_{58}/\Gamma_{33}$ $\frac{\Gamma_{58}/\Gamma_{33}}{\Gamma_{0.201}\pm0.007} = \frac{EVTS}{0.201\pm0.007} = \frac{DOCUMENT\ ID}{0.199\pm0.004\pm0.009} \approx 10.5 \text{k} \qquad \text{AUBERT} \qquad 090 \text{ BABR } e^+e^- \approx 10.6 \text{ GeV}$ • • • We do not use the following data for averages, fits, limits, etc. • • • 0.265 \pm 0.041 \pm 0.031 98 FRABETTI 97D E687 γ Be \approx 200 GeV $\Gamma(\rho^0\pi^+)/\Gamma(2\pi^+\pi^-) \qquad \qquad$		rror include				1	
1.11 \pm 0.07 \pm 0.04 1 ALEXANDER 08 uses single- and double-tagged events in an overall fit. $\Gamma(2\pi^{+}\pi^{-})/\Gamma(K^{+}K^{-}\pi^{+})$ VALUE EVTS DOCUMENT ID TECN COMMENT 0.201 \pm 0.007 OUR FIT 0.199 \pm 0.004 \pm 0.009 \approx 10.5k AUBERT 0.90 BABR $e^{+}e^{-}\approx$ 10.6 GeV • • • We do not use the following data for averages, fits, limits, etc. • • • 0.265 \pm 0.041 \pm 0.031 98 FRABETTI 97D E687 γ Be \approx 200 GeV $\Gamma(\rho^{0}\pi^{+})/\Gamma(2\pi^{+}\pi^{-})$ VALUE 0.018 \pm 0.005 \pm 0.010 AUBERT 0.90 BABR Dalitz fit, \approx 10.5k evts • • We do not use the following data for averages, fits, limits, etc. • • • 0.058 \pm 0.023 \pm 0.037 AITALA 01A E791 Dalitz fit, 1475 \pm 50 evts 0.058 \pm 0.023 \pm 0.037 FRABETTI 97D E687 γ Be \approx 200 GeV $\Gamma(\pi^{+}(\pi^{+}\pi^{-})s_{-wave})/\Gamma(2\pi^{+}\pi^{-})$ This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses 568 $D_{s}^{+} \rightarrow 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products POCUMENT ID TECN COMMENT F60/F58 This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses 568 $D_{s}^{+} \rightarrow 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products 20 different solutions are given — than on D_{s}^{+} fit fractions. VALUE DOCUMENT ID TECN COMMENT OMBERT 0.008 BABR Dalitz fit, \approx 10.5k evts				-			GeV
This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses 568 $D_s^+ \rightarrow 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. Tech Comment 10 study various parametrizations of the decay amplitudes. Tech Comment 10 study various parametrizations of the decay amplitudes. Tech Comment 10 study various parametrizations. $P_{s} = P_{s} = P_$	• • • We do not use the						
	$1.11\pm0.07\pm0.04$	•	¹ ALEXANDER	80	CLEO	See ONYISI 13	3
VALUEEVTSDOCUMENT IDTECNCOMMENT0.201±0.007 OUR FIT0.199±0.004±0.009≈ 10.5kAUBERT090 BABR $e^+e^- \approx 10.6 \text{ GeV}$ • • • We do not use the following data for averages, fits, limits, etc.• • •0.265±0.041±0.03198 FRABETTI97D E687γ Be ≈ 200 GeVΓ(ρ0π+)/Γ(2π+π-)Γ59/Γ58VALUECL%DOCUMENT IDTECNCOMMENT0.018±0.005±0.010AUBERT090 BABRDalitz fit, ≈ 10.5k evts• • • We do not use the following data for averages, fits, limits, etc.• • •not seenLINK04 FOCSDalitz fit, 1475±50 evts0.058±0.023±0.037AITALA01A E791 Dalitz fit, 848 evts<0.073	¹ ALEXANDER 08 use	s single- an	nd double-tagged	d event	ts in an	overall fit.	
0.199±0.004±0.009 ≈ 10.5k AUBERT 090 BABR e ⁺ e ⁻ ≈ 10.6 GeV • • • We do not use the following data for averages, fits, limits, etc. • • • 0.265±0.041±0.031 98 FRABETTI 97D E687 γ Be ≈ 200 GeV	VALUE	-π+) EVTS	<u>DOCUMENT</u>	<i>ID</i>	<u>TECI</u>		Γ ₅₈ /Γ ₃₃
0.265±0.041±0.031 98 FRABETTI 97D E687 γ Be ≈ 200 GeV	$0.199\pm0.004\pm0.009$						0.6 GeV
	• • • We do not use the	following o	data for average	s, fits,	limits, e	etc. • • •	
VALUECL%DOCUMENT IDTECNCOMMENT0.018±0.005±0.010AUBERT090BABRDalitz fit, ≈ 10.5k evts• • • We do not use the following data for averages, fits, limits, etc. • • •not seenLINK04FOCSDalitz fit, 1475±50 evts0.058±0.023±0.037AITALA01AE791Dalitz fit, 848 evts<0.073	$0.265 \pm 0.041 \pm 0.031$	98	FRABETTI	97	7D E68	7 γ Be \approx 200) GeV
0.018±0.005±0.010 AUBERT 090 BABR Dalitz fit, ≈ 10.5k evts • • • We do not use the following data for averages, fits, limits, etc. • • • not seen LINK 04 FOCS Dalitz fit, 1475 ± 50 evts 0.058±0.023±0.037 AITALA 01A E791 Dalitz fit, 848 evts <0.073 90 FRABETTI 97D E687 γ Be ≈ 200 GeV $\Gamma(\pi^+(\pi^+\pi^-)_{S-wave})/\Gamma(2\pi^+\pi^-)$ This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses $568 \ D_s^+ \rightarrow 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions. VALUE DOCUMENT ID TECN COMMENT 0.833 ±0.020 OUR AVERAGE 0.830 ±0.009 ±0.019 1 AUBERT 090 BABR Dalitz fit, ≈ 10.5k evts	, , , ,		DOCUMENT ID		TECN		Γ_{59}/Γ_{58}
• • • We do not use the following data for averages, fits, limits, etc. • • • not seen LINK 04 FOCS Dalitz fit, 1475 ± 50 evts $0.058 \pm 0.023 \pm 0.037$ AITALA 01A E791 Dalitz fit, 848 evts < 0.073 90 FRABETTI 97D E687 γ Be \approx 200 GeV $ \Gamma(\pi^+(\pi^+\pi^-)_{S-\text{wave}})/\Gamma(2\pi^+\pi^-) $ This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses $568 \ D_s^+ \to 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions. $ \frac{VALUE}{O.833 \pm 0.020 \ OUR \ AVERAGE} $ DOCUMENT ID TECN COMMENT $ \frac{VALUE}{O.833 \pm 0.020 \ OUR \ AVERAGE} $ DOCUMENT ID TECN COMMENT		CL%					5k ovts
0.058 \pm 0.023 \pm 0.037 AITALA 01A E791 Dalitz fit, 848 evts <0.073 90 FRABETTI 97D E687 γ Be \approx 200 GeV $ \Gamma(\pi^+(\pi^+\pi^-)_{S-\text{wave}})/\Gamma(2\pi^+\pi^-) $ This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses $568\ D_s^+ \to 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions. $ \frac{VALUE}{DOCUMENT\ ID} $		following o	_				JK EVIS
<0.073 $90 \text{FRABETTI} 97\text{D} \text{E687} \gamma \text{ Be} \approx 200 \text{ GeV}$ $\Gamma(\pi^+(\pi^+\pi^-)_{S-\text{wave}})/\Gamma(2\pi^+\pi^-) \Gamma_{60}/\Gamma_{58}$ This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses $568 \ D_s^+ \to 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S-wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions. $\frac{VALUE}{0.833 \pm 0.020 \text{ OUR AVERAGE}}$ $0.830 \pm 0.009 \pm 0.019$ $1 \text{AUBERT} 090 \text{BABR} \text{Dalitz fit,} \approx 10.5\text{k evts}$	not seen		LINK	04	FOCS	Dalitz fit, 1475	\pm 50 evts
$\Gamma(\pi^+(\pi^+\pi^-)_{S-wave})/\Gamma(2\pi^+\pi^-)$ Γ_{60}/Γ_{58} This is the "fit fraction" from the Dalitz-plot analysis. See also KLEMPT 08, which uses 568 $D_s^+ \to 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S -wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions. **VALUE** **DOCUMENT ID** **DO							
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uses $568~D_s^+ \rightarrow 3\pi$ decays (over 280 background events) from FNAL E791 to study various parametrizations of the decay amplitudes. The emphasis there is more on S -wave $\pi\pi$ decay products — 20 different solutions are given — than on D_s^+ fit fractions. VALUE DOCUMENT ID TECN COMMENT TECN OMMENT 0.833 ± 0.020 OUR AVERAGE 1 AUBERT 090 BABR Dalitz fit, ≈ 10.5 k evts	$\Gamma(\pi^+(\pi^+\pi^-)_{S-\text{wave}}$ This is the "fit fra	$(1)/\Gamma(2\pi^+)$	$\pi^-ig)$ n the Dalitz-plot	: analy	sis. See		
various parametrizations of the decay amplitudes. The emphasis there is more on S -wave $\pi\pi$ decay products — 20 different solutions are given — than on D_S^+ fit fractions. VALUE DOCUMENT ID TECN COMMENT 0.833 ± 0.020 OUR AVERAGE 0.830 ± 0.009 ± 0.019 AUBERT 090 BABR Dalitz fit, ≈ 10.5 k evts							
fractions. $VALUE$ DOCUMENT ID TECN COMMENT 0.833 \pm 0.020 OUR AVERAGE 0.830 \pm 0.009 \pm 0.019 $\frac{1}{2}$ AUBERT 090 BABR Dalitz fit, \approx 10.5k evts	various parametriz	ations of t	he decay amplit	tudes.	The er	nphasis there is	more on
VALUEDOCUMENT IDTECNCOMMENT 0.833 ± 0.020 OUR AVERAGE $0.830 \pm 0.009 \pm 0.019$ 1 AUBERT090 BABRDalitz fit, ≈ 10.5 k evts		products -	— 20 different	solutio	ns are g	given — than o	on D_s^+ fit
$0.830~\pm 0.009~\pm 0.019$	VALUE		OCUMENT ID	TE	CN CO	OMMENT	
			UDEDT 0	0 - 0		II. C. 10 E	
0.0704±0.0300±0.0430 Envi	$0.830 \pm 0.009 \pm 0.019$ $0.8704 \pm 0.0560 \pm 0.0438$						
1 AUBERT 090 gives the amplitude and phase of the $\pi^+\pi^-$ <i>S</i> -wave in 29 $\pi^+\pi^-$	¹ AUBERT 090 gives	the amplit	tude and phase	of th	$\pi = \pi + \pi$	— S-wave in 2	9 $\pi^{+}\pi^{-}$
invariant-mass bins.	invariant-mass bins.						
² LINK 04 borrows a K-matrix parametrization from ANISOVICH 03 of the full π - π <i>S</i> -							
wave isoscalar scattering amplitude to describe the $\pi^+\pi^-$ S-wave component of the	wave isoscalar scatte	ring amplit	ude to describe	the π	τ'π .	o-wave compone	ent of the
$\pi \cdot \pi \cdot \pi$ state. I ne fit fraction given above is a sum over five t_0 mesons, the t_0 (980),		e fit fractio 500), f ₀ (15	n given above is 00), and $f_0(175)$	a sum 0). Se	e LINK	04 for details a	nd discus-
$\pi^+\pi^+\pi^-$ 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 discus-	sion.			-). 50			

$\Gamma(f_0(980)\pi^+, f_0 \rightarrow \pi^+\pi^-)/\Gamma$ This is the "fit fraction"	from the Dali	tz-plot	analysis	Γ_{61}/Γ_{58} . See above for the full
$\pi^+(\pi^+\pi^-)_{S-wave}$ fit fr				
VALUE	DOCUMENT			COMMENT
• • We do not use the following	_	_		
$0.565 \pm 0.043 \pm 0.047$ $1.074 \pm 0.140 \pm 0.043$	AITALA FRABETTI			Dalitz fit, 848 evts γ Be $pprox$ 200 GeV
$\Gamma(f_0(1370)\pi^+, f_0 \rightarrow \pi^+\pi^-)$ This is the "fit fraction" $\pi^+(\pi^+\pi^-)_{S-wave}$ fit fraction"	from the Dali action.	tz-plot		
	DOCUMENT			
• • We do not use the following	g data for avera	ages, fits	s, limits,	etc. • • •
$0.324 \pm 0.077 \pm 0.017$	AITALA	014	E791	Dalitz fit, 848 evts
$\Gamma(f_0(1500)\pi^+, f_0 \rightarrow \pi^+\pi^-)$ This is the "fit fraction" $\pi^+(\pi^+\pi^-)_{S-wave}$ fit fraction"	from the Dali action.	tz-plot		
VALUE	·			COMMENT
• • We do not use the followin		_		
$0.274 \pm 0.114 \pm 0.019$				γ Be $pprox$ 200 GeV
¹ FRABETTI 97D calls this mod	e $S(1475)\pi^+$, l	out finds	the mas	ss and width of this $S(1475)$
to be in excellent agreement	with those of th	ie $\iota^0(120)$	00).	
$\Gamma(f_2(1270)\pi^+, f_2 \to \pi^+\pi^-)$	$)/\Gamma(2\pi^{+}\pi^{-})$			Γ ₆₄ /Γ ₅₈
$\Gamma(f_2(1270)\pi^+, f_2 \rightarrow \pi^+\pi^-)$ This is the "fit fraction" from	$)/\Gamma(2\pi^+\pi^-)$ om the Dalitz-p	lot analy	ysis.	5., 55
$\Gamma(f_2(1270)\pi^+, f_2 \to \pi^+\pi^-)$	$)/\Gamma(2\pi^{+}\pi^{-})$	lot analy	ysis.	5., 55
$\Gamma(f_2(1270)\pi^+, f_2 \rightarrow \pi^+\pi^-)$ This is the "fit fraction" from the value 0.101 ± 0.018 OUR AVERAGE	/Γ(2π⁺π⁻) om the Dalitz-p <u>DOCUMENT ID</u> AUBERT	lot analy	ysis. <u>FECN</u> 1	COMMENT $pprox 10.5$ k evts
$\Gamma(f_2(1270)\pi^+, f_2 \rightarrow \pi^+\pi^-)$ This is the "fit fraction" from the value 0.101 ± 0.018 OUR AVERAGE $0.101 \pm 0.015 \pm 0.011$ $0.0974 \pm 0.0449 \pm 0.0294$	/Γ(2π⁺π⁻) om the Dalitz-p <u>DOCUMENT ID</u> AUBERT LINK	lot analy 	ysis. FECN S BABR I	COMMENT Dalitz fit, $pprox$ 10.5k evts
$\Gamma(f_2(1270)\pi^+, f_2 \rightarrow \pi^+\pi^-)$ This is the "fit fraction" from the value 0.101 ± 0.018 OUR AVERAGE $0.101 \pm 0.015 \pm 0.011$	/Γ(2π⁺π⁻) om the Dalitz-p <u>DOCUMENT ID</u> AUBERT LINK	lot analy 	ysis. FECN S BABR I	COMMENT Dalitz fit, $pprox$ 10.5k evts
Γ (f_2 (1270) π^+ , f_2 → $\pi^+\pi^-$) This is the "fit fraction" from the value 0.101 ± 0.018 OUR AVERAGE $0.101 \pm 0.015 \pm 0.011$ $0.0974 \pm 0.0449 \pm 0.0294$ • • • We do not use the following $0.197 \pm 0.033 \pm 0.006$	Magnetic (A) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	lot analy 090 E 04 F ages, fits	ysis. FECN S BABR I FOCS I s, limits,	COMMENT Dalitz fit, ≈ 10.5 k evts Dalitz fit, 1475 ± 50 evts etc. • • • Dalitz fit, 848 evts
Γ (f_2 (1270) π^+ , f_2 → $\pi^+\pi^-$) This is the "fit fraction" from the value 0.101 ± 0.018 OUR AVERAGE $0.101 \pm 0.015 \pm 0.011$ $0.0974 \pm 0.0449 \pm 0.0294$ • • • We do not use the following $0.197 \pm 0.033 \pm 0.006$	$(\Gamma(2\pi^+\pi^-))$ om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera	lot analy 090 E 04 F ages, fits	ysis. FECN S BABR I FOCS I s, limits,	COMMENT Dalitz fit, ≈ 10.5 k evts Dalitz fit, 1475 ± 50 evts etc. • •
Γ(f_2 (1270) π^+ , $f_2 \rightarrow \pi^+\pi^-$) This is the "fit fraction" from the "fit fraction" from the fit fraction from the fit fraction" from the fit fraction from the fit fraction from the fit fraction" from the fit fraction from the fit fraction" from the fit fraction fraction from the fit fraction fraction from the fit fraction fr	$(\Gamma(2\pi^+\pi^-))$ om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI $(\Gamma(2\pi^+\pi^-))/\Gamma(2\pi^+\pi^-)$	090 E 04 F ages, fits 01A E 97D E	ysis. FECN SABR IFOCS IF	COMMENT Dalitz fit, ≈ 10.5 k evts Dalitz fit, 1475 ± 50 evts etc. • • • Dalitz fit, 848 evts
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the "fit fraction" fraction fra	$(\Gamma(2\pi^+\pi^-))$ om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI $(\Gamma(2\pi^+\pi^-))/\Gamma(2\pi^+\pi^-)$	lot analy 090 E 04 F ages, fits 01A E 97D E	ysis. FECN SABR I FOCS I s, limits, F791 I F687	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the "fit fraction" from the second of the s	$(\Gamma(2\pi^+\pi^-))$ om the Dalitz-poment ID AUBERT LINK g data for avera AITALA FRABETTI $(\Gamma(2\pi^+\pi^-))/\Gamma(2\pi^+\pi^-)$ om the Dalitz-p	lot analy 090 E 04 F ages, fits 01A E 97D E	ysis. FECN SABR I FOCS I s, limits, F791 I F687	COMMENT Dalitz fit, ≈ 10.5 k evts Dalitz fit, 1475 ± 50 evts etc. • • • Dalitz fit, 848 evts $y \text{ Be } \approx 200 \text{ GeV}$
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the value of the following of the fol	$(-1)^{\Gamma}$ (2π+π-) om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI F)/ Γ (2π+π- om the Dalitz-p DOCUMENT ID AUBERT	090 E 04 F 01A E 97D E	ysis. FECN SABR I FOCS I S, limits, F791 I F687 F687 F687 SABR I	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV Γ_{65}/Γ_{58} COMMENT Dalitz fit, \approx 10.5k evts
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the state of	Γ (2π+π-) om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI Γ)/ Γ (2π+π- om the Dalitz-p DOCUMENT ID AUBERT LINK	090 E 04 F ages, fits 01A E 97D E lot analy 090 E 04 F	ysis. FECN SABR I FOCS I FOSS, limits, F791 I F687 F687 F687 SABR I FOCS I	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the value of the following of the fol	Γ (2π+π-) om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI Γ)/ Γ (2π+π- om the Dalitz-p DOCUMENT ID AUBERT LINK	090 E 04 F ages, fits 01A E 97D E lot analy 090 E 04 F	ysis. FECN SABR I FOCS I FOSS, limits, F791 I F687 F687 F687 SABR I FOCS I	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the state of	Γ (2π+π-) om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI Γ)/ Γ (2π+π- om the Dalitz-p DOCUMENT ID AUBERT LINK	090 E 04 F ages, fits 01A E 97D E lot analy 090 E 04 F	ysis. BABR I COCS I S, limits, COSS SABR I COSS	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from this is the "fit fracti	Γ (2π+π-) om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI Γ)/ Γ (2π+π- om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera	090 E 04 F ages, fits 01A E 97D E 1 090 E 04 F ages, fits	ysis. BABR I COCS I S, limits, COSS SABR I COSS	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV Γ_{65}/Γ_{58} COMMENT Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • •
Γ(f_2 (1270) $π^+$, $f_2 → π^+π^-$) This is the "fit fraction" from the value of the fit fraction" from the value of the fit fraction" from the value of the fit fraction from the fit fraction fraction from the fit fraction fraction fraction fraction fraction fr	Γ (2π+π-) om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera AITALA FRABETTI Γ)/ Γ (2π+π- om the Dalitz-p DOCUMENT ID AUBERT LINK g data for avera	lot analy 090 E 04 F ages, fits 01A E 97D E 1 090 E 04 F ages, fits	ysis. BABR I COCS I S, limits, COSS SABR I COSS	Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts γ Be \approx 200 GeV Γ_{65}/Γ_{58} COMMENT Dalitz fit, \approx 10.5k evts Dalitz fit, 1475 \pm 50 evts etc. • • • Dalitz fit, 848 evts

$\Gamma(2\pi^+\pi^-\pi^0)/\Gamma(q^2)$	$\phi\pi^+)$					Γ ₆₇ /Γ ₃₄
		DOCUMENT ID				
• • • We do not use	the following	data for average	es, fits,	, limits,	etc. • • •	
<3.3	90	ANJOS	89E	E691	Photoprodu	ction
$\Gamma(\eta\pi^+)/\Gamma_{ ext{total}}$ Unseen decay n	nodes of the	η are included.				Γ ₆₈ /Γ
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.70±0.09 OUR FIT 1.71±0.08 OUR AVE	Error inclu					
$1.67 \pm 0.08 \pm 0.06$		ONYISI	13	CLEO	$e^{+}e^{-}$ at 4.3	17 GeV
$1.82\!\pm\!0.14\!\pm\!0.07$	0.8k	ZUPANC	13	BELL	e^+e^- at γ	$(4S), \Upsilon(5S)$
• • • We do not use	the following					· /· · /
$1.58\!\pm\!0.11\!\pm\!0.18$		¹ ALEXANDER	80	CLEO	See ONYISI	13
¹ ALEXANDER 08	uses single- a	and double-tagge	d even	ts in an	overall fit.	
$\Gamma(\eta \pi^+)/\Gamma(K^+K_3^0)$ Unseen decay not VALUE	nodes of the		ID	TEC	<u> COMMEN</u>	Γ ₆₈ /Γ ₃₁
1.13 ±0.07 OUR FI	T Error inc				COMMEN	
• • • We do not use	the following	data for average	es, fits,	, limits,	etc. • • •	
$1.236 \pm 0.043 \pm 0.063$	2587 ± 89	MENDEZ	1	0 CLE	O See ONY	'ISI 13
$\Gamma(\eta \pi^+)/\Gamma(\phi \pi^+)$	ander of the	**************************************	ماريطمط	ı		Γ_{68}/Γ_{34}
VALUE		resonances are in <u>DOCUMENT ID</u>			COMMENT	
ullet $ullet$ We do not use	the following	data for average	es, fits,	, limits,	etc. • • •	
$0.48 \pm 0.03 \pm 0.04$	920	JESSOP	98	CLE2	$e^+e^-pprox \gamma$	(45)
$0.54\!\pm\!0.09\!\pm\!0.06$	165	ALEXANDER			See JESSOP	
$\Gamma(\omega\pi^+)/\Gamma_{ ext{total}}$ Unseen decay n	nodes of the	ω are included.				Γ ₆₉ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
0.24±0.06 OUR FIT						
$0.21\pm0.09\pm0.01$	6 ± 2.4	GE	09A	CLEO	e^+e^- at 4	170 MeV
$\Gamma(\omega\pi^+)/\Gamma(\eta\pi^+)$ Unseen decay n	nodes of the	resonances are in	cluded	l.		Γ ₆₉ /Γ ₆₈
VALUE		DOCUMENT ID			COMMENT	
0.14±0.04 OUR FIT						
$0.16\pm0.04\pm0.03$		BALEST	97	CLE2	$e^+e^-\approx '$	$\Upsilon(4S)$
$\Gamma(3\pi^+2\pi^-)/\Gamma(K^-)$	•	DOCUMENT ID		TECN	COMMENT	Γ_{70}/Γ_{33}
<u>VALUE</u> 0.146±0.014 OUR A \(\)	VFRAGE	DOCUMENT ID		IECN	COMMENT	
$0.145\pm0.011\pm0.010$		LINK	03 D	FOCS	γ A, $\overline{\it E}_{\gamma}$ $pprox$	180 GeV
$0.158 \pm 0.042 \pm 0.031$		FRABETTI	97C	E687	γ Be, $\overline{E}_{\gamma} \approx$	200 GeV
_ :			- -		,	

$\Gamma(\eta ho^+)/\Gamma_{ ext{total}}$ Unseen decay n						Γ ₇₂ /Γ
VALUE (units 10^{-2})						
$8.9\pm0.6\pm0.5$	328 ± 22	NAIK	(09A CLE	EO $\eta ightarrow 2\gamma$	
		esonances are inc	cluded	l.		Γ ₇₂ /Γ ₃₄
VALUE		DOCUMENT ID				
• • • We do not use	the following	data for average				
$2.98 \pm 0.20 \pm 0.39$	447	JESSOP	98	CLE2	$e^+e^-pprox \Upsilon(4)$	·S)
$2.86 \pm 0.38 ^{+0.36}_{-0.38}$	217	AVERY	92	CLE2	See JESSOP 9	8
$\Gamma(\eta\pi^+\pi^0)/\Gamma_{\rm total}$						Γ ₇₃ /Γ
VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
$9.2\pm0.4\pm1.1$		ONYISI	13	CLEO	$e^{+}e^{-}$ at 4.17	GeV
$\Gamma(\omega\pi^+\pi^0)/\Gamma_{ m total}$						Γ ₇₄ /Γ
Unseen decay no VALUE (units 10 ⁻²)		DOCUMENT ID		TECN	COMMENT	
2.78±0.65±0.25		GE				
$\Gamma(3\pi^+2\pi^-\pi^0)/\Gamma_{\rm t}$	otal					Γ ₇₅ /Γ
VALUE		DOCUMENT ID		TECN	COMMENT	
$0.049 ^{igoplus 0.033}_{-0.030}$		BARLAG	92 C	ACCM	π^- 230 GeV	
$\Gamma(\omega 2\pi^+\pi^-)/\Gamma_{ m tota}$		are included.				Γ ₇₆ /Γ
$VALUE$ (units 10^{-2})	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT	
$1.58\pm0.45\pm0.09$	29 ± 8.2	GE	09A	CLEO	$e^{+}e^{-}$ at 4170	MeV
$\Gamma(\eta'(958)\pi^+)/\Gamma_{to}$		to a second				Γ ₇₇ /Γ
Unseen decay n VALUE (units 10^{-2})	nodes of the η	(958) are includ		TECN	COMMENT	
3.94±0.15±0.20		DOCUMENT ID ONYISI		CLEO	$\frac{COMMENT}{e^+e^-}$ at 4.17	Call
• • • We do not use	the following		13 s. fits.			Gev
$3.77 \pm 0.25 \pm 0.30$		¹ ALEXANDER	80	CLEO	See ONYISI 13	3
¹ ALEXANDER 08	uses single- ar	nd double-tagged	l even	ts in an	overall fit.	
$\Gamma(\eta'(958)\pi^+)/\Gamma(\eta'(958)\pi^+)$	0,	$^{\prime}$ (958) are includ	led.			Γ ₇₇ /Γ ₃₁
<u>VALUE</u>	EVTS	DOCUMENT I		TEC	COMMENT	
ullet $ullet$ We do not use	the following	data for average	s, fits,	limits, e	etc. • • •	
$2.654 \pm 0.088 \pm 0.139$	1436 ± 47	MENDEZ	10	0 CLE	O See ONYISI	13

$\Gamma(\eta'(958)\pi^+)/\Gamma$	$(\phi\pi^+)$,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ماريط	1	Γ ₇₇ /Γ ₃₄
VALUE		resonances are in <u>DOCUMENT ID</u>			COMMENT
• • • We do not us					
$1.03 \pm 0.06 \pm 0.07$	537	JESSOP	98	CLE2	$e^+e^-pprox \ \varUpsilon(4S)$
$1.20\!\pm\!0.15\!\pm\!0.11$	281	ALEXANDER	92	CLE2	` ,
$2.5 \pm 1.0 {+1.5} \atop {-0.4}$	22	ALVAREZ	91	NA14	Photoproduction
$2.5 \pm 0.5 \pm 0.3$	215	ALBRECHT	90 D	ARG	e^+e^-pprox 10.4 GeV
$\Gamma(\omega\eta\pi^+)/\Gamma_{ ext{total}}$		ω and η are inclu	ıded.		Γ ₇₉ /Γ
<u>VALUE</u>		DOCUMENT ID		TECN	COMMENT
$< 2.13 \times 10^{-2}$	90	GE	09/	CLEC	e^+e^- at 4170 MeV
$\Gamma(\eta'(958)\rho^+)/\Gamma$	total				Γ ₈₀ /Γ
$VALUE$ (units 10^{-2})		DOCUMENT ID		TECN	COMMENT
$5.8 \pm 1.4 \pm 0.4$		ABLIKIM	15z	BES3	482 ${ m pb}^{-1}$, 4009 ${ m MeV}$
$\Gamma(\eta'(958)\rho^+)/\Gamma$	$(\phi \pi^+)$	resonances are in	cludec	ı	Γ ₈₀ /Γ ₃₄
<u>VALUE</u>		DOCUMENT ID			COMMENT
$2.78\pm0.28\pm0.30$	137	JESSOP	98	CLE2	$e^+e^-pprox ~ \gamma$ (4S)
• • • We do not us	se the following	data for average	s, fits	, limits,	etc. • • •
$3.44 \pm 0.62 ^{+0.44}_{-0.46}$	68	AVERY	92	CLE2	See JESSOP 98
$\Gamma(\eta'(958)\pi^+\pi^0)$	$/\Gamma_{ ext{total}}$				Γ ₈₁ /Γ
VALUE (units 10 ⁻²)		DOCUMENT ID		TECN	
$5.6 \pm 0.5 \pm 0.6$		ONYISI	13	CLEO	e^+e^- at 4.17 GeV
$\Gamma(\eta'(958)\pi^+\pi^0)$	nonresonant)	$/\Gamma_{ ext{total}}$			Γ ₈₂ /Γ
<u>VALUE</u>	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT
$< 5.1 \times 10^{-2}$	90	ABLIKIM	15Z	BES3	482 pb $^{-1}$, 4009 MeV
_	Mode	s with one or	three	<i>K</i> 's -	
$\Gamma(K^+\pi^0)/\Gamma(K^+$	_				Γ ₈₃ /Γ ₃₁
$VALUE$ (units 10^{-2})	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT
4.2±1.4±0.2	202 ± 70	MENDEZ	10		e^+e^- at 4170 MeV
• • • We do not us	se the following	data for average	s, fits	, limits,	etc. • • •
$5.5 \pm 1.3 \pm 0.7$	141 ± 34	ADAMS	07A	CLEO	See MENDEZ 10
$\Gamma(K_S^0\pi^+)/\Gamma(K^+)$	• ·				Γ_{84}/Γ_{31}
VALUE (units 10 ⁻²) 8.12±0.28 OUR	<u>EVTS</u> VERAGE	DOCUMENT ID		TECN	COMMENT
8.5 $\pm 0.7 \pm 0.2$		MENDEZ	10	CLFO	e^+e^- at 4170 MeV
$8.03\pm0.24\pm0.19$		WON			e^+e^- at $\Upsilon(4S)$
$10.4 \pm 2.4 \pm 1.4$		LINK	08	FOCS	γ A, $\overline{E}_{\gamma} \approx 180 \text{ GeV}$
• • • We do not us	se the following	data for average			
$8.2 \pm 0.9 \pm 0.2$	206 ± 22	ADAMS	07A	CLEO	See MENDEZ 10
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$\Gamma(K^+\eta)/\Gamma(K^+\eta)$ Unseen decay	$(K_{oldsymbol{5}}^{oldsymbol{0}})$ modes of the η	are included.				Γ_{85}/Γ_{31}
$VALUE$ (units 10^{-2})	EVTS	DOCUMENT	ID	TECI	COMMENT	
$11.8 \pm 2.2 \pm 0.6$	222 ± 41	MENDEZ	10) CLE	O e^+e^- at	4170 MeV
$\Gamma(K^+\eta)/\Gamma(\eta\pi^+)$	*					Γ_{85}/Γ_{68}
VALUE (units 10 ⁻²)						
• • • We do not us		_				
$8.9 \pm 1.5 \pm 0.4$	113 ± 18	ADAMS	07A	CLEO	See MENDE	Z 10
	modes of the ω	are included.				Γ ₈₆ /Γ
<i>VALUE</i> (units 10 ⁻²)		DOCUMENT ID				
<0.24	90	GE	09A	CLEO	$e^{+}e^{-}$ at 41	70 MeV
	modes of the η	` '				Γ_{87}/Γ_{31}
VALUE (units 10 ⁻²)						
$11.8 \pm 3.6 \pm 0.7$	56 ± 17	MENDEZ	10) CLE	O e'e at	4170 MeV
$\Gamma(K^+\eta'(958))/\Gamma$, , ,					Γ ₈₇ /Γ ₇₇
VALUE (units 10^{-2})		DOCUMENT ID				
• • • We do not us						7.10
$4.2 \pm 1.3 \pm 0.3$	28 ± 9	ADAMS	07A	CLEO	See MENDE	Z 10
$\Gamma(K^+\pi^+\pi^-)/\Gamma_0$	total					Γ ₈₈ /Γ
$VALUE$ (units 10^{-2})		DOCUMENT ID		TECN	COMMENT	
0.66 ±0.04 OUR					1	
0.654±0.033±0.02 • • • We do not us		ONYISI				l7 GeV
$0.69 \pm 0.05 \pm 0.03$		uata for average $^{ m 1}$ ALEXANDER				12
						13
¹ ALEXANDER 0		id double-tagged	a event	s in an	overall fit.	
$\Gamma(K^+\pi^+\pi^-)/\Gamma$						Γ_{88}/Γ_{33}
<u>VALUE</u> 0.120±0.007 OUR	<u>EVTS</u>	<u>DOCUMENT</u>	ID C 1 1	TECN	COMMENT	
0.120 ± 0.007 OOR $0.127 \pm 0.007 \pm 0.01$						180 GeV
0.22, 20.00, 20.02	307 ± 31	2			γ γ γ γ γ γ	100 001
$\Gamma(K^+\rho^0)/\Gamma(K^+$ This is the "f	$(\pi^+\pi^-)$ it fraction" from	the Dalitz-plot	analys	is.		Γ_{89}/Γ_{88}
VALUE		DOCUMENT ID		TECN		
$0.3883 \pm 0.0531 \pm 0.$	0261	LINK	04F	FOCS	Dalitz fit, 56	7 evts
$\Gamma(K^+\rho(1450)^0$, This is the "f	$ ho^0 ightarrow \pi^+ \pi^- ight)$ it fraction" from			is.		Γ_{90}/Γ_{88}
		DOCUMENT ID		TECN		
$0.1062 \pm 0.0351 \pm 0.$	0104	LINK	04F	FOCS	Dalitz fit, 56	7 evts

$\Gamma(K^*(892)^0\pi^+$, K	$\zeta^{*0} \rightarrow K^{+} \pi$	$(r^-)/\Gamma(K^+\pi^+)$	π^{-}			Γ_{91}/Γ_{88}
This is the "fit	fraction" from	n the Dalitz-plo	t analys		COMMENT	
VALUE 0.2164±0.0321±0.0	114	<u>DOCUMENT ID</u> LINK			•	67 evts
				. 0 00	Buntz ne, oc	
$\Gamma(K^*(1410)^0\pi^+,$ This is the "fit		$\pi^-)/\Gamma(K^+\pi)$ n the Dalitz-plo		sis.		Γ_{92}/Γ_{88}
VALUE		DOCUMENT ID				_
$0.1882 \pm 0.0403 \pm 0.0$	122	LINK	04F	FOCS	Dalitz fit, 56	7 evts
$\Gamma(K^*(1430)^0\pi^+,$ This is the "fit	$K^{*0} \rightarrow K^+$ fraction" from	π^-)/Γ($K^+\pi$ n the Dalitz-plo	$(+\pi^-)$	sis.		Γ_{93}/Γ_{88}
VALUE		DOCUMENT ID				
$0.0765\pm0.0500\pm0.0$	170	LINK	04F	FOCS	Dalitz fit, 56	67 evts
$\Gamma(K^+\pi^+\pi^-\text{nonro})$ This is the "fit	esonant)/Γ($(K^+\pi^+\pi^-)$ n the Dalitz-plo	t analys	sis.		Γ_{94}/Γ_{88}
VALUE		DOCUMENT ID			COMMENT	
$0.1588 \pm 0.0492 \pm 0.0$	153	LINK	04F	FOCS	Dalitz fit, 56	67 evts
$\Gamma(K^0\pi^+\pi^0)/\Gamma_{\rm tot}$						Γ ₉₅ /Γ
$VALUE$ (units 10^{-2})	EVTS	DOCUMENT	ID	TECN	COMMENT	
$1.00\pm0.18\pm0.04$	44 ± 8	NAIK	09	A CLEC	e^+e^- at	4170 MeV
$\Gamma(K_S^0 2\pi^+\pi^-)/\Gamma($			T 10	TEC	U COMMENS	Γ ₉₆ /Γ ₄₇
<i>VALUE</i> 0.18±0.04±0.05		<u>DOCOMEN I</u> LINK			$\frac{N}{N} = \frac{COMMENT}{\gamma}$ A, \overline{E}_{γ}	
0.10 ± 0.04 ± 0.03	119 ± 50	LIMIX	00	, 100	L_{γ}	○ 100 GeV
$\Gamma(K^+\omega\pi^0)/\Gamma_{ ext{total}}$		ω are included.				Γ ₉₇ /Γ
VALUE (units 10^{-2})	<u>CL%</u>	DOCUMENT ID)	TECN	COMMENT	
<0.82	90	GE	09A	CLEO	$e^{+}e^{-}$ at 41	170 MeV
$\Gamma(K^+\omega\pi^+\pi^-)/\Gamma$ Unseen decay in	total modes of the	a are included				Γ ₉₈ /Γ
VALUE (units 10^{-2})		DOCUMENT ID)	TECN	COMMENT	
<0.54	90	GE			$e^{+}e^{-}$ at 41	170 MeV
$\Gamma(K^+\omega\eta)/\Gamma_{ ext{total}}$						Г ₉₉ /Г
		ω and η are incl	uded.			
•	<u>CL%</u>	DOCUMENT ID				
<0.79	90	GE	09A	CLEO	$e^{+}e^{-}$ at 41	L70 MeV
$\Gamma(2K^+K^-)/\Gamma(K^2)$,					Γ_{100}/Γ_{33}
$VALUE$ (units 10^{-3})		DOCUMENT	ID	TECN	<u>COMMENT</u>	
4.0 ± 0.3 ± 0.2 • • • We do not use					R $e^+e^-\approx$ etc. • • •	$\Upsilon(4S)$
$8.95\pm2.12^{+2.24}_{-2.31}$	31	LINK	02	FOCS	γ A, \approx 18	0 GeV
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$\Gamma(\phi K^+, \phi \to K^+ K)$ VALUE	-)/Γ(2 <i>K</i> -	+ K-) DOCUMENT ID		TECN		_L /Γ ₁₀₀
0.41±0.08±0.03					$e^+e^-\approx \Upsilon(4S)$)
	Doubly (Cabibbo-suppre	essed	modes		
		определения				
$\Gamma(2K^+\pi^-)/\Gamma(K^+K^-)$					Γ ₁₀	$_{02}/\Gamma_{33}$
<u>VALUE (units 10⁻³)</u>		DOCUMENT	ID	TECI	COMMENT	
2.33±0.23 OUR AVER/		DEL AMO	C A 1	116 DAE	ορ .± .= χ(4 C)
$2.3 \pm 0.3 \pm 0.2$ $2.29\pm 0.28\pm 0.12$		KO	LAC-	IIG BAE	SR $e^+e^-pprox arGamma(4)$ L e^+e^- at $arGamma(4)$	45) IS)
$5.2 \pm 1.7 \pm 1.1$		LINK	C)5K FOC	S < 0.78%, CL =	= 90%
Γ(K ⁺ K*(892) ⁰ , K*	$^{0} \rightarrow K^{+} \pi$, ,	•			₃ /Γ ₁₀₂
<u>VALUE</u>		DOCUMENT ID				`
$0.47 \pm 0.22 \pm 0.15$		DEL-AMO-SA	116	BABK	$e^+e^-\approx \Upsilon(4S)$)
	Bar	yon-antibaryor	mo	de —		
$\Gamma(p\overline{n})/\Gamma_{\text{total}}$ This is the only b	arvonic mod	de allowed kinem	aticall	v	Γ	₁₀₄ /Г
VALUE (units 10 ⁻³)	-			-	MMENT	
					e^- , $E_{\rm cm} \approx 4170$) MeV
	Rar	e or forbidden	mod	es —		
$\Gamma(\pi^+ e^+ e^-)/\Gamma_{\text{total}}$					Γ	- ₁₀₅ /Г
	a useful tes	t for a $\Delta C = 1$ we	ak ne	utral cui	rent because both	
must change flavo						
VALUE		DOCUMENT ID				
<13 × 10 ⁻⁶					$e^+e^-\approx \Upsilon(45)$)
• • We do not use th						
$< 2.2 \times 10^{-5}$		¹ RUBIN			$e^{+}e^{-}$ at 4170 N	ЛeV
		AITALA				
¹ This RUBIN 10 limi See the next data b	it is for the lock.	e^+e^- mass in	the co	ontinuum	n away from the ϕ	(1020)
$\Gamma(\pi^+\phi, \phi \rightarrow e^+e^-$,,					₁₀₆ /Γ
	for the ΔC	$\mathcal{I}=1$ weak neut	ral cu	rrent, bu	it leads to the π^+	e ⁺ e ⁻
final state. <u>VALUE</u>	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT	
					$e^{+}e^{-}$ at 4170 N	
$\Gamma(\pi^+\mu^+\mu^-)/\Gamma_{\text{total}}$ This mode is not must change flavor			ak ne	utral cui	rent because both	- 107/Γ quarks
VALUE		DOCUMENT ID		TECN	COMMENT	
$<4.1 \times 10^{-7}$	90	AAIJ	13AF	LHCB	pp at 7 TeV	

 VVe do not 	use the	following d	lata for ave	ages fits	limits 6	etc • • •
$<4.3 \times 10^{-5}$	ase the	90	LEES			${ m e^+e^-}pprox~\gamma(4S)$
$< 2.6 \times 10^{-5}$		90	LINK			γ A, $\overline{E}_{\gamma} \approx 180 \text{ GeV}$
$< 1.4 \times 10^{-4}$		90	AITALA			π^- N 500 GeV
$<4.3 \times 10^{-4}$		90	KODAMA			π^- emulsion 600 GeV
F(V+ -+) /	-					
$\Gamma(K^+e^+e^-)/$		=1 weak nei	ıtral current	Allowed	hv highe	Γ ₁₀₈ /Γ er-order electroweak inter-
actions.	.nc <u>a</u> c-	-1 Weak net	itiai curiciit	. / tilowcu	by mgm	er-order electroweak inter-
VALUE		CL%				COMMENT
<3.7 × 10 ⁻⁶			LEES			$e^+e^-\approx \Upsilon(4S)$
• • • We do not	use the					
$<5.2 \times 10^{-5}$		90	RUBIN			e ⁺ e ⁻ at 4170 MeV
$<1.6 \times 10^{-3}$		90	ALIALA	99G	E791	π^- N 500 GeV
$\Gamma(K^+\mu^+\mu^-)$	/Γ _{total}					Γ ₁₀₉ /Γ
A test for t	the ΔC =	=1 weak neu	ıtral current	. Allowed	by highe	er-order electroweak inter-
actions. <i>VALUE</i>	CL%	DOCUM	IENT ID	TFCN	СОММЕ	-NT
<21 × 10 ⁻⁶		LEES				
• • • We do not						
$< 3.6 \times 10^{-5}$	90	LINK	03	F FOCS	γ A. \overline{E}	$ ilde{\gamma} pprox 180 \; GeV$
	90		A 99			,
$< 5.9 \times 10^{-4}$	90					nulsion 600 GeV
$\Gamma(K^*(892)^+\mu)$	Ŧ,,=\.	/				
			ıtral current	. Allowed	by highe	Γ ₁₁₀ /Γ er-order electroweak inter-
A test for t actions. <u>VALUE</u>	:he Δ <i>Č</i> =	=1 weak neu _ <u>CL%</u> _	<u>DOCUMENT</u>	· ID	TECN	cr-order electroweak inter-
A test for t actions.	:he Δ <i>Č</i> =	=1 weak neu		· ID	TECN	er-order electroweak inter-
A test for to actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A$ A test of less	the $\Delta C = \int_{\mathbf{total}}^{\mathbf{r}}$	=1 weak neu - <u>CL%</u> 90 mily-numbe	<u>DOCUMENT</u> KODAMA r conservati	95 on.	<u>TECN</u> E653	er-order electroweak inter- $\underline{COMMENT}$ π^- emulsion 600 GeV Γ_{111}/Γ
A test for to actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A$ A test of let VALUE	:he △ <i>Č</i> =	=1 weak neu - <u>CL%</u> 90 mily-numbe - <u>CL%</u>	DOCUMENT KODAMA r conservati DOCUMENT	95 on.	<u>TECN</u> E653	er-order electroweak inter- $\frac{COMMENT}{\pi^- \text{ emulsion } 600 \text{ GeV}}$ $\boxed{\Gamma_{111}/\Gamma}$ $\underline{COMMENT}$
A test for to actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A$ A test of less	the $\Delta C = \int_{\mathbf{total}}^{\mathbf{r}}$	=1 weak neu - <u>CL%</u> 90 mily-numbe	DOCUMENT KODAMA r conservati	95 on.	<u>TECN</u> E653	er-order electroweak inter- $\underline{COMMENT}$ π^- emulsion 600 GeV Γ_{111}/Γ
A test for the actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A test of less of $	rtotal epton-fa	=1 weak neu - <u>CL%</u> 90 mily-numbe - <u>CL%</u>	DOCUMENT KODAMA r conservati DOCUMENT LEES	95 on. 11G	<u>TECN</u> E653	er-order electroweak inter- $\frac{COMMENT}{\pi^- \text{ emulsion } 600 \text{ GeV}}$ $\boxed{\Gamma_{111}/\Gamma}$ $\underline{COMMENT}$
A test for to actions. VALUE $< 1.4 \times 10^{-3}$ $\Gamma(\pi^+ e^+ \mu^-)/A$ A test of letter $< 12 \times 10^{-6}$ $\Gamma(\pi^+ e^- \mu^+)/A$ A test of letter $< 12 \times 10^{-6}$ $VALUE$	rtotal epton-fa	=1 weak neu _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u>	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT	95 on. 11G on. 11G	TECN E653 TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^{-}} \text{ emulsion 600 GeV}$ Γ_{111}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{112}/Γ $\frac{COMMENT}{COMMENT}$
A test for to actions. VALUE $< 1.4 \times 10^{-3}$ $\Gamma(\pi^+ e^+ \mu^-)/A \text{ test of less } \frac{VALUE}{< 12 \times 10^{-6}}$ $\Gamma(\pi^+ e^- \mu^+)/A \text{ test of less } \frac{VALUE}{< 12 \times 10^{-6}}$	rtotal epton-fa	=1 weak neu _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u>	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT	95 on. 11G on. 11G	TECN E653 TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^{-}} \text{ emulsion 600 GeV}$ Γ_{111}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{112}/Γ
A test for the actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A test of less of $	F _{total} epton-fa	=1 weak neu 	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT LEES	95 on. 11G on. 11G	TECN E653 TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^{-}} \text{ emulsion 600 GeV}$ Γ_{111}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{112}/Γ $\frac{COMMENT}{COMMENT}$
A test for to actions. VALUE $< 1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A test of lessed to the second test of lessed test of less$	F _{total} epton-fa	=1 weak neu - <u>CL%</u> 90 mily-numbe - <u>CL%</u> 90 mily-numbe - <u>CL%</u> 90	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT LEES r conservati	95 on. 11G on. 11G 11G on.	TECN E653 TECN BABR TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^{-} \text{ emulsion } 600 \text{ GeV}}$ Γ_{111}/Γ $\frac{COMMENT}{e^{+}e^{-} \approx \Upsilon(4S)}$ Γ_{112}/Γ $\frac{COMMENT}{e^{+}e^{-} \approx \Upsilon(4S)}$ Γ_{113}/Γ
A test for to actions. VALUE $< 1.4 \times 10^{-3}$ $\Gamma(\pi^+ e^+ \mu^-)/A test of lessed for the second secon$	Ftotal epton-fa /Γtotal epton-fa	=1 weak neu - <u>CL%</u> 90 mily-numbe - <u>CL%</u> 90 mily-numbe - <u>CL%</u> 90 mily-numbe	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT LEES	95 on. 11G on. 11G on. 11G	TECN E653 TECN BABR TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^- \text{ emulsion } 600 \text{ GeV}}$ Γ_{111}/Γ $\frac{COMMENT}{e^+ e^- \approx \Upsilon(4S)}$ Γ_{112}/Γ $\frac{COMMENT}{e^+ e^- \approx \Upsilon(4S)}$
A test for the actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A test of lessed to the second s$	F _{total} epton-fa	=1 weak neu _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u> _ 90 mily-numbe _ <u>CL%</u> _ 90	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT LEES r conservati DOCUMENT LEES	95 on. 116 on. 116 on. 116 116	TECN E653 TECN BABR TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^{-}} \text{ emulsion } 600 \text{ GeV}$ Γ_{111}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{112}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{113}/Γ $\frac{COMMENT}{COMMENT}$
A test for the actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A test of lessed to the second s$	Ttotal epton-fa / Γtotal epton-fa	=1 weak neu - CL% - 90 mily-numbe	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT LEES r conservati DOCUMENT LEES	95 on. 11G on. 11G 11G on. 11G	TECN E653 TECN BABR TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^- \text{ emulsion } 600 \text{ GeV}}$ Γ_{111}/Γ $\frac{COMMENT}{e^+e^- \approx \Upsilon(4S)}$ Γ_{112}/Γ $\frac{COMMENT}{e^+e^- \approx \Upsilon(4S)}$ Γ_{113}/Γ $\frac{COMMENT}{e^+e^- \approx \Upsilon(4S)}$
A test for to actions. VALUE $<1.4 \times 10^{-3}$ $\Gamma(\pi^+e^+\mu^-)/A$ A test of letter $<12 \times 10^{-6}$ $\Gamma(\pi^+e^-\mu^+)/A$ A test of letter $<20 \times 10^{-6}$ $\Gamma(K^+e^+\mu^-)/A$ A test of letter $<14 \times 10^{-6}$ $\Gamma(K^+e^-\mu^+)/A$ A test of letter $<14 \times 10^{-6}$	Ttotal epton-fa / Γtotal epton-fa	=1 weak neu - CL% - 90 mily-numbe - CL% - 90 mily-numbe - CL% - 90 mily-numbe - CL% - 90	DOCUMENT KODAMA r conservati DOCUMENT LEES r conservati DOCUMENT LEES r conservati DOCUMENT LEES	95 on. 11G on. 11G 11G on. 11G on. 11G	TECN BABR TECN BABR TECN BABR	er-order electroweak inter- $\frac{COMMENT}{\pi^{-}} \text{ emulsion } 600 \text{ GeV}$ Γ_{111}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{112}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{113}/Γ $\frac{COMMENT}{e^{+}e^{-}} \approx \Upsilon(4S)$ Γ_{114}/Γ

$\Gamma(\pi^-2e^+)/\Gamma_{\text{total}}$ A test of lepton-nu	ımber conse	ervation			Γ ₁₁₅ /Γ
VALUE		DOCUMENT ID		TECN	COMMENT
$< 4.1 \times 10^{-6}$	90	LEES	11 G	BABR	$e^+e^-pprox ~ $
• • • We do not use the	following o	data for averages	s, fits,	limits, e	etc. • • •
$< 1.8 \times 10^{-5}$	90	RUBIN	10	CLEO	e^+e^- at 4170 MeV
$< 69 \times 10^{-5}$	90	AITALA	99 G	E791	π^- N 500 GeV
$\Gamma(\pi^-2\mu^+)/\Gamma_{ ext{total}}$ A test of lepton-nu	ımber conse	ervation.			Γ ₁₁₆ /Γ
<u>VALUE</u>	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-7}$		AAIJ			pp at 7 TeV
• • • We do not use the	following o	data for averages	s, fits,	limits, e	etc. • • •
$<1.4 \times 10^{-5}$		LEES			$e^+e^{-} \approx \Upsilon(4S)$
$< 2.9 \times 10^{-5}$	90	LINK			γ A, $\overline{\it E}_{\gamma}{pprox}$ 180 GeV
$< 8.2 \times 10^{-5}$	90	AITALA			π^- N 500 GeV
$<4.3 \times 10^{-4}$	90	KODAMA	95	E653	π^- emulsion 600 GeV
$\Gamma(\pi^-e^+\mu^+)/\Gamma_{ ext{total}}$ A test of lepton-nu	ımber conse	ervation.			Γ ₁₁₇ /Γ
VALUE		DOCUMENT ID		TECN	COMMENT
$< 8.4 \times 10^{-6}$	90	LEES	11 G	BABR	$e^+e^-pprox ~ \varUpsilon(4S)$
• • • We do not use the	following o	data for averages	s, fits,	limits, e	etc. • • •
$< 7.3 \times 10^{-4}$	90	AITALA	99 G	E791	π^- N 500 GeV
$\Gamma(K^-2e^+)/\Gamma_{\text{total}}$ A test of lepton-nu	mber conse	ervation.			Γ ₁₁₈ /Γ
VALUE		DOCUMENT ID			
< 5.2 × 10 ⁻⁶		LEES			$e^+e^-\approx \Upsilon(4S)$
• • • We do not use the					
$< 1.7 \times 10^{-5}$		RUBIN			$e^{+}e^{-}$ at 4170 MeV
$< 63 \times 10^{-5}$	90	AITALA	99G	E791	π^- N 500 GeV
$\Gamma(K^-2\mu^+)/\Gamma_{\text{total}}$ A test of lepton-nu	ımber conse	ervation.			Γ ₁₁₉ /Γ
<u>VALUE</u>		DOCUMENT ID			
$<1.3 \times 10^{-5}$	90	LEES	11 G	BABR	$e^+e^-pprox \ \varUpsilon(4S)$
$<1.3 \times 10^{-5}$	90	LINK	03F	FOCS	γ A, $\overline{\it E}_{\gamma} {pprox}$ 180 GeV
• • • We do not use the	following o	lata for averages	s, fits,	limits, e	etc. • • •
$< 1.8 \times 10^{-4}$	90	AITALA	99G	E791	π^- N 500 GeV
$< 5.9 \times 10^{-4}$	90	KODAMA	95	E653	π^- emulsion 600 GeV
$\Gamma(K^-e^+\mu^+)/\Gamma_{\text{total}}$	umbar aanaa	am ration			Γ ₁₂₀ /Γ
A test of lepton-nu		ervation. <u>DOCUMENT ID</u>		TECN	COMMENT
<6.1 × 10 ⁻⁶		LEES			$e^+e^-\approx \Upsilon(4S)$
• • • We do not use the					` ,
$< 6.8 \times 10^{-4}$	90	AITALA			π^- N 500 GeV
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 $\Gamma(K^*(892)^-2\mu^+)/\Gamma_{\text{total}}$

 Γ_{121}/Γ

A test of lepton-number conservation.

<u>VALUE</u>	CL%	DOCUMENT ID		TECN	COMMENT
<1.4 × 10 ⁻³	90	KODAMA	95	E653	π^- emulsion 600 GeV

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

This is the difference between D_s^+ and D_s^- partial widths for the decay to state f, divided by the sum of the widths:

$$A_{CP}(f) = \left[\Gamma(D_s^+ \to f) - \Gamma(D_s^- \to \overline{f}) \right] / \left[\Gamma(D_s^+ \to f) + \Gamma(D_s^- \to \overline{f}) \right].$$

$A_{CP}(\mu^{\pm}\nu)$ in $D_{s}^{+} \rightarrow \mu^{+}\nu$, $D_{s}^{-} \rightarrow \mu^{-}\overline{\nu}_{\mu}$

DOCUMENT ID TECN COMMENT

ALEXANDER 09 CLEO e^+e^- at 4170 MeV 4.8 ± 6.1

$A_{CP}(K^{\pm}K^0_{\mathbf{S}}) \text{ in } D^{\pm}_{\mathbf{s}} o K^{\pm}K^0_{\mathbf{S}}$

VALUE (%)	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT
0.08±0.26 OUR AVE	RAGE				
$-0.05\!\pm\!0.23\!\pm\!0.24$	288k	¹ LEES			e^+e^- at $\varUpsilon(4S)$
$2.6\ \pm 1.5\ \pm 0.6$		ONYISI	-		e^+e^- at 4.17 GeV
$0.12 \pm 0.36 \pm 0.22$		KO	10	BELL	$e^+e^-pprox \ \varUpsilon(4S)$
• • • We do not use th	e followin	g data for averages	s, fits,	limits, e	etc. • • •

 $4.7 \pm 1.8 \pm 0.9$ 4.0k MENDEZ 10 CLEO See ONYISI 13 ALEXANDER 08 CLEO See MENDEZ 10 $4.9 \pm 2.1 \pm 0.9$

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

VALUE (%) DOCUMENT ID TECN COMMENT 13 CLEO $e^{+}e^{-}$ at 4.17 GeV $-0.5\pm0.8\pm0.4$ ONYISI

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

 $0.3 \pm 1.1 \pm 0.8$ ALEXANDER 08 CLEO See ONYISI 13

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

DOCUMENT ID TECN COMMENT $-0.38\pm0.26\pm0.08$

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

DOCUMENT ID TECN COMMENT ONYISI 13 CLEO e^+e^- at 4.17 GeV $-1.6\pm6.0\pm1.1$

$A_{CP}(2K_S^0\pi^{\pm}) \text{ in } D_S^{\pm} \rightarrow 2K_S^0\pi^{\pm}$

DOCUMENT ID 13 CLEO $e^{+}e^{-}$ at 4.17 GeV $3.1 \pm 5.2 \pm 0.6$ ONYISI

 $^{^1}$ LEES 13E finds that after subtracting the contribution due to $K^0-\overline{K}^0$ mixing, the CPasymmetry is $(+0.28 \pm 0.23 \pm 0.24)\%$.

```
A_{CP}(K^+K^-\pi^\pm\pi^0) in D_s^\pm\to K^+K^-\pi^\pm\pi^0
                                                       TECN COMMENT
                                                     13 CLEO e^{+}e^{-} at 4.17 GeV
  0.0\pm 2.7\pm 1.2
                                     ONYISI
• • • We do not use the following data for averages, fits, limits, etc. • • •
                                     ALEXANDER 08 CLEO See ONYISI 13
A_{CP}(K^{\pm}K^0_S\pi^+\pi^-) in D^{\pm}_s\to K^{\pm}K^0_S\pi^+\pi^-
-5.7\pm5.3\pm0.9
                                     ONYISI 13 CLEO e^+e^- at 4.17 GeV
A_{CP}(K_S^0 K^{\mp} 2\pi^{\pm}) \text{ in } D_s^+ \rightarrow K_S^0 K^{\mp} 2\pi^{\pm}
                                    DOCUMENT ID TECN COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • •
-0.7\pm3.6\pm1.1
                                     ALEXANDER 08 CLEO See ONYISI 13
A_{CP}(\pi^+\pi^-\pi^\pm) in D_s^\pm \to \pi^+\pi^-\pi^\pm
                                     DOCUMENT ID TECN COMMENT
                                                13 CLEO e^{+}e^{-} at 4.17 GeV
-0.7\pm3.0\pm0.6
                                     ONYISI
• • • We do not use the following data for averages, fits, limits, etc. • • •
  2.0 \pm 4.6 \pm 0.7
                                     ALEXANDER 08 CLEO See ONYISI 13
A_{CP}(\pi^{\pm}\eta) \text{ in } D_s^{\pm} \rightarrow \pi^{\pm}\eta
  1.1 \pm 3.0 \pm 0.8
• • We do not use the following data for averages, fits, limits, etc. • •
-4.6\pm2.9\pm0.3
                          2.5k
                                     MENDEZ
                                                     10 CLEO See ONYISI 13
                                     ALEXANDER 08 CLEO See MENDEZ 10
-8.2\pm5.2\pm0.8
A_{CP}(\pi^{\pm}\eta') in D_s^{\pm} \rightarrow \pi^{\pm}\eta'
                                     DOCUMENT ID TECN COMMENT
                                                     13 CLEO e^{+}e^{-} at 4.17 GeV
-2.2\pm2.2\pm0.6
                                     ONYISI

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

-6.1\pm3.0\pm0.3
                     1.4k
                                     MENDEZ
                                                     10 CLEO See ONYISI 13
-5.5\pm3.7\pm1.2
                                     ALEXANDER 08 CLEO See MENDEZ 10
A_{CP}(\eta\pi^{\pm}\pi^{0}) in D_{s}^{\pm} \rightarrow \eta\pi^{\pm}\pi^{0}
VALUE (%)
-0.5\pm3.9\pm2.0
A_{CP}(\eta'\pi^{\pm}\pi^{0}) \text{ in } D_{\epsilon}^{\pm} \rightarrow \eta'\pi^{\pm}\pi^{0}
                                     DOCUMENT ID TECN COMMENT
                                                     13 CLEO e^+e^- at 4.17 GeV
-0.4\pm7.4\pm1.9
                                     ONYISI
```

$A_{CP}(K^{\pm}\pi^{0}) \text{ in } D_{s}^{\pm} \rightarrow K^{\pm}\pi^{0}$

26.6±23.8±0.9 202 ± 70 **MENDEZ** • • We do not use the following data for averages, fits, limits, etc.

07A CLEO See MENDEZ 10

ADAMS

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

DOCUMENT ID

TEN

0.4 ±0.5 OUR AVERAGE ¹ AAIJ $0.38 \pm 0.46 \pm 0.17$ 121k 14BD LHCB pp at 7, 8 TeV **LEES** $0.3 \pm 2.0 \pm 0.3$ 14k 13E BABR e^+e^- at $\Upsilon(4S)$

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

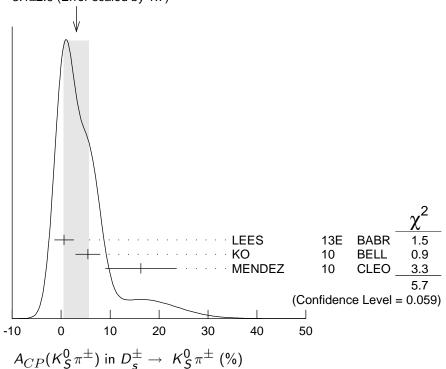
 $0.61 \pm 0.83 \pm 0.14$ **AAIJ** 13W LHCB See AAIJ 14BD

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

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
3.1 ± 2.6 OUR AVI	ERAGE	Error includes scale	factor	of 1.7.	See the ideogram below.
$0.6 \pm 2.0 \pm 0.3$	14k	LEES	13E	BABR	e^+e^- at $\varUpsilon(4S)$
$5.45 \pm \ 2.50 \pm 0.33$		KO	10	BELL	$e^+e^-pprox \ \varUpsilon(4S)$
$16.3 \pm 7.3 \pm 0.3$	0.4k	MENDEZ	10	CLEO	e^+e^- at 4170 MeV
• • • We do not use the	he follow	ing data for averages	, fits,	limits, e	etc. • • •
27 +11		ADAMS	07A	CLEO	See MENDEZ 10

WEIGHTED AVERAGE 3.1±2.6 (Error scaled by 1.7)



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

VALUE (%) DOCUMENT ID TECN COMMENT

4.5±4.8±0.6 ONYISI 13 CLEO e^+e^- at 4.17 GeV

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

 $11.2\pm7.0\pm0.9$ ALEXANDER 08 CLEO See ONYISI 13

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

VALUE (%) EVTS DOCUMENT ID TECN COMMENT

OCITED + - + 4170 M V

9.3±15.2±0.9 222 ± 41 MENDEZ 10 CLEO e^+e^- at 4170 MeV

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

-20 ± 18 ADAMS 07A CLEO See MENDEZ 10

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

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

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

-17 ± 37 ADAMS 07A CLEO See MENDEZ 10

CP VIOLATING ASYMMETRIES OF P-ODD (T-ODD) MOMENTS

$A_{Tviol}(K_S^0 K^{\pm} \pi^+ \pi^-) \text{ in } D_S^{\pm} \rightarrow K_S^0 K^{\pm} \pi^+ \pi^-$

 ${\sf C}_T \equiv \vec{p}_{{\cal K}^+} \cdot (\vec{p}_{\pi^+} \times \vec{p}_{\pi^-})$ is a parity-odd correlation of the ${\cal K}^+$, π^+ , and π^- momenta for the D_s^+ . $\overline{C}_T \equiv \vec{p}_{{\cal K}^-} \cdot (\vec{p}_{\pi^-} \times \vec{p}_{\pi^+})$ is the corresponding quantity for the D_s^- . Then

 $\begin{array}{l} \underline{A}_T \stackrel{s}{\equiv} [\Gamma(C_T > 0) - \Gamma(C_T < 0)] / [\Gamma(C_T > 0) + \Gamma(C_T < 0)], \text{ and} \\ \overline{A}_T \stackrel{s}{\equiv} [\Gamma(-\overline{C}_T > 0) - \Gamma(-\overline{C}_T < 0)] / [\Gamma(-\overline{C}_T > 0) + \Gamma(-\overline{C}_T < 0)], \text{ and} \\ \underline{A}_T \stackrel{s}{\equiv} \frac{1}{2} (\underline{A}_T - \overline{A}_T) = \underline{C}_T \text{ and } \overline{C}_T \text{ are commonly referred to as } \overline{C}_T = \underline{C}_T =$

 ${\sf A}_{Tviol} \equiv \frac{1}{2}({\sf A}_T - \overline{{\sf A}}_T)$. ${\sf C}_T$ and $\overline{{\sf C}}_T$ are commonly referred to as T-odd moments, because they are odd under T reversal. However, the T-conjugate process ${\sf K}_S^0 \, {\sf K}^\pm \, {\pi}^+ \, {\pi}^- \to \, D_S^\pm$ is not accessible, while the P-conjugate process is.

VALUE (units 10^{-3})EVTSDOCUMENT IDTECNCOMMENT $-13.6 \pm 7.7 \pm 3.4$ 29.8 ± 0.3 kLEES11E BABR $e^+e^- \approx \Upsilon(4S)$

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

 $-36~\pm67~\pm23$ 508 \pm 34 LINK 05E FOCS γ A, $\overline{E}_{\gamma} \approx 180$ GeV

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

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

<u>VALUE</u>	<u>EVTS</u>	DOCUMENT ID	TECN	COMMENT
0.84 ±0.11 OUR AV	ERAGE Error	includes scale fa	ctor of 2.4.	
$0.816 \pm 0.036 \pm 0.030$	$25\pm0.5\text{k}$	$^{ m 1}$ AUBERT	08AN BABR	$\phi e^+ \nu_e$
$0.713 \pm 0.202 \pm 0.284$	793	LINK	04C FOCS	$\phi \mu^+ \nu_{\mu}$
$1.57 \ \pm 0.25 \ \pm 0.19$	271	AITALA	99D E791	$\phi e^+ \nu_e^-, \phi \mu^+ \nu_\mu$
$1.4\pm0.5\pm0.3$	308	AVERY	94 B CLE2	$\phi e^+ \nu_e$
$1.1\pm0.8\pm0.1$	90	FRABETTI	94F E687	$\phi \mu^+ \nu_{\mu}$
$2.1 \begin{array}{c} +0.6 \\ -0.5 \end{array} \pm 0.2$	19	KODAMA	93 E653	$\phi \mu^+ \nu_{\mu}$

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$r_{\rm V} \equiv V(0)/A_1(0) \ {\rm in} \ D_{\rm s}^+ ightarrow \ \phi \ell^+ u_{\ell}$

VALUE	<u>EVTS</u>	DOCUMENT ID	TECN	COMMENT
1.80 ±0.08 OUR	AVERAGE			
$1.807 \pm 0.046 \pm 0.06$	$55 25 \pm 0.5 k$	$^{ m 1}$ AUBERT	08AN BABR	$\phi e^+ \nu_e$
$1.549 \pm 0.250 \pm 0.14$	18 793	LINK	04C FOCS	$\phi \mu^+ \nu_{\mu}$
$2.27 \pm 0.35 \pm 0.22$	2 271	AITALA	99D E791	$\phi e^+ \nu_e^-, \phi \mu^+ \nu_\mu^-$
$0.9 \pm 0.6 \pm 0.3$	308	AVERY	94B CLE2	$\phi e^+ \nu_e$
$1.8\pm0.9\pm0.2$	90	FRABETTI	94F E687	$\phi \mu^+ \nu_{\mu}$
$2.3 \begin{array}{cc} +1.1 \\ -0.9 \end{array} \pm 0.4$	19	KODAMA	93 E653	$\phi \mu^+ \nu_{\mu}$

 $^{^1}$ To compare with previous measurements, this AUBERT 08AN value is from a fit that fixes the pole masses at $m_A=2.5~{\rm GeV/c^2}$ and $m_V=2.1~{\rm GeV/c^2}$. A simultaneous fit to r_2 , $r_{\rm V}$, r_0 (a significant s-wave contribution) and m_A , gives $r_{\rm V}=1.849\pm0.060\pm0.095$.

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

•				
<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT
AGE				
308	AVERY	94 B	CLE2	$\phi\mathrm{e}^+ u_e$
90	$^{ m 1}$ FRABETTI	94F	E687	$\phi \mu^+ \nu_{\mu}$
19	$^{ m 1}$ KODAMA	93	E653	$\phi \mu^+ \nu_{\mu}$
	AGE 308 90	AGE 308 AVERY 90 ¹ FRABETTI	AGE 308 AVERY 94B 90 ¹ FRABETTI 94F	AGE 308 AVERY 94B CLE2 90 ¹ FRABETTI 94F E687

 $^{^1 \, {\}sf FRABETTI}$ 94F and KODAMA 93 evaluate Γ_L/Γ_T for a lepton mass of zero.

D_s^{\pm} REFERENCES

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 $^{^1}$ To compare with previous measurements, this AUBERT 08AN value is from a fit that fixes the pole masses at $m_A=2.5~{\rm GeV/c^2}$ and $m_V=2.1~{\rm GeV/c^2}$. A simultaneous fit to r_2 , $r_{\rm V}$, r_0 (a significant s-wave contribution) and m_A , gives $r_2=0.763\pm0.071\pm0.065$.

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