CHARMED, STRANGE MESONS
($C = S = \pm1$)

$D_s^+ = c\overline{s}$, $D_s^- = \overline{c}s$, similarly for D_s^*'s

$D_s^{\pm}$
was $F^{\pm}$

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

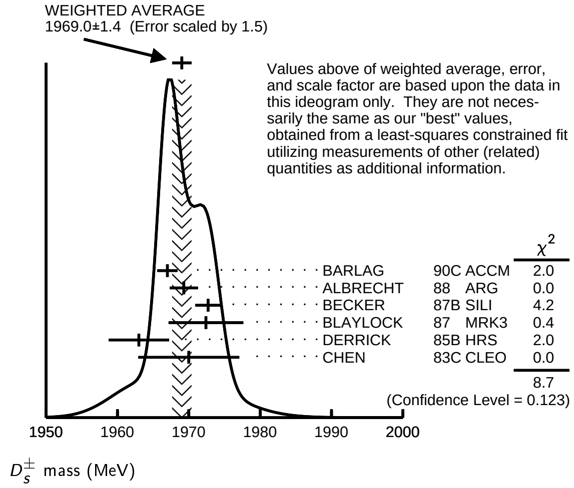
The angular distributions of the decays of the ϕ and $\overline{K}^*(892)^0$ in the $\phi\pi^+$ and $K^+\overline{K}^*(892)^0$ modes strongly indicate that the spin is zero. The parity given is that expected of a $c\overline{s}$ ground state.

$D_s^{\pm}$ MASS

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements. Measurements of the $D_s^{\pm}$ mass with an error greater than 10 MeV are omitted from the fit and average. A number of early measurements giving $m > 2000$ MeV have been omitted altogether. They may be found in our 1990 edition (Phys. Lett. **B239**).

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1968.5± 0.7 OUR FIT Error includes scale factor of 1.2.					
1969.0± 1.4 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.					
1967.0± 1.0± 1.0	54	BARLAG	90C	ACCM	π^- Cu 230 GeV
1969.3± 1.4± 1.4		ALBRECHT	88	ARG	e^+e^- 9.4–10.6 GeV
1972.7± 1.5± 1.0	21	BECKER	87B	SILI	200 GeV π,K,p
1972.4± 3.7± 3.7	27	BLAYLOCK	87	MRK3	e^+e^- 4.14 GeV
1963 ± 3 ± 3	30	DERRICK	85B	HRS	e^+e^- 29 GeV
1970 ± 5 ± 5	104	CHEN	83C	CLEO	e^+e^- 10.5 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1968.3± 0.7± 0.7	290	[1] ANJOS	88	E691	Photoproduction
1980 ±15	6	USHIDA	86	EMUL	ν wideband
1973.6± 2.6± 3.0	163	ALBRECHT	85D	ARG	e^+e^- 10 GeV
1948 ±28 ±10	65	AIHARA	84D	TPC	e^+e^- 29 GeV
1975 ± 9 ±10	49	ALTHOFF	84	TASS	e^+e^- 14–25 GeV
1975 ± 4	3	BAILEY	84	ACCM	hadron$^+$ Be $\rightarrow \phi\pi^+$X

[1] ANJOS 88 enters the fit via $m_{D_s^{\pm}} - m_{D^{\pm}}$ (see below).



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

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
99.1±0.6 OUR FIT Error includes scale factor of 1.1.					
98.9±0.7 OUR AVERAGE					
98.5±1.5	555	CHEN	89	CLEO	e^+e^- 10.5 GeV
99.0±0.8	290	ANJOS	88	E691	Photoproduction

$D_s^{\pm}$ MEAN LIFE

Measurements with an error greater than 0.2×10^{-12} s are omitted from the average.

VALUE (10^{-12} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.467±0.017 OUR AVERAGE					
0.475±0.020±0.007	900	FRABETTI	93F	E687	γBe, $D_s^+ \rightarrow \phi\pi^+$
$0.33\ ^{+0.12}_{-0.08}$ ±0.03	15	ALVAREZ	90	NA14	γ, $D_s^+ \rightarrow \phi\pi^+$
$0.469\ ^{+0.102}_{-0.086}$	54	[2] BARLAG	90C	ACCM	π^- Cu 230 GeV
0.50 ±0.06 ±0.03	104	FRABETTI	90	E687	γBe, $\phi\pi^+$
$0.56\ ^{+0.13}_{-0.12}$ ±0.08	144	ALBRECHT	88I	ARG	e^+e^- 10 GeV
0.47 ±0.04 ±0.02	228	RAAB	88	E691	Photoproduction
$0.33\ ^{+0.10}_{-0.06}$	21	[3] BECKER	87B	SILI	200 GeV π,K,p
$0.26\ ^{+0.16}_{-0.09}$	6	USHIDA	86	EMUL	ν wideband
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.31\ ^{+0.24}_{-0.20}$ ±0.05	18	AVERILL	89	HRS	e^+e^- 29 GeV
$0.48\ ^{+0.06}_{-0.05}$ ±0.02	99	ANJOS	87B	E691	See RAAB 88
$0.57\ ^{+0.36}_{-0.26}$ ±0.09	9	BRAUNSCH...	87	TASS	e^+e^- 35–44 GeV
0.47 ±0.22 ±0.05	141	CSORNA	87	CLEO	e^+e^- 10 GeV
$0.35\ ^{+0.24}_{-0.18}$ ±0.09	17	JUNG	86	HRS	See AVERILL 89
$0.32\ ^{+0.30}_{-0.13}$	3	BAILEY	84	ACCM	hadron$^+$ Be $\rightarrow \phi\pi^+$X
$0.19\ ^{+0.13}_{-0.07}$	4	USHIDA	83	EMUL	See USHIDA 86

[2] BARLAG 90C estimates the systematic error to be negligible.
[3] BECKER 87B estimates the systematic error to be negligible.

D_s^+ DECAY MODES

Branching fractions for modes below 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.

Nearly all other modes are measured relative to the $\phi\pi^+$ mode. However, none of the determinations of the $\phi\pi^+$ branching fraction are direct measurements: all rely on calculated relations between D^+ and D_s^+ decay widths, on estimates of D_s^+ cross sections, or on other model-dependent assumptions. Thus a better determination of the $\phi\pi^+$ branching fraction could cause the other branching fractions to slide up or down, all together.

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Inclusive modes		
Γ_1	K^- anything	$(13\ ^{+14}_{-12})$ %	
Γ_2	$\overline{K}^0$ anything + K^0 anything	(39 ±28) %	
Γ_3	K^+ anything	$(20\ ^{+18}_{-14})$ %	
Γ_4	non-$K\overline{K}$ anything	(64 ±17) %	
Γ_5	e^+ anything	< 20 %	CL=90%
	Leptonic and semileptonic modes		
Γ_6	$\mu^+\nu_\mu$	(5.9 ± 2.2) $\times 10^{-3}$	S=1.1
Γ_7	$\phi\ell^+\nu_\ell$	[a] (1.88± 0.29) %	
Γ_8	$\phi e^+\nu_e$		
Γ_9	$\phi\mu^+\nu_\mu$		
Γ_{10}	$\eta\mu^+\nu_\mu$ + $\eta'(958)\mu^+\nu_\mu$	(7.4 ± 3.2) %	
Γ_{11}	$\eta\mu^+\nu_\mu$		
Γ_{12}	$\eta'(958)\mu^+\nu_\mu$	< 3.0 %	CL=90%
	Hadronic modes with two K's (including from ϕ's)		
Γ_{13}	$K^+\overline{K}^0$	(3.5 ± 0.7) %	
Γ_{14}	$K^+K^-\pi^+$	(4.8 ± 0.7) %	
	In the fit as $\frac{1}{2}\Gamma_{15} + \frac{2}{3}\Gamma_{16} + \Gamma_{17}$.		
Γ_{15}	$\phi\pi^+$	(3.5 ± 0.4) %	
Γ_{16}	$K^+\overline{K}^*(892)^0$	(3.3 ± 0.5) %	
Γ_{17}	$K^+K^-\pi^+$ nonresonant	(8.7 ± 3.2) $\times 10^{-3}$	
Γ_{18}	$K^0\overline{K}^0\pi^+$		
Γ_{19}	$K^*(892)^+\overline{K}^0$	(4.2 ± 1.0) %	
Γ_{20}	$K^+K^-\pi^+\pi^0$		
Γ_{21}	$\phi\pi^+\pi^0$	(8 ± 4) %	
Γ_{22}	$\phi\rho^+$	$(6.5\ ^{+1.6}_{-1.8})$ %	
Γ_{23}	$\phi\pi^+\pi^0$ 3-body	< 2.5 %	CL=90%
Γ_{24}	$K^+K^-\pi^+\pi^0$ non-ϕ	< 8 %	CL=90%