CHARMED MESONS ($C = \pm 1$)

$D^+ = c\overline{d}$, $D^0 = c\overline{u}$, $\overline{D}^0 = \overline{c}u$, $D^- = \overline{c}d$, similarly for D^*'s

$D^\pm$

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

Mass $m = 1869.60 \pm 0.16$ MeV (S = 1.1)
Mean life $\tau = (1040 \pm 7) \times 10^{-15}$ s
$c\tau = 311.8$ μm

c-quark decays

$\Gamma(c \to \ell^+ \text{anything})/\Gamma(c \to \text{anything}) = 0.096 \pm 0.004$ [a]
$\Gamma(c \to D^*(2010)^+ \text{anything})/\Gamma(c \to \text{anything}) = 0.255 \pm 0.017$

CP-violation decay-rate asymmetries

$A_{CP}(\mu^\pm \nu) = 0.08 \pm 0.08$
$A_{CP}(K^0_S \pi^\pm) = -0.009 \pm 0.009$
$A_{CP}(K^\mp 2\pi^\pm) = -0.005 \pm 0.010$
$A_{CP}(K^\mp \pi^\pm \pi^\pm \pi^0) = 0.010 \pm 0.013$
$A_{CP}(K^0_S \pi^\pm \pi^0) = 0.003 \pm 0.009$
$A_{CP}(K^0_S \pi^\pm \pi^+ \pi^-) = 0.001 \pm 0.013$
$A_{CP}(K^0_S K^\pm) = 0.07 \pm 0.06$
$A_{CP}(K^+ K^- \pi^\pm) = (0.3 \pm 0.6)\%$
$A_{CP}(K^\pm K^{*0}) = (0.1 \pm 1.3)\%$
$A_{CP}(\phi\pi^\pm) = (-0.9 \pm 1.1)\%$
$A_{CP}(K^\pm K^*_0(1430)^0) = (8^{+7}_{-6})\%$
$A_{CP}(K^\pm K^*_2(1430)^0) = (43^{+20}_{-26})\%$
$A_{CP}(K^\pm K^*_0(800)) = (-12^{+18}_{-13})\%$
$A_{CP}(a_0(1450)^0 \pi^\pm) = (-19^{+14}_{-16})\%$
$A_{CP}(\phi(1680)\pi^\pm) = (-9 \pm 26)\%$
$A_{CP}(\pi^+ \pi^- \pi^\pm) = -0.02 \pm 0.04$
$A_{CP}(K^0_S K^\pm \pi^+ \pi^-) = -0.04 \pm 0.07$

T-violation decay-rate asymmetry

$A_T(K^0_S K^\pm \pi^+ \pi^-) = 0.02 \pm 0.07$

D^+ form factors

$f_+(0)|V_{cs}|$ in $\overline{K}^0 \ell^+ \nu_\ell = 0.707 \pm 0.013$
$r_1 \equiv a_1/a_0$ in $\overline{K}^0 \ell^+ \nu_\ell = -1.7 \pm 0.5$
$r_2 \equiv a_2/a_0$ in $\overline{K}^0 \ell^+ \nu_\ell = -14 \pm 11$
$f_+(0)|V_{cd}|$ in $\pi^0 \ell^+ \nu_\ell = 0.146 \pm 0.007$
$r_1 \equiv a_1/a_0$ in $\pi^0 \ell^+ \nu_\ell = -1.4 \pm 0.9$
$r_2 \equiv a_2/a_0$ in $\pi^0 \ell^+ \nu_\ell = -4 \pm 5$
$r_v \equiv V(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 1.62 \pm 0.08$ (S = 1.5)
$r_2 \equiv A_2(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 0.83 \pm 0.05$
$r_3 \equiv A_3(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 0.0 \pm 0.4$
Γ_L/Γ_T in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 1.13 \pm 0.08$
Γ_+/Γ_- in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 0.22 \pm 0.06$ (S = 1.6)

Most decay modes (other than the semileptonic modes) that involve a neutral K meson are now given as K^0_S modes, not as $\overline{K}^0$ modes. Nearly always it is a K^0_S that is measured, and interference between Cabibbo-allowed and doubly Cabibbo-suppressed modes can invalidate the assumption that $2\,\Gamma(K^0_S) = \Gamma(\overline{K}^0)$.

D^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Inclusive modes			
e^+ semileptonic	(16.07±0.30) %		–
μ^+ anything	(17.6 ±3.2) %		–
K^- anything	(25.7 ±1.4) %		–
$\overline{K}^0$ anything + K^0 anything	(61 ±5) %		–
K^+ anything	(5.9 ±0.8) %		–
$K^*(892)^-$ anything	(6 ±5) %		–
$\overline{K}^*(892)^0$ anything	(23 ±5) %		–
$K^*(892)^0$ anything	< 6.6 %	CL=90%	–
η anything	(6.3 ±0.7) %		–
η' anything	(1.04±0.18) %		–
ϕ anything	(1.03±0.12) %		–
Leptonic and semileptonic modes			
$e^+ \nu_e$	< 8.8 $\times 10^{-6}$	CL=90%	935
$\mu^+ \nu_\mu$	(3.82±0.33) $\times 10^{-4}$		932
$\tau^+ \nu_\tau$	< 1.2 $\times 10^{-3}$	CL=90%	90
$\overline{K}^0 e^+ \nu_e$	(8.83±0.22) %		869
$\overline{K}^0 \mu^+ \nu_\mu$	(9.4 ±0.8) %	S=1.2	865
$K^- \pi^+ e^+ \nu_e$	(4.1 ±0.6) %	S=1.1	864
$\overline{K}^*(892)^0 e^+ \nu_e$, $\overline{K}^*(892)^0 \to K^- \pi^+$	(3.68±0.21) %		722
$K^- \pi^+ e^+ \nu_e$ nonresonant	< 7 $\times 10^{-3}$	CL=90%	864

$K^-\pi^+\mu^+\nu_\mu$	(3.9 ±0.5) %			851
$\overline{K}^*(892)^0\mu^+\nu_\mu$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(3.7 ±0.3) %			717
$K^-\pi^+\mu^+\nu_\mu$ nonresonant	(2.1 ±0.6) $\times 10^{-3}$			851
$K^-\pi^+\pi^0\mu^+\nu_\mu$	< 1.7	$\times 10^{-3}$	CL=90%	825
$\pi^0 e^+\nu_e$	(4.05±0.18) $\times 10^{-3}$			930
$\eta e^+\nu_e$	(1.33±0.21) $\times 10^{-3}$			855
$\rho^0 e^+\nu_e$	(2.2 ±0.4) $\times 10^{-3}$			774
$\rho^0\mu^+\nu_\mu$	(2.5 ±0.5) $\times 10^{-3}$			770
$\omega e^+\nu_e$	(1.6 $^{+0.7}_{-0.6}$) $\times 10^{-3}$			771
$\eta'(958) e^+\nu_e$	< 3.5	$\times 10^{-4}$	CL=90%	689
$\phi e^+\nu_e$	< 1.6	$\times 10^{-4}$	CL=90%	657

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

$\overline{K}^*(892)^0 e^+\nu_e$	(5.53±0.32) %		S=1.2	722
$\overline{K}^*(892)^0\mu^+\nu_\mu$	(5.5 ±0.5) %		S=1.2	717
$\overline{K}_0^*(1430)^0\mu^+\nu_\mu$	< 2.5	$\times 10^{-4}$		380
$\overline{K}^*(1680)^0\mu^+\nu_\mu$	< 1.6	$\times 10^{-3}$		105

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

$K_S^0\pi^+$	(1.49±0.04) %		S=1.4	863
$K_L^0\pi^+$	(1.46±0.05) %			863
$K^-2\pi^+$	[b] (9.4 ±0.4) %		S=2.2	846
$(K^-\pi^+)_{S-\text{wave}}\pi^+$	(7.52±0.33) %			846
$\overline{K}_0^*(1430)^0\pi^+$, $\overline{K}_0^*(1430)^0 \to K^-\pi^+$	[c] (1.25±0.08) %			382
$\overline{K}^*(892)^0\pi^+$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(1.04±0.12) %			714
$\overline{K}^*(1410)^0\pi^+$, $\overline{K}^{*0} \to K^-\pi^+$	not seen			381
$\overline{K}_2^*(1430)^0\pi^+$, $\overline{K}_2^*(1430)^0 \to K^-\pi^+$	[c] (2.3 ±0.7) $\times 10^{-4}$			371
$\overline{K}^*(1680)^0\pi^+$, $\overline{K}^*(1680)^0 \to K^-\pi^+$	[c] (2.2 ±1.1) $\times 10^{-4}$			58
$K^-(2\pi^+)_{I=2}$	(1.45±0.27) %			–
$K_S^0\pi^+\pi^0$	[b] (6.90±0.32) %		S=1.3	845
$K_S^0\rho^+$	(4.7 ±1.0) %			677
$\overline{K}^*(892)^0\pi^+$, $\overline{K}^*(892)^0 \to K_S^0\pi^0$	(1.3 ±0.6) %			714
$K_S^0\pi^+\pi^0$ nonresonant	(9 ±7) $\times 10^{-3}$			845
$K^-2\pi^+\pi^0$	[d] (6.08±0.29) %		S=1.6	816

$K^0_S 2\pi^+\pi^-$	[d]	(3.10±0.11) %	S=1.1	814
$K^- 3\pi^+\pi^-$	[b]	(5.7 ±0.6) × 10^{-3}	S=1.2	772
$\overline{K}^*(892)^0 2\pi^+\pi^-$,		(1.2 ±0.4) × 10^{-3}		645
$\overline{K}^*(892)^0 \to K^-\pi^+$				
$\overline{K}^*(892)^0\rho^0\pi^+$,		(2.3 ±0.4) × 10^{-3}		239
$\overline{K}^*(892)^0 \to K^-\pi^+$				
$\overline{K}^*(892)^0 a_1(1260)^+$	[e]	(9.3 ±1.9) × 10^{-3}		†
$K^-\rho^0 2\pi^+$		(1.72±0.29) × 10^{-3}		524
$K^- 3\pi^+\pi^-$ nonresonant		(4.0 ±3.0) × 10^{-4}		772
$K^+ 2K^0_S$		(4.6 ±2.1) × 10^{-3}		545
$K^+K^-K^0_S\pi^+$		(2.4 ±0.5) × 10^{-4}		436

Pionic modes

$\pi^+\pi^0$		(1.26±0.09) × 10^{-3}		925
$2\pi^+\pi^-$		(3.27±0.22) × 10^{-3}		909
$\rho^0\pi^+$		(8.3 ±1.5) × 10^{-4}		767
$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$		(1.83±0.18) × 10^{-3}		909
$\sigma\pi^+$, $\sigma \to \pi^+\pi^-$		(1.38±0.13) × 10^{-3}		–
$f_0(980)\pi^+$,		(1.57±0.34) × 10^{-4}		669
$f_0(980) \to \pi^+\pi^-$				
$f_0(1370)\pi^+$,		(8 ±4) × 10^{-5}		–
$f_0(1370) \to \pi^+\pi^-$				
$f_2(1270)\pi^+$,		(5.0 ±0.9) × 10^{-4}		485
$f_2(1270) \to \pi^+\pi^-$				
$\rho(1450)^0\pi^+$,	<	8 × 10^{-5}	CL=95%	338
$\rho(1450)^0 \to \pi^+\pi^-$				
$f_0(1500)\pi^+$,		(1.1 ±0.4) × 10^{-4}		–
$f_0(1500) \to \pi^+\pi^-$				
$f_0(1710)\pi^+$,	<	5 × 10^{-5}	CL=95%	–
$f_0(1710) \to \pi^+\pi^-$				
$f_0(1790)\pi^+$,	<	7 × 10^{-5}	CL=95%	–
$f_0(1790) \to \pi^+\pi^-$				
$(\pi^+\pi^+)_{S-\text{wave}}\pi^-$	<	1.2 × 10^{-4}	CL=95%	909
$2\pi^+\pi^-$ nonresonant	<	1.1 × 10^{-4}	CL=95%	909
$\pi^+ 2\pi^0$		(4.7 ±0.4) × 10^{-3}		910
$2\pi^+\pi^-\pi^0$		(1.16±0.09) %		883
$\eta\pi^+$, $\eta \to \pi^+\pi^-\pi^0$		(7.8 ±0.5) × 10^{-4}		848
$\omega\pi^+$, $\omega \to \pi^+\pi^-\pi^0$	<	3 × 10^{-4}	CL=90%	763
$3\pi^+ 2\pi^-$		(1.66±0.17) × 10^{-3}	S=1.1	845

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

$\eta\pi^+$	(3.43±0.22) × 10^{-3}		848
$\eta\pi^+\pi^0$	(1.38±0.35) × 10^{-3}		830

$\omega\pi^+$		$< 3.4 \times 10^{-4}$	CL=90%	764
$\eta'(958)\pi^+$		$(4.4 \pm 0.4) \times 10^{-3}$		681
$\eta'(958)\pi^+\pi^0$		$(1.6 \pm 0.5) \times 10^{-3}$		654

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

$K^+K^0_S$		$(2.86 \pm 0.12) \times 10^{-3}$	S=1.9	793
$K^+K^-\pi^+$	[b]	$(9.8 \pm 0.4) \times 10^{-3}$	S=1.9	744
$\phi\pi^+$, $\phi \to K^+K^-$		$(2.72 \pm 0.13) \times 10^{-3}$		647
$K^+\overline{K}^*(892)^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(2.51^{+0.13}_{-0.17}) \times 10^{-3}$		613
$K^+\overline{K}^*_0(1430)^0$, $\overline{K}^*_0(1430)^0 \to K^-\pi^+$		$(1.8 \pm 0.4) \times 10^{-3}$		–
$K^+\overline{K}^*_2(1430)^0$, $\overline{K}^*_2 \to K^-\pi^+$		$(1.7 \ ^{+1.2}_{-0.8}) \times 10^{-4}$		–
$K^+\overline{K}^*_0(800)$, $\overline{K}^*_0 \to K^-\pi^+$		$(6.8 \ ^{+3.5}_{-2.1}) \times 10^{-4}$		–
$a_0(1450)^0\pi^+$, $a^0_0 \to K^+K^-$		$(4.5 \ ^{+7.0}_{-1.9}) \times 10^{-4}$		–
$\phi(1680)\pi^+$, $\phi \to K^+K^-$		$(5.0 \ ^{+4.0}_{-1.9}) \times 10^{-5}$		–
$K^+K^-\pi^+$ nonresonant		not seen		744
$K^+K^0_S\pi^+\pi^-$		$(1.74 \pm 0.18) \times 10^{-3}$		678
$K^0_S K^-2\pi^+$		$(2.38 \pm 0.18) \times 10^{-3}$		678
$K^+K^-2\pi^+\pi^-$		$(2.3 \pm 1.2) \times 10^{-4}$		600

A few poorly measured branching fractions:

$\phi\pi^+\pi^0$		(2.3 ± 1.0) %		619
$\phi\rho^+$		< 1.5 %	CL=90%	259
$K^+K^-\pi^+\pi^0$ non-ϕ		$(1.5 \ ^{+0.7}_{-0.6})$ %		682
$K^*(892)^+K^0_S$		(1.6 ± 0.7) %		612

Doubly Cabibbo-suppressed modes

$K^+\pi^0$		$(2.37 \pm 0.32) \times 10^{-4}$		864
$K^+\pi^+\pi^-$		$(5.42 \pm 0.30) \times 10^{-4}$		846
$K^+\rho^0$		$(2.1 \pm 0.5) \times 10^{-4}$		679
$K^*(892)^0\pi^+$, $K^*(892)^0 \to K^+\pi^-$		$(2.5 \pm 0.5) \times 10^{-4}$		714
$K^+f_0(980)$, $f_0(980) \to \pi^+\pi^-$		$(4.8 \pm 2.9) \times 10^{-5}$		–
$K^*_2(1430)^0\pi^+$, $K^*_2(1430)^0 \to K^+\pi^-$		$(4.4 \pm 2.9) \times 10^{-5}$		–
$K^+\pi^+\pi^-$ nonresonant		not seen		846
$2K^+K^-$		$(8.9 \pm 2.1) \times 10^{-5}$		550

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

$\pi^+ e^+ e^-$	*C1*		< 7.4	$\times 10^{-6}$	CL=90%	930
$\pi^+ \phi,\ \phi \to\ e^+ e^-$		[*f*]	$(\ 2.7\ ^{+4.0}_{-1.8}\ ) \times 10^{-6}$			–
$\pi^+ \mu^+ \mu^-$	*C1*		< 3.9	$\times 10^{-6}$	CL=90%	918
$\pi^+ \phi,\ \phi \to\ \mu^+ \mu^-$		[*f*]	$(\ 1.8\ \pm 0.8\ ) \times 10^{-6}$			–
$\rho^+ \mu^+ \mu^-$	*C1*		< 5.6	$\times 10^{-4}$	CL=90%	757
$K^+ e^+ e^-$		[*g*]	< 6.2	$\times 10^{-6}$	CL=90%	870
$K^+ \mu^+ \mu^-$		[*g*]	< 9.2	$\times 10^{-6}$	CL=90%	856
$\pi^+ e^\pm \mu^\mp$	*LF*	[*h*]	< 3.4	$\times 10^{-5}$	CL=90%	927
$K^+ e^\pm \mu^\mp$	*LF*	[*h*]	< 6.8	$\times 10^{-5}$	CL=90%	866
$\pi^- 2e^+$	*L*		< 3.6	$\times 10^{-6}$	CL=90%	930
$\pi^- 2\mu^+$	*L*		< 4.8	$\times 10^{-6}$	CL=90%	918
$\pi^- e^+ \mu^+$	*L*		< 5.0	$\times 10^{-5}$	CL=90%	927
$\rho^- 2\mu^+$	*L*		< 5.6	$\times 10^{-4}$	CL=90%	757
$K^- 2e^+$	*L*		< 4.5	$\times 10^{-6}$	CL=90%	870
$K^- 2\mu^+$	*L*		< 1.3	$\times 10^{-5}$	CL=90%	856
$K^- e^+ \mu^+$	*L*		< 1.3	$\times 10^{-4}$	CL=90%	866
$K^*(892)^- 2\mu^+$	*L*		< 8.5	$\times 10^{-4}$	CL=90%	703

D^0

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

Mass $m = 1864.83 \pm 0.14$ MeV
$m_{D^\pm} - m_{D^0} = 4.77 \pm 0.10$ MeV (S = 1.1)
Mean life $\tau = (410.1 \pm 1.5) \times 10^{-15}$ s
$c\tau = 122.9\ \mu$m
$\left|m_{D_1^0} - m_{D_2^0}\right| = (2.39^{+0.59}_{-0.63}) \times 10^{10}\ \hbar\ \mathrm{s}^{-1}$
$(\Gamma_{D_1^0} - \Gamma_{D_2^0})/\Gamma = 2y = (1.66 \pm 0.32) \times 10^{-2}$
$\left|q/p\right| = 0.86^{+0.18}_{-0.15}$
$A_\Gamma = (1.4 \pm 2.7) \times 10^{-3}$
$K^+\pi^-$ relative strong phase: $\cos\delta = 1.03^{+0.32}_{-0.18}$
$K^-\pi^+\pi^0$ coherence factor $R_{K\pi\pi^0} = 0.78^{+0.11}_{-0.25}$
$K^-\pi^+\pi^0$ average relative strong phase $\delta^{K\pi\pi^0} = (239^{+32}_{-28})^\circ$
$K^-\pi^-2\pi^+$ coherence factor $R_{K3\pi} = 0.36^{+0.24}_{-0.30}$
$K^-\pi^-2\pi^+$ average relative strong phase $\delta^{K3\pi} = (118^{+60}_{-50})^\circ$

CP-violation decay-rate asymmetries (labeled by the D^0 decay)

$A_{CP}(K^+K^-) = (-0.17 \pm 0.31) \times 10^{-2}$ (S = 1.3)
$A_{CP}(2K^0_S) = -0.23 \pm 0.19$
$A_{CP}(\pi^+\pi^-) = (0.2 \pm 0.4) \times 10^{-2}$
$A_{CP}(2\pi^0) = 0.00 \pm 0.05$
$A_{CP}(\pi^+\pi^-\pi^0) = (0.3 \pm 0.4)\%$
$A_{CP}(\rho(770)^+\pi^- \to \pi^+\pi^-\pi^0) = (1.6 \pm 1.2)\%$
$A_{CP}(\rho(770)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-1.6 \pm 1.5)\%$
$A_{CP}(\rho(770)^-\pi^+ \to \pi^+\pi^-\pi^0) = (-0.7 \pm 1.2)\%$
$A_{CP}(\rho(1450)^+\pi^- \to \pi^+\pi^-\pi^0) = (0.0 \pm 0.14)\%$
$A_{CP}(\rho(1450)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-0.1 \pm 0.22)\%$
$A_{CP}(\rho(1450)^-\pi^+ \to \pi^+\pi^-\pi^0) = (0.2 \pm 0.32)\%$
$A_{CP}(\rho(1700)^+\pi^- \to \pi^+\pi^-\pi^0) = (-0.4 \pm 1.1)\%$
$A_{CP}(\rho(1700)^0\pi^0 \to \pi^+\pi^-\pi^0) = (1.3 \pm 0.9)\%$
$A_{CP}(\rho(1700)^-\pi^+ \to \pi^+\pi^-\pi^0) = (0.5 \pm 0.7)\%$
$A_{CP}(f_0(980)\pi^0 \to \pi^+\pi^-\pi^0) = (0.0 \pm 0.14)\%$
$A_{CP}(f_0(1370)\pi^0 \to \pi^+\pi^-\pi^0) = (0.2 \pm 0.14)\%$
$A_{CP}(f_0(1500)\pi^0 \to \pi^+\pi^-\pi^0) = (0.0 \pm 0.14)\%$
$A_{CP}(f_0(1710)\pi^0 \to \pi^+\pi^-\pi^0) = (0.0 \pm 0.14)\%$
$A_{CP}(f_2(1270)\pi^0 \to \pi^+\pi^-\pi^0) = (-0.1 \pm 0.14)\%$
$A_{CP}(\sigma(400)\pi^0 \to \pi^+\pi^-\pi^0) = (0.1 \pm 0.14)\%$
$A_{CP}(\text{nonresonant } \pi^+\pi^-\pi^0) = (-0.2 \pm 0.4)\%$
$A_{CP}(K^+K^-\pi^0) = (-1.0 \pm 1.7)\%$
$A_{CP}(K^*(892)^+K^- \to K^+K^-\pi^0) = (-0.8 \pm 1.2)\%$
$A_{CP}(K^*(1410)^+K^- \to K^+K^-\pi^0) = (-1.7 \pm 1.9)\%$
$A_{CP}((K^+\pi^0)_{S-wave}K^- \to K^+K^-\pi^0) = (2 \pm 5)\%$
$A_{CP}(\phi(1020)\pi^0 \to K^+K^-\pi^0) = (0.4 \pm 0.8)\%$
$A_{CP}(f_0(980)\pi^0 \to K^+K^-\pi^0) = (-0.4 \pm 2.6)\%$
$A_{CP}(a_0(980)^0\pi^0 \to K^+K^-\pi^0) = (-0.6 \pm 1.9)\%$
$A_{CP}(f_2'(1525)\pi^0 \to K^+K^-\pi^0) = (0.0 \pm 0.32)\%$
$A_{CP}(K^*(892)^-K^+ \to K^+K^-\pi^0) = (-1.7 \pm 1.4)\%$
$A_{CP}(K^*(1410)^-K^+ \to K^+K^-\pi^0) = (-1.7 \pm 2.9)\%$
$A_{CP}((K^-\pi^0)_{S-wave}K^+ \to K^+K^-\pi^0) = (-0.4 \pm 2.5)\%$
$A_{CP}(K^0_S\phi) = -0.03 \pm 0.09$
$A_{CP}(K^0_S\pi^0) = 0.001 \pm 0.013$
$A_{CP}(K^-\pi^+) = -0.004 \pm 0.010$
$A_{CP}(K^+\pi^-) = 0.022 \pm 0.032$
$A_{CP}(K^-\pi^+\pi^0) = 0.002 \pm 0.009$
$A_{CP}(K^+\pi^-\pi^0) = 0.00 \pm 0.05$
$A_{CP}(K^0_S\pi^+\pi^-) = -0.009^{+0.026}_{-0.060}$

$A_{CP}(K^*(892)^-\pi^+ \to K^0_S\pi^+\pi^-) < 3.5\times10^{-4}$, CL = 95%
$A_{CP}(K^*(892)^+\pi^- \to K^0_S\pi^+\pi^-) < 7.8\times10^{-4}$, CL = 95%
$A_{CP}(\overline{K}^0\rho^0 \to K^0_S\pi^+\pi^-) < 4.8\times10^{-4}$, CL = 95%
$A_{CP}(\overline{K}^0\omega \to K^0_S\pi^+\pi^-) < 9.2\times10^{-4}$, CL = 95%
$A_{CP}(\overline{K}^0 f_0(980) \to K^0_S\pi^+\pi^-) < 6.8\times10^{-4}$, CL = 95%
$A_{CP}(\overline{K}^0 f_2(1270) \to K^0_S\pi^+\pi^-) < 13.5\times10^{-4}$, CL = 95%
$A_{CP}(\overline{K}^0 f_0(1370) \to K^0_S\pi^+\pi^-) < 25.5\times10^{-4}$, CL = 95%
$A_{CP}(K^*_0(1430)^-\pi^+ \to K^0_S\pi^+\pi^-) < 9.0\times10^{-4}$, CL = 95%
$A_{CP}(K^*_2(1430)^-\pi^+ \to K^0_S\pi^+\pi^-) < 6.5\times10^{-4}$, CL = 95%
$A_{CP}(K^*(1680)^-\pi^+ \to K^0_S\pi^+\pi^-) < 28.4\times10^{-4}$, CL = 95%
$A_{CP}(K^-\pi^+\pi^+\pi^-) = 0.007 \pm 0.010$
$A_{CP}(K^+\pi^-\pi^+\pi^-) = -0.02 \pm 0.04$
$A_{CP}(K^+K^-\pi^+\pi^-) = -0.08 \pm 0.07$

T-violation decay-rate asymmetry

$A_T(K^+K^-\pi^+\pi^-) = 0.01 \pm 0.07$

CPT-violation decay-rate asymmetry

$A_{CPT}(K^\mp\pi^\pm) = 0.008 \pm 0.008$

Form factors

$r_V \equiv$ V(0)/A$_1$(0) in $D^0 \to K^*(892)^-\ell^+\nu_\ell = 1.7 \pm 0.8$
$r_2 \equiv$ A$_2$(0)/A$_1$(0) in $D^0 \to K^*(892)^-\ell^+\nu_\ell = 0.9 \pm 0.4$
$f_+(0)|V_{cs}|$ in $D^0 \to K^-\ell^+\nu_\ell = 0.726 \pm 0.009$
$r_1 \equiv a_1/a_0$ in $D^0 \to K^-\ell^+\nu_\ell = -2.65 \pm 0.35$
$r_2 \equiv a_1/a_0$ in $D^0 \to K^-\ell^+\nu_\ell = 13 \pm 9$
$f_+(0)|V_{cd}|$ in $D^0 \to \pi^-\ell^+\nu_\ell = 0.152 \pm 0.005$
$r_1 \equiv a_1/a_0$ in $D^0 \to \pi^-\ell^+\nu_\ell = -2.8 \pm 0.5$
$r_2 \equiv a_1/a_0$ in $D^0 \to \pi^-\ell^+\nu_\ell = 6 \pm 3.0$

Most decay modes (other than the semileptonic modes) that involve a neutral K meson are now given as K^0_S modes, not as $\overline{K}^0$ modes. Nearly always it is a K^0_S that is measured, and interference between Cabibbo-allowed and doubly Cabibbo-suppressed modes can invalidate the assumption that $2\,\Gamma(K^0_S) = \Gamma(\overline{K}^0)$.

D^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Topological modes			
0-prongs	[i] (17 ± 6) %		–
2-prongs	(69 ± 6) %		–
4-prongs	[j] (14.3 ± 0.5) %		–
6-prongs	[k] (6.4 ± 1.3) $\times 10^{-4}$		–
Inclusive modes			
e^+ anything	[l] (6.49 ± 0.11) %		–
μ^+ anything	(6.7 ± 0.6) %		–
K^- anything	(54.7 ± 2.8) %	S=1.3	–
$\overline{K}^0$ anything + K^0 anything	(47 ± 4) %		–
K^+ anything	(3.4 ± 0.4) %		–
$K^*(892)^-$ anything	(15 ± 9) %		–
$\overline{K}^*(892)^0$ anything	(9 ± 4) %		–
$K^*(892)^+$ anything	< 3.6 %	CL=90%	–
$K^*(892)^0$ anything	(2.8 ± 1.3) %		–
η anything	(9.5 ± 0.9) %		–
η' anything	(2.48 ± 0.27) %		–
ϕ anything	(1.05 ± 0.11) %		–
Semileptonic modes			
$K^- e^+ \nu_e$	(3.55 ± 0.05) %	S=1.2	867
$K^- \mu^+ \nu_\mu$	(3.31 ± 0.13) %		864
$K^*(892)^- e^+ \nu_e$	(2.17 ± 0.16) %		719
$K^*(892)^- \mu^+ \nu_\mu$	(1.98 ± 0.24) %		714
$K^- \pi^0 e^+ \nu_e$	(1.6 $^{+\ 1.3}_{-\ 0.5}$) %		861
$\overline{K}^0 \pi^- e^+ \nu_e$	(2.7 $^{+\ 0.9}_{-\ 0.7}$) %		860
$K^- \pi^+ \pi^- e^+ \nu_e$	(2.8 $^{+\ 1.4}_{-\ 1.1}$) $\times 10^{-4}$		843
$K_1(1270)^- e^+ \nu_e$	(7.6 $^{+\ 4.0}_{-\ 3.1}$) $\times 10^{-4}$		498
$K^- \pi^+ \pi^- \mu^+ \nu_\mu$	< 1.2 $\times 10^{-3}$	CL=90%	821
$(\overline{K}^*(892)\pi)^- \mu^+ \nu_\mu$	< 1.4 $\times 10^{-3}$	CL=90%	692
$\pi^- e^+ \nu_e$	(2.89 ± 0.08) $\times 10^{-3}$	S=1.1	927
$\pi^- \mu^+ \nu_\mu$	(2.37 ± 0.24) $\times 10^{-3}$		924
$\rho^- e^+ \nu_e$	(1.9 ± 0.4) $\times 10^{-3}$		771

Hadronic modes with one $\overline{K}$

$K^-\pi^+$		(3.89 ± 0.05) %	S=1.2	861
$K^0_S\pi^0$		(1.22 ± 0.05) %		860
$K^0_L\pi^0$		(10.0 ± 0.7) $\times 10^{-3}$		860
$K^0_S\pi^+\pi^-$	[b]	(2.94 ± 0.16) %	S=1.1	842
$K^0_S\rho^0$		(6.6 $^{+\ 0.6}_{-\ 0.8}$) $\times 10^{-3}$		674
$K^0_S\omega$, $\omega \to \pi^+\pi^-$		(2.1 ± 0.6) $\times 10^{-4}$		670
$K^0_S(\pi^+\pi^-)_{S-\text{wave}}$		(3.5 ± 0.8) $\times 10^{-3}$		842
$K^0_S f_0(980)$, $f_0(980) \to \pi^+\pi^-$		(1.27 $^{+\ 0.40}_{-\ 0.24}$) $\times 10^{-3}$		549
$K^0_S f_0(1370)$, $f_0(1370) \to \pi^+\pi^-$		(2.9 $^{+\ 0.9}_{-\ 1.3}$) $\times 10^{-3}$		†
$K^0_S f_2(1270)$, $f_2(1270) \to \pi^+\pi^-$		(9 $^{+10}_{-\ 6}$) $\times 10^{-5}$		262
$K^*(892)^-\pi^+$, $K^*(892)^- \to K^0_S\pi^-$		(1.73 $^{+\ 0.14}_{-\ 0.17}$) %		711
$K^*_0(1430)^-\pi^+$, $K^*_0(1430)^- \to K^0_S\pi^-$		(2.81 $^{+\ 0.40}_{-\ 0.33}$) $\times 10^{-3}$		378
$K^*_2(1430)^-\pi^+$, $K^*_2(1430)^- \to K^0_S\pi^-$		(3.5 $^{+\ 2.0}_{-\ 1.1}$) $\times 10^{-4}$		367
$K^*(1680)^-\pi^+$, $K^*(1680)^- \to K^0_S\pi^-$		(5 ± 4) $\times 10^{-4}$		46
$K^*(892)^+\pi^-$, $K^*(892)^+ \to K^0_S\pi^+$	[m]	(1.18 $^{+\ 0.60}_{-\ 0.35}$) $\times 10^{-4}$		711
$K^*_0(1430)^+\pi^-$, $K^*_0(1430)^+ \to K^0_S\pi^+$	[m]	< 1.5 $\times 10^{-5}$	CL=95%	–
$K^*_2(1430)^+\pi^-$, $K^*_2(1430)^+ \to K^0_S\pi^+$	[m]	< 3.5 $\times 10^{-5}$	CL=95%	–
$K^0_S\pi^+\pi^-$ nonresonant		(2.7 $^{+\ 6.0}_{-\ 1.7}$) $\times 10^{-4}$		842
$K^-\pi^+\pi^0$	[b]	(13.9 ± 0.5) %	S=1.7	844
$K^-\rho^+$		(10.8 ± 0.7) %		675
$K^-\rho(1700)^+$, $\rho(1700)^+ \to \pi^+\pi^0$		(7.9 ± 1.7) $\times 10^{-3}$		†
$K^*(892)^-\pi^+$, $K^*(892)^- \to K^-\pi^0$		(2.22 $^{+\ 0.40}_{-\ 0.19}$) %		711
$\overline{K}^*(892)^0\pi^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		(1.88 ± 0.23) %		711
$K^*_0(1430)^-\pi^+$, $K^*_0(1430)^- \to K^-\pi^0$		(4.6 ± 2.1) $\times 10^{-3}$		378

$\overline{K}_0^*(1430)^0\pi^0$,		(5.7 $^{+\ 5.0}_{-\ 1.5}$) $\times 10^{-3}$		379
$\overline{K}_0^*(1430)^0 \to\ K^-\pi^+$				
$K^*(1680)^-\pi^+$,		(1.8 $\pm$ 0.7) $\times 10^{-3}$		46
$K^*(1680)^- \to\ K^-\pi^0$				
$K^-\pi^+\pi^0$ nonresonant		(1.11 $^{+\ 0.50}_{-\ 0.19}$) %		844
$K_S^0 2\pi^0$		(8.3 $\pm$ 0.6) $\times 10^{-3}$		843
$\overline{K}^*(892)^0\pi^0$,		(6.7 $^{+\ 1.8}_{-\ 1.5}$) $\times 10^{-3}$		711
$\overline{K}^*(892)^0 \to\ K_S^0\pi^0$				
$K_S^0 2\pi^0$ nonresonant		(4.5 $\pm$ 1.1) $\times 10^{-3}$		843
$K^-2\pi^+\pi^-$	[*b*]	(8.09 $^{+\ 0.21}_{-\ 0.18}$) %	S=1.3	813
$K^-\pi^+\rho^0$ total		(6.76 $\pm$ 0.33) %		609
$K^-\pi^+\rho^0$ 3-body		(5.1 $\pm$ 2.3) $\times 10^{-3}$		609
$\overline{K}^*(892)^0\rho^0$,		(1.06 $\pm$ 0.23) %		416
$\overline{K}^*(892)^0 \to\ K^-\pi^+$				
$K^- a_1(1260)^+$,		(3.6 $\pm$ 0.6) %		327
$a_1(1260)^+ \to\ 2\pi^+\pi^-$				
$\overline{K}^*(892)^0\pi^+\pi^-$ total,		(1.6 $\pm$ 0.4) %		685
$\overline{K}^*(892)^0 \to\ K^-\pi^+$				
$\overline{K}^*(892)^0\pi^+\pi^-$ 3-body,		(9.9 $\pm$ 2.3) $\times 10^{-3}$		685
$\overline{K}^*(892)^0 \to\ K^-\pi^+$				
$K_1(1270)^-\pi^+$,	[*n*]	(2.9 $\pm$ 0.3) $\times 10^{-3}$		484
$K_1(1270)^- \to\ K^-\pi^+\pi^-$				
$K^-2\pi^+\pi^-$ nonresonant		(1.88 $\pm$ 0.26) %		813
$K_S^0\pi^+\pi^-\pi^0$	[*o*]	(5.4 $\pm$ 0.6) %		813
$K_S^0\eta$, $\eta \to\ \pi^+\pi^-\pi^0$		(9.8 $\pm$ 0.6) $\times 10^{-4}$		772
$K_S^0\omega$, $\omega \to\ \pi^+\pi^-\pi^0$		(9.9 $\pm$ 0.5) $\times 10^{-3}$		670
$K^-2\pi^+\pi^-\pi^0$		(4.2 $\pm$ 0.4) %		771
$\overline{K}^*(892)^0\pi^+\pi^-\pi^0$,		(1.3 $\pm$ 0.6) %		643
$\overline{K}^*(892)^0 \to\ K^-\pi^+$				
$K^-\pi^+\omega$, $\omega \to\ \pi^+\pi^-\pi^0$		(2.7 $\pm$ 0.5) %		605
$\overline{K}^*(892)^0\omega$,		(6.5 $\pm$ 3.0) $\times 10^{-3}$		410
$\overline{K}^*(892)^0 \to\ K^-\pi^+$,				
$\omega \to\ \pi^+\pi^-\pi^0$				
$K_S^0\eta\pi^0$		(5.6 $\pm$ 1.2) $\times 10^{-3}$		721
$K_S^0 a_0(980)$, $a_0(980) \to\ \eta\pi^0$		(6.7 $\pm$ 2.1) $\times 10^{-3}$		–
$\overline{K}^*(892)^0\eta$,		(1.6 $\pm$ 0.5) $\times 10^{-3}$		–
$\overline{K}^*(892)^0 \to\ K_S^0\pi^0$				
$K_S^0 2\pi^+2\pi^-$		(2.80 $\pm$ 0.30) $\times 10^{-3}$		768
$K_S^0\rho^0\pi^+\pi^-$, no $K^*(892)^-$		(1.1 $\pm$ 0.7) $\times 10^{-3}$		–

$K^*(892)^- 2\pi^+\pi^-$, $K^*(892)^- \to K^0_S\pi^-$, no ρ^0	(5 ± 8)	$\times 10^{-4}$		642
$K^*(892)^-\rho^0\pi^+$, $K^*(892)^- \to K^0_S\pi^-$	(1.7 ± 0.7)	$\times 10^{-3}$		230
$K^0_S 2\pi^+ 2\pi^-$ nonresonant	< 1.3	$\times 10^{-3}$	CL=90%	768
$K^- 3\pi^+ 2\pi^-$	(2.2 ± 0.6)	$\times 10^{-4}$		713

Fractions of many of the following modes with resonances have already appeared above as submodes of particular charged-particle modes. (Modes for which there are only upper limits and $\overline{K}^*(892)\rho$ submodes only appear below.)

$K^0_S\eta$	(4.29 ± 0.27)	$\times 10^{-3}$		772
$K^0_S\omega$	(1.11 ± 0.06)	%		670
$K^0_S\eta'(958)$	(9.3 ± 1.4)	$\times 10^{-3}$		565
$K^- a_1(1260)^+$	(7.8 ± 1.1)	%		327
$K^- a_2(1320)^+$	< 2	$\times 10^{-3}$	CL=90%	198
$\overline{K}^*(892)^0\pi^+\pi^-$ total	(2.4 ± 0.5)	%		685
$\overline{K}^*(892)^0\pi^+\pi^-$ 3-body	(1.48 ± 0.34)	%		685
$\overline{K}^*(892)^0\rho^0$	(1.58 ± 0.35)	%		417
$\overline{K}^*(892)^0\rho^0$ transverse	(1.7 ± 0.6)	%		417
$\overline{K}^*(892)^0\rho^0$ S-wave	(3.0 ± 0.6)	%		417
$\overline{K}^*(892)^0\rho^0$ S-wave long.	< 3	$\times 10^{-3}$	CL=90%	417
$\overline{K}^*(892)^0\rho^0$ P-wave	< 3	$\times 10^{-3}$	CL=90%	417
$\overline{K}^*(892)^0\rho^0$ D-wave	(2.1 ± 0.6)	%		417
$K_1(1270)^-\pi^+$ [n]	(1.6 ± 0.8)	%		484
$K_1(1400)^-\pi^+$	< 1.2	%	CL=90%	386
$\overline{K}^*(892)^0\pi^+\pi^-\pi^0$	(1.9 ± 0.9)	%		643
$K^-\pi^+\omega$	(3.0 ± 0.6)	%		605
$\overline{K}^*(892)^0\omega$	(1.1 ± 0.5)	%		410
$K^-\pi^+\eta'(958)$	(7.5 ± 1.9)	$\times 10^{-3}$		479
$\overline{K}^*(892)^0\eta'(958)$	< 1.1	$\times 10^{-3}$	CL=90%	119

Hadronic modes with three K's

$K^0_S K^+ K^-$	(4.65 ± 0.30)	$\times 10^{-3}$		544
$K^0_S a_0(980)^0$, $a_0^0 \to K^+K^-$	(3.1 ± 0.4)	$\times 10^{-3}$		–
$K^- a_0(980)^+$, $a_0^+ \to K^+K^0_S$	(6.2 ± 1.8)	$\times 10^{-4}$		–
$K^+ a_0(980)^-$, $a_0^- \to K^-K^0_S$	< 1.2	$\times 10^{-4}$	CL=95%	–
$K^0_S f_0(980)$, $f_0 \to K^+K^-$	< 1.0	$\times 10^{-4}$	CL=95%	–
$K^0_S\phi$, $\phi \to K^+K^-$	(2.14 ± 0.15)	$\times 10^{-3}$		520
$K^0_S f_0(1370)$, $f_0 \to K^+K^-$	(1.8 ± 1.1)	$\times 10^{-4}$		–
$3K^0_S$	(9.5 ± 1.3)	$\times 10^{-4}$		539

$K^+ 2K^- \pi^+$	$(2.21 \pm 0.32) \times 10^{-4}$		434
$K^+ K^- \overline{K}^*(892)^0$, $\overline{K}^*(892)^0 \to K^- \pi^+$	$(4.4 \pm 1.7) \times 10^{-5}$		†
$K^- \pi^+ \phi$, $\phi \to K^+ K^-$	$(4.0 \pm 1.7) \times 10^{-5}$		422
$\phi \overline{K}^*(892)^0$, $\phi \to K^+ K^-$, $\overline{K}^*(892)^0 \to K^- \pi^+$	$(1.06 \pm 0.20) \times 10^{-4}$		†
$K^+ 2K^- \pi^+$ nonresonant	$(3.3 \pm 1.5) \times 10^{-5}$		434
$2K^0_S K^\pm \pi^\mp$	$(6.2 \pm 1.3) \times 10^{-4}$		427

Pionic modes

$\pi^+ \pi^-$	$(1.397 \pm 0.026) \times 10^{-3}$		922
$2\pi^0$	$(8.0 \pm 0.8) \times 10^{-4}$		923
$\pi^+ \pi^- \pi^0$	(1.44 ± 0.06) %	S=1.8	907
$\rho^+ \pi^-$	$(9.8 \pm 0.4) \times 10^{-3}$		764
$\rho^0 \pi^0$	$(3.73 \pm 0.22) \times 10^{-3}$		764
$\rho^- \pi^+$	$(4.97 \pm 0.23) \times 10^{-3}$		764
$\rho(1450)^+ \pi^-$, $\rho(1450)^+ \to \pi^+ \pi^0$	$(1.6 \pm 2.0) \times 10^{-5}$		–
$\rho(1450)^0 \pi^0$, $\rho(1450)^0 \to \pi^+ \pi^-$	$(4.3 \pm 1.9) \times 10^{-5}$		–
$\rho(1450)^- \pi^+$, $\rho(1450)^- \to \pi^- \pi^0$	$(2.6 \pm 0.4) \times 10^{-4}$		–
$\rho(1700)^+ \pi^-$, $\rho(1700)^+ \to \pi^+ \pi^0$	$(5.9 \pm 1.4) \times 10^{-4}$		–
$\rho(1700)^0 \pi^0$, $\rho(1700)^0 \to \pi^+ \pi^-$	$(7.2 \pm 1.7) \times 10^{-4}$		–
$\rho(1700)^- \pi^+$, $\rho(1700)^- \to \pi^- \pi^0$	$(4.6 \pm 1.1) \times 10^{-4}$		–
$f_0(980) \pi^0$, $f_0(980) \to \pi^+ \pi^-$	$(3.6 \pm 0.8) \times 10^{-5}$		–
$f_0(600) \pi^0$, $f_0(600) \to \pi^+ \pi^-$	$(1.18 \pm 0.21) \times 10^{-4}$		–
$f_0(1370) \pi^0$, $f_0(1370) \to \pi^+ \pi^-$	$(5.3 \pm 2.1) \times 10^{-5}$		–
$f_0(1500) \pi^0$, $f_0(1500) \to \pi^+ \pi^-$	$(5.6 \pm 1.5) \times 10^{-5}$		–
$f_0(1710) \pi^0$, $f_0(1710) \to \pi^+ \pi^-$	$(4.5 \pm 1.5) \times 10^{-5}$		–
$f_2(1270) \pi^0$, $f_2(1270) \to \pi^+ \pi^-$	$(1.90 \pm 0.20) \times 10^{-4}$		–
$\pi^+ \pi^- \pi^0$ nonresonant	$(1.21 \pm 0.35) \times 10^{-4}$		907
$3\pi^0$	$< 3.5 \times 10^{-4}$	CL=90%	908
$2\pi^+ 2\pi^-$	$(7.44 \pm 0.21) \times 10^{-3}$	S=1.1	880
$a_1(1260)^+ \pi^-$, $a_1^+ \to 2\pi^+ \pi^-$ total	$(4.46 \pm 0.31) \times 10^{-3}$		–

$a_1(1260)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ S-wave		$(3.22 \pm 0.25) \times 10^{-3}$		–
$a_1(1260)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ D-wave		$(1.9 \pm 0.5) \times 10^{-4}$		–
$a_1(1260)^+\pi^-$, $a_1^+ \to \sigma\pi^+$		$(6.2 \pm 0.7) \times 10^{-4}$		–
$2\rho^0$ total		$(1.82 \pm 0.13) \times 10^{-3}$		518
$2\rho^0$, parallel helicities		$(8.2 \pm 3.2) \times 10^{-5}$		–
$2\rho^0$, perpendicular helicities		$(4.8 \pm 0.6) \times 10^{-4}$		–
$2\rho^0$, longitudinal helicities		$(1.25 \pm 0.10) \times 10^{-3}$		–
Resonant $(\pi^+\pi^-)\pi^+\pi^-$ 3-body total		$(1.49 \pm 0.12) \times 10^{-3}$		–
$\sigma\pi^+\pi^-$		$(6.1 \pm 0.9) \times 10^{-4}$		–
$f_0(980)\pi^+\pi^-$, $f_0 \to \pi^+\pi^-$		$(1.8 \pm 0.5) \times 10^{-4}$		–
$f_2(1270)\pi^+\pi^-$, $f_2 \to \pi^+\pi^-$		$(3.6 \pm 0.6) \times 10^{-4}$		–
$\pi^+\pi^- 2\pi^0$		(1.00 ± 0.09) %		882
$\eta\pi^0$	[p]	$(6.4 \pm 1.1) \times 10^{-4}$		846
$\omega\pi^0$	[p]	$< 2.6 \times 10^{-4}$	CL=90%	761
$2\pi^+ 2\pi^- \pi^0$		$(4.2 \pm 0.5) \times 10^{-3}$		844
$\eta\pi^+\pi^-$	[p]	$(1.09 \pm 0.16) \times 10^{-3}$		827
$\omega\pi^+\pi^-$	[p]	$(1.6 \pm 0.5) \times 10^{-3}$		738
$3\pi^+ 3\pi^-$		$(4.2 \pm 1.2) \times 10^{-4}$		795
$\eta'(958)\pi^0$		$(8.1 \pm 1.6) \times 10^{-4}$		678
$\eta'(958)\pi^+\pi^-$		$(4.5 \pm 1.7) \times 10^{-4}$		650
2η		$(1.67 \pm 0.19) \times 10^{-3}$		754
$\eta\eta'(958)$		$(1.26 \pm 0.27) \times 10^{-3}$		537

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

K^+K^-		$(3.94 \pm 0.07) \times 10^{-3}$	S=1.3	791
$2K^0_S$		$(1.9 \pm 0.7) \times 10^{-4}$	S=2.5	789
$K^0_S K^-\pi^+$		$(3.5 \pm 0.5) \times 10^{-3}$	S=1.1	739
$\overline{K}^*(892)^0 K^0_S$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$< 6 \times 10^{-4}$	CL=90%	608
$K^0_S K^+\pi^-$		$(2.6 \pm 0.5) \times 10^{-3}$		739
$K^*(892)^0 K^0_S$, $K^*(892)^0 \to K^+\pi^-$		$< 2.9 \times 10^{-4}$	CL=90%	608
$K^+K^-\pi^0$		$(3.29 \pm 0.13) \times 10^{-3}$		743
$K^*(892)^+K^-$, $K^*(892)^+ \to K^+\pi^0$		$(1.46 \pm 0.07) \times 10^{-3}$		–
$K^*(892)^-K^+$, $K^*(892)^- \to K^-\pi^0$		$(5.2 \pm 0.4) \times 10^{-4}$		–
$(K^+\pi^0)_{S-wave}K^-$		$(2.34 \pm 0.17) \times 10^{-3}$		743

$(K^-\pi^0)_{S-wave}K^+$		$(\ 1.3 \pm 0.4\ )\times10^{-4}$		743
$f_0(980)\pi^0,\ f_0\to K^+K^-$		$(\ 3.5 \pm 0.6\ )\times10^{-4}$		–
$\phi\pi^0,\ \phi\to K^+K^-$		$(\ 6.4 \pm 0.4\ )\times10^{-4}$		–
$2K^0_S\pi^0$		$<\ 5.9\times10^{-4}$		740
$K^+K^-\pi^+\pi^-$	[q]	$(\ 2.43 \pm 0.12\ )\times10^{-3}$		677
$\phi\pi^+\pi^-$ 3-body, $\phi\to K^+K^-$		$(\ 2.4 \pm 2.4\ )\times10^{-5}$		614
$\phi\rho^0,\ \phi\to K^+K^-$		$(\ 7.1 \pm 0.6\ )\times10^{-4}$		250
$K^+K^-\rho^0$ 3-body		$(\ 5 \pm 7\ )\times10^{-5}$		302
$f_0(980)\pi^+\pi^-,\ f_0\to K^+K^-$		$(\ 3.6 \pm 0.9\ )\times10^{-4}$		–
$K^*(892)^0K^\mp\pi^\pm$ 3-body, $K^{*0}\to K^\pm\pi^\mp$	[r]	$(\ 2.7 \pm 0.6\ )\times10^{-4}$		531
$K^*(892)^0\overline{K}{}^*(892)^0,\ K^{*0}\to K^\pm\pi^\mp$		$(\ 7 \pm 5\ )\times10^{-5}$		272
$K_1(1270)^\pm K^\mp,\ K_1(1270)^\pm\to K^\pm\pi^+\pi^-$		$(\ 8.0 \pm 1.8\ )\times10^{-4}$		–
$K_1(1400)^\pm K^\mp,\ K_1(1400)^\pm\to K^\pm\pi^+\pi^-$		$(\ 5.3 \pm 1.2\ )\times10^{-4}$		–
$2K^0_S\pi^+\pi^-$		$(\ 1.28 \pm 0.24\ )\times10^{-3}$		673
$K^0_SK^-2\pi^+\pi^-$		$<\ 1.5\times10^{-4}$	CL=90%	595
$K^+K^-\pi^+\pi^-\pi^0$		$(\ 3.1 \pm 2.0\ )\times10^{-3}$		600

Other $K\overline{K}X$ modes. They include all decay modes of the ϕ, η, and ω.

$\phi\eta$		$(\ 1.4 \pm 0.5\ )\times10^{-4}$		489
$\phi\omega$		$<\ 2.1\times10^{-3}$	CL=90%	238

Radiative modes

$\rho^0\gamma$		$<\ 2.4\times10^{-4}$	CL=90%	771
$\omega\gamma$		$<\ 2.4\times10^{-4}$	CL=90%	768
$\phi\gamma$		$(\ 2.70 \pm 0.35\ )\times10^{-5}$		654
$\overline{K}{}^*(892)^0\gamma$		$(\ 3.28 \pm 0.34\ )\times10^{-4}$		719

Doubly Cabibbo suppressed (*DC*) modes or $\Delta C = 2$ forbidden via mixing (*C2M*) modes

$K^+\ell^-\overline{\nu}_\ell$ via $\overline{D}{}^0$		$<\ 2.2\times10^{-5}$	CL=90%	–
K^+ or $K^*(892)^+e^-\overline{\nu}_e$ via $\overline{D}{}^0$		$<\ 6\times10^{-5}$	CL=90%	–
$K^+\pi^-$	*DC*	$(\ 1.48 \pm 0.07\ )\times10^{-4}$		861
$K^+\pi^-$ via DCS		$(\ 1.31 \pm 0.08\ )\times10^{-4}$		–
$K^+\pi^-$ via $\overline{D}{}^0$		$<\ 1.6\times10^{-5}$	CL=95%	861
$K^0_S\pi^+\pi^-$ in $D^0\to\overline{D}{}^0$		$<\ 1.9\times10^{-4}$	CL=95%	–
$K^*(892)^+\pi^-,\ K^*(892)^+\to K^0_S\pi^+$	*DC*	$(\ 1.18\ ^{+\ 0.60}_{-\ 0.35}\ )\times10^{-4}$		711
$K^*_0(1430)^+\pi^-,\ K^*_0(1430)^+\to K^0_S\pi^+$	*DC*	$<\ 1.5\times10^{-5}$		–

$K_2^*(1430)^+\pi^-$, $K_2^*(1430)^+ \to K_S^0\pi^+$	*DC*	$<$ 3.5	$\times 10^{-5}$	–
$K^+\pi^-\pi^0$	*DC*	(3.05 $\pm$ 0.17)	$\times 10^{-4}$	844
$K^+\pi^-\pi^0$ via $\overline{D}^0$		(7.3 $\pm$ 0.5)	$\times 10^{-4}$	–
$K^+\pi^+2\pi^-$	*DC*	(2.62 $^{+\ 0.21}_{-\ 0.19}$)	$\times 10^{-4}$	813
$K^+\pi^+2\pi^-$ via $\overline{D}^0$		$<$ 4	$\times 10^{-4}$ CL=90%	812
μ^- anything via $\overline{D}^0$		$<$ 4	$\times 10^{-4}$ CL=90%	–

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

$\gamma\gamma$	*C1*	$<$ 2.7	$\times 10^{-5}$ CL=90%	932
e^+e^-	*C1*	$<$ 1.2	$\times 10^{-6}$ CL=90%	932
$\mu^+\mu^-$	*C1*	$<$ 1.3	$\times 10^{-6}$ CL=90%	926
$\pi^0 e^+e^-$	*C1*	$<$ 4.5	$\times 10^{-5}$ CL=90%	928
$\pi^0\mu^+\mu^-$	*C1*	$<$ 1.8	$\times 10^{-4}$ CL=90%	915
ηe^+e^-	*C1*	$<$ 1.1	$\times 10^{-4}$ CL=90%	852
$\eta\mu^+\mu^-$	*C1*	$<$ 5.3	$\times 10^{-4}$ CL=90%	838
$\pi^+\pi^-e^+e^-$	*C1*	$<$ 3.73	$\times 10^{-4}$ CL=90%	922
$\rho^0 e^+e^-$	*C1*	$<$ 1.0	$\times 10^{-4}$ CL=90%	771
$\pi^+\pi^-\mu^+\mu^-$	*C1*	$<$ 3.0	$\times 10^{-5}$ CL=90%	894
$\rho^0\mu^+\mu^-$	*C1*	$<$ 2.2	$\times 10^{-5}$ CL=90%	754
ωe^+e^-	*C1*	$<$ 1.8	$\times 10^{-4}$ CL=90%	768
$\omega\mu^+\mu^-$	*C1*	$<$ 8.3	$\times 10^{-4}$ CL=90%	751
$K^-K^+e^+e^-$	*C1*	$<$ 3.15	$\times 10^{-4}$ CL=90%	791
ϕe^+e^-	*C1*	$<$ 5.2	$\times 10^{-5}$ CL=90%	654
$K^-K^+\mu^+\mu^-$	*C1*	$<$ 3.3	$\times 10^{-5}$ CL=90%	710
$\phi\mu^+\mu^-$	*C1*	$<$ 3.1	$\times 10^{-5}$ CL=90%	631
$\overline{K}^0 e^+e^-$		[*g*] $<$ 1.1	$\times 10^{-4}$ CL=90%	866
$\overline{K}^0\mu^+\mu^-$		[*g*] $<$ 2.6	$\times 10^{-4}$ CL=90%	852
$K^-\pi^+e^+e^-$	*C1*	$<$ 3.85	$\times 10^{-4}$ CL=90%	861
$\overline{K}^*(892)^0 e^+e^-$		[*g*] $<$ 4.7	$\times 10^{-5}$ CL=90%	719
$K^-\pi^+\mu^+\mu^-$	*C1*	$<$ 3.59	$\times 10^{-4}$ CL=90%	829
$\overline{K}^*(892)^0\mu^+\mu^-$		[*g*] $<$ 2.4	$\times 10^{-5}$ CL=90%	700
$\pi^+\pi^-\pi^0\mu^+\mu^-$	*C1*	$<$ 8.1	$\times 10^{-4}$ CL=90%	863
$\mu^\pm e^\mp$	*LF*	[*h*] $<$ 8.1	$\times 10^{-7}$ CL=90%	929
$\pi^0 e^\pm\mu^\mp$	*LF*	[*h*] $<$ 8.6	$\times 10^{-5}$ CL=90%	924
$\eta e^\pm\mu^\mp$	*LF*	[*h*] $<$ 1.0	$\times 10^{-4}$ CL=90%	848
$\pi^+\pi^-e^\pm\mu^\mp$	*LF*	[*h*] $<$ 1.5	$\times 10^{-5}$ CL=90%	911
$\rho^0 e^\pm\mu^\mp$	*LF*	[*h*] $<$ 4.9	$\times 10^{-5}$ CL=90%	767
$\omega e^\pm\mu^\mp$	*LF*	[*h*] $<$ 1.2	$\times 10^{-4}$ CL=90%	764
$K^-K^+e^\pm\mu^\mp$	*LF*	[*h*] $<$ 1.8	$\times 10^{-4}$ CL=90%	754
$\phi e^\pm\mu^\mp$	*LF*	[*h*] $<$ 3.4	$\times 10^{-5}$ CL=90%	648
$\overline{K}^0 e^\pm\mu^\mp$	*LF*	[*h*] $<$ 1.0	$\times 10^{-4}$ CL=90%	863

$K^-\pi^+e^\pm\mu^\mp$	*LF*	[*h*] < 5.53	$\times 10^{-4}$	CL=90%	848
$\overline{K}^*(892)^0e^\pm\mu^\mp$	*LF*	[*h*] < 8.3	$\times 10^{-5}$	CL=90%	714
$2\pi^-2e^+$ + c.c.	*L*	< 1.12	$\times 10^{-4}$	CL=90%	922
$2\pi^-2\mu^+$ + c.c.	*L*	< 2.9	$\times 10^{-5}$	CL=90%	894
$K^-\pi^-2e^+$ + c.c.	*L*	< 2.06	$\times 10^{-4}$	CL=90%	861
$K^-\pi^-2\mu^+$ + c.c.	*L*	< 3.9	$\times 10^{-4}$	CL=90%	829
$2K^-2e^+$ + c.c.	*L*	< 1.52	$\times 10^{-4}$	CL=90%	791
$2K^-2\mu^+$ + c.c.	*L*	< 9.4	$\times 10^{-5}$	CL=90%	710
$\pi^-\pi^-e^+\mu^+$ + c.c.	*L*	< 7.9	$\times 10^{-5}$	CL=90%	911
$K^-\pi^-e^+\mu^+$ + c.c.	*L*	< 2.18	$\times 10^{-4}$	CL=90%	848
$2K^-e^+\mu^+$ + c.c.	*L*	< 5.7	$\times 10^{-5}$	CL=90%	754
pe^-	*L*,*B*	[*s*] < 1.0	$\times 10^{-5}$	CL=90%	696
$\overline{p}e^+$	*L*,*B*	[*t*] < 1.1	$\times 10^{-5}$	CL=90%	696

$D^*(2007)^0$

$I(J^P) = \frac{1}{2}(1^-)$
I, *J*, *P* need confirmation.

Mass $m = 2006.96 \pm 0.16$ MeV
$m_{D^{*0}} - m_{D^0} = 142.12 \pm 0.07$ MeV
Full width $\Gamma < 2.1$ MeV, CL = 90%

$\overline{D}^*(2007)^0$ modes are charge conjugates of modes below.

$D^*(2007)^0$ DECAY MODES	Fraction (Γ_i/Γ)	*p* (MeV/*c*)
$D^0\pi^0$	(61.9±2.9) %	43
$D^0\gamma$	(38.1±2.9) %	137

$D^*(2010)^\pm$

$I(J^P) = \frac{1}{2}(1^-)$
I, *J*, *P* need confirmation.

Mass $m = 2010.25 \pm 0.14$ MeV
$m_{D^*(2010)^+} - m_{D^+} = 140.65 \pm 0.10$ MeV (S = 1.1)
$m_{D^*(2010)^+} - m_{D^0} = 145.421 \pm 0.010$ MeV (S = 1.1)
Full width $\Gamma = 96 \pm 22$ keV

$D^*(2010)^-$ modes are charge conjugates of the modes below.

$D^*(2010)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^+$	(67.7±0.5) %	39
$D^+\pi^0$	(30.7±0.5) %	38
$D^+\gamma$	(1.6±0.4) %	136

$D_0^*(2400)^0$

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

Mass $m = 2318 \pm 29$ MeV (S = 1.7)
Full width $\Gamma = 267 \pm 40$ MeV

$D_0^*(2400)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^+\pi^-$	seen	385

$D_1(2420)^0$

$I(J^P) = \frac{1}{2}(1^+)$
I, J, P need confirmation.

Mass $m = 2422.0 \pm 0.6$ MeV
$m_{D_1^0} - m_{D^{*+}} = 411.7 \pm 0.6$
Full width $\Gamma = 20.4 \pm 1.7$ MeV

$\overline{D}_1(2420)^0$ modes are charge conjugates of modes below.

$D_1(2420)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+\pi^-$	seen	354
$D^0\pi^+\pi^-$	seen	426
$D^+\pi^-$	not seen	473
$D^{*0}\pi^+\pi^-$	not seen	280

$D_2^*(2460)^0$

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

$J^P = 2^+$ assignment strongly favored.

Mass $m = 2462.8 \pm 1.0$ MeV (S = 1.5)
$m_{D_2^{*0}} - m_{D^+} = 593.2 \pm 1.0$ MeV (S = 1.5)
$m_{D_2^{*0}} - m_{D^{*+}} = 452.6 \pm 1.0$ MeV (S = 1.5)
Full width $\Gamma = 42.9 \pm 3.1$ MeV (S = 1.7)

$\overline{D}{}_2^*(2460)^0$ modes are charge conjugates of modes below.

$D_2^*(2460)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^+\pi^-$	seen	507
$D^*(2010)^+\pi^-$	seen	391
$D^0\pi^+\pi^-$	not seen	464
$D^{*0}\pi^+\pi^-$	not seen	326

$D_2^*(2460)^\pm$

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

$J^P = 2^+$ assignment strongly favored.

Mass $m = 2460.1^{+2.6}_{-3.5}$ MeV (S = 1.5)
$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV
Full width $\Gamma = 37 \pm 6$ MeV (S = 1.4)

$D_2^*(2460)^-$ modes are charge conjugates of modes below.

$D_2^*(2460)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^+$	seen	508
$D^{*0}\pi^+$	seen	391
$D^+\pi^+\pi^-$	not seen	457
$D^{*+}\pi^+\pi^-$	not seen	320

NOTES

[*a*] This result applies to $Z^0 \to c\overline{c}$ decays only. Here ℓ^+ is an average (not a sum) of e^+ and μ^+ decays.

[*b*] 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 in the Particle Listings.

[*c*] These subfractions of the $K^-2\pi^+$ mode are uncertain: see the Particle Listings.

[*d*] Submodes of the $D^+ \to K^-2\pi^+\pi^0$ and $K^0_S2\pi^+\pi^-$ modes were studied by ANJOS 92C and COFFMAN 92B, but with at most 142 events for the first mode and 229 for the second – not enough for precise results. With nothing new for 18 years, we refer to our 2008 edition, Physics Letters **B667** 1 (2008), for those results.

[*e*] The unseen decay modes of the resonances are included.

[*f*] This is *not* a test for the ΔC=1 weak neutral current, but leads to the $\pi^+\ell^+\ell^-$ final state.

[*g*] This mode is not a useful test for a ΔC=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.

[*i*] This value is obtained by subtracting the branching fractions for 2-, 4- and 6-prongs from unity.

[*j*] This is the sum of our $K^-2\pi^+\pi^-$, $K^-2\pi^+\pi^-\pi^0$, $\overline{K}^0 2\pi^+2\pi^-$, $K^+2K^-\pi^+$, $2\pi^+2\pi^-$, $2\pi^+2\pi^-\pi^0$, $K^+K^-\pi^+\pi^-$, and $K^+K^-\pi^+\pi^-\pi^0$, branching fractions.

[*k*] This is the sum of our $K^-3\pi^+2\pi^-$ and $3\pi^+3\pi^-$ branching fractions.

[*l*] The branching fractions for the $K^-e^+\nu_e$, $K^*(892)^-e^+\nu_e$, $\pi^-e^+\nu_e$, and $\rho^-e^+\nu_e$ modes add up to 6.20 $\pm$ 0.17 %.

[*m*] This is a doubly Cabibbo-suppressed mode.

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

[*o*] Submodes of the $D^0 \to K^0_S\pi^+\pi^-\pi^0$ mode with a K^* and/or ρ were studied by COFFMAN 92B, but with only 140 events. With nothing new for 18 years, we refer to our 2008 edition, Physics Letters **B667** 1 (2008), for those results.

[*p*] This branching fraction includes all the decay modes of the resonance in the final state.

[*q*] The experiments on the division of this charge mode amongst its submodes disagree, and the submode branching fractions here add up to considerably more than the charged-mode fraction.

[r] However, these upper limits are in serious disagreement with values obtained in another experiment.

[s] This limit is for either D^0 or $\overline{D}^0$ to pe^-.

[t] This limit is for either D^0 or $\overline{D}^0$ to $\overline{p}e^+$.