$D^{\pm}$

$I(J^P) = \frac{1}{2}(0^-)$

$D^{\pm}$ MASS

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1869.3± 0.5 OUR FIT	Error includes scale factor of 1.1.				
1869.4± 0.5 OUR AVERAGE					
1870.0± 0.5±1.0	317	BARLAG	90C	ACCM	π^- Cu 230 GeV
1863 ± 4		DERRICK	84	HRS	e^+e^- 29 GeV
1869.4± 0.6		[1] TRILLING	81	RVUE	e^+e^- 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1875 ±10	9	ADAMOVICH	87	EMUL	Photoproduction
1860 ±16	6	ADAMOVICH	84	EMUL	Photoproduction
1868.4± 0.5		[1] SCHINDLER	81	MRK2	e^+e^- 3.77 GeV
1874 ± 5		GOLDHABER	77	MRK1	D^0, D^+ recoil spectra
1868.3± 0.9		[1] PERUZZI	77	MRK1	e^+e^- 3.77 GeV
1874 ±11		PICCOLO	77	MRK1	e^+e^- 4.03, 4.41 GeV
1876 ±15	50	PERUZZI	76	MRK1	$K^{\mp}\pi^{\pm}\pi^{\pm}$

[1] PERUZZI 77 and SCHINDLER 81 errors do not include the 0.13% uncertainty in the absolute SPEAR energy calibration. TRILLING 81 uses the high precision $J/\psi(1S)$ and $\psi(2S)$ measurements of ZHOLENTZ 80 to determine this uncertainty and combines the PERUZZI 77 and SCHINDLER 81 results to obtain the value quoted.

$D^{\pm}$ MEAN LIFE

Measurements with an error $> 0.1\times10^{-12}$ s are omitted from the average, and those with an error $> 0.2\times10^{-12}$ s have been omitted from the Listings.

VALUE (10^{-12} s)	EVTS	DOCUMENT ID		TECN	COMMENT
1.051 ±0.013 OUR AVERAGE					
$1.0336\pm0.0221^{+0.0099}_{-0.0127}$	3777	BONVICINI	99	CLE2	$e^+e^- \approx \Upsilon(4S)$
1.048 ±0.015 ±0.011	9k	FRABETTI	94D	E687	$D^+ \to K^-\pi^+\pi^+$
1.075 ±0.040 ±0.018	2455	FRABETTI	91	E687	γ Be, $D^+ \to K^-\pi^+\pi^+$
1.03 ±0.08 ±0.06	200	ALVAREZ	90	NA14	γ, $D^+ \to K^-\pi^+\pi^+$
$1.05^{+0.077}_{-0.072}$	317	[2] BARLAG	90C	ACCM	π^- Cu 230 GeV
1.05 ±0.08 ±0.07	363	ALBRECHT	88I	ARG	e^+e^- 10 GeV
1.090 ±0.030 ±0.025	2992	RAAB	88	E691	Photoproduction

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

1.12	$^{+0.14}_{-0.11}$		149	AGUILAR-...	87D	HYBR	$\pi^- p$ and pp
1.09	$^{+0.19}_{-0.15}$		59	BARLAG	87B	ACCM	K^- and π^- 200 GeV
1.14	± 0.16	± 0.07	247	CSORNA	87	CLEO	e^+e^- 10 GeV
1.09	± 0.14		74	[3] PALKA	87B	SILI	π Be 200 GeV
0.86	± 0.13	$^{+0.07}_{-0.03}$	48	ABE	86	HYBR	γp 20 GeV

[2] BARLAG 90C estimates the systematic error to be negligible.
[3] PALKA 87B observes this in $D^+ \to \overline{K}^*(892) e \nu$.

D^+ DECAY MODES

D^- modes are charge conjugates of the modes below.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Inclusive modes			
Γ_1	e^+ anything		(17.2 ± 1.9) %	
Γ_2	K^- anything		(24.2 ± 2.8) %	S=1.4
Γ_3	$\overline{K}^0$ anything + K^0 anything		(59 ± 7) %	
Γ_4	K^+ anything		(5.8 ± 1.4) %	
Γ_5	η anything	[a]	< 13 %	CL=90%
Γ_6	ϕ anything		< 1.8 %	CL=90%
Γ_7	ϕe^+ anything		< 1.6 %	CL=90%
Γ_8	μ^+ anything			
	Leptonic and semileptonic modes			
Γ_9	$\mu^+ \nu_\mu$		$(8 ^{+17}_{-5}) \times 10^{-4}$	
Γ_{10}	$\overline{K}^0 \ell^+ \nu_\ell$	[b]	(6.8 ± 0.8) %	
Γ_{11}	$\overline{K}^0 e^+ \nu_e$		(6.7 ± 0.9) %	
Γ_{12}	$\overline{K}^0 \mu^+ \nu_\mu$		$(7.0 ^{+3.0}_{-2.0})$ %	
Γ_{13}	$K^- \pi^+ e^+ \nu_e$		$(4.1 ^{+0.9}_{-0.7})$ %	
Γ_{14}	$\overline{K}^*(892)^0 e^+ \nu_e \times B(\overline{K}^{*0} \to K^- \pi^+)$		(3.2 ± 0.33) %	
Γ_{15}	$K^- \pi^+ e^+ \nu_e$ nonresonant		$< 7 \times 10^{-3}$	CL=90%
Γ_{16}	$K^- \pi^+ \mu^+ \nu_\mu$		(3.2 ± 0.4) %	S=1.1
	In the fit as $\frac{2}{3}\Gamma_{28} + \Gamma_{18}$, where $\frac{2}{3}\Gamma_{28} = \Gamma_{17}$.			
Γ_{17}	$\overline{K}^*(892)^0 \mu^+ \nu_\mu \times B(\overline{K}^{*0} \to K^- \pi^+)$		(2.9 ± 0.4) %	

Γ_{18}	$K^- \pi^+ \mu^+ \nu_\mu$ nonresonant		$(2.7 \pm 1.1) \times 10^{-3}$	
Γ_{19}	$\overline{K}^0 \pi^+ \pi^- e^+ \nu_e$			
Γ_{20}	$K^- \pi^+ \pi^0 e^+ \nu_e$			
Γ_{21}	$(\overline{K}^*(892)\pi)^0 e^+ \nu_e$		< 1.2 %	CL=90%
Γ_{22}	$(\overline{K}\pi\pi)^0 e^+ \nu_e$ non-$\overline{K}^*(892)$		$< 9 \times 10^{-3}$	CL=90%
Γ_{23}	$K^- \pi^+ \pi^0 \mu^+ \nu_\mu$		$< 1.4 \times 10^{-3}$	CL=90%
Γ_{24}	$\pi^0 \ell^+ \nu_\ell$	[c]	$(3.1 \pm 1.5) \times 10^{-3}$	
Γ_{25}	$\pi^+ \pi^- e^+ \nu_e$			

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

Γ_{26}	$\overline{K}^*(892)^0 \ell^+ \nu_\ell$	[b]	(4.7 ± 0.4) %	
Γ_{27}	$\overline{K}^*(892)^0 e^+ \nu_e$		(4.8 ± 0.5) %	
Γ_{28}	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$		(4.4 ± 0.6) %	S=1.1
Γ_{29}	$\overline{K}_1(1270)^0 \mu^+ \nu_\mu$		< 3.5 %	CL=95%
Γ_{30}	$\overline{K}^*(1410)^0 \mu^+ \nu_\mu$		< 2.7 %	CL=95%
Γ_{31}	$\overline{K}_2^*(1430)^0 \mu^+ \nu_\mu$		$< 8 \times 10^{-3}$	CL=95%
Γ_{32}	$\rho^0 e^+ \nu_e$		$(2.2 \pm 0.8) \times 10^{-3}$	
Γ_{33}	$\rho^0 \mu^+ \nu_\mu$		$(2.7 \pm 0.7) \times 10^{-3}$	
Γ_{34}	$\phi e^+ \nu_e$		< 2.09 %	CL=90%
Γ_{35}	$\phi \mu^+ \nu_\mu$		< 3.72 %	CL=90%
Γ_{36}	$\eta \ell^+ \nu_\ell$		$< 5 \times 10^{-3}$	CL=90%
Γ_{37}	$\eta'(958) \mu^+ \nu_\mu$		$< 9 \times 10^{-3}$	CL=90%

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

Γ_{38}	$\overline{K}^0 \pi^+$		(2.89 ± 0.26) %	S=1.1
Γ_{39}	$K^- \pi^+ \pi^+$	[d]	(9.0 ± 0.6) %	
Γ_{40}	$\overline{K}^*(892)^0 \pi^+ \times B(\overline{K}^{*0} \to K^- \pi^+)$		(1.27 ± 0.13) %	
Γ_{41}	$\overline{K}_0^*(1430)^0 \pi^+ \times B(\overline{K}_0^*(1430)^0 \to K^- \pi^+)$		(2.3 ± 0.3) %	
Γ_{42}	$\overline{K}^*(1680)^0 \pi^+ \times B(\overline{K}^*(1680)^0 \to K^- \pi^+)$		$(3.7 \pm 0.8) \times 10^{-3}$	
Γ_{43}	$K^- \pi^+ \pi^+$ nonresonant		(8.5 ± 0.8) %	
Γ_{44}	$\overline{K}^0 \pi^+ \pi^0$	[d]	(9.7 ± 3.0) %	S=1.1
Γ_{45}	$\overline{K}^0 \rho^+$		(6.6 ± 2.5) %	
Γ_{46}	$\overline{K}^*(892)^0 \pi^+ \times B(\overline{K}^{*0} \to \overline{K}^0 \pi^0)$		$(6.3 \pm 0.4) \times 10^{-3}$	
Γ_{47}	$\overline{K}^0 \pi^+ \pi^0$ nonresonant		(1.3 ± 1.1) %	
Γ_{48}	$K^- \pi^+ \pi^+ \pi^0$	[d]	(6.4 ± 1.1) %	
Γ_{49}	$\overline{K}^*(892)^0 \rho^+$ total $\times B(\overline{K}^{*0} \to K^- \pi^+)$		(1.4 ± 0.9) %	
Γ_{50}	$\overline{K}_1(1400)^0 \pi^+ \times B(\overline{K}_1(1400)^0 \to K^- \pi^+ \pi^0)$		(2.2 ± 0.6) %	

Γ_{51}	$K^- \rho^+ \pi^+$ total		(3.1 ± 1.1) %	
Γ_{52}	$K^- \rho^+ \pi^+$ 3-body		(1.1 ± 0.4) %	
Γ_{53}	$\overline{K}^*(892)^0 \pi^+ \pi^0$ total $\times$ B($\overline{K}^{*0} \rightarrow K^- \pi^+$)		(4.5 ± 0.9) %	
Γ_{54}	$\overline{K}^*(892)^0 \pi^+ \pi^0$ 3-body $\times$ B($\overline{K}^{*0} \rightarrow K^- \pi^+$)		(2.8 ± 0.9) %	
Γ_{55}	$K^*(892)^- \pi^+ \pi^+$ 3-body $\times$ B($K^{*-} \rightarrow K^- \pi^0$)		$(7 \pm 3) \times 10^{-3}$	
Γ_{56}	$K^- \pi^+ \pi^+ \pi^0$ nonresonant	[e]	(1.2 ± 0.6) %	
Γ_{57}	$\overline{K}^0 \pi^+ \pi^+ \pi^-$	[d]	(7.0 ± 0.9) %	
Γ_{58}	$\overline{K}^0 a_1(1260)^+$ $\times$ B($a_1(1260)^+ \rightarrow \pi^+ \pi^+ \pi^-$)		(4.0 ± 0.9) %	
Γ_{59}	$\overline{K}_1(1400)^0 \pi^+$ $\times$ B($\overline{K}_1(1400)^0 \rightarrow \overline{K}^0 \pi^+ \pi^-$)		(2.2 ± 0.6) %	
Γ_{60}	$K^*(892)^- \pi^+ \pi^+$ 3-body $\times$ B($K^{*-} \rightarrow \overline{K}^0 \pi^-$)		(1.4 ± 0.6) %	
Γ_{61}	$\overline{K}^0 \rho^0 \pi^+$ total		(4.2 ± 0.9) %	
Γ_{62}	$\overline{K}^0 \rho^0 \pi^+$ 3-body		$(5 \pm 5) \times 10^{-3}$	
Γ_{63}	$\overline{K}^0 \pi^+ \pi^+ \pi^-$ nonresonant		$(8 \pm 4) \times 10^{-3}$	
Γ_{64}	$K^- \pi^+ \pi^+ \pi^+ \pi^-$	[d]	$(7.2 \pm 1.0) \times 10^{-3}$	
Γ_{65}	$\overline{K}^*(892)^0 \pi^+ \pi^+ \pi^-$ $\times$ B($\overline{K}^{*0} \rightarrow K^- \pi^+$)		$(5.4 \pm 2.3) \times 10^{-3}$	
Γ_{66}	$\overline{K}^*(892)^0 \rho^0 \pi^+$ $\times$ B($\overline{K}^{*0} \rightarrow K^- \pi^+$)		$(1.9 {}^{+1.1}_{-1.0}) \times 10^{-3}$	
Γ_{67}	$\overline{K}^*(892)^0 \pi^+ \pi^+ \pi^-$ no-ρ $\times$ B($\overline{K}^{*0} \rightarrow K^- \pi^+$)		$(2.9 \pm 1.1) \times 10^{-3}$	
Γ_{68}	$K^- \rho^0 \pi^+ \pi^+$		$(3.1 \pm 0.9) \times 10^{-3}$	
Γ_{69}	$K^- \pi^+ \pi^+ \pi^+ \pi^-$ nonresonant		$< 2.3 \times 10^{-3}$	CL=90%
Γ_{70}	$K^- \pi^+ \pi^+ \pi^0 \pi^0$		$(2.2 {}^{+5.0}_{-0.9})$ %	
Γ_{71}	$\overline{K}^0 \pi^+ \pi^+ \pi^- \pi^0$		$(5.4 {}^{+3.0}_{-1.4})$ %	
Γ_{72}	$\overline{K}^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^-$		$(8 \pm 7) \times 10^{-4}$	
Γ_{73}	$K^- \pi^+ \pi^+ \pi^+ \pi^- \pi^0$		$(2.0 \pm 1.8) \times 10^{-3}$	
Γ_{74}	$\overline{K}^0 \overline{K}^0 K^+$		(1.8 ± 0.8) %	

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

Γ_{75}	$\overline{K}^0 \rho^+$		(6.6 ± 2.5) %	
Γ_{76}	$\overline{K}^0 a_1(1260)^+$		(8.0 ± 1.7) %	
Γ_{77}	$\overline{K}^0 a_2(1320)^+$		$< 3 \times 10^{-3}$	CL=90%
Γ_{78}	$\overline{K}^*(892)^0 \pi^+$		(1.90 ± 0.19) %	
Γ_{79}	$\overline{K}^*(892)^0 \rho^+$ total	[e]	(2.1 ± 1.3) %	
Γ_{80}	$\overline{K}^*(892)^0 \rho^+$ S-wave	[e]	(1.6 ± 1.6) %	
Γ_{81}	$\overline{K}^*(892)^0 \rho^+$ P-wave		$< 1 \times 10^{-3}$	CL=90%

Γ_{82}	$\overline{K}^*(892)^0 \rho^+$ D-wave		$(10 \pm 7) \times 10^{-3}$	
Γ_{83}	$\overline{K}^*(892)^0 \rho^+$ D-wave longitudinal		$< 7 \times 10^{-3}$	CL=90%
Γ_{84}	$\overline{K}_1(1270)^0 \pi^+$		$< 7 \times 10^{-3}$	CL=90%
Γ_{85}	$\overline{K}_1(1400)^0 \pi^+$		(4.9 ± 1.2) %	
Γ_{86}	$\overline{K}^*(1410)^0 \pi^+$		$< 7 \times 10^{-3}$	CL=90%
Γ_{87}	$\overline{K}_0^*(1430)^0 \pi^+$		(3.7 ± 0.4) %	
Γ_{88}	$\overline{K}^*(1680)^0 \pi^+$		(1.43 ± 0.30) %	
Γ_{89}	$\overline{K}^*(892)^0 \pi^+ \pi^0$ total		(6.7 ± 1.4) %	
Γ_{90}	$\overline{K}^*(892)^0 \pi^+ \pi^0$ 3-body	[e]	(4.2 ± 1.4) %	
Γ_{91}	$K^*(892)^- \pi^+ \pi^+$ total			
Γ_{92}	$K^*(892)^- \pi^+ \pi^+$ 3-body		(2.0 ± 0.9) %	
Γ_{93}	$K^- \rho^+ \pi^+$ total		(3.1 ± 1.1) %	
Γ_{94}	$K^- \rho^+ \pi^+$ 3-body		(1.1 ± 0.4) %	
Γ_{95}	$\overline{K}^0 \rho^0 \pi^+$ total		(4.2 ± 0.9) %	CL=90%
Γ_{96}	$\overline{K}^0 \rho^0 \pi^+$ 3-body		$(5 \pm 5) \times 10^{-3}$	
Γ_{97}	$\overline{K}^0 f_0(980) \pi^+$		$< 5 \times 10^{-3}$	CL=90%
Γ_{98}	$\overline{K}^*(892)^0 \pi^+ \pi^+ \pi^-$		$(8.1 \pm 3.4) \times 10^{-3}$	S=1.7
Γ_{99}	$\overline{K}^*(892)^0 \rho^0 \pi^+$		$(2.9 ^{+1.7}_{-1.5}) \times 10^{-3}$	S=1.8
Γ_{100}	$\overline{K}^*(892)^0 \pi^+ \pi^+ \pi^-$ no-ρ		$(4.3 \pm 1.7) \times 10^{-3}$	
Γ_{101}	$K^- \rho^0 \pi^+ \pi^+$		$(3.1 \pm 0.9) \times 10^{-3}$	

Pionic modes

Γ_{102}	$\pi^+ \pi^0$		$(2.5 \pm 0.7) \times 10^{-3}$	
Γ_{103}	$\pi^+ \pi^+ \pi^-$		$(3.1 \pm 0.4) \times 10^{-3}$	S=1.5
Γ_{104}	$\sigma \pi^+$		$(1.42 \pm 0.34) \times 10^{-3}$	
Γ_{105}	$\rho^0 \pi^+$		$(1.03 \pm 0.18) \times 10^{-3}$	
Γ_{106}	$f_0(980) \pi^+ \times$ B$(f_0 \to \pi^+ \pi^-)$	[f]	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{107}	$f_2(1270) \pi^+$		$(1.05 \pm 0.20) \times 10^{-3}$	
Γ_{108}	$f_0(1370) \pi^+$			
Γ_{109}	$\rho(1450)^0 \pi^+$			
Γ_{110}	$\pi^+ \pi^+ \pi^-$ nonresonant		$(2.4 \pm 2.0) \times 10^{-4}$	
Γ_{111}	$\pi^+ \pi^+ \pi^- \pi^0$		$(1.9 ^{+1.5}_{-1.2})$ %	
Γ_{112}	$\eta \pi^+ \times$ B$(\eta \to \pi^+ \pi^- \pi^0)$		$(6.9 \pm 1.4) \times 10^{-4}$	
Γ_{113}	$\omega \pi^+ \times$ B$(\omega \to \pi^+ \pi^- \pi^0)$		$< 6 \times 10^{-3}$	CL=90%
Γ_{114}	$\pi^+ \pi^+ \pi^+ \pi^- \pi^-$		$(2.1 \pm 0.4) \times 10^{-3}$	
Γ_{115}	$\pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^0$		$(2.9 ^{+2.9}_{-2.0}) \times 10^{-3}$	

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

Γ_{116}	$\eta\pi^+$		$(3.0 \pm 0.6) \times 10^{-3}$	
Γ_{117}	$\rho^0\pi^+$		$(1.05 \pm 0.31) \times 10^{-3}$	
Γ_{118}	$\omega\pi^+$		$< 7 \times 10^{-3}$	CL=90%
Γ_{119}	$\eta\rho^+$		$< 7 \times 10^{-3}$	CL=90%
Γ_{120}	$\eta'(958)\pi^+$		$(5.0 \pm 1.0) \times 10^{-3}$	
Γ_{121}	$\eta'(958)\rho^+$		$< 5 \times 10^{-3}$	CL=90%

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

Γ_{122}	$K^+\overline{K}^0$		$(7.4 \pm 1.0) \times 10^{-3}$	
Γ_{123}	$K^+K^-\pi^+$	[d]	$(8.7 \pm 0.7) \times 10^{-3}$	
Γ_{124}	$\phi\pi^+ \times \text{B}(\phi \to K^+K^-)$		$(3.0 \pm 0.3) \times 10^{-3}$	
Γ_{125}	$K^+\overline{K}^*(892)^0 \times \text{B}(\overline{K}^{*0} \to K^-\pi^+)$		$(2.8 \pm 0.4) \times 10^{-3}$	
Γ_{126}	$K^+K^-\pi^+$ nonresonant		$(4.5 \pm 0.9) \times 10^{-3}$	
Γ_{127}	$K^0\overline{K}^0\pi^+$		—	
Γ_{128}	$K^*(892)^+\overline{K}^0 \times \text{B}(K^{*+} \to K^0\pi^+)$		(2.1 ± 1.0) %	
Γ_{129}	$K^+K^-\pi^+\pi^0$		—	
Γ_{130}	$\phi\pi^+\pi^0 \times \text{B}(\phi \to K^+K^-)$		(1.1 ± 0.5) %	
Γ_{131}	$\phi\rho^+ \times \text{B}(\phi \to K^+K^-)$		$< 7 \times 10^{-3}$	CL=90%
Γ_{132}	$K^+K^-\pi^+\pi^0$ non-ϕ		$(1.5 {}^{+0.7}_{-0.6})$ %	
Γ_{133}	$K^+\overline{K}^0\pi^+\pi^-$		< 2 %	CL=90%
Γ_{134}	$K^0K^-\pi^+\pi^+$		(1.0 ± 0.6) %	
Γ_{135}	$K^*(892)^+\overline{K}^*(892)^0 \times \text{B}^2(K^{*+} \to K^0\pi^+)$		(1.2 ± 0.5) %	
Γ_{136}	$K^0K^-\pi^+\pi^+$ non-$K^{*+}\overline{K}^{*0}$		$< 7.9 \times 10^{-3}$	CL=90%
Γ_{137}	$K^+K^-\pi^+\pi^+\pi^-$		—	
Γ_{138}	$\phi\pi^+\pi^+\pi^- \times \text{B}(\phi \to K^+K^-)$		$< 1 \times 10^{-3}$	CL=90%
Γ_{139}	$K^+K^-\pi^+\pi^+\pi^-$ nonresonant		< 3 %	CL=90%

Fractions of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

Γ_{140}	$\phi\pi^+$	$(6.1 \pm 0.6) \times 10^{-3}$	
Γ_{141}	$\phi\pi^+\pi^0$	(2.3 ± 1.0) %	
Γ_{142}	$\phi\rho^+$	< 1.4 %	CL=90%
Γ_{143}	$\phi\pi^+\pi^+\pi^-$	$< 2 \times 10^{-3}$	CL=90%
Γ_{144}	$K^+\overline{K}^*(892)^0$	$(4.2 \pm 0.5) \times 10^{-3}$	
Γ_{145}	$K^*(892)^+\overline{K}^0$	(3.2 ± 1.5) %	
Γ_{146}	$K^*(892)^+\overline{K}^*(892)^0$	(2.6 ± 1.1) %	

Doubly Cabibbo suppressed (*DC*) modes, $\Delta C = 1$ weak neutral current (*C1*) modes, or Lepton Family number (*LF*) or Lepton number (*L*) violating modes

Γ_{147}	$K^+\pi^+\pi^-$	*DC*		$(6.8 \pm 1.5) \times 10^{-4}$	
Γ_{148}	$K^+\rho^0$	*DC*		$(2.5 \pm 1.2) \times 10^{-4}$	
Γ_{149}	$K^*(892)^0\pi^+$	*DC*		$(3.6 \pm 1.6) \times 10^{-4}$	
Γ_{150}	$K^+\pi^+\pi^-$ nonresonant	*DC*		$(2.4 \pm 1.2) \times 10^{-4}$	
Γ_{151}	$K^+K^+K^-$	*DC*		$< 1.4 \times 10^{-4}$	CL=90%
Γ_{152}	ϕK^+	*DC*		$< 1.3 \times 10^{-4}$	CL=90%
Γ_{153}	$\pi^+e^+e^-$	*C1*		$< 5.2 \times 10^{-5}$	CL=90%
Γ_{154}	$\pi^+\mu^+\mu^-$	*C1*		$< 1.5 \times 10^{-5}$	CL=90%
Γ_{155}	$\rho^+\mu^+\mu^-$	*C1*		$< 5.6 \times 10^{-4}$	CL=90%
Γ_{156}	$K^+e^+e^-$		[*g*]	$< 2.0 \times 10^{-4}$	CL=90%
Γ_{157}	$K^+\mu^+\mu^-$		[*g*]	$< 4.4 \times 10^{-5}$	CL=90%
Γ_{158}	$\pi^+e^\pm\mu^\mp$	*LF*	[*h*]	$< 3.4 \times 10^{-5}$	CL=90%
Γ_{159}	$\pi^+e^+\mu^-$				
Γ_{160}	$\pi^+e^-\mu^+$				
Γ_{161}	$K^+e^\pm\mu^\mp$	*LF*	[*h*]	$< 6.8 \times 10^{-5}$	CL=90%
Γ_{162}	$K^+e^+\mu^-$				
Γ_{163}	$K^+e^-\mu^+$				
Γ_{164}	$\pi^-e^+e^+$	*L*		$< 9.6 \times 10^{-5}$	CL=90%
Γ_{165}	$\pi^-\mu^+\mu^+$	*L*		$< 1.7 \times 10^{-5}$	CL=90%
Γ_{166}	$\pi^-e^+\mu^+$	*L*		$< 5.0 \times 10^{-5}$	CL=90%
Γ_{167}	$\rho^-\mu^+\mu^+$	*L*		$< 5.6 \times 10^{-4}$	CL=90%
Γ_{168}	$K^-e^+e^+$	*L*		$< 1.2 \times 10^{-4}$	CL=90%
Γ_{169}	$K^-\mu^+\mu^+$	*L*		$< 1.2 \times 10^{-4}$	CL=90%
Γ_{170}	$K^-e^+\mu^+$	*L*		$< 1.3 \times 10^{-4}$	CL=90%
Γ_{171}	$K^*(892)^-\mu^+\mu^+$	*L*		$< 8.5 \times 10^{-4}$	CL=90%

Γ_{172} A dummy mode used by the fit. (33 ± 5) %

[*a*] This is a weighted average of $D^\pm$ (44%) and D^0 (56%) branching fractions. See "D^+ and $D^0 \rightarrow$ (η anything) / (total D^+ and D^0)" under "D^+ Branching Ratios" in these Particle Listings.

[*b*] This value averages the e^+ and μ^+ branching fractions, after making a small phase-space adjustment to the μ^+ fraction to be able to use it as an e^+ fraction; hence our ℓ^+ here is really an e^+.

[*c*] An ℓ indicates an e or a μ mode, not a sum over these modes.

[*d*] 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.

[*e*] The two experiments measuring this fraction are in serious disagreement. See the Particle Listings.

[*f*] This value includes only $\pi^+\pi^-$ decays of the intermediate resonance, because branching fractions of this resonance are not known.

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

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

CONSTRAINED FIT INFORMATION

An overall fit to 30 branching ratios uses 51 measurements and one constraint to determine 19 parameters. The overall fit has a $\chi^2 = 25.2$ for 33 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.

x_{13}	5									
x_{18}	4	2								
x_{27}	18	29	8							
x_{28}	14	7	31	25						
x_{38}	38	9	8	31	25					
x_{39}	32	16	14	56	45	55				
x_{44}	0	0	0	0	0	0	0			
x_{48}	7	4	3	13	10	12	23	0		
x_{57}	9	5	4	17	14	16	30	0	18	
x_{64}	15	8	7	28	22	27	49	0	11	15
x_{78}	21	11	9	37	29	36	65	0	15	20
x_{85}	5	3	2	9	7	8	16	0	31	37
x_{92}	3	1	1	5	4	5	9	0	29	13
x_{98}	5	2	2	9	7	8	15	0	3	5
x_{99}	3	2	1	6	5	6	11	0	2	3
x_{103}	15	8	7	27	22	27	49	0	11	15
x_{122}	22	7	6	23	18	53	41	0	9	12
x_{172}	−35	−26	−12	−41	−34	−38	−55	−58	−46	−45
	x_{11}	x_{13}	x_{18}	x_{27}	x_{28}	x_{38}	x_{39}	x_{44}	x_{48}	x_{57}

x_{78}	32							
x_{85}	8	10						
x_{92}	4	6	12					
x_{98}	29	10	2	1				
x_{99}	8	7	2	1	15			
x_{103}	24	32	8	4	7	5		
x_{122}	20	26	6	4	6	4	20	
x_{172}	−30	−38	−46	−32	−16	−10	−27	−27
	x_{64}	x_{78}	x_{85}	x_{92}	x_{98}	x_{99}	x_{103}	x_{122}

D^+ BRANCHING RATIOS

See the "Note on *D* Mesons" above. Some now-obsolete measurements have been omitted from these Listings.

— *c*-quark decays —

$\Gamma(c \to e^+ \text{anything})/\Gamma(c \to \text{anything})$

We only put the average of e^+ and μ^+ measurements from $Z^0 \to c\overline{c}$ decays in the Summary Table; see below.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.103 \pm 0.009^{+0.009}_{-0.008}}$	378	[4] ABBIENDI	99K	OPAL	$Z^0 \to c\overline{c}$

[4] ABBIENDI 99K uses the excess of right-sign over wrong-sign leptons opposite reconstructed $D^*(2010)^+ \to D^0 \pi^+$ decays in $Z^0 \to c\overline{c}$.

$\Gamma(c \to \mu^+ \text{anything})/\Gamma(c \to \text{anything})$

We only put the average of e^+ and μ^+ measurements from $Z^0 \to c\overline{c}$ decays in the Summary Table; see below.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.087±0.006 OUR AVERAGE					
$0.095 \pm 0.007^{+0.014}_{-0.013}$	2829	ASTIER	00D	NOMD	$\nu_\mu \text{Fe} \to \mu^- \mu^+ X$
$0.090 \pm 0.007^{+0.007}_{-0.006}$	476	[5] ABBIENDI	99K	OPAL	$Z^0 \to c\overline{c}$
$0.086 \pm 0.017^{+0.008}_{-0.007}$	69	[6] ALBRECHT	92F	ARG	$e^+ e^- \approx$ 10 GeV
$0.078 \pm 0.009 \pm 0.012$		ONG	88	MRK2	$e^+ e^-$ 29 GeV
$0.078 \pm 0.015 \pm 0.02$		BARTEL	87	JADE	$e^+ e^-$ 34.6 GeV
$0.082 \pm 0.012^{+0.02}_{-0.01}$		ALTHOFF	84G	TASS	$e^+ e^-$ 34.5 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.089 \pm 0.018 \pm 0.025$		BARTEL	85J	JADE	See BARTEL 87

[5] ABBIENDI 99K uses the excess of right-sign over wrong-sign leptons opposite reconstructed $D^*(2010)^+ \to D^0 \pi^+$ decays in $Z^0 \to c\overline{c}$.

[6] ALBRECHT 92F uses the excess of right-sign over wrong-sign leptons in a sample of events tagged by fully reconstructed $D^*(2010)^+ \to D^0 \pi^+$ decays.

$\Gamma(c \to \ell^+ \text{anything})/\Gamma(c \to \text{anything})$

This is an average (not a sum) of e^+ and μ^+ measurements.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.096 ±0.004 OUR AVERAGE					
0.0958±0.0042±0.0028	1828	[7] ABREU	00O	DLPH	$Z^0 \to c\overline{c}$
0.095 ±0.006 $^{+0.007}_{-0.006}$	854	[8] ABBIENDI	99K	OPAL	$Z^0 \to c\overline{c}$

[7] ABREU 00O uses leptons opposite fully reconstructed $D^*(2010)^+$, D^+, or D^0 mesons.
[8] ABBIENDI 99K uses the excess of right-sign over wrong-sign leptons opposite reconstructed $D^*(2010)^+ \to D^0\pi^+$ decays in $Z^0 \to c\overline{c}$.

$\Gamma(c \to D^*(2010)^+ \text{anything})/\Gamma(c \to \text{anything})$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.255±0.015±0.008	2371	[9] ABREU	00O	DLPH	$Z^0 \to c\overline{c}$

[9] ABREU 00O uses slow pions opposite fully reconstructed $D^*(2010)^+$, D^+, or D^0 mesons as a signal of $D^*(2010)^-$ production.

—— Inclusive modes ——

$\Gamma(e^+ \text{anything})/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.172±0.019 OUR AVERAGE					
0.20 $^{+0.09}_{-0.07}$		AGUILAR-...	87E	HYBR	πp, pp 360, 400 GeV
0.170±0.019±0.007	158	BALTRUSAIT...	85B	MRK3	e^+e^- 3.77 GeV
0.168±0.064	23	SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.220 $^{+0.044}_{-0.022}$		BACINO	80	DLCO	e^+e^- 3.77 GeV

D^+ and $D^0 \to (e^+ \text{anything})$ / (total D^+ and D^0)

If measured at the $\psi(3770)$, this quantity is a weighted average of D^+ (44%) and D^0 (56%) branching fractions. Only experiments at $E_{\text{cm}} = 3.77$ GeV are included in the average here. We don't put this result in the Meson Summary Table.

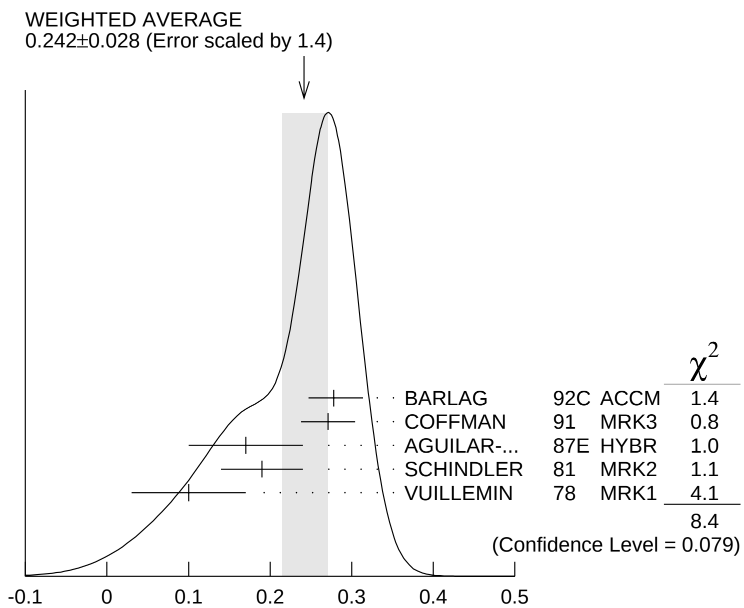
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.110±0.011 OUR AVERAGE	Error includes scale factor of 1.1.				
0.117±0.011	295	BALTRUSAIT...	85B	MRK3	e^+e^- 3.77 GeV
0.10 ±0.032		[10] SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
0.072±0.028		FELLER	78	MRK1	e^+e^- 3.772 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.096±0.004±0.011	2207	[11] ALBRECHT	96C	ARG	$e^+e^- \approx$ 10 GeV
0.134±0.015±0.010		[12] ABE	93E	VNS	e^+e^- 58 GeV
0.098±0.009 $^{+0.006}_{-0.005}$	240	[13] ALBRECHT	92F	ARG	$e^+e^- \approx$ 10 GeV
0.096±0.007±0.015		[14] ONG	88	MRK2	e^+e^- 29 GeV
0.116 $^{+0.011}_{-0.009}$		[14] PAL	86	DLCO	e^+e^- 29 GeV
0.091±0.009±0.013		[14] AIHARA	85	TPC	e^+e^- 29 GeV
0.092±0.022±0.040		[14] ALTHOFF	84J	TASS	e^+e^- 34.6 GeV
0.091±0.013		[14] KOOP	84	DLCO	See PAL 86
0.08 ±0.015		[15] BACINO	79	DLCO	e^+e^- 3.772 GeV

[10] Isolates D^+ and $D^0 \rightarrow e^+ X$ and weights for relative production (44%–56%).
[11] ALBRECHT 96C uses e^- in the hemisphere opposite to $D^{*+} \rightarrow D^0 \pi^+$ events.
[12] ABE 93E also measures forward-backward asymmetries and fragmentation functions for c and b quarks.
[13] ALBRECHT 92F uses the excess of right-sign over wrong-sign leptons in a sample of events tagged by fully reconstructed $D^*(2010)^+ \rightarrow D^0 \pi^+$ decays.
[14] Average BR for charm $\rightarrow e^+ X$. Unlike at $E_{\rm cm} = 3.77$ GeV, the admixture of charmed mesons is unknown.
[15] Not independent of BACINO 80 measurements of $\Gamma(e^+ \text{anything})/\Gamma_{\rm total}$ for the D^+ and D^0 separately.

$\Gamma(K^- \text{anything})/\Gamma_{\rm total}$ Γ_2/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.242±0.028 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
$0.278^{+0.036}_{-0.031}$		[16] BARLAG	92C	ACCM	π^- Cu 230 GeV
$0.271 \pm 0.023 \pm 0.024$		COFFMAN	91	MRK3	$e^+ e^-$ 3.77 GeV
0.17 ± 0.07		AGUILAR-...	87E	HYBR	πp, $p p$ 360, 400 GeV
0.19 ± 0.05	26	SCHINDLER	81	MRK2	$e^+ e^-$ 3.771 GeV
0.10 ± 0.07	3	VUILLEMIN	78	MRK1	$e^+ e^-$ 3.772 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.16^{+0.08}_{-0.07}$		AGUILAR-...	86B	HYBR	See AGUILAR-BENITEZ 87E

[16] BARLAG 92C computes the branching fraction using topological normalization.



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

$\left[\Gamma(\overline{K}^0 \text{anything}) + \Gamma(K^0 \text{anything})\right]/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.59 ±0.07 OUR AVERAGE					
0.612±0.065±0.043		COFFMAN	91	MRK3	e^+e^- 3.77 GeV
0.52 ±0.18	15	SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
0.39 ±0.29	3	VUILLEMIN	78	MRK1	e^+e^- 3.772 GeV

$\Gamma(K^+ \text{anything})/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.058±0.014 OUR AVERAGE					
0.055±0.013±0.009		COFFMAN	91	MRK3	e^+e^- 3.77 GeV
$0.08\ ^{+0.06}_{-0.05}$		AGUILAR-...	87E	HYBR	πp, pp 360, 400 GeV
0.06 ±0.04	12	SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
0.06 ±0.06	2	VUILLEMIN	78	MRK1	e^+e^- 3.772 GeV

D^+ and D^0 → (η anything) / (total D^+ and D^0)

If measured at the $\psi(3770)$, this quantity is a weighted average of D^+ (44%) and D^0 (56%) branching fractions. Only the experiment at $E_{\text{cm}} = 3.77$ GeV is used.

VALUE	DOCUMENT ID		TECN	COMMENT
<0.13	PARTRIDGE	81	CBAL	e^+e^- 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.02	[17] BRANDELIK	79	DASP	e^+e^- 4.03 GeV

[17] The BRANDELIK 79 result is based on the absence of an η signal at $E_{\text{cm}} = 4.03$ GeV. PARTRIDGE 81 observes a substantially higher η cross section at 4.03 GeV.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.018	90	[18] BAI	00C	BES	$e^+e^- \to D\overline{D}^*$, $D^*\overline{D}^*$

[18] BAI 00C finds the average (ϕ anything) branching fraction for the 4.03-GeV mix of D^+ and D^0 mesons to be (1.34 ± 0.52 ± 0.12)%.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.016	90	BAI	00C	BES	$e^+e^- \to D\overline{D}^*$, $D^*\overline{D}^*$

Leptonic and semileptonic modes

$\Gamma(\mu^+\nu_\mu)/\Gamma_{\text{total}}$ Γ_9/Γ

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

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.0008\ ^{+0.0016}_{-0.0005}\ ^{+0.0005}_{-0.0002}}$		1	[19] BAI	98B	BES	$e^+e^- \to D^{*+}D^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.00072	90		ADLER	88B	MRK3	e^+e^- 3.77 GeV
< 0.02	90	0	[20] AUBERT	83	SPEC	μ^+ Fe, 250 GeV

[19] BAI 98B obtains $f_D = (300^{+180}_{-150}{}^{+80}_{-40})$ MeV from this measurement.

[20] AUBERT 83 obtains an upper limit 0.014 assuming the final state contains equal amounts of (D^+,D^-), (D^+,$\overline{D}^0$), (D^-,D^0), and (D^0,$\overline{D}^0$). We quote the limit they get under more general assumptions.

$\Gamma(\overline{K}^0 \ell^+ \nu_\ell)/\Gamma_{total}$ — Γ_{10}/Γ

We average our $\overline{K}^0 e^+ \nu_e$ and $\overline{K}^0 \mu^+ \nu_\mu$ branching fractions, after multiplying the latter by a phase-space factor of 1.03 to be able to use it with the $\overline{K}^0 e^+ \nu_e$ fraction. Hence our ℓ^+ here is really an e^+.

VALUE	DOCUMENT ID		COMMENT
0.068±0.008 OUR AVERAGE			
0.067±0.009	PDG	00	Our $\Gamma(\overline{K}^0 e^+ \nu_e)/\Gamma_{total}$
$0.072^{+0.031}_{-0.020}$	PDG	00	$1.03 \times$ our $\Gamma(\overline{K}^0 \mu^+ \nu_\mu)/\Gamma_{total}$

$\Gamma(\overline{K}^0 e^+ \nu_e)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.067±0.009 OUR FIT					
$0.06^{+0.022}_{-0.013}\pm0.007$	13	BAI	91	MRK3	$e^+ e^- \approx$ 3.77 GeV

$\Gamma(\overline{K}^0 e^+ \nu_e)/\Gamma(\overline{K}^0 \pi^+)$ — Γ_{11}/Γ_{38}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
2.32±0.31 OUR FIT					
2.60±0.35±0.26	186	[21] BEAN	93C	CLE2	$e^+ e^- \approx \Upsilon(4S)$

[21] BEAN 93C uses $\overline{K}^0 \mu^+ \nu_\mu$ as well as $\overline{K}^0 e^+ \nu_e$ events and makes a small phase-space adjustment to the number of the μ^+ events to use them as e^+ events.

$\Gamma(\overline{K}^0 e^+ \nu_e)/\Gamma(K^- \pi^+ \pi^+)$ — Γ_{11}/Γ_{39}

VALUE	DOCUMENT ID		TECN	COMMENT
0.74±0.10 OUR FIT				
0.66±0.09±0.14	ANJOS	91C	E691	γ Be 80–240 GeV

$\Gamma(\overline{K}^0 \mu^+ \nu_\mu)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.07^{+0.028}_{-0.016}\pm0.012$	14	BAI	91	MRK3	$e^+ e^- \approx$ 3.77 GeV

$\Gamma(\overline{K}^0 \mu^+ \nu_\mu)/\Gamma(\mu^+ \text{anything})$ — Γ_{12}/Γ_8

VALUE	EVTS	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.76±0.06	84	[22] AOKI	88	π^- emulsion

[22] From topological branching ratios in emulsion with an identified muon.

$\Gamma(K^- \pi^+ e^+ \nu_e)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.041^{+0.009}_{-0.007}$ OUR FIT						
$0.035^{+0.012}_{-0.007}\pm0.004$		14	[23] BAI	91	MRK3	$e^+ e^- \approx$ 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.057	90		[24] AGUILAR-...	87F	HYBR	πp, $p p$ 360, 400 GeV

[23] BAI 91 finds that a fraction $0.79^{+0.15}_{-0.17}{}^{+0.09}_{-0.03}$ of combined D^+ and D^0 decays to $\overline{K} \pi e^+ \nu_e$ (24 events) are $\overline{K}^*(892) e^+ \nu_e$.

[24] AGUILAR-BENITEZ 87F computes the branching fraction using topological normalization.

$\Gamma\big(\overline{K}^*(892)^0 \ell^+ \nu_\ell\big)/\Gamma_{\text{total}}$ — Γ_{26}/Γ

We average our $\overline{K}^{*0} e^+ \nu_e$ and $\overline{K}^{*0} \mu^+ \nu_\mu$ branching fractions, after multiplying the latter by a phase-space factor of 1.05 to be able to use it with the $\overline{K}^{*0} e^+ \nu_e$ fraction. Hence our ℓ^+ here is really an e^+.

VALUE	DOCUMENT ID		COMMENT
0.047±0.004 OUR AVERAGE			
0.048±0.005	PDG	00	Our $\Gamma(\overline{K}^{*0} e^+ \nu_e)/\Gamma_{\text{total}}$
0.046±0.006	PDG	00	1.05 × our $\Gamma(\overline{K}^{*0} \mu^+ \nu_\mu)/\Gamma_{\text{total}}$

$\Gamma\big(\overline{K}^*(892)^0 e^+ \nu_e\big)/\Gamma\big(K^- \pi^+ e^+ \nu_e\big)$ — Γ_{27}/Γ_{13}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$1.16^{+0.21}_{-0.24}$ OUR FIT					
1.0 ±0.3	35	ADAMOVICH	91	OMEG	π^- 340 GeV

$\Gamma\big(\overline{K}^*(892)^0 e^+ \nu_e\big)/\Gamma\big(K^- \pi^+ \pi^+\big)$ — Γ_{27}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.53±0.05 OUR FIT					
0.54±0.05 OUR AVERAGE					
0.67±0.09±0.07	710	[25] BEAN	93C	CLE2	$e^+e^- \approx \Upsilon(4S)$
0.62±0.15±0.09	35	ADAMOVICH	91	OMEG	π^- 340 GeV
0.55±0.08±0.10	880	ALBRECHT	91	ARG	$e^+e^- \approx$ 10.4 GeV
0.49±0.04±0.05		ANJOS	89B	E691	Photoproduction

[25] BEAN 93C uses $\overline{K}^{*0} \mu^+ \nu_\mu$ as well as $\overline{K}^{*0} e^+ \nu_e$ events and makes a small phase-space adjustment to the number of the μ^+ events to use them as e^+ events.

$\Gamma\big(K^- \pi^+ e^+ \nu_e \text{ nonresonant}\big)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.007	90	[26] ANJOS	89B	E691	Photoproduction

[26] ANJOS 89B assumes a $\Gamma(D^+ \to K^- \pi^+ \pi^+)/\Gamma_{\text{total}} = 9.1 \pm 1.3 \pm 0.4\%$.

$\Gamma\big(K^- \pi^+ \mu^+ \nu_\mu\big)/\Gamma_{\text{total}}$ — $\Gamma_{16}/\Gamma = (\Gamma_{18}+\frac{2}{3}\Gamma_{28})/\Gamma$

VALUE	DOCUMENT ID
0.032±0.004 OUR FIT Error includes scale factor of 1.1.	

$\Gamma\big(\overline{K}^*(892)^0 \mu^+ \nu_\mu\big)/\Gamma_{\text{total}}$ — Γ_{28}/Γ

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.044 ±0.006 OUR FIT Error includes scale factor of 1.1.					
0.0325±0.0071±0.0075	224	[27] KODAMA	92C	E653	π^- emulsion 600 GeV

[27] KODAMA 92C measures $\Gamma(D^+ \to \overline{K}^{*0} \mu^+ \nu_\mu)/\Gamma(D^0 \to K^- \mu^+ \nu_\mu) = 0.43 \pm 0.09 \pm 0.09$ and then uses $\Gamma(D^0 \to K^- \mu^+ \nu_\mu) = (7.0 \pm 0.7) \times 10^{10}\ \text{s}^{-1}$ to get the quoted branching fraction. See also the footnote to KODAMA 92C in the next data block.

$\Gamma(\overline{K}^*(892)^0 \mu^+ \nu_\mu)/\Gamma(K^- \pi^+ \pi^+)$ — Γ_{28}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.49±0.06 OUR FIT					
0.53±0.06 OUR AVERAGE					
0.56±0.04±0.06	875	FRABETTI	93E	E687	γ Be $\overline{E}_\gamma \approx$ 200 GeV
0.46±0.07±0.08	224	[28] KODAMA	92C	E653	π^- emulsion 600 GeV

[28] KODAMA 92C uses the same $\overline{K}^{*0} \mu^+ \nu_\mu$ events normalizing instead with $D^0 \to K^- \mu^+ \nu_\mu$ events, as reported in the preceding data block.

$\Gamma(K^- \pi^+ \mu^+ \nu_\mu \text{ nonresonant})/\Gamma(K^- \pi^+ \mu^+ \nu_\mu)$ — $\Gamma_{18}/\Gamma_{16} = \Gamma_{18}/(\Gamma_{18}+\frac{2}{3}\Gamma_{28})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.083±0.029 OUR FIT				
0.083±0.029	FRABETTI	93E	E687	< 0.12 (90% CL)

$\Gamma(\overline{K}^0 \pi^+ \pi^- e^+ \nu_e)/\Gamma_{total}$ — Γ_{19}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.022^{+0.047}_{-0.006}\pm0.004$	1	[29] AGUILAR-...	87F	HYBR	πp, $p p$ 360, 400 GeV

[29] AGUILAR-BENITEZ 87F computes the branching fraction using topological normalization.

$\Gamma(K^- \pi^+ \pi^0 e^+ \nu_e)/\Gamma_{total}$ — Γ_{20}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.044^{+0.052}_{-0.013}\pm0.007$	2	[30] AGUILAR-...	87F	HYBR	πp, $p p$ 360, 400 GeV

[30] AGUILAR-BENITEZ 87F computes the branching fraction using topological normalization.

$\Gamma((\overline{K}^*(892)\pi)^0 e^+ \nu_e)/\Gamma_{total}$ — Γ_{21}/Γ

Unseen decay modes of the $\overline{K}^*(892)$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.012	90	ANJOS	92	E691	Photoproduction

$\Gamma((\overline{K}\pi\pi)^0 e^+ \nu_e \text{ non-}\overline{K}^*(892))/\Gamma_{total}$ — Γ_{22}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.009	90	ANJOS	92	E691	Photoproduction

$\Gamma(K^- \pi^+ \pi^0 \mu^+ \nu_\mu)/\Gamma(K^- \pi^+ \mu^+ \nu_\mu)$ — $\Gamma_{23}/\Gamma_{16} = \Gamma_{23}/(\Gamma_{18}+\frac{2}{3}\Gamma_{28})$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.042	90	FRABETTI	93E	E687	γ Be $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\overline{K}_1(1270)^0 \mu^+ \nu_\mu)/\Gamma(\overline{K}^*(892)^0 \mu^+ \nu_\mu)$ — Γ_{29}/Γ_{28}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.78	95	ABE	99P	CDF	$\overline{p} p$ 1.8 TeV

$\Gamma(\overline{K}^*(1410)^0 \mu^+ \nu_\mu)/\Gamma(\overline{K}^*(892)^0 \mu^+ \nu_\mu)$ — Γ_{30}/Γ_{28}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.60	95	ABE	99P	CDF	$\overline{p}p$ 1.8 TeV

$\Gamma(\overline{K}^*_2(1430)^0 \mu^+ \nu_\mu)/\Gamma(\overline{K}^*(892)^0 \mu^+ \nu_\mu)$ — Γ_{31}/Γ_{28}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.19	95	ABE	99P	CDF	$\overline{p}p$ 1.8 TeV

$\Gamma(\pi^0 \ell^+ \nu_\ell)/\Gamma(\overline{K}^0 \ell^+ \nu_\ell)$ — Γ_{24}/Γ_{10}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.046±0.014±0.017	100	[31] BARTELT	97	CLE2	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.085±0.027±0.014	53	[32] ALAM	93	CLE2	See BARTELT 97

[31] BARTELT 97 thus directly measures the product of ratios squared of CKM matrix elements and form factors at q^2=0: $|V_{cd}/V_{cs}|^2 \cdot |f_+^\pi(0)/f_+^K(0)|^2 = 0.046 \pm 0.014 \pm 0.017$.

[32] ALAM 93 thus directly measures the product of ratios squared of CKM matrix elements and form factors at q^2=0: $|V_{cd}/V_{cs}|^2 \cdot |f_+^\pi(0)/f_+^K(0)|^2 = 0.085 \pm 0.027 \pm 0.014$.

$\Gamma(\pi^+\pi^- e^+ \nu_e)/\Gamma_{\text{total}}$ — Γ_{25}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.057	90	[33] AGUILAR-...	87F	HYBR	πp, pp 360, 400 GeV

[33] AGUILAR-BENITEZ 87F computes the branching fraction using topological normalization.

$\Gamma(\rho^0 e^+ \nu_e)/\Gamma_{\text{total}}$ — Γ_{32}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0037	90	BAI	91	MRK3	$e^+e^- \approx$ 3.77 GeV

$\Gamma(\rho^0 e^+ \nu_e)/\Gamma(\overline{K}^*(892)^0 e^+ \nu_e)$ — Γ_{32}/Γ_{27}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.045±0.014±0.009	49	[34] AITALA	97	E791	π^- nucleus, 500 GeV

[34] AITALA 97 explicitly subtracts $D^+ \to \eta' e^+ \nu_e$ and other backgrounds to get this result.

$\Gamma(\rho^0 \mu^+ \nu_\mu)/\Gamma(\overline{K}^*(892)^0 \mu^+ \nu_\mu)$ — Γ_{33}/Γ_{28}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.061±0.014 OUR AVERAGE					
0.051±0.015±0.009	54	[35] AITALA	97	E791	π^- nucleus, 500 GeV
0.079±0.019±0.013	39	[36] FRABETTI	97	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.044^{+0.031}_{-0.025}\pm0.014$	4	[37] KODAMA	93C	E653	π^- emulsion 600 GeV

[35] AITALA 97 explicitly subtracts $D^+ \to \eta' \mu^+ \nu_\mu$ and other backgrounds to get this result.

[36] Because the reconstruction efficiency for photons is low, this FRABETTI 97 result also includes any $D^+ \to \eta' \mu^+ \nu_\mu \to \gamma \rho^0 \mu^+ \nu_\mu$ events in the numerator.

[37] This KODAMA 93C result is based on a final signal of $4.0^{+2.8}_{-2.3} \pm 1.3$ events; the estimates of backgrounds that affect this number are somewhat model dependent.

$\Gamma(\phi e^+ \nu_e)/\Gamma_{total}$ **Γ_{34}/Γ**

Decay modes of the ϕ not included in the search are corrected for.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0209	90	BAI	91	MRK3	$e^+e^- \approx$ 3.77 GeV

$\Gamma(\phi \mu^+ \nu_\mu)/\Gamma_{total}$ **Γ_{35}/Γ**

Decay modes of the ϕ not included in the search are corrected for.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0372	90	BAI	91	MRK3	$e^+e^- \approx$ 3.77 GeV

$\Gamma(\eta \ell^+ \nu_\ell)/\Gamma(\pi^0 \ell^+ \nu_\ell)$ **Γ_{36}/Γ_{24}**

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	BARTELT	97	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\eta'(958) \mu^+ \nu_\mu)/\Gamma(\overline{K}^*(892)^0 \mu^+ \nu_\mu)$ **Γ_{37}/Γ_{28}**

Decay modes of the $\eta'(958)$ not included in the search are corrected for.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	KODAMA	93B	E653	π^- emulsion 600 GeV

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

$\Gamma(\overline{K}^0 \pi^+)/\Gamma_{total}$ **Γ_{38}/Γ**

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0289±0.0026 OUR FIT Error includes scale factor of 1.1.					
0.032 ±0.004 OUR AVERAGE					
0.032 ±0.005 ±0.002	161	ADLER	88C	MRK3	e^+e^- 3.77 GeV
0.033 ±0.009	36	[38] SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
0.033 ±0.013	17	[39] PERUZZI	77	MRK1	e^+e^- 3.77 GeV

[38] SCHINDLER 81 (MARK-2) measures $\sigma(e^+e^- \rightarrow \psi(3770)) \times$ branching fraction to be 0.14 ± 0.03 nb. We use the MARK-3 (ADLER 88C) value of $\sigma = 4.2 \pm 0.6 \pm 0.3$ nb.

[39] PERUZZI 77 (MARK-1) measures $\sigma(e^+e^- \rightarrow \psi(3770)) \times$ branching fraction to be 0.14 ± 0.05 nb. We use the MARK-3 (ADLER 88C) value of $\sigma = 4.2 \pm 0.6 \pm 0.3$ nb.

$\Gamma(\overline{K}^0 \pi^+)/\Gamma(K^- \pi^+ \pi^+)$ **Γ_{38}/Γ_{39}**

It is generally assumed for modes such as $D^+ \rightarrow \overline{K}^0 \pi^+$ that

$$\Gamma(D^+ \rightarrow \overline{K}^0 \pi^+) = 2\Gamma(D^+ \rightarrow K^0_S \pi^+);$$

it is the latter Γ that is actually measured. BIGI 95 points out that interference between Cabibbo-allowed and doubly Cabibbo-suppressed amplitudes, where both occur, could invalidate this assumption by a few percent.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.321±0.025 OUR FIT Error includes scale factor of 1.1.					
0.32 ±0.04 OUR AVERAGE Error includes scale factor of 1.4.					
0.348±0.024±0.022	473	[40] BISHAI	97	CLE2	$e^+e^- \approx \Upsilon(4S)$
0.274±0.030±0.031	264	ANJOS	90C	E691	Photoproduction

[40] See BISHAI 97 for an isospin analysis of $D^+ \rightarrow \overline{K}\pi$ amplitudes.

$\Gamma(K^-\pi^+\pi^+)/\Gamma_{total}$ — Γ_{39}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.090±0.006 OUR FIT					
0.091±0.007 OUR AVERAGE					
0.093±0.006±0.008	1502	[41] BALEST	94	CLE2	$e^+e^- \approx \Upsilon(4S)$
0.091±0.013±0.004	1164	ADLER	88C	MRK3	e^+e^- 3.77 GeV
0.091±0.019	239	[42] SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
0.086±0.020	85	[43] PERUZZI	77	MRK1	e^+e^- 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.064^{+0.015}_{-0.014}$		[44] BARLAG	92C	ACCM	π^- Cu 230 GeV
$0.063^{+0.028}_{-0.014}\pm0.011$	8	[44] AGUILAR-...	87F	HYBR	πp, pp 360, 400 GeV

[41] BALEST 94 measures the ratio of $D^+ \rightarrow K^-\pi^+\pi^+$ and $D^0 \rightarrow K^-\pi^+$ branching fractions to be 2.35 ± 0.16 ± 0.16 and uses their absolute measurement of the $D^0 \rightarrow K^-\pi^+$ fraction (AKERIB 93).

[42] SCHINDLER 81 (MARK-2) measures $\sigma(e^+e^- \rightarrow \psi(3770))$ × branching fraction to be 0.38 ± 0.05 nb. We use the MARK-3 (ADLER 88C) value of σ = 4.2 ± 0.6 ± 0.3 nb.

[43] PERUZZI 77 (MARK-1) measures $\sigma(e^+e^- \rightarrow \psi(3770))$ × branching fraction to be 0.36 ± 0.06 nb. We use the MARK-3 (ADLER 88C) value of σ = 4.2 ± 0.6 ± 0.3 nb.

[44] AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

$\Gamma(\overline{K}^*(892)^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{78}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.212±0.016 OUR FIT					
0.210±0.015 OUR AVERAGE					
0.206±0.009±0.014		FRABETTI	94G	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
0.255±0.014±0.050		ANJOS	93	E691	γ Be 90–260 GeV
0.21 ±0.06 ±0.06		ALVAREZ	91B	NA14	Photoproduction
0.20 ±0.02 ±0.11		ADLER	87	MRK3	e^+e^- 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.053	90	SCHINDLER	81	MRK2	e^+e^- 3.771 GeV

$\Gamma(\overline{K}_0^*(1430)^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{87}/Γ_{39}

Unseen decay modes of the $\overline{K}_0^*(1430)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.41 ±0.04 OUR AVERAGE				
0.458±0.035±0.094	FRABETTI	94G	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
0.400±0.031±0.027	ANJOS	93	E691	γ Be 90–260 GeV

$\Gamma(\overline{K}^*(1680)^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{88}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(1680)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.160±0.032 OUR AVERAGE	Error includes scale factor of 1.1.			
0.182±0.023±0.028	FRABETTI	94G	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
0.113±0.015±0.050	ANJOS	93	E691	γ Be 90–260 GeV

$\Gamma(K^-\pi^+\pi^+ \text{ nonresonant})/\Gamma(K^-\pi^+\pi^+)$ — Γ_{43}/Γ_{39}

VALUE	DOCUMENT ID		TECN	COMMENT
0.95 ±0.07 OUR AVERAGE				
0.998±0.037±0.072	FRABETTI	94G	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
0.838±0.088±0.275	ANJOS	93	E691	γ Be 90–260 GeV
0.79 ±0.07 ±0.15	ADLER	87	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^0\pi^+\pi^0)/\Gamma_{\text{total}}$ — Γ_{44}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.097±0.030 OUR FIT Error includes scale factor of 1.1.					
0.107±0.029 OUR AVERAGE					
0.102±0.025±0.016	159	ADLER	88C	MRK3	e^+e^- 3.77 GeV
0.19 ±0.12	10	[45] SCHINDLER	81	MRK2	e^+e^- 3.771 GeV

[45] SCHINDLER 81 (MARK-2) measures $\sigma(e^+e^- \rightarrow \psi(3770)) \times$ branching fraction to be 0.78 ± 0.48 nb. We use the MARK-3 (ADLER 88C) value of $\sigma = 4.2 \pm 0.6 \pm 0.3$ nb.

$\Gamma(\overline{K}^0\rho^+)/\Gamma(\overline{K}^0\pi^+\pi^0)$ — Γ_{45}/Γ_{44}

VALUE	DOCUMENT ID		TECN	COMMENT
0.68±0.08±0.12	ADLER	87	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^*(892)^0\pi^+)/\Gamma(\overline{K}^0\pi^+\pi^0)$ — Γ_{78}/Γ_{44}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.20±0.06 OUR FIT				
0.57±0.18±0.18	ADLER	87	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^0\pi^+\pi^0 \text{ nonresonant})/\Gamma(\overline{K}^0\pi^+\pi^0)$ — Γ_{47}/Γ_{44}

VALUE	DOCUMENT ID		TECN	COMMENT
0.13±0.07±0.08	ADLER	87	MRK3	e^+e^- 3.77 GeV

$\Gamma(K^-\pi^+\pi^+\pi^0)/\Gamma_{\text{total}}$ — Γ_{48}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.064±0.011 OUR FIT					
0.058±0.012±0.012	142	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.034^{+0.056}_{-0.070}$		[46] BARLAG	92C	ACCM	π^- Cu 230 GeV
$0.022^{+0.047}_{-0.006}\pm0.004$	1	[46] AGUILAR-...	87F	HYBR	πp, $p p$ 360, 400 GeV
$0.063^{+0.014}_{-0.013}\pm0.012$	175	BALTRUSAIT...	86E	MRK3	See COFFMAN 92B

[46] AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

$\Gamma(K^-\pi^+\pi^+\pi^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{48}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.71±0.12 OUR FIT					
0.76±0.11±0.12	91	ANJOS	92C	E691	γ Be 90–260 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.69±0.10±0.16		ANJOS	89E	E691	See ANJOS 92C
$0.57^{+0.65}_{-0.17}$	1	AGUILAR-...	83B	HYBR	$\pi^- p$, 360 GeV

$\Gamma(\overline{K}^*(892)^0 \rho^+ \text{total})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$ — Γ_{79}/Γ_{48}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.33±0.165±0.12	[47] ANJOS	92C	E691	γBe 90–260 GeV

[47] See, however, the next entry, where the two experiments disagree completely.

$\Gamma(\overline{K}^*(892)^0 \rho^+ S\text{-wave})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$ — Γ_{80}/Γ_{48}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included. The two experiments here disagree completely.

VALUE	DOCUMENT ID		TECN	COMMENT
0.26 ±0.25 OUR AVERAGE	Error includes scale factor of 3.1.			
0.15 ±0.075±0.045	ANJOS	92C	E691	γBe 90–260 GeV
0.833±0.116±0.165	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^*(892)^0 \rho^+ P\text{-wave})/\Gamma_{total}$ — Γ_{81}/Γ

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.001	90	ANJOS	92C	E691	γBe 90–260 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.005	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^*(892)^0 \rho^+ D\text{-wave})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$ — Γ_{82}/Γ_{48}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.15±0.09±0.045	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma(\overline{K}^*(892)^0 \rho^+ D\text{-wave longitudinal})/\Gamma_{total}$ — Γ_{83}/Γ

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.007	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}_1(1400)^0 \pi^+)/\Gamma(K^- \pi^+ \pi^+ \pi^0)$ — Γ_{85}/Γ_{48}

Unseen decay modes of the $\overline{K}_1(1400)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.77 ±0.20 OUR FIT				
0.907±0.218±0.180	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(K^- \rho^+ \pi^+ \text{total})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$ — Γ_{93}/Γ_{48}

This includes $\overline{K}^*(892)^0 \rho^+$, *etc.* The next entry gives the specifically 3-body fraction.

VALUE	DOCUMENT ID		TECN	COMMENT
0.48±0.13±0.09	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma(K^- \rho^+ \pi^+ \text{3-body})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$ — Γ_{94}/Γ_{48}

VALUE	DOCUMENT ID		TECN	COMMENT
0.17 ±0.06 OUR AVERAGE				
0.18 ±0.08 ±0.04	ANJOS	92C	E691	γBe 90–260 GeV
0.159±0.065±0.060	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^*(892)^0\pi^+\pi^0\,\text{total})/\Gamma(K^-\pi^+\pi^+\pi^0)$ — Γ_{89}/Γ_{48}

This includes $\overline{K}^*(892)^0\rho^+$, *etc.* The next two entries give the specifically 3-body fraction. Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
1.05±0.11±0.08	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma(\overline{K}^*(892)^0\pi^+\pi^0\,\text{3-body})/\Gamma_{\text{total}}$ — Γ_{90}/Γ

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.008	90	[48] COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

[48] See, however, the next entry: ANJOS 92C sees a large signal in this channel.

$\Gamma(\overline{K}^*(892)^0\pi^+\pi^0\,\text{3-body})/\Gamma(K^-\pi^+\pi^+\pi^0)$ — Γ_{90}/Γ_{48}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.66±0.09±0.17	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma(K^*(892)^-\pi^+\pi^+\,\text{3-body})/\Gamma(K^-\pi^+\pi^+\pi^0)$ — Γ_{92}/Γ_{48}

Unseen decay modes of the $K^*(892)^-$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.32±0.14 OUR FIT Error includes scale factor of 1.1.				
0.24±0.12±0.09	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma(K^-\pi^+\pi^+\pi^0\,\text{nonresonant})/\Gamma_{\text{total}}$ — Γ_{56}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.002	90	[49] ANJOS	92C	E691	γBe 90–260 GeV

[49] Whereas ANJOS 92C finds no signal here, COFFMAN 92B finds a fairly large one; see the next entry.

$\Gamma(K^-\pi^+\pi^+\pi^0\,\text{nonresonant})/\Gamma(K^-\pi^+\pi^+\pi^0)$ — Γ_{56}/Γ_{48}

VALUE	DOCUMENT ID		TECN	COMMENT
0.184±0.070±0.050	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^0\pi^+\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{57}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.070±0.009 OUR FIT					
0.071±0.016 OUR AVERAGE					
0.066±0.015±0.005	168	ADLER	88C	MRK3	e^+e^- 3.77 GeV
0.12 ±0.05	21	[50] SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.042^{+0.019}_{-0.017}$		[51] BARLAG	92C	ACCM	π^- Cu 230 GeV
$0.243^{+0.064}_{-0.041}\pm0.041$	11	[51] AGUILAR-...	87F	HYBR	πp, pp 360, 400 GeV

[50] SCHINDLER 81 (MARK-2) measures $\sigma(e^+e^-\to\psi(3770))\times$ branching fraction to be 0.51 ± 0.08 nb. We use the MARK-3 (ADLER 88C) value of $\sigma=4.2\pm0.6\pm0.3$ nb.

[51] AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

$\Gamma(\overline{K}^0\pi^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{57}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.10 OUR FIT					
0.77±0.07±0.11	229	ANJOS	92C	E691	γ Be 90–260 GeV

$\Gamma(\overline{K}^0 a_1(1260)^+)/\Gamma(\overline{K}^0\pi^+\pi^+\pi^-)$ — Γ_{76}/Γ_{57}

Unseen decay modes of the $a_1(1260)^+$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
1.15 ±0.19 OUR AVERAGE Error includes scale factor of 1.1.				
1.66 ±0.28 ±0.40	ANJOS	92C	E691	γ Be 90–260 GeV
1.078±0.114±0.140	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^0 a_2(1320)^+)/\Gamma_{total}$ — Γ_{77}/Γ

Unseen decay modes of the $a_2(1320)^+$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.003	90	ANJOS	92C	E691	γ Be 90–260 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.008	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}_1(1270)^0\pi^+)/\Gamma_{total}$ — Γ_{84}/Γ

Unseen decay modes of the $\overline{K}_1(1270)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.007	90	ANJOS	92C	E691	γ Be 90–260 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.011	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}_1(1400)^0\pi^+)/\Gamma_{total}$ — Γ_{85}/Γ

Unseen decay modes of the $\overline{K}_1(1400)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.009	90	[52] ANJOS	92C	E691	γ Be 90–260 GeV

[52] ANJOS 92C sees no evidence for $\overline{K}_1(1400)^0\pi^+$ in either the $\overline{K}^0\pi^+\pi^+\pi^-$ or $K^-\pi^+\pi^+\pi^0$ channels, whereas COFFMAN 92B finds the $\overline{K}_1(1400)^0\pi^+$ branching fraction to be large; see the next entry.

$\Gamma(\overline{K}_1(1400)^0\pi^+)/\Gamma(\overline{K}^0\pi^+\pi^+\pi^-)$ — Γ_{85}/Γ_{57}

Unseen decay modes of the $\overline{K}_1(1400)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.70 ±0.17 OUR FIT				
0.623±0.106±0.180	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma(\overline{K}^*(1410)^0\pi^+)/\Gamma_{total}$ — Γ_{86}/Γ

Unseen decay modes of the $\overline{K}^*(1410)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.007	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma\big(K^*(892)^-\pi^+\pi^+\text{total}\big)/\Gamma\big(\overline{K}^0\pi^+\pi^+\pi^-\big)$ — Γ_{91}/Γ_{57}

Unseen decay modes of the $K^*(892)^-$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.41±0.14	14	ALEEV	94	BIS2	nN 20–70 GeV

$\Gamma\big(K^*(892)^-\pi^+\pi^+\text{3-body}\big)/\Gamma_{\text{total}}$ — Γ_{92}/Γ

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.020±0.009 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.013	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma\big(K^*(892)^-\pi^+\pi^+\text{3-body}\big)/\Gamma\big(\overline{K}^0\pi^+\pi^+\pi^-\big)$ — Γ_{92}/Γ_{57}

Unseen decay modes of the $K^*(892)^-$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.29±0.13 OUR FIT Error includes scale factor of 1.1.				
0.50±0.09±0.21	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma\big(\overline{K}^0\rho^0\pi^+\text{total}\big)/\Gamma\big(\overline{K}^0\pi^+\pi^+\pi^-\big)$ — Γ_{95}/Γ_{57}

This includes $\overline{K}^0 a_1(1260)^+$. The next two entries give the specifically 3-body reaction.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.60±0.10±0.17	90	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma\big(\overline{K}^0\rho^0\pi^+\text{3-body}\big)/\Gamma_{\text{total}}$ — Γ_{96}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.004	90	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma\big(\overline{K}^0\rho^0\pi^+\text{3-body}\big)/\Gamma\big(\overline{K}^0\pi^+\pi^+\pi^-\big)$ — Γ_{96}/Γ_{57}

VALUE	DOCUMENT ID		TECN	COMMENT
0.07±0.04±0.06	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma\big(\overline{K}^0 f_0(980)\pi^+\big)/\Gamma_{\text{total}}$ — Γ_{97}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.005	90	ANJOS	92C	E691	γBe 90–260 GeV

$\Gamma\big(\overline{K}^0\pi^+\pi^+\pi^-\text{ nonresonant}\big)/\Gamma\big(\overline{K}^0\pi^+\pi^+\pi^-\big)$ — Γ_{63}/Γ_{57}

VALUE	DOCUMENT ID		TECN	COMMENT
0.12±0.06 OUR AVERAGE				
0.10±0.04 ±0.06	ANJOS	92C	E691	γBe 90–260 GeV
0.17±0.056±0.100	COFFMAN	92B	MRK3	e^+e^- 3.77 GeV

$\Gamma\big(K^-\pi^+\pi^+\pi^+\pi^-\big)/\Gamma_{\text{total}}$ — Γ_{64}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.0037^{+0.0012}_{-0.0010}$	[53] BARLAG	92C	ACCM	π^- Cu 230 GeV

[53] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(K^-\pi^+\pi^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{64}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.080±0.009 OUR FIT					
0.083±0.009 OUR AVERAGE					
0.077±0.008±0.010	239	FRABETTI	97C	E687	γ Be, $\overline{E}_\gamma \approx$ 200 GeV
0.09 ±0.01 ±0.01	113	ANJOS	90D	E691	Photoproduction

$\Gamma(\overline{K}^*(892)^0\pi^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+\pi^+\pi^-)$ — Γ_{98}/Γ_{64}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
1.1 ±0.4 OUR FIT Error includes scale factor of 1.8.				
1.25±0.12±0.23	ANJOS	90D	E691	Photoproduction

$\Gamma(\overline{K}^*(892)^0\rho^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{99}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.032^{+0.019}_{-0.017}}$ **OUR FIT** Error includes scale factor of 1.8.				
0.023±0.010±0.006	FRABETTI	97C	E687	γ Be, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\overline{K}^*(892)^0\rho^0\pi^+)/\Gamma(\overline{K}^*(892)^0\pi^+\pi^+\pi^-)$ — Γ_{99}/Γ_{98}

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.36^{+0.24}_{-0.20}}$ **OUR FIT** Error includes scale factor of 1.8.				
0.75±0.17±0.19	ANJOS	90D	E691	Photoproduction

$\Gamma(\overline{K}^*(892)^0\pi^+\pi^+\pi^-\ \text{no-}\rho)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{100}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.048±0.015±0.011	FRABETTI	97C	E687	γ Be, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(K^-\rho^0\pi^+\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{68}/Γ_{39}

VALUE	DOCUMENT ID		TECN	COMMENT
0.034±0.009±0.005	FRABETTI	97C	E687	γ Be, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(K^-\pi^+\pi^+\pi^+\pi^-\ \text{nonresonant})/\Gamma(K^-\pi^+\pi^+)$ — Γ_{69}/Γ_{39}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.026	90	FRABETTI	97C	E687	γ Be, $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(K^-\pi^+\pi^+\pi^0\pi^0)/\Gamma_{\text{total}}$ — Γ_{70}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.022^{+0.047}_{-0.008}\pm0.004}$	1	[54] AGUILAR-...	87F	HYBR	πp, $p p$ 360, 400 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.015		[54] BARLAG	92C	ACCM	π^- Cu 230 GeV

[54] AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

$\Gamma(\overline{K}^0\pi^+\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.054^{+0.030}_{-0.014}}$ **OUR AVERAGE**					
$0.099^{+0.036}_{-0.070}$		[55] BARLAG	92C	ACCM	π^- Cu 230 GeV
$0.044^{+0.052}_{-0.013}\pm0.007$	2	[55] AGUILAR-...	87F	HYBR	πp, pp 360, 400 GeV

[55] AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

$\Gamma(\overline{K}^0\pi^+\pi^+\pi^+\pi^-\pi^-)/\Gamma_{total}$ — Γ_{72}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.0008\pm0.0007}$	[56] BARLAG	92C	ACCM	π^- Cu 230 GeV

[56] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(K^-\pi^+\pi^+\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{73}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.0020\pm0.0018}$	[57] BARLAG	92C	ACCM	π^- Cu 230 GeV

[57] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(\overline{K}^0\overline{K}^0K^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{74}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.20\pm0.09}$ **OUR AVERAGE** Error includes scale factor of 2.4.					
$0.14\pm0.04\pm0.02$	39	ALBRECHT	94I	ARG	$e^+e^-\approx$ 10 GeV
0.34 ± 0.07	70	AMMAR	91	CLEO	$e^+e^-\approx$ 10.5 GeV

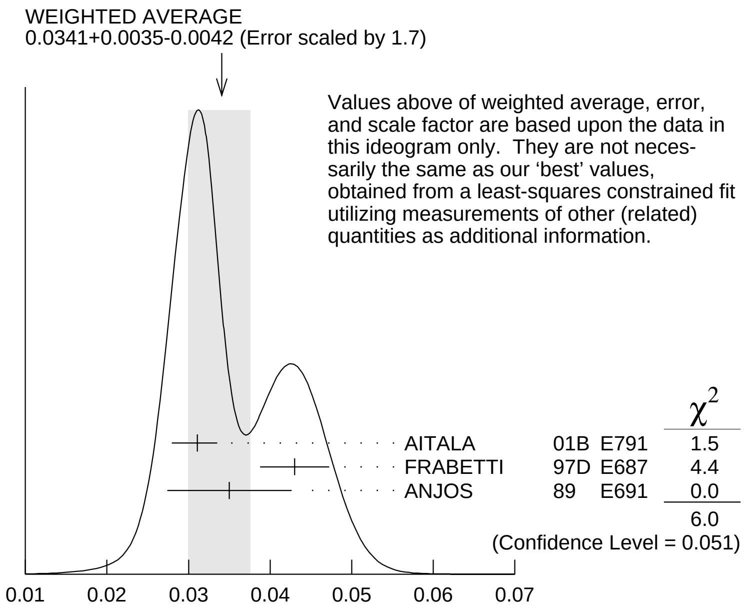
Pionic modes

$\Gamma(\pi^+\pi^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{102}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.028\pm0.006\pm0.005}$	34	SELEN	93	CLE2	$e^+e^-\approx\Upsilon(4S)$

$\Gamma(\pi^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{103}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.034\pm0.004}$ **OUR FIT** Error includes scale factor of 2.0.					
$\mathbf{0.0341^{+0.0035}_{-0.0042}}$ **OUR AVERAGE** Error includes scale factor of 1.7. See the ideogram below.					
$0.0311\pm0.0018^{+0.0016}_{-0.0026}$	1172	AITALA	01B	E791	π^- nucleus, 500 GeV
$0.043\pm0.003\pm0.003$	236	FRABETTI	97D	E687	γ Be $\approx$ 200 GeV
$0.035\pm0.007\pm0.003$	83	ANJOS	89	E691	Photoproduction
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.032\pm0.011\pm0.003$	20	ADAMOVICH	93	WA82	π^- 340 GeV
$0.042\pm0.016\pm0.010$	57	BALTRUSAIT...	85E	MRK3	e^+e^- 3.77 GeV



$\Gamma\left(\pi^+\pi^+\pi^-\right)/\Gamma\left(K^-\pi^+\pi^+\right)$

$\Gamma(\sigma\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{104}/\Gamma_{103}$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.463±0.090±0.021	[58] AITALA	01B	E791	π^- nucleus, 500 GeV

[58] See AITALA 01B for the magnitude and phase of this amplitude relative to the $\rho^0\pi^+$ amplitude.

$\Gamma(\rho^0\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{105}/\Gamma_{103}$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.336±0.032±0.022	AITALA	01B	E791	π^- nucleus, 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.289±0.055±0.058	[59] FRABETTI	97D	E687	γ Be $\approx$ 200 GeV

[59] FRABETTI 97D also includes $f_2(1270)\pi^+$ and $f_0(980)\pi^+$ modes in the fit, but the resulting decay fractions are not statistically significant.

$\Gamma(\rho^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{105}/Γ_{39}

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.015	90	ANJOS	89	E691	Photoproduction

$\Gamma(f_0(980)\pi^+ \times B(f_0 \to \pi^+\pi^-))/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{106}/\Gamma_{103}$

This includes only the $\pi^+\pi^-$ decays of the $f_0(980)$, because branching fractions of this resonance are not known.

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.062±0.013±0.004	[60] AITALA	01B	E791	π^- nucleus, 500 GeV

[60] See AITALA 01B for the magnitude and phase of this amplitude relative to the $\rho^0\pi^+$ amplitude.

$\Gamma(f_2(1270)\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{107}/\Gamma_{103}$

Unseen decay modes of the $f_2(1270)$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.343±0.044±0.007	[61] AITALA	01B	E791	π^- nucleus, 500 GeV

[61] See AITALA 01B for the magnitude and phase of this amplitude relative to the $\rho^0\pi^+$ amplitude.

$\Gamma(f_0(1370)\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{108}/\Gamma_{103}$

This includes only the $\pi^+\pi^-$ decays of the $f_0(1370)$, because branching fractions of this resonance are not known.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.023±0.015±0.008	[62] AITALA	01B	E791	π^- nucleus, 500 GeV

[62] This AITALA 01B result does not have enough statistical significance to advance it to the Summary Tables.

$\Gamma(\rho(1450)^0\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{109}/\Gamma_{103}$

This includes only the $\pi^+\pi^-$ decays of the $\rho(1450)$, because branching fractions of this resonance are not known.

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.007±0.007±0.003	[63] AITALA	01B	E791	π^- nucleus, 500 GeV

[63] This AITALA 01B result does not have enough statistical significance to advance it to the Summary Tables.

$\Gamma(\pi^+\pi^+\pi^-$ nonresonant$)/\Gamma(\pi^+\pi^+\pi^-)$ — $\Gamma_{110}/\Gamma_{103}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.078±0.060±0.027	[64] AITALA	01B	E791	π^- nucleus, 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.589±0.105±0.081	[65] FRABETTI	97D	E687	γ Be ≈ 200 GeV

[64] See AITALA 01B for the magnitude and phase of this amplitude relative to the $\rho^0\pi^+$ amplitude.

[65] FRABETTI 97D also includes $f_2(1270)\pi^+$ and $f_0(980)\pi^+$ modes in the fit, but the resulting decay fractions are not statistically significant.

$\Gamma(\pi^+\pi^+\pi^-$ nonresonant$)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{110}/Γ_{39}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.027±0.007±0.002	ANJOS	89	E691	Photoproduction

$\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{111}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$0.019^{+0.015}_{-0.012}$	[66] BARLAG	92C	ACCM	π^- Cu 230 GeV

[66] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{111}/Γ_{39}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.4	90	ANJOS	89E	E691	Photoproduction

$\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+)$ — $\Gamma_{116}/\Gamma_{140}$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.49±0.08	275	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\eta\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{116}/Γ_{39}

Unseen decay modes of the η are included.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.083±0.023±0.014		99	DAOUDI	92	CLE2	See JESSOP 98
<0.12	90		ANJOS	89E	E691	Photoproduction

$\Gamma(\omega\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{118}/Γ_{39}

Unseen decay modes of the ω are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.08	90	ANJOS	89E	E691	Photoproduction

$\Gamma(\pi^+\pi^+\pi^+\pi^-\pi^-)/\Gamma_{total}$ — Γ_{114}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.0010^{+0.0008}_{-0.0007}$	[67] BARLAG	92C	ACCM	π^- Cu 230 GeV

[67] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(\pi^+\pi^+\pi^+\pi^-\pi^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{114}/Γ_{39}

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.023±0.004±0.002		58	FRABETTI	97C	E687	γBe, $\overline{E}_\gamma \approx$ 200 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.019	90		ANJOS	89	E691	Photoproduction

$\Gamma(\eta\rho^+)/\Gamma(\phi\pi^+)$ — $\Gamma_{119}/\Gamma_{140}$

Unseen decay modes of the η are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.11	90	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\eta\rho^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{119}/Γ_{39}

Unseen decay modes of the η are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.13	90	DAOUDI	92	CLE2	See JESSOP 98

$\Gamma(\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0)/\Gamma_{total}$ — Γ_{115}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.0029^{+0.0029}_{-0.0020}}$	[68] BARLAG	92C	ACCM	π^- Cu 230 GeV

[68] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(\eta'(958)\pi^+)/\Gamma(\phi\pi^+)$ — $\Gamma_{120}/\Gamma_{140}$

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.82±0.14	126	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\eta'(958)\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{120}/Γ_{39}

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.1	90	DAOUDI	92	CLE2	See JESSOP 98
<0.1	90	ALVAREZ	91	NA14	Photoproduction
<0.13	90	ANJOS	91B	E691	γ Be, $\overline{E}_\gamma \approx$ 145 GeV

$\Gamma(\eta'(958)\rho^+)/\Gamma(\phi\pi^+)$ — $\Gamma_{121}/\Gamma_{140}$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.86	90	JESSOP	98	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\eta'(958)\rho^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{121}/Γ_{39}

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.17	90	DAOUDI	92	CLE2	See JESSOP 98

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

$\Gamma(K^+\overline{K}^0)/\Gamma(\overline{K}^0\pi^+)$ — Γ_{122}/Γ_{38}

It is generally assumed for modes such as $D^+ \rightarrow \overline{K}^0\pi^+$ that

$$\Gamma(D^+ \rightarrow \overline{K}^0\pi^+) = 2\Gamma(D^+ \rightarrow K^0_S\pi^+);$$

it is the latter Γ that is actually measured. BIGI 95 points out that interference between Cabibbo-allowed and doubly Cabibbo-suppressed amplitudes, where both occur, could invalidate this assumption by a few percent.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.255±0.029 OUR FIT					
0.263±0.035 OUR AVERAGE					
0.25 ±0.04 ±0.02	129	FRABETTI	95	E687	γ Be $\overline{E}_\gamma \approx$ 200 GeV
0.271±0.065±0.039	69	ANJOS	90C	E691	γ Be
0.317±0.086±0.048	31	BALTRUSAIT...	85E	MRK3	e^+e^- 3.77 GeV
0.25 ±0.15	6	SCHINDLER	81	MRK2	e^+e^- 3.771 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.222±0.041±0.029	70	[69] BISHAI	97	CLE2	$e^+e^- \approx \Upsilon(4S)$

[69] This BISHAI 97 result is redundant with results elsewhere in the Listings.

$\Gamma(K^+\overline{K}^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{122}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.082±0.010 OUR FIT					
0.077±0.014±0.007	70	[70] BISHAI	97	CLE2	$e^+e^- \approx \Upsilon(4S)$

[70] See BISHAI 97 for an isospin analysis of $D^+ \rightarrow K\overline{K}$ amplitudes.

$\Gamma(K^+K^-\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{123}/Γ_{39}

VALUE	DOCUMENT ID		TECN	COMMENT
0.097 ±0.006 OUR AVERAGE				
0.093 ±0.010 $^{+0.008}_{-0.006}$	JUN	00	SELX	Σ^- nucleus, 600 GeV
0.0976±0.0042±0.0046	FRABETTI	95B	E687	Dalitz plot analysis

$\Gamma(\phi\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{140}/Γ_{39}

Unseen decay modes of the ϕ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.068±0.005 OUR AVERAGE					
0.058±0.006±0.006		FRABETTI	95B	E687	Dalitz plot analysis
0.062±0.017±0.006	19	ADAMOVICH	93	WA82	π^- 340 GeV
0.077±0.011±0.005	128	DAOUDI	92	CLE2	$e^+e^- \approx$ 10.5 GeV
0.098±0.032±0.014	12	ALVAREZ	90C	NA14	Photoproduction
0.071±0.008±0.007	84	ANJOS	88	E691	Photoproduction
0.084±0.021±0.011	21	BALTRUSAIT...	85E	MRK3	e^+e^- 3.77 GeV

$\Gamma(K^+\overline{K}^*(892)^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{144}/Γ_{39}

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.047±0.005 OUR AVERAGE	Error includes scale factor of 1.2.				
0.044±0.003±0.004		[71] FRABETTI	95B	E687	Dalitz plot analysis
0.058±0.009±0.006	73	ANJOS	88	E691	Photoproduction
0.048±0.021±0.011	14	BALTRUSAIT...	85E	MRK3	e^+e^- 3.77 GeV

[71] See FRABETTI 95B for evidence also of $\overline{K}^*_0(1430)^0 K^+$ in the $D^+ \rightarrow K^+K^-\pi^+$ Dalitz plot.

$\Gamma(K^+K^-\pi^+ \text{ nonresonant})/\Gamma(K^-\pi^+\pi^+)$ — Γ_{126}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.050±0.009 OUR AVERAGE					
0.049±0.008±0.006	95	ANJOS	88	E691	Photoproduction
0.059±0.026±0.009	37	BALTRUSAIT...	85E	MRK3	e^+e^- 3.77 GeV

$\Gamma(K^*(892)^+\overline{K}^0)/\Gamma(\overline{K}^0\pi^+)$ — Γ_{145}/Γ_{38}

Unseen decay modes of the $K^*(892)^+$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.3±0.4	67	FRABETTI	95	E687	γ Be $\overline{E}_\gamma \approx$ 200 GeV

$\Gamma(\phi\pi^+\pi^0)/\Gamma_{total}$ — Γ_{141}/Γ

Unseen decay modes of the ϕ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.023±0.010	[72] BARLAG	92C	ACCM	π^- Cu 230 GeV

[72] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(\phi\pi^+\pi^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{141}/Γ_{39}

Unseen decay modes of the ϕ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.58	90	ALVAREZ	90C	NA14	Photoproduction
<0.28	90	ANJOS	89E	E691	Photoproduction

$\Gamma(\phi\rho^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{142}/Γ_{39}

Unseen decay modes of the ϕ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.16	90	DAOUDI	92	CLE2	$e^+e^- \approx$ 10.5 GeV

$\Gamma(K^+K^-\pi^+\pi^0 \text{ non-}\phi)/\Gamma_{total}$ — Γ_{132}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$0.015^{+0.007}_{-0.006}$	[73] BARLAG	92C	ACCM	π^- Cu 230 GeV

[73] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(K^+K^-\pi^+\pi^0 \text{ non-}\phi)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{132}/Γ_{39}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.25	90	ANJOS	89E	E691	Photoproduction

$\Gamma(K^+\overline{K}^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{133}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	90	ALBRECHT	92B	ARG	$e^+e^- \simeq$ 10.4 GeV

$\Gamma(K^0K^-\pi^+\pi^+)/\Gamma_{total}$ — Γ_{134}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.01 ±0.005±0.003	ALBRECHT	92B	ARG	$e^+e^- \simeq$ 10.4 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.003	[74] BARLAG	92C	ACCM	π^- Cu 230 GeV

[74] BARLAG 92C computes the branching fraction using topological normalization.

$\Gamma(K^*(892)^+\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{146}/Γ

Unseen decay modes of the $K^*(892)$'s are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.026±0.008±0.007	ALBRECHT	92B	ARG	$e^+e^- \simeq$ 10.4 GeV

$\Gamma(K^0K^-\pi^+\pi^+ \text{ non-}K^{*+}\overline{K}^{*0})/\Gamma_{total}$ — Γ_{136}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0079	90	ALBRECHT	92B	ARG	$e^+e^- \simeq$ 10.4 GeV

$\Gamma(\phi\pi^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{143}/Γ

Unseen decay modes of the ϕ are included.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.002	90	0	ANJOS	88	E691	Photoproduction

$\Gamma(\phi\pi^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{143}/Γ_{39}

Unseen decay modes of the ϕ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.031	90	ALVAREZ	90C	NA14	Photoproduction

$\Gamma(\phi\pi^+\pi^+\pi^-)/\Gamma(\phi\pi^+)$ — $\Gamma_{143}/\Gamma_{140}$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.6	90	FRABETTI	92	E687	γ Be

$\Gamma(K^+K^-\pi^+\pi^+\pi^-$ nonresonant$)/\Gamma_{total}$ — Γ_{139}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.03	90	12	ANJOS	88	E691	Photoproduction

Rare or forbidden modes

$\Gamma(K^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{147}/Γ_{39}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0075±0.0016 OUR AVERAGE					
0.0077±0.0017±0.0008	59	AITALA	97C	E791	π^- nucleus, 500 GeV
0.0072±0.0023±0.0017	21	FRABETTI	95E	E687	γBe, $\overline{E}_\gamma$= 220 GeV

$\Gamma(K^+\rho^0)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{148}/\Gamma_{147}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.37±0.14±0.07	AITALA	97C	E791	π^- nucleus, 500 GeV

$\Gamma(K^+\rho^0)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{148}/Γ_{39}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0067	90	FRABETTI	95E	E687	γBe, $\overline{E}_\gamma$= 220 GeV

$\Gamma(K^*(892)^0\pi^+)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{149}/\Gamma_{147}$

Unseen decay modes of the $K^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.53±0.21±0.02	AITALA	97C	E791	π^- nucleus, 500 GeV

$\Gamma(K^*(892)^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{149}/Γ_{39}

Unseen decay modes of the $K^*(892)^0$ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0021	90	FRABETTI	95E	E687	γBe, $\overline{E}_\gamma$= 220 GeV

$\Gamma(K^+\pi^+\pi^-$ nonresonant$)/\Gamma(K^+\pi^+\pi^-)$ — $\Gamma_{150}/\Gamma_{147}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.36±0.14±0.07	AITALA	97C	E791	π^- nucleus, 500 GeV

$\Gamma(K^+K^+K^-)/\Gamma(K^-\pi^+\pi^+)$ — Γ_{151}/Γ_{39}

A doubly Cabibbo-suppressed decay with no simple spectator process possible.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.0016	90		[75] FRABETTI	95F	E687	γBe, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.057 ±0.020±0.007		13	ADAMOVICH	93	WA82	π^- 340 GeV

[75] Using the $\phi\pi^+$ mode to normalize, FRABETTI 95F gets $\Gamma(K^+K^+K^-)/\Gamma(\phi\pi^+) <$ 0.025.

$\Gamma(\phi K^+)/\Gamma(\phi\pi^+)$ — $\Gamma_{152}/\Gamma_{140}$

A doubly Cabibbo-suppressed decay with no simple spectator process possible.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.021	90		FRABETTI	95F	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$0.058^{+0.032}_{-0.026}\pm0.007$		4	[76] ANJOS	92D	E691	γ Be, $\overline{E}_\gamma$ = 145 GeV

[76] The evidence of ANJOS 92D is a small excess of events $(4.5^{+2.4}_{-2.0})$.

$\Gamma(\pi^+ e^+ e^-)/\Gamma_{total}$ — Γ_{153}/Γ

A test for the $\Delta C = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{<5.2\times10^{-5}}$	90		AITALA	99G	E791	$\pi^- N$ 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<1.1\times10^{-4}$	90		FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<6.6\times10^{-5}$	90		AITALA	96	E791	$\pi^- N$ 500 GeV
$<2.5\times10^{-3}$	90		WEIR	90B	MRK2	e^+e^- 29 GeV
$<2.6\times10^{-3}$	90	39	HAAS	88	CLEO	e^+e^- 10 GeV

$\Gamma(\pi^+ \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{154}/Γ

A test for the $\Delta C = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{<1.5\times10^{-5}}$	90		AITALA	99G	E791	$\pi^- N$ 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<8.9\times10^{-5}$	90		FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<1.8\times10^{-5}$	90		AITALA	96	E791	$\pi^- N$ 500 GeV
$<2.2\times10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV
$<5.9\times10^{-3}$	90		WEIR	90B	MRK2	e^+e^- 29 GeV
$<2.9\times10^{-3}$	90	36	HAAS	88	CLEO	e^+e^- 10 GeV

$\Gamma(\rho^+ \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{155}/Γ

A test for the $\Delta C = 1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{<5.6\times10^{-4}}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^+ e^+ e^-)/\Gamma_{total}$ — Γ_{156}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<2.0\times10^{-4}}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
$\mathbf{<2.0\times10^{-4}}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.8\times10^{-3}$	90	WEIR	90B	MRK2	e^+e^- 29 GeV

$\Gamma(K^+\mu^+\mu^-)/\Gamma_{\text{total}}$ Γ_{157}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<4.4 × 10⁻⁵	90		AITALA	99G	E791	π^- N 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<9.7 \times 10^{-5}$	90		FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<3.2 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV
$<9.2 \times 10^{-3}$	90		WEIR	90B	MRK2	e^+e^- 29 GeV

$\Gamma(\pi^+e^\pm\mu^\mp)/\Gamma_{\text{total}}$ Γ_{158}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.4 \times 10^{-5}$	90	AITALA	99G	E791	π^- N 500 GeV

$\Gamma(\pi^+e^+\mu^-)/\Gamma_{\text{total}}$ Γ_{159}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.1 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<3.3 \times 10^{-3}$	90	WEIR	90B	MRK2	e^+e^- 29 GeV

$\Gamma(\pi^+e^-\mu^+)/\Gamma_{\text{total}}$ Γ_{160}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<3.3 \times 10^{-3}$	90	WEIR	90B	MRK2	e^+e^- 29 GeV

$\Gamma(K^+e^\pm\mu^\mp)/\Gamma_{\text{total}}$ Γ_{161}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.8 \times 10^{-5}$	90	AITALA	99G	E791	π^- N 500 GeV

$\Gamma(K^+e^+\mu^-)/\Gamma_{\text{total}}$ Γ_{162}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<3.4 \times 10^{-3}$	90	WEIR	90B	MRK2	e^+e^- 29 GeV

$\Gamma(K^+e^-\mu^+)/\Gamma_{\text{total}}$ Γ_{163}/Γ

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<3.4 \times 10^{-3}$	90	WEIR	90B	MRK2	e^+e^- 29 GeV

$\Gamma(\pi^- e^+ e^+)/\Gamma_{total}$ — Γ_{164}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9.6 \times 10^{-5}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.1 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<4.8 \times 10^{-3}$	90	WEIR	90B	MRK2	$e^+ e^-$ 29 GeV

$\Gamma(\pi^- \mu^+ \mu^+)/\Gamma_{total}$ — Γ_{165}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-5}$	90		AITALA	99G	E791	$\pi^- N$ 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<8.7 \times 10^{-5}$	90		FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<2.2 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV
$<6.8 \times 10^{-3}$	90		WEIR	90B	MRK2	$e^+ e^-$ 29 GeV

$\Gamma(\pi^- e^+ \mu^+)/\Gamma_{total}$ — Γ_{166}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.0 \times 10^{-5}$	90	AITALA	99G	E791	$\pi^- N$ 500 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.1 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
$<3.7 \times 10^{-3}$	90	WEIR	90B	MRK2	$e^+ e^-$ 29 GeV

$\Gamma(\rho^- \mu^+ \mu^+)/\Gamma_{total}$ — Γ_{167}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<5.6 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$\Gamma(K^- e^+ e^+)/\Gamma_{total}$ — Γ_{168}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-4}$	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<9.1 \times 10^{-3}$	90	WEIR	90B	MRK2	$e^+ e^-$ 29 GeV

$\Gamma(K^- \mu^+ \mu^+)/\Gamma_{total}$ — Γ_{169}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-4}$	90		FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<3.2 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV
$<4.3 \times 10^{-3}$	90		WEIR	90B	MRK2	$e^+ e^-$ 29 GeV

$\Gamma(K^- e^+ \mu^+)/\Gamma_{total}$ — Γ_{170}/Γ

A test of lepton-number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10⁻⁴	90	FRABETTI	97B	E687	γ Be, $\overline{E}_\gamma \approx$ 220 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.0 \times 10^{-3}$	90	WEIR	90B	MRK2	$e^+ e^-$ 29 GeV

$\Gamma(K^*(892)^- \mu^+ \mu^+)/\Gamma_{total}$ — Γ_{171}/Γ

A test of lepton-number conservation.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<8.5 \times 10^{-4}$	90	0	KODAMA	95	E653	π^- emulsion 600 GeV

$D^\pm$ CP-VIOLATING DECAY-RATE ASYMMETRIES

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

This is the difference between D^+ and D^- partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.002±0.011 OUR AVERAGE					
+0.006±0.011±0.005	14k	[77] LINK	00B	FOCS	
−0.014±0.029		[77] AITALA	97B	E791	$-0.062 < A_{CP} < +0.034$ (90% CL)
−0.031±0.068		[77] FRABETTI	94I	E687	$-0.14 < A_{CP} < +0.081$ (90% CL)

[77] FRABETTI 94I, AITALA 98C, and LINK 00B measure $N(D^+ \to K^- K^+ \pi^+)/N(D^+ \to K^- \pi^+ \pi^+)$, the ratio of numbers of events observed, and similarly for the D^-.

$A_{CP}(K^\pm K^{*0})$ in $D^+ \to K^+ \overline{K}^{*0}$, $D^- \to K^- K^{*0}$

This is the difference between D^+ and D^- partial widths for these modes divided by the sum of the widths.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.02 ±0.05 OUR AVERAGE				
−0.010±0.050	[78] AITALA	97B	E791	$-0.092 < A_{CP} < +0.072$ (90% CL)
−0.12 ±0.13	[78] FRABETTI	94I	E687	$-0.33 < A_{CP} < +0.094$ (90% CL)

[78] FRABETTI 94I and AITALA 97B measure $N(D^+ \to K^+ \overline{K}^*(892)^0)/N(D^+ \to K^- \pi^+ \pi^+)$, the ratio of numbers of events observed, and similarly for the D^-.

$A_{CP}(\phi \pi^\pm)$ in $D^\pm \to \phi \pi^\pm$

This is the difference between D^+ and D^- partial widths for these modes divided by the sum of the widths.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.014±0.033 OUR AVERAGE				
−0.028±0.036	[79] AITALA	97B	E791	$-0.087 < A_{CP} < +0.031$ (90% CL)
+0.066±0.086	[79] FRABETTI	94I	E687	$-0.075 < A_{CP} < +0.21$ (90% CL)

[79] FRABETTI 94I and AITALA 97B measure $N(D^+ \to \phi \pi^+)/N(D^+ \to K^- \pi^+ \pi^+)$, the ratio of numbers of events observed, and similarly for the D^-.

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

This is the difference between D^+ and D^- partial widths for these modes divided by the sum of the widths.

VALUE	DOCUMENT ID		TECN	COMMENT
−0.017±0.042	[80] AITALA	97B	E791	$-0.086 < A_{CP} < +0.052$ (90% CL)

[80] AITALA 97B measure $N(D^+ \to \pi^+\pi^-\pi^+)/N(D^+ \to K^-\pi^+\pi^+)$, the ratio of numbers of events observed, and similarly for the D^-.

$D^\pm$ PRODUCTION CROSS SECTION AT $\psi(3770)$

A compilation of the cross sections for the direct production of $D^\pm$ mesons at or near the $\psi(3770)$ peak in e^+e^- production.

VALUE (nanobarns)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4.2 \pm 0.6 \pm 0.3$	[81] ADLER	88C	MRK3	e^+e^- 3.768 GeV
5.5 ± 1.0	[82] PARTRIDGE	84	CBAL	e^+e^- 3.771 GeV
$6.00 \pm 0.72 \pm 1.02$	[83] SCHINDLER	80	MRK2	e^+e^- 3.771 GeV
9.1 ± 2.0	[84] PERUZZI	77	MRK1	e^+e^- 3.774 GeV

[81] This measurement compares events with one detected D to those with two detected D mesons, to determine the the absolute cross section. ADLER 88C measure the ratio of cross sections (neutral to charged) to be $1.36 \pm 0.23 \pm 0.14$. This measurement does not include the decays of the $\psi(3770)$ not associated with charmed particle production.

[82] This measurement comes from a scan of the $\psi(3770)$ resonance and a fit to the cross section. PARTRIDGE 84 measures 6.4 ± 1.15 nb for the cross section. We take the phase space division of neutral and charged D mesons in $\psi(3770)$ decay to be 1.33, and we assume that the $\psi(3770)$ is an isosinglet to evaluate the cross sections. The noncharm decays (e.g. radiative) of the $\psi(3770)$ are included in this measurement and may amount to a few percent correction.

[83] This measurement comes from a scan of the $\psi(3770)$ resonance and a fit to the cross section. SCHINDLER 80 assume the phase space division of neutral and charged D mesons in $\psi(3770)$ decay to be 1.33, and that the $\psi(3770)$ is an isosinglet. The noncharm decays (e.g. radiative) of the $\psi(3770)$ are included in this measurement and may amount to a few percent correction.

[84] This measurement comes from a scan of the $\psi(3770)$ resonance and a fit to the cross section. The phase space division of neutral and charged D mesons in $\psi(3770)$ decay is taken to be 1.33, and $\psi(3770)$ is assumed to be an isosinglet. The noncharm decays (e.g. radiative) of the $\psi(3770)$ are included in this measurement and may amount to a few percent correction. We exclude this measurement from the average because of uncertainties in the contamination from τ lepton pairs. Also see RAPIDIS 77.

$D^+ \to \overline{K}^*(892)^0 \ell^+ \nu_\ell$ FORM FACTORS

$r_v \equiv V(0)/A_1(0)$ in $D^+ \to \overline{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.82±0.09 OUR AVERAGE					
$1.45 \pm 0.23 \pm 0.07$	763	ADAMOVICH	99	BEAT	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$1.90 \pm 0.11 \pm 0.09$	3000	[85] AITALA	98B	E791	$\overline{K}^*(892)^0 e^+ \nu_e$
$1.84 \pm 0.11 \pm 0.09$	3034	AITALA	98F	E791	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$1.74 \pm 0.27 \pm 0.28$	874	FRABETTI	93E	E687	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$2.00^{+0.34}_{-0.32} \pm 0.16$	305	KODAMA	92	E653	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$2.0 \pm 0.6 \pm 0.3$	183	ANJOS	90E	E691	$\overline{K}^*(892)^0 e^+ \nu_e$

[85] This is slightly different from the AITALA 98B value: see ref. [5] in AITALA 98F.

$r_2 \equiv A_2(0)/A_1(0)$ in $D^+ \to \overline{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.07 OUR AVERAGE					
1.00±0.15±0.03	763	ADAMOVICH	99	BEAT	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
0.71±0.08±0.09	3000	AITALA	98B	E791	$\overline{K}^*(892)^0 e^+ \nu_e$
0.75±0.08±0.09	3034	AITALA	98F	E791	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
0.78±0.18±0.10	874	FRABETTI	93E	E687	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$0.82^{+0.22}_{-0.23}\pm0.11$	305	KODAMA	92	E653	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
0.0 ±0.5 ±0.2	183	ANJOS	90E	E691	$\overline{K}^*(892)^0 e^+ \nu_e$

$r_3 \equiv A_3(0)/A_1(0)$ in $D^+ \to \overline{K}^*(892)^0 \ell^+ \nu_\ell$

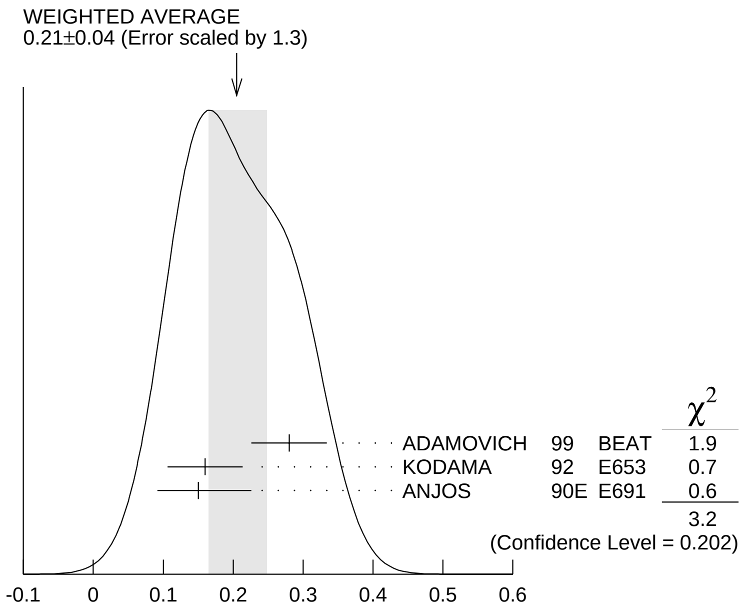
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.04±0.33±0.29	3034	AITALA	98F	E791	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$

Γ_L/Γ_T in $D^+ \to \overline{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.14±0.08 OUR AVERAGE					
1.09±0.10±0.02	763	ADAMOVICH	99	BEAT	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
1.20±0.13±0.13	874	FRABETTI	93E	E687	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
1.18±0.18±0.08	305	KODAMA	92	E653	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$1.8\ ^{+0.6}_{-0.4}\ \pm0.3$	183	ANJOS	90E	E691	$\overline{K}^*(892)^0 e^+ \nu_e$

Γ_+/Γ_- in $D^+ \to \overline{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.21±0.04 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
0.28±0.05±0.02	763	ADAMOVICH	99	BEAT	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
0.16±0.05±0.02	305	KODAMA	92	E653	$\overline{K}^*(892)^0 \mu^+ \nu_\mu$
$0.15^{+0.07}_{-0.05}\pm0.03$	183	ANJOS	90E	E691	$\overline{K}^*(892)^0 e^+ \nu_e$



Γ_+/Γ_- in $D^+ \rightarrow \overline{K}^*(892)^0 \ell^+ \nu_\ell$

$D^\pm$ REFERENCES

AITALA	01B	PRL 86 770	E.M. Aitala *et al.*	(FNAL E791 Collab.)
ABREU	00O	EPJ C12 209	P. Abreu *et al.*	(DELPHI Collab.)
ASTIER	00D	PL B486 35	P. Astier *et al.*	(CERN NOMAD Collab.)
BAI	00C	PR D62 052001	J.Z. Bai *et al.*	(BEPC BES Collab.)
JUN	00	PRL 84 1857	S.Y. Jun *et al.*	(FNAL SELEX Collab.)
LINK	00B	PL B491 232	J.M. Link *et al.*	(FNAL FOCUS Collab.)
Also	00D	PL B495 443 (errata)	J.M. Link *et al.*	(FNAL FOCUS Collab.)
PDG	00	EPJ C15 1	D.E. Groom *et al.*	
ABBIENDI	99K	EPJ C8 573	G. Abbiendi *et al.*	(OPAL Collab.)
ABE	99P	PR D60 092005	F. Abe *et al.*	(CDF Collab.)
ADAMOVICH	99	EPJ C6 35	M. Adamovich *et al.*	(CERN BEATRICE Collab.)
AITALA	99G	PL B462 401	E.M. Aitala *et al.*	(FNAL E791 Collab.)
BONVICINI	99	PRL 82 4586	G. Bonvicini *et al.*	(CLEO Collab.)
AITALA	98B	PRL 80 1393	E.M. Aitala *et al.*	(FNAL E791 Collab.)
AITALA	98C	PL B421 405	E.M. Aitala *et al.*	(FNAL E791 Collab.)
AITALA	98F	PL B440 435	E.M. Aitala *et al.*	(FNAL E791 Collab.)
BAI	98B	PL B429 188	J.Z. Bai *et al.*	(BEPC BES Collab.)
JESSOP	98	PR D58 052002	C.P. Jessop *et al.*	(CLEO Collab.)
AITALA	97	PL B397 325	E.M. Aitala *et al.*	(FNAL E791 Collab.)
AITALA	97B	PL B403 377	E.M. Aitala *et al.*	(FNAL E791 Collab.)
AITALA	97C	PL B404 187	E.M. Aitala *et al.*	(FNAL E791 Collab.)
BARTELT	97	PL B405 373	J. Bartelt *et al.*	(CLEO Collab.)
BISHAI	97	PRL 78 3261	M. Bishai *et al.*	(CLEO Collab.)
FRABETTI	97	PL B391 235	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	97B	PL B398 239	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	97C	PL B401 131	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	97D	PL B407 79	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
AITALA	96	PRL 76 364	E.M. Aitala *et al.*	(FNAL E791 Collab.)
ALBRECHT	96C	PL B374 249	H. Albrecht *et al.*	(ARGUS Collab.)
BIGI	95	PL B349 363	I.I. Bigi, H. Yamamoto	(NDAM, HARV)
FRABETTI	95	PL B346 199	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	95B	PL B351 591	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	95E	PL B359 403	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	95F	PL B363 259	P.L. Frabetti *et al.*	(FNAL E687 Collab.)

KODAMA	95	PL B345 85	K. Kodama *et al.*	(FNAL E653 Collab.)
ALBRECHT	94I	ZPHY C64 375	H. Albrecht *et al.*	(ARGUS Collab.)
ALEEV	94	PAN 57 1370	A.N. Aleev *et al.*	(Serpukhov BIS-2 Collab.)
		Translated from YF 57 1443.		
BALEST	94	PRL 72 2328	R. Balest *et al.*	(CLEO Collab.)
FRABETTI	94D	PL B323 459	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	94G	PL B331 217	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	94I	PR D50 R2953	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ABE	93E	PL B313 288	K. Abe *et al.*	(VENUS Collab.)
ADAMOVICH	93	PL B305 177	M.I. Adamovich *et al.*	(CERN WA82 Collab.)
AKERIB	93	PRL 71 3070	D.S. Akerib *et al.*	(CLEO Collab.)
ALAM	93	PRL 71 1311	M.S. Alam *et al.*	(CLEO Collab.)
ANJOS	93	PR D48 56	J.C. Anjos *et al.*	(FNAL E691 Collab.)
BEAN	93C	PL B317 647	A. Bean *et al.*	(CLEO Collab.)
FRABETTI	93E	PL B307 262	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
KODAMA	93B	PL B313 260	K. Kodama *et al.*	(FNAL E653 Collab.)
KODAMA	93C	PL B316 455	K. Kodama *et al.*	(FNAL E653 Collab.)
SELEN	93	PRL 71 1973	M.A. Selen *et al.*	(CLEO Collab.)
ALBRECHT	92B	ZPHY C53 361	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	92F	PL B278 202	H. Albrecht *et al.*	(ARGUS Collab.)
ANJOS	92	PR D45 R2177	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	92C	PR D46 1941	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	92D	PRL 69 2892	J.C. Anjos *et al.*	(FNAL E691 Collab.)
BARLAG	92C	ZPHY C55 383	S. Barlag *et al.*	(ACCMOR Collab.)
Also	90D	ZPHY C48 29	S. Barlag *et al.*	(ACCMOR Collab.)
COFFMAN	92B	PR D45 2196	D.M. Coffman *et al.*	(Mark III Collab.)
DAOUDI	92	PR D45 3965	M. Daoudi *et al.*	(CLEO Collab.)
FRABETTI	92	PL B281 167	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
KODAMA	92	PL B274 246	K. Kodama *et al.*	(FNAL E653 Collab.)
KODAMA	92C	PL B286 187	K. Kodama *et al.*	(FNAL E653 Collab.)
ADAMOVICH	91	PL B268 142	M.I. Adamovich *et al.*	(WA82 Collab.)
ALBRECHT	91	PL B255 634	H. Albrecht *et al.*	(ARGUS Collab.)
ALVAREZ	91	PL B255 639	M.P. Alvarez *et al.*	(CERN NA14/2 Collab.)
ALVAREZ	91B	ZPHY C50 11	M.P. Alvarez *et al.*	(CERN NA14/2 Collab.)
AMMAR	91	PR D44 3383	R. Ammar *et al.*	(CLEO Collab.)
ANJOS	91B	PR D43 R2063	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	91C	PRL 67 1507	J.C. Anjos *et al.*	(FNAL-TPS Collab.)
BAI	91	PRL 66 1011	Z. Bai *et al.*	(Mark III Collab.)
COFFMAN	91	PL B263 135	D.M. Coffman *et al.*	(Mark III Collab.)
FRABETTI	91	PL B263 584	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ALVAREZ	90	ZPHY C47 539	M.P. Alvarez *et al.*	(CERN NA14/2 Collab.)
ALVAREZ	90C	PL B246 261	M.P. Alvarez *et al.*	(CERN NA14/2 Collab.)
ANJOS	90C	PR D41 2705	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	90D	PR D42 2414	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	90E	PRL 65 2630	J.C. Anjos *et al.*	(FNAL E691 Collab.)
BARLAG	90C	ZPHY C46 563	S. Barlag *et al.*	(ACCMOR Collab.)
WEIR	90B	PR D41 1384	A.J. Weir *et al.*	(Mark II Collab.)
ANJOS	89	PRL 62 125	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	89B	PRL 62 722	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ANJOS	89E	PL B223 267	J.C. Anjos *et al.*	(FNAL E691 Collab.)
ADLER	88B	PRL 60 1375	J. Adler *et al.*	(Mark III Collab.)
ADLER	88C	PRL 60 89	J. Adler *et al.*	(Mark III Collab.)
ALBRECHT	88I	PL B210 267	H. Albrecht *et al.*	(ARGUS Collab.)
ANJOS	88	PRL 60 897	J.C. Anjos *et al.*	(FNAL E691 Collab.)
AOKI	88	PL B209 113	S. Aoki *et al.*	(WA75 Collab.)
HAAS	88	PRL 60 1614	P. Haas *et al.*	(CLEO Collab.)
ONG	88	PRL 60 2587	R.A. Ong *et al.*	(Mark II Collab.)
RAAB	88	PR D37 2391	J.R. Raab *et al.*	(FNAL E691 Collab.)
ADAMOVICH	87	EPL 4 887	M.I. Adamovich *et al.*	
ADLER	87	PL B196 107	J. Adler *et al.*	(Mark III Collab.)
AGUILAR-...	87D	PL B193 140	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
Also	88B	ZPHY C40 321	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
AGUILAR-...	87E	ZPHY C36 551	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
Also	88B	ZPHY C40 321	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
AGUILAR-...	87F	ZPHY C36 559	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
Also	88	ZPHY C38 520 erratum	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
BARLAG	87B	ZPHY C37 17	S. Barlag *et al.*	(ACCMOR Collab.)
BARTEL	87	ZPHY C33 339	W. Bartel *et al.*	(JADE Collab.)

CSORNA	87	PL B191 318	S.E. Csorna *et al.*	(CLEO Collab.)
PALKA	87B	ZPHY C35 151	H. Palka *et al.*	(ACCMOR Collab.)
ABE	86	PR D33 1	K. Abe *et al.*	
AGUILAR-...	86B	ZPHY C31 491	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
BALTRUSAIT...	86E	PRL 56 2140	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
PAL	86	PR D33 2708	T. Pal *et al.*	(DELCO Collab.)
AIHARA	85	ZPHY C27 39	H. Aihara *et al.*	(TPC Collab.)
BALTRUSAIT...	85B	PRL 54 1976	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
BALTRUSAIT...	85E	PRL 55 150	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
BARTEL	85J	PL 163B 277	W. Bartel *et al.*	(JADE Collab.)
ADAMOVICH	84	PL 140B 119	M.I. Adamovich *et al.*	(CERN WA58 Collab.)
ALTHOFF	84G	ZPHY C22 219	M. Althoff *et al.*	(TASSO Collab.)
ALTHOFF	84J	PL 146B 443	M. Althoff *et al.*	(TASSO Collab.)
DERRICK	84	PRL 53 1971	M. Derrick *et al.*	(HRS Collab.)
KOOP	84	PRL 52 970	D.E. Koop *et al.*	(DELCO Collab.)
PARTRIDGE	84	Thesis CALT-68-1150	R.A. Partridge	(Crystal Ball Collab.)
AGUILAR-...	83B	PL 123B 98	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
AUBERT	83	NP B213 31	J.J. Aubert *et al.*	(EMC Collab.)
PARTRIDGE	81	PRL 47 760	R. Partridge *et al.*	(Crystal Ball Collab.)
SCHINDLER	81	PR D24 78	R.H. Schindler *et al.*	(Mark II Collab.)
TRILLING	81	PRPL 75 57	G.H. Trilling	(LBL, UCB) J
BACINO	80	PRL 45 329	W.J. Bacino *et al.*	(DELCO Collab.)
SCHINDLER	80	PR D21 2716	R.H. Schindler *et al.*	(Mark II Collab.)
ZHOLENTZ	80	PL 96B 214	A.A. Zholents *et al.*	(NOVO)
Also	81	SJNP 34 814	A.A. Zholents *et al.*	(NOVO)
		Translated from YAF 34 1471.		
BACINO	79	PRL 43 1073	W.J. Bacino *et al.*	(DELCO Collab.)
BRANDELIK	79	PL 80B 412	R. Brandelik *et al.*	(DASP Collab.)
FELLER	78	PRL 40 274	J.M. Feller *et al.*	(Mark I Collab.)
VUILLEMIN	78	PRL 41 1149	V. Vuillemin *et al.*	(Mark I Collab.)
GOLDHABER	77	PL 69B 503	G. Goldhaber *et al.*	(Mark I Collab.)
PERUZZI	77	PRL 39 1301	I. Peruzzi *et al.*	(Mark I Collab.)
PICCOLO	77	PL 70B 260	M. Piccolo *et al.*	(Mark I Collab.)
RAPIDIS	77	PRL 39 526	P.A. Rapidis *et al.*	(Mark I Collab.)
PERUZZI	76	PRL 37 569	I. Peruzzi *et al.*	(Mark I Collab.)

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