Γ_{25}	$K^+\overline{K}^0\pi^+\pi^-$	$<$ 2.7	%	CL=90%
Γ_{26}	$K^0K^-\pi^+\pi^+$	(4.2 ± 1.1)	%	
Γ_{27}	$K^*(892)^+\overline{K}^*(892)^0$	(5.6 ± 2.1)	%	
Γ_{28}	$K^0K^-\pi^+\pi^+$ non-$K^{*+}\overline{K}^{*0}$	$<$ 2.8	%	CL=90%
Γ_{29}	$K^+K^-\pi^+\pi^+\pi^-$			
Γ_{30}	$\phi\pi^+\pi^+\pi^-$	(1.8 ± 0.5)	%	
Γ_{31}	$K^+K^-\pi^+\pi^+\pi^-$ non-ϕ	$(3.0\ ^{+\ 3.0}_{-\ 2.0})\times10^{-3}$		

Other hadronic modes

Γ_{32}	$\pi^+\pi^+\pi^-$	(1.35± 0.31)	%	
Γ_{33}	$\rho^0\pi^+$	$<$ 2.8	$\times10^{-3}$	CL=90%
Γ_{34}	$f_0(980)\pi^+$	(10 ± 4)	$\times10^{-3}$	
Γ_{35}	$\pi^+\pi^+\pi^-$ nonresonant	(1.01± 0.35)	%	
Γ_{36}	$\pi^+\pi^+\pi^-\pi^0$	$<$ 12	%	CL=90%
Γ_{37}	$\eta\pi^+$	(1.9 ± 0.4)	%	
Γ_{38}	$\omega\pi^+$	$<$ 1.7	%	CL=90%
Γ_{39}	$\pi^+\pi^+\pi^+\pi^-\pi^-$	$(3.0\ ^{+\ 4.0}_{-\ 3.0})\times10^{-3}$		
Γ_{40}	$\pi^+\pi^+\pi^-\pi^0\pi^0$			
Γ_{41}	$\eta\rho^+$	(10.0 ± 2.2)	%	
Γ_{42}	$\eta\pi^+\pi^0$ 3-body	$<$ 2.9	%	CL=90%
Γ_{43}	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0$	(4.9 ± 3.2)	%	
Γ_{44}	$\eta'(958)\pi^+$	(4.7 ± 1.4)	%	
Γ_{45}	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$			
Γ_{46}	$\eta'(958)\rho^+$	(12.0 ± 3.0)	%	
Γ_{47}	$\eta'(958)\pi^+\pi^0$ 3-body	$<$ 3.0	%	CL=90%
Γ_{48}	$K^0\pi^+$	$<$ 7	$\times10^{-3}$	CL=90%
Γ_{49}	$K^+\pi^+\pi^-$	$(3.0\ ^{+\ 4.0}_{-\ 3.0})\times10^{-3}$		
Γ_{50}	$K^+K^-K^+$			
Γ_{51}	ϕK^+	$<$ 2.5	$\times10^{-3}$	CL=90%
Γ_{52}	A dummy mode used by the fit.	(91.7 ± 1.1)	%	

[a] For now, we average together measurements of the $\phi e^+\nu_e$ and $\phi\mu^+\nu_\mu$ branching fractions.

CONSTRAINED FIT INFORMATION

An overall fit to 5 branching ratios uses 16 measurements and one constraint to determine 5 parameters. The overall fit has a χ^2 = 9.4 for 12 degrees of freedom.

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

x_{15}	12			
x_{16}	9	73		
x_{17}	4	32	23	
x_{52}	−32	−87	−87	−55
	x_6	x_{15}	x_{16}	x_{17}

D_s^+ BRANCHING RATIOS

A few older, now obsolete results have been omitted. They may be found in our 1990 edition (Phys. Lett. **B239**).

Inclusive modes

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

VALUE	DOCUMENT ID		TECN	COMMENT
$0.13^{+0.14}_{-0.12}\pm0.02$	COFFMAN	91	MRK3	e^+e^- 4.14 GeV

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

VALUE	DOCUMENT ID		TECN	COMMENT
$0.39^{+0.28}_{-0.27}\pm0.04$	COFFMAN	91	MRK3	e^+e^- 4.14 GeV

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

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.64±0.17±0.03	[4] COFFMAN	91	MRK3	e^+e^- 4.14 GeV

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

$\Gamma(e^+\text{anything})/\Gamma_{\rm total}$ Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	[5] BAI	90	MRK3	e^+e^- 4.14 GeV

[5] Expressed as a value, the BAI 90 result is $\Gamma(e^+\text{anything})/\Gamma_{\rm total} = 0.05\pm0.05\pm0.02$.

Leptonic and semileptonic modes

$\Gamma(\mu^+\nu_\mu)/\Gamma_{\rm total}$ Γ_6/Γ

See the "Note on Pseudoscalar-Meson Decay Constants" in the Listings for the $\pi^\pm$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0059±0.0022 OUR FIT		Error includes scale factor of 1.1.			
$\mathbf{0.004\ ^{+0.0018+0.0020}_{-0.0014-0.0019}}$	8	[6] AOKI	93	WA75	π^- emulsion 350 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.03	0	[7] AUBERT	83	SPEC	μ^+ Fe, 250 GeV

[6] AOKI 93 assumes the ratio of production cross sections of the D_s^+ and D^0 is 0.27. The value of $\Gamma(\mu^+\nu_\mu)/\Gamma_{\rm total}$ here gives a pseudoscalar decay constant $f_{D_s} = (232\pm45\pm52)$ MeV.

[7] AUBERT 83 assume that the $D_s^\pm$ production rate is 20% of total charm production rate.

$\Gamma(\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ Γ_6/Γ_{15}

See the "Note on Pseudoscalar-Meson Decay Constants" in the Listings for the $\pi^\pm$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.17 ±0.06 OUR FIT		Error includes scale factor of 1.1.			
0.245±0.052±0.074	39	[8] ACOSTA	94	CLEO	$e^+e^-\approx\Upsilon(4S)$

[8] ACOSTA 94 obtains $f_{D_s} = (344\pm37\pm52\pm42)$ MeV from this measurement, using $\Gamma(D_s^+\to\phi\pi^+)/\Gamma(\text{total}) = 0.037\pm0.009$.

$\Gamma(\phi\ell^+\nu_\ell)/\Gamma(\phi\pi^+)$ Γ_7/Γ_{15}

For now, we average together measurements of the $\Gamma(\phi e^+\nu_e)/\Gamma(\phi\pi^+)$ and $\Gamma(\phi\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ ratios.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.54±0.05 OUR AVERAGE						
0.54±0.05±0.04		367	[9] BUTLER	94	CLEO	$e^+e^-\approx\Upsilon(4S)$
0.58±0.17±0.07		97	[10] FRABETTI	93G	E687	γ Be $\overline{E}_\gamma$= 220 GeV
0.57±0.15±0.15		104	[11] ALBRECHT	91	ARG	$e^+e^-\approx$ 10.4 GeV
$0.49\pm0.10^{+0.10}_{-0.14}$		54	[12] ALEXANDER	90B	CLEO	e^+e^- 10.5–11 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
seen		19	[13] KODAMA	93	E653	π^- emulsion 600 GeV
<0.45	90		[11] ANJOS	90B	E691	γ Be, $\overline{E}_\gamma\approx$ 145 GeV

[9] BUTLER 94 uses both $\phi e^+\nu_e$ and $\phi\mu^+\nu_\mu$ events, and makes a phase-space adjustment to the latter to use them as $\phi e^+\nu_e$ events.

[10] FRABETTI 93G measures the $\Gamma(\phi\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ ratio.

[11] ALBRECHT 91 and ANJOS 90B measure the $\Gamma(\phi e^+\nu_e)/\Gamma(\phi\pi^+)$ ratio.

[12] ALEXANDER 90B measures an average of the $\Gamma(\phi e^+\nu_e)/\Gamma(\phi\pi^+)$ and $\Gamma(\phi\mu^+\nu_\mu)/\Gamma(\phi\pi^+)$ ratios.

[13] KODAMA 93 measures form-factor ratios and the ratio of longitudinal to transverse partial widths.

$[\Gamma(\eta\mu^+\nu_\mu)+\Gamma(\eta'(958)\mu^+\nu_\mu)]/\Gamma(\phi\mu^+\nu_\mu)$ $(\Gamma_{11}+\Gamma_{12})/\Gamma_9$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
3.9±1.6	13	KODAMA	93	E653	π^- emulsion 600 GeV

$\Gamma(\eta'(958)\mu^+\nu_\mu)/\Gamma(\phi\mu^+\nu_\mu)$ Γ_{12}/Γ_9

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	KODAMA	93B	E653	π^- emulsion 600 GeV

Hadronic modes with two K's

$\Gamma(K^+\overline{K}^0)/\Gamma(\phi\pi^+)$ Γ_{13}/Γ_{15}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.01±0.16 OUR AVERAGE					
1.15±0.31±0.19	68	ANJOS	90C	E691	γ Be
0.92±0.32±0.20		ADLER	89B	MRK3	e^+e^- 4.14 GeV
0.99±0.17±0.10		CHEN	89	CLEO	e^+e^- 10 GeV

$\Gamma(K^+K^-\pi^+)/\Gamma_{\rm total}$ $\Gamma_{14}/\Gamma = (\frac{1}{2}\Gamma_{15}+\frac{2}{3}\Gamma_{16}+\Gamma_{17})/\Gamma$

VALUE	DOCUMENT ID
0.048±0.007 OUR FIT	