

CHARMED MESONS

($C = \pm 1$)

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

$D^\pm$

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

$$\text{Mass } m = 1869.66 \pm 0.05 \text{ MeV}$$

$$\text{Mean life } \tau = (1033 \pm 5) \times 10^{-15} \text{ s}$$

$$c\tau = 309.8 \text{ } \mu\text{m}$$

c-quark decays

$$\Gamma(c \rightarrow \ell^+ \text{ anything}) / \Gamma(c \rightarrow \text{ anything}) = 0.096 \pm 0.004 \text{ } [a]$$

$$\Gamma(c \rightarrow D^{*}(2010)^+ \text{ anything}) / \Gamma(c \rightarrow \text{ anything}) = 0.255 \pm 0.017$$

CP-violation decay-rate asymmetries

$$A_{CP}(\mu^\pm \nu) = (8 \pm 8)\%$$

$$A_{CP}(K_L^0 e^\pm \nu) = (-0.6 \pm 1.6)\%$$

$$A_{CP}(K_S^0 \pi^\pm) = (-0.41 \pm 0.09)\%$$

$$A_{CP}(K_L^0 K^\pm) \text{ in } D^\pm \rightarrow K_L^0 K^\pm = (-4.2 \pm 3.4) \times 10^{-2}$$

$$A_{CP}(K^\mp 2\pi^\pm) = (-0.18 \pm 0.16)\%$$

$$A_{CP}(K^\mp \pi^\pm \pi^\pm \pi^0) = (-0.3 \pm 0.7)\%$$

$$A_{CP}(K_S^0 \pi^\pm \pi^0) = (-0.1 \pm 0.7)\%$$

$$A_{CP}(K_S^0 \pi^\pm \eta) \text{ in } D^\pm \rightarrow K_S^0 \pi^\pm \eta = (-0.9 \pm 3.1) \times 10^{-2}$$

$$A_{CP}(K_S^0 \pi^\pm \pi^+ \pi^-) = (0.0 \pm 1.2)\%$$

$$A_{CP}(K^\pm \pi^+ \pi^- \pi^0) \text{ in } D^\pm \rightarrow K^\pm \pi^+ \pi^- \pi^0 = -0.04 \pm 0.06$$

$$A_{CP}(\pi^\pm \pi^0) = (0.4 \pm 1.3)\% \quad (S = 1.7)$$

$$A_{CP}(\pi^\pm \eta) = (0.3 \pm 0.5)\%$$

$$A_{CP}(\pi^\pm \pi^0 \eta) \text{ in } D^\pm \rightarrow \pi^\pm \pi^0 \eta = (-6 \pm 7) \times 10^{-2}$$

$$A_{CP}(\pi^\pm \eta \eta) \text{ in } D^\pm \rightarrow \pi^\pm \eta \eta = (8 \pm 9) \times 10^{-2}$$

$$A_{CP}(\pi^\pm \eta'(958)) = (0.41 \pm 0.23)\% \quad (S = 1.2)$$

$$A_{CP}(\bar{K}^0 / K^0 K^\pm) = (0.11 \pm 0.17)\%$$

$$A_{CP}(K_S^0 K^\pm) = (-0.01 \pm 0.07)\%$$

$$A_{CP}(K_S^0 K^\pm \pi^0) \text{ in } D^\pm \rightarrow K_S^0 K^\pm \pi^0 = (1 \pm 4) \times 10^{-2}$$

$$A_{CP}(K_L^0 K^\pm \pi^0) \text{ in } D^\pm \rightarrow K_L^0 K^\pm \pi^0 = (-1 \pm 4) \times 10^{-2}$$

$$A_{CP}(K^\pm K^\mp \pi^\pm) = (0.37 \pm 0.29)\%$$

$$A_{CP}(K^\pm K^{*0}) = (-0.3 \pm 0.4)\%$$

$$A_{CP|S}(K^+ \bar{K}^{*0}) \text{ in } D^\pm \rightarrow K^- K^+ \pi^\pm = (-0.3 \pm 0.6) \times 10^{-3}$$

$$A_{CP}(\phi \pi^\pm) = (0.01 \pm 0.09)\% \quad (S = 1.8)$$

$$A_{CP|S}(\phi \pi^+) \text{ in } D^\pm \rightarrow K^- K^+ \pi^\pm = (1.0 \pm 0.5) \times 10^{-3}$$

$$A_{CP}(K^\pm K_0^*(1430)^0) = (8_{-6}^{+7})\%$$

$$\begin{aligned}
A_{CP}(K^\pm K_2^*(1430)^0) &= (43^{+20}_{-26})\% \\
A_{CP}(K^\pm K_0^*(700)) &= (-12^{+18}_{-13})\% \\
A_{CP}(a_0(1450)^0 \pi^\pm) &= (-19^{+14}_{-16})\% \\
A_{CP}(\phi(1680) \pi^\pm) &= (-9 \pm 26)\% \\
A_{CP}(\pi^\pm 2\pi^0) \text{ in } D^\pm \rightarrow \pi^\pm 2\pi^0 &= (5.6 \pm 2.7)\% \\
A_{CP}(\pi^+ \pi^- \pi^\pm) &= (0.5 \pm 2.0)\% \\
A_{CP}(2\pi^\pm \pi^\mp \pi^0) \text{ in } D^\pm \rightarrow 2\pi^\pm \pi^\mp \pi^0 &= (0.3 \pm 2.0)\% \\
A_{CP}(2\pi^\pm \pi^\mp 2\pi^0) \text{ in } D^\pm \rightarrow 2\pi^\pm \pi^\mp 2\pi^0 &= (-4 \pm 4)\% \\
A_{CP}(\pi^+ \pi^- \pi^\pm \eta) \text{ in } D^\pm \rightarrow \pi^+ \pi^- \pi^\pm \eta &= (3 \pm 5) \times 10^{-2} \\
A_{CP}(K_S^0 K^\pm \pi^+ \pi^-) &= (-4 \pm 7)\% \\
A_{CP}(K^\pm \pi^0) &= (-3 \pm 5)\% \\
A_{CP}(K^\pm \eta) \text{ in } D^\pm \rightarrow K^\pm \eta &= (-6 \pm 11) \times 10^{-2}
\end{aligned}$$

χ^2 tests of CP-violation (CPV)

$$\begin{aligned}
\text{Local CPV in } D^\pm \rightarrow \pi^+ \pi^- \pi^\pm &= 78.1\% \\
\text{Local CPV in } D^\pm \rightarrow K^+ K^- \pi^\pm &= 31\% \\
\text{Local CPV in } D^\pm \rightarrow K^+ K^- K^\pm &= 31.6\%
\end{aligned}$$

CP violating asymmetries of P-odd (T-odd) moments

$$\begin{aligned}
A_T(K_S^0 K^\pm \pi^+ \pi^-) &= (-3 \pm 8) \times 10^{-3} [b] \quad (S = 1.1) \\
A_{Tviol}(K^+ K^- K_S^0 \pi^\pm) \text{ in } D^\pm \rightarrow K^+ K^- K_S^0 \pi^\pm &= (-3.3 \pm 2.7)\%
\end{aligned}$$

D^+ form factors

$$\begin{aligned}
f_+(0)|V_{cs}| \text{ in } \bar{K}^0 \ell^+ \nu_\ell &= 0.7163 \pm 0.0033 \\
r_1 \equiv a_1/a_0 \text{ in } \bar{K}^0 \ell^+ \nu_\ell &= -2.13 \pm 0.14 \\
r_2 \equiv a_2/a_0 \text{ in } \bar{K}^0 \ell^+ \nu_\ell &= -3 \pm 12 \quad (S = 1.5) \\
f_+(0)|V_{cd}| \text{ in } \pi^0 \ell^+ \nu_\ell &= 0.1407 \pm 0.0025 \\
r_1 \equiv a_1/a_0 \text{ in } \pi^0 \ell^+ \nu_\ell &= -2.00 \pm 0.13 \\
r_2 \equiv a_2/a_0 \text{ in } \pi^0 \ell^+ \nu_\ell &= -4 \pm 5 \\
f_+(0)|V_{cd}| \text{ in } D^+ \rightarrow \eta \ell^+ \nu_\ell \ (\ell = e \text{ or } \nu) &= (8.4 \pm 0.4) \times 10^{-2} \\
r_1 \equiv a_1/a_0 \text{ in } D^+ \rightarrow \eta e^+ \nu_e &= -5.3 \pm 2.7 \quad (S = 1.9) \\
r_\nu \equiv V(0)/A_1(0) \text{ in } D^+ \rightarrow \omega e^+ \nu_e &= 1.24 \pm 0.11 \\
r_2 \equiv A_2(0)/A_1(0) \text{ in } D^+ \rightarrow \omega e^+ \nu_e &= 1.06 \pm 0.16 \\
r_\nu \equiv V(0)/A_1(0) \text{ in } D^+, D^0 \rightarrow \rho e^+ \nu_e &= 1.53 \pm 0.08 \\
r_2 \equiv A_2(0)/A_1(0) \text{ in } D^+, D^0 \rightarrow \rho e^+ \nu_e &= 0.82 \pm 0.05 \\
r_\nu \equiv V(0)/A_1(0) \text{ in } \bar{K}^*(892)^0 \ell^+ \nu_\ell &= 1.48 \pm 0.05 \quad (S = 1.9) \\
r_2 \equiv A_2(0)/A_1(0) \text{ in } \bar{K}^*(892)^0 \ell^+ \nu_\ell &= 0.794 \pm 0.020 \\
r_3 \equiv A_3(0)/A_1(0) \text{ in } \bar{K}^*(892)^0 \ell^+ \nu_\ell &= 0.0 \pm 0.4 \\
\Gamma_L/\Gamma_T \text{ in } \bar{K}^*(892)^0 \ell^+ \nu_\ell &= 1.13 \pm 0.08 \\
\Gamma_+/\Gamma_- \text{ in } \bar{K}^*(892)^0 \ell^+ \nu_\ell &= 0.22 \pm 0.06 \quad (S = 1.6)
\end{aligned}$$

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

D^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Inclusive modes			
e^+ semileptonic	(16.07 $\pm$ 0.30) %		—
μ^+ anything	(17.6 $\pm$ 3.2) %		—
K^- anything	(25.7 $\pm$ 1.4) %		—
K_S^0 anything	(33.1 $\pm$ 0.4) %		—
K^+ anything	(5.9 $\pm$ 0.8) %		—
$K^*(892)^-$ anything	(6 $\pm$ 5) %		—
$\bar{K}^*(892)^0$ anything	(23 $\pm$ 5) %		—
$K^*(892)^0$ anything	< 6.6	% CL=90%	—
η anything	(6.3 $\pm$ 0.7) %		—
η' anything	(1.04 $\pm$ 0.18) %		—
ϕ anything	(1.12 $\pm$ 0.04) %		—
$\pi^+\pi^+\pi^-$ anything	(15.25 $\pm$ 0.20) %		—
Leptonic and semileptonic modes			
$e^+\nu_e$	< 8.8	$\times 10^{-6}$ CL=90%	935
$\gamma e^+\nu_e$	< 3.0	$\times 10^{-5}$ CL=90%	935
$\mu^+\nu_\mu$	(3.74 $\pm$ 0.17) $\times 10^{-4}$		932
$\tau^+\nu_\tau$	(1.20 $\pm$ 0.27) $\times 10^{-3}$		90
$\bar{K}^0 e^+\nu_e$	(8.81 $\pm$ 0.07) %		869
$\bar{K}^0 \mu^+\nu_\mu$	(8.68 $\pm$ 0.10) %		865
$K_S^0 \pi^0 e^+\nu_e$	(8.81 $\pm$ 0.23) $\times 10^{-3}$		863
$(K_S^0 \pi^0)_{S-wave} e^+\nu_e$	(5.4 $\pm$ 0.4) $\times 10^{-4}$		863
$\bar{K}^*(892)^0 e^+\nu_e, \bar{K}^{*0} \rightarrow K_S^0 \pi^0$	(8.27 $\pm$ 0.22) $\times 10^{-3}$		—
$K^-\pi^+ e^+\nu_e$	(4.02 $\pm$ 0.18) %	S=3.2	864
$\bar{K}^*(892)^0 e^+\nu_e, \bar{K}^*(892)^0 \rightarrow K^-\pi^+$	(3.77 $\pm$ 0.17) %		722
$(K^-\pi^+)_{[0.8-1.0]\text{GeV}} e^+\nu_e$	(3.39 $\pm$ 0.09) %		864
$(K^-\pi^+)_{S-wave} e^+\nu_e$	(2.28 $\pm$ 0.11) $\times 10^{-3}$		—
$\bar{K}^*(1410)^0 e^+\nu_e, \bar{K}^*(1410)^0 \rightarrow K^-\pi^+$	< 6	$\times 10^{-3}$ CL=90%	—
$\bar{K}_2^*(1430)^0 e^+\nu_e, \bar{K}_2^*(1430)^0 \rightarrow K^-\pi^+$	< 5	$\times 10^{-4}$ CL=90%	—
$K^-\pi^+ e^+\nu_e$ nonresonant	< 7	$\times 10^{-3}$ CL=90%	864
$\bar{K}^*(892)^0 e^+\nu_e$	(5.40 $\pm$ 0.10) %	S=1.1	722

$K^- \pi^+ \mu^+ \nu_\mu$	(3.62 $\pm$ 0.33) %	851
$\bar{K}^*(892)^0 \mu^+ \nu_\mu$,	(3.52 $\pm$ 0.10) %	717
$\bar{K}^*(892)^0 \rightarrow K^- \pi^+$		
$K^- \pi^+ \mu^+ \nu_\mu$ nonresonant	(1.9 $\pm$ 0.5) $\times 10^{-3}$	851
$\bar{K}^*(892)^0 \mu^+ \nu_\mu$	(5.27 $\pm$ 0.15) % S=1.1	717
$K^- \pi^+ \pi^0 \mu^+ \nu_\mu$	< 1.5 $\times 10^{-3}$ CL=90%	825
$\bar{K}_1(1270)^0 e^+ \nu_e$, $\bar{K}_1^0 \rightarrow$ $K^- \pi^+ \pi^0$	(1.06 $\pm$ 0.15) $\times 10^{-3}$	—
$\bar{K}_1(1270)^0 e^+ \nu_e$, $\bar{K}_1^0 \rightarrow$ $K_S^0 \pi^+ \pi^-$	(1.5 $\pm$ 0.5 $\pm$ 0.4) $\times 10^{-4}$	—
$\bar{K}_0^*(1430)^0 \mu^+ \nu_\mu$	< 2.3 $\times 10^{-4}$ CL=90%	380
$\bar{K}^*(1680)^0 \mu^+ \nu_\mu$	< 1.4 $\times 10^{-3}$ CL=90%	105
$\pi^0 e^+ \nu_e$	(3.72 $\pm$ 0.17) $\times 10^{-3}$ S=2.0	930
$\pi^0 \mu^+ \nu_\mu$	(3.50 $\pm$ 0.15) $\times 10^{-3}$	927
$\eta e^+ \nu_e$	(1.11 $\pm$ 0.07) $\times 10^{-3}$	855
$\eta \mu^+ \nu_\mu$	(1.04 $\pm$ 0.11) $\times 10^{-3}$	851
$\pi^- \pi^+ e^+ \nu_e$	(2.45 $\pm$ 0.08) $\times 10^{-3}$	924
$f_0(500)^0 e^+ \nu_e$, $f_0(500)^0 \rightarrow$ $\pi^+ \pi^-$	(6.2 $\pm$ 0.4) $\times 10^{-4}$	—
$\rho^0 e^+ \nu_e$	(1.87 $\pm$ 0.06) $\times 10^{-3}$	774
$f_0(500)^0 \mu^+ \nu_\mu$, $f_0^0 \rightarrow$ $\pi^+ \pi^-$	(7.2 $\pm$ 1.5) $\times 10^{-4}$	—
$\rho^0 \mu^+ \nu_\mu$	(1.64 $\pm$ 0.16) $\times 10^{-3}$	770
$\omega e^+ \nu_e$	(1.69 $\pm$ 0.11) $\times 10^{-3}$	771
$\omega \mu^+ \nu_\mu$	(1.77 $\pm$ 0.21) $\times 10^{-3}$	767
$\eta'(958) e^+ \nu_e$	(2.0 $\pm$ 0.4) $\times 10^{-4}$	690
$a(980)^0 e^+ \nu_e$, $a(980)^0 \rightarrow \eta \pi^0$	(1.7 $\pm$ 0.8 $\pm$ 0.7) $\times 10^{-4}$	—
$K_S^0 K_S^0 e^+ \nu_e$	< 1.54 $\times 10^{-5}$ CL=90%	791
$K_S^0 \eta e^+ \nu_e$	< 2.0 $\times 10^{-4}$ CL=90%	775
$\eta \eta e^+ \nu_e$	< 1.0 $\times 10^{-4}$ CL=90%	757
$K^+ K^- e^+ \nu_e$	< 2.10 $\times 10^{-5}$ CL=90%	794
$b_1(1235)^0 e^+ \nu_e$, $b_1^0 \rightarrow \omega \pi^0$	< 1.75 $\times 10^{-4}$ CL=90%	—
$\phi e^+ \nu_e$	< 1.3 $\times 10^{-5}$ CL=90%	657
$D^0 e^+ \nu_e$	< 1.0 $\times 10^{-4}$ CL=90%	5

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

$K_S^0 \pi^+$	(1.561 $\pm$ 0.031) % S=1.7	863
$K_L^0 \pi^+$	(1.46 $\pm$ 0.05) %	863
$K^- 2\pi^+$	[c] (9.38 $\pm$ 0.16) % S=1.6	846
$(K^- \pi^+)_{S\text{-wave}} \pi^+$	(7.52 $\pm$ 0.17) %	846
$\bar{K}_0^*(1430)^0 \pi^+$,	[d] (1.25 $\pm$ 0.06) %	382
$\bar{K}_0^*(1430)^0 \rightarrow K^- \pi^+$		

$\bar{K}^*(892)^0 \pi^+$,	(1.04 $\pm$ 0.12) %	714
$\bar{K}^*(892)^0 \rightarrow K^- \pi^+$		
$\bar{K}^*(1410)^0 \pi^+$, $\bar{K}^{*0} \rightarrow$	not seen	381
$K^- \pi^+$		
$\bar{K}_2^*(1430)^0 \pi^+$,	[d] (2.3 $\pm$ 0.7) $\times 10^{-4}$	371
$\bar{K}_2^*(1430)^0 \rightarrow K^- \pi^+$		
$\bar{K}^*(1680)^0 \pi^+$,	[d] (2.2 $\pm$ 1.1) $\times 10^{-4}$	58
$\bar{K}^*(1680)^0 \rightarrow K^- \pi^+$		
$K^-(2\pi^+)_{I=2}$	(1.45 $\pm$ 0.26) %	—
$K_S^0 \pi^+ \pi^0$	[c] (7.36 $\pm$ 0.20) %	845
$K_S^0 \rho^+$	(6.14 $\pm$ 0.60 $\pm$ 0.35) %	677
$K_S^0 \rho(1450)^+$, $\rho^+ \rightarrow \pi^+ \pi^0$	(1.5 $\pm$ 1.2 $\pm$ 1.4) $\times 10^{-3}$	—
$\bar{K}^*(892)^0 \pi^+$,	(2.64 $\pm$ 0.32) $\times 10^{-3}$	714
$\bar{K}^*(892)^0 \rightarrow K_S^0 \pi^0$		
$\bar{K}_0^*(1430)^0 \pi^+$, $\bar{K}_0^{*0} \rightarrow$	(2.7 $\pm$ 0.9) $\times 10^{-3}$	—
$K_S^0 \pi^0$		
$\bar{K}_0^*(1680)^0 \pi^+$, $\bar{K}_0^{*0} \rightarrow$	(10 $\pm$ 7 $\pm$ 10) $\times 10^{-4}$	—
$K_S^0 \pi^0$		
$\bar{K}^0 \pi^+$, $\bar{K}^0 \rightarrow K_S^0 \pi^0$	(6 $\pm$ 5 $\pm$ 4) $\times 10^{-3}$	—
$K_S^0 \pi^+ \pi^0$ nonresonant	(3 $\pm$ 4) $\times 10^{-3}$	845
$K_S^0 \pi^+ \pi^0$ nonresonant and	(1.37 $\pm$ 0.21 $\pm$ 0.40) %	—
$\bar{K}^0 \pi^+$		
$(K_S^0 \pi^0)_{S\text{-wave}} \pi^+$	(1.27 $\pm$ 0.27 $\pm$ 0.33) %	845
$K_S^0 \pi^+ \omega$	(7.1 $\pm$ 0.5) $\times 10^{-3}$	606
$K_S^0 \pi^+ \eta$	(1.27 $\pm$ 0.05) %	722
$K_S^0 a_0(980)^+$, $a_0^+ \rightarrow \pi^+ \eta$	(1.33 $\pm$ 0.06) %	—
$\bar{K}_0^*(1430)^0 \pi^+$, $\bar{K}_0^{*0} \rightarrow K_S^0 \eta$	(1.38 $\pm$ 0.26) $\times 10^{-3}$	—
$K_S^0 \pi^+ \eta'(958)$	(1.90 $\pm$ 0.21) $\times 10^{-3}$	481
$K^- 2\pi^+ \pi^0$	[e] (6.25 $\pm$ 0.18) %	817
$K_S^0 2\pi^+ \pi^-$	[e] (3.10 $\pm$ 0.09) %	814
$K_S^0 \pi^+ 2\pi^0$	(2.89 $\pm$ 0.09) %	817
$K_S^0 a_1(1260)^+$, $a_1^+ \rightarrow$	(8.7 $\pm$ 1.6) $\times 10^{-3}$	—
$\rho(770)^+ \pi^0$		
$K_S^0 a_1(1260)^+$, $a_1^+ \rightarrow$	(1.0 $\pm$ 0.6) $\times 10^{-3}$	—
$f_0(500) \pi^+$, $f_0 \rightarrow \pi^0 \pi^0$		
$\bar{K}_1(1400)^0 \pi^+$, $\bar{K}_1^0 \rightarrow$	(2.3 $\pm$ 0.4) $\times 10^{-3}$	—
$\bar{K}^*(892)^0 \pi^0$, $\bar{K}^{*0} \rightarrow$		
$K_S^0 \pi^0$		
$\bar{K}^*(892)^0 \rho^+$, $\bar{K}^{*0} \rightarrow K_S^0 \pi^0$	(9.7 $\pm$ 0.9) $\times 10^{-3}$	—

$\bar{K}^*(892)^0 \pi^+ \pi^0$ non-resonant, $\bar{K}^{*0} \rightarrow K_S^0 \pi^0$	$(2.6 \pm 0.7) \times 10^{-3}$	—
$K_S^0 \rho^+ \pi^0$ non-resonant	$(4.8 \pm 0.5) \times 10^{-3}$	—
$K^- 2\pi^+ \eta$	$(1.35 \pm 0.12) \times 10^{-3}$	657
$K_S^0 \pi^+ \pi^0 \eta$	$(1.22 \pm 0.25) \times 10^{-3}$	657
$K^- 3\pi^+ \pi^-$	[c] $(5.7 \pm 0.5) \times 10^{-3}$	S=1.1 772
$\bar{K}^*(892)^0 2\pi^+ \pi^-$, $\bar{K}^*(892)^0 \rightarrow K^- \pi^+$	$(1.2 \pm 0.4) \times 10^{-3}$	645
$\bar{K}^*(892)^0 \rho^0 \pi^+$, $\bar{K}^*(892)^0 \rightarrow K^- \pi^+$	$(2.3 \pm 0.4) \times 10^{-3}$	239
$\bar{K}^*(892)^0 a_1(1260)^+$	[f] $(9.3 \pm 1.9) \times 10^{-3}$	†
$K^- \rho^0 2\pi^+$	$(1.72 \pm 0.28) \times 10^{-3}$	524
$K^- 3\pi^+ \pi^-$ nonresonant	$(4.0 \pm 2.9) \times 10^{-4}$	772
$K_S^0 2\pi^+ \pi^- \pi^0$	$(1.53 \pm 0.08) \%$	773
$K_S^0 \pi^+ 3\pi^0$	$(5.5 \pm 0.5) \times 10^{-3}$	776
$K^- 2\pi^+ 2\pi^0$	$(4.95 \pm 0.32) \times 10^{-3}$	776
$K^+ 2K_S^0$	$(2.54 \pm 0.13) \times 10^{-3}$	545
$K^+ K^- K_S^0 \pi^+$	$(2.4 \pm 0.5) \times 10^{-4}$	436
Pionic modes		
$\pi^+ \pi^0$	$(1.247 \pm 0.033) \times 10^{-3}$	925
$2\pi^+ \pi^-$	$(3.27 \pm 0.09) \times 10^{-3}$	909
$\rho^0 \pi^+$	$(8.4 \pm 0.8) \times 10^{-4}$	767
$\pi^+ (\pi^+ \pi^-)_{S\text{-wave}}$	$(2.01 \pm 0.06) \times 10^{-3}$	909
$\sigma \pi^+$, $\sigma \rightarrow \pi^+ \pi^-$	$(1.38 \pm 0.10) \times 10^{-3}$	—
$f_0(980) \pi^+$, $f_0 \rightarrow \pi^+ \pi^-$	$(1.57 \pm 0.32) \times 10^{-4}$	669
$f_0(1370) \pi^+$, $f_0 \rightarrow \pi^+ \pi^-$	$(8 \pm 4) \times 10^{-5}$	—
$\omega \pi^+$, $\omega \rightarrow \pi^+ \pi^-$	$(3.4 \pm 0.5) \times 10^{-6}$	—
$f_2(1270) \pi^+$, $f_2 \rightarrow \pi^+ \pi^-$	$(4.58 \pm 0.28) \times 10^{-4}$	485
$\rho(1450)^0 \pi^+$, $\rho^0 \rightarrow \pi^+ \pi^-$	$(1.8 \pm 0.5) \times 10^{-4}$	338
$\rho(1700)^0 \pi^+$, $\rho^0 \rightarrow \pi^+ \pi^-$	$(1.9 \pm 0.5) \times 10^{-4}$	—
$f_0(1500) \pi^+$, $f_0 \rightarrow \pi^+ \pi^-$	$(1.1 \pm 0.4) \times 10^{-4}$	—
$f_0(1710) \pi^+$, $f_0 \rightarrow \pi^+ \pi^-$	$< 5 \times 10^{-5}$ CL=95%	—
$f_0(1790) \pi^+$, $f_0 \rightarrow \pi^+ \pi^-$	$< 7 \times 10^{-5}$ CL=95%	—
$(\pi^+ \pi^+)_{S\text{-wave}} \pi^-$	$< 1.2 \times 10^{-4}$ CL=95%	909
$2\pi^+ \pi^-$ nonresonant	$< 1.1 \times 10^{-4}$ CL=95%	909
$\pi^+ 2\pi^0$	$(4.61 \pm 0.15) \times 10^{-3}$	910
$2\pi^+ \pi^- \pi^0$	$(1.165 \pm 0.030) \%$	883
$\pi^+ 3\pi^0$	$(4.17 \pm 0.26) \times 10^{-3}$	885
$\pi^+ 4\pi^0$	$(1.9 \pm 0.4) \times 10^{-3}$	851
$2\pi^+ \pi^- 2\pi^0$	$(1.07 \pm 0.05) \%$	848
$3\pi^+ 2\pi^-$	$(1.66 \pm 0.16) \times 10^{-3}$	S=1.1 845
$2\pi^+ \pi^- 3\pi^0$	$(3.42 \pm 0.35) \times 10^{-3}$	803
$3\pi^+ 2\pi^- \pi^0$	$(2.34 \pm 0.27) \times 10^{-3}$	799

$\eta\pi^+$	$(3.77 \pm 0.09) \times 10^{-3}$	848
$\eta\pi^+\pi^0$	$(2.05 \pm 0.35) \times 10^{-3}$	S=2.2 831
$\rho(770)^+\eta, \rho^+ \rightarrow \pi^+\pi^0$	$(1.9 \pm 0.8) \times 10^{-4}$	—
$a_0(980)^+\pi^0, a_0^+ \rightarrow \pi^+\eta$	$(9.0 \pm 1.9) \times 10^{-4}$	—
$a_0(980)^0\pi^+, a_0^0 \rightarrow \pi^0\eta$	$(3.5 \pm 1.1) \times 10^{-4}$	—
$a_2(1700)^+\pi^0, a_2^+ \rightarrow \pi^+\eta$	$(9 \pm 5) \times 10^{-5}$	—
$a_0(1450)^+\pi^0, a_0^+ \rightarrow \pi^+\eta$	$(1.4 \pm 0.6) \times 10^{-4}$	—
$\eta 2\pi^+\pi^-$	$(3.41 \pm 0.20) \times 10^{-3}$	798
$\eta\pi^+2\pi^0$	$(3.20 \pm 0.33) \times 10^{-3}$	801
$\eta\pi^+3\pi^0$	$(2.9 \pm 0.5) \times 10^{-3}$	759
$\eta 2\pi^+\pi^-\pi^0$	$(3.88 \pm 0.34) \times 10^{-3}$	755
$\eta\eta\pi^+$	$(2.96 \pm 0.26) \times 10^{-3}$	700
$\omega\pi^+$	$(2.8 \pm 0.6) \times 10^{-4}$	764
$\omega\pi^+\pi^0$	$(3.9 \pm 0.9) \times 10^{-3}$	742
$\eta'(958)\pi^+$	$(4.97 \pm 0.19) \times 10^{-3}$	681
$\eta'(958)\pi^+\pi^0$	$(1.6 \pm 0.5) \times 10^{-3}$	654

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

$K_S^0 K^+$	$(3.04 \pm 0.09) \times 10^{-3}$	S=2.2 793
$K_L^0 K^+$	$(3.21 \pm 0.16) \times 10^{-3}$	793
$K_S^0 K^+\pi^0$	$(5.07 \pm 0.30) \times 10^{-3}$	744
$K^*(892)^+ K_S^0, K^{*+} \rightarrow K_S^0 \pi^0$	$(2.89 \pm 0.30) \times 10^{-3}$	612
$\bar{K}^*(892)^0 K^+, \bar{K}^{*0} \rightarrow K_S^0 \pi^0$	$(5.2 \pm 1.4) \times 10^{-4}$	613
$K_L^0 K^+\pi^0$	$(5.24 \pm 0.31) \times 10^{-3}$	744
$K^+ K^- \pi^+$	[c] $(9.68 \pm 0.18) \times 10^{-3}$	744
$K^+ \bar{K}^*(892)^0, \bar{K}^*(892)^0 \rightarrow K^- \pi^+$	$(2.49 \pm 0.08) \times 10^{-3}$	613
$K^+ \bar{K}_0^*(1430)^0, \bar{K}_0^*(1430)^0 \rightarrow K^- \pi^+$	$(1.82 \pm 0.35) \times 10^{-3}$	—
$K^+ \bar{K}_2^*(1430)^0, \bar{K}_2^* \rightarrow K^- \pi^+$	$(1.6 \pm 1.2) \times 10^{-4}$	—
$K^+ \bar{K}_0^*(700), \bar{K}_0^* \rightarrow K^- \pi^+$	$(6.8 \pm 3.5) \times 10^{-4}$	—
$a_0(1450)^0 \pi^+, a_0^0 \rightarrow K^+ K^-$	$(4.5 \pm 7.0) \times 10^{-4}$	—
$\phi(1680)\pi^+, \phi \rightarrow K^+ K^-$	$(4.9 \pm 4.0) \times 10^{-5}$	—
$\phi\pi^+, \phi \rightarrow K^+ K^-$	$(2.69 \pm 0.07) \times 10^{-3}$	647
$\phi\pi^+$	$(5.70 \pm 0.14) \times 10^{-3}$	647
$K^+ K^- \pi^+\pi^0$	$(6.62 \pm 0.32) \times 10^{-3}$	682

$K_S^0 K_S^0 \pi^+$	$(2.97 \pm 0.10) \times 10^{-3}$	741
$K_S^0 K^{*+}(892)^+, K^{*+} \rightarrow K_S^0 \pi^+$	$(2.90 \pm 0.11) \times 10^{-3}$	—
$K_S^0 (K_S^0 \pi^+) \rightarrow K_S^0 K_S^0 \pi^+$	$(1.31 \pm 0.34) \times 10^{-4}$	—
$K_S^0 K_S^0 \pi^+ \pi^0$	$(1.34 \pm 0.21) \times 10^{-3}$	679
$K_S^0 K^+ \eta$	$(1.8 \pm 0.5) \times 10^{-4}$	516
$K^+ K_S^0 \pi^+ \pi^-$	$(1.89 \pm 0.13) \times 10^{-3}$	678
$K_S^0 K^+ \pi^0 \pi^0$	$(5.8 \pm 1.3) \times 10^{-4}$	683
$K_S^0 K^- 2\pi^+$	$(2.27 \pm 0.13) \times 10^{-3}$	678
$K^+ K^- 2\pi^+ \pi^-$	$(2.3 \pm 1.2) \times 10^{-4}$	601

A few poorly measured branching fractions:

$\phi \pi^+ \pi^0$	$(2.3 \pm 1.0) \%$	619
$\phi \rho^+$	$< 1.5 \%$ CL=90%	260
$K^+ K^- \pi^+ \pi^0$ non- ϕ	$(1.5 \pm_{-0.6}^{+0.7}) \%$	682

Radiative modes

$\rho(770)^+ \gamma$	$< 1.3 \times 10^{-5}$ CL=90%	—
$K^{*+}(892)^+ \gamma$	$< 1.8 \times 10^{-5}$ CL=90%	722

Doubly Cabibbo-suppressed modes

$K^+ \pi^0$	$(2.08 \pm 0.21) \times 10^{-4}$ S=1.4	864
$K^+ \eta$	$(1.25 \pm 0.16) \times 10^{-4}$ S=1.1	776
$K^+ \eta'(958)$	$(1.85 \pm 0.20) \times 10^{-4}$	571
$K^+ 2\pi^0$	$(2.1 \pm 0.4) \times 10^{-4}$	847
$K^{*+}(892)^+ \pi^0$	$(3.4 \pm 1.4) \times 10^{-4}$	714
$K^+ \pi^+ \pi^-$	$(4.91 \pm 0.09) \times 10^{-4}$	846
$K^+ \rho^0$	$(1.9 \pm 0.5) \times 10^{-4}$	679
$K^+ \eta \pi^0$	$(2.1 \pm 0.5) \times 10^{-4}$	726
$K^{*+}(892)^+ \eta$	$(4.4 \pm_{-1.5}^{+1.8}) \times 10^{-4}$	586
$K^{*+}(892)^0 \pi^+, K^{*+}(892)^0 \rightarrow K^+ \pi^-$	$(2.3 \pm 0.4) \times 10^{-4}$	714
$K^+ f_0(980), f_0(980) \rightarrow \pi^+ \pi^-$	$(4.4 \pm 2.6) \times 10^{-5}$	—
$K_2^{*+}(1430)^0 \pi^+, K_2^{*+}(1430)^0 \rightarrow K^+ \pi^-$	$(3.9 \pm 2.7) \times 10^{-5}$	—
$K^+ \pi^+ \pi^-$ nonresonant	not seen	846
$K^+ \pi^+ \pi^- \pi^0$	$(1.21 \pm 0.09) \times 10^{-3}$	817
$K^+ \pi^+ \pi^- \pi^0$ nonresonant	$(1.10 \pm 0.07) \times 10^{-3}$	817
$K^+ \omega$	$(5.7 \pm_{-2.1}^{+2.5}) \times 10^{-5}$	675
$2K^+ K^-$	$(6.14 \pm 0.11) \times 10^{-5}$	550

$\phi(1020)^0 K^+$	< 2.1	$\times 10^{-5} \text{CL}=90\%$	—
$K^+ \phi(1020), \phi \rightarrow K^+ K^-$	(4.4 ± 0.6)	$\times 10^{-6}$	—
$K^+(K^+ K^-)_{S\text{-wave}}$	(5.77 ± 0.12)	$\times 10^{-5}$	550

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

$\pi^+ e^+ e^-$	C1	< 1.1	$\times 10^{-6} \text{CL}=90\%$	930
$\pi^+ \pi^0 e^+ e^-$		< 1.4	$\times 10^{-5} \text{CL}=90\%$	925
$\pi^+ \phi, \phi \rightarrow e^+ e^-$	[g]	$(1.7 \pm_{-0.9}^{+1.4})$	$\times 10^{-6}$	—
$\pi^+ \mu^+ \mu^-$	C1	< 6.7	$\times 10^{-8} \text{CL}=90\%$	918
$\pi^+ \phi, \phi \rightarrow \mu^+ \mu^-$	[g]	(1.8 ± 0.8)	$\times 10^{-6}$	—
$\rho^+ \mu^+ \mu^-$	C1	< 5.6	$\times 10^{-4} \text{CL}=90\%$	757
$K^+ e^+ e^-$	[h]	< 8.5	$\times 10^{-7} \text{CL}=90\%$	870
$K^+ \pi^0 e^+ e^-$		< 1.5	$\times 10^{-5} \text{CL}=90\%$	864
$K_S^0 \pi^+ e^+ e^-$		< 2.6	$\times 10^{-5} \text{CL}=90\%$	—
$K_S^0 K^+ e^+ e^-$		< 1.1	$\times 10^{-5} \text{CL}=90\%$	792
$K^+ \mu^+ \mu^-$	[h]	< 5.4	$\times 10^{-8} \text{CL}=90\%$	856
$\pi^+ e^+ \mu^-$	LF	< 2.1	$\times 10^{-7} \text{CL}=90\%$	927
$\pi^+ e^- \mu^+$	LF	< 2.2	$\times 10^{-7} \text{CL}=90\%$	927
$K^+ e^+ \mu^-$	LF	< 7.5	$\times 10^{-8} \text{CL}=90\%$	866
$K^+ e^- \mu^+$	LF	< 1.0	$\times 10^{-7} \text{CL}=90\%$	866
$\pi^- 2e^+$	L	< 5.3	$\times 10^{-7} \text{CL}=90\%$	930
$\pi^- 2\mu^+$	L	< 1.4	$\times 10^{-8} \text{CL}=90\%$	918
$\pi^- e^+ \mu^+$	L	< 1.3	$\times 10^{-7} \text{CL}=90\%$	927
$\rho^- 2\mu^+$	L	< 5.6	$\times 10^{-4} \text{CL}=90\%$	757
$K^- 2e^+$	L	< 9	$\times 10^{-7} \text{CL}=90\%$	870
$K_S^0 \pi^- 2e^+$	L	< 3.3	$\times 10^{-6} \text{CL}=90\%$	863
$K^- \pi^0 2e^+$	L	< 8.5	$\times 10^{-6} \text{CL}=90\%$	864
$K^- 2\mu^+$	L	< 1.0	$\times 10^{-5} \text{CL}=90\%$	856
$K^- e^+ \mu^+$	L	< 1.9	$\times 10^{-6} \text{CL}=90\%$	866
$K^*(892)^- 2\mu^+$	L	< 8.5	$\times 10^{-4} \text{CL}=90\%$	703
Λe^+	L,B	< 1.1	$\times 10^{-6} \text{CL}=90\%$	602
$\bar{\Lambda} e^+$	L,B	< 6.5	$\times 10^{-7} \text{CL}=90\%$	602
$\Sigma^0 e^+$	L,B	< 1.7	$\times 10^{-6} \text{CL}=90\%$	554
$\bar{\Sigma}^0 e^+$	L,B	< 1.3	$\times 10^{-6} \text{CL}=90\%$	554
$\bar{n} e^+$		< 1.43	$\times 10^{-5} \text{CL}=90\%$	699
$n e^+$		< 2.91	$\times 10^{-5} \text{CL}=90\%$	699



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

Mass $m = 1864.84 \pm 0.05$ MeV

$m_{D^\pm} - m_{D^0} = 4.822 \pm 0.015$ MeV

Mean life $\tau = (410.3 \pm 1.0) \times 10^{-15}$ s

$c\tau = 123.01$ μm

Mixing and related parameters

$$|m_{D_1^0} - m_{D_2^0}| = (0.997 \pm 0.116) \times 10^{10} \hbar \text{ s}^{-1}$$

$$(\Gamma_{D_1^0} - \Gamma_{D_2^0})/\Gamma = 2y = (1.394 \pm 0.056) \times 10^{-2}$$

$$|q/p| = 0.995 \pm 0.016$$

$$A_\Gamma = (0.89 \pm 1.13) \times 10^{-4}$$

$$\phi_{K_S^0 \pi \pi} = 0.02_{-0.05}^{+0.04}$$

$$K^+ \pi^- \text{ relative strong phase: } \cos \delta = 0.990 \pm 0.025$$

$$K^- \pi^+ \pi^0 \text{ coherence factor } R_{K \pi \pi^0} = 0.792 \pm 0.033$$

$$K^- \pi^+ \pi^0 \text{ average relative strong phase } \delta^{K \pi \pi^0} = (198 \pm 10)^\circ$$

$$K^- \pi^- 2\pi^+ \text{ coherence factor } R_{K 3\pi} = 0.52_{-0.09}^{+0.10}$$

$$K^- \pi^- 2\pi^+ \text{ average relative strong phase } \delta^{K 3\pi} = (149_{-16}^{+26})^\circ \quad (S = 1.4)$$

$$D^0 \rightarrow K^- \pi^- 2\pi^+, R_{K 3\pi} (y \cos \delta^{K 3\pi} - x \sin \delta^{K 3\pi}) = (-3.0 \pm 0.7) \times 10^{-3} \text{ TeV}^{-1}$$

$$K_S^0 K^+ \pi^- \text{ coherence factor } R_{K_S^0 K \pi} = 0.70 \pm 0.08$$

$$K_S^0 K^+ \pi^- \text{ average relative strong phase } \delta^{K_S^0 K \pi} = (0 \pm 16)^\circ$$

$$K^* K \text{ coherence factor } R_{K^* K} = 0.94 \pm 0.12$$

$$K^* K \text{ average relative strong phase } \delta^{K^* K} = (-17 \pm 18)^\circ$$

CP-even fractions (labeled by the D^0 decay)

$$CP\text{-even fraction in } D^0 \rightarrow K_S^0 \pi^+ \pi^- \pi^0 \text{ decays} = (23.6 \pm 0.9)\%$$

$$CP\text{-even fraction in } D^0 \rightarrow \pi^+ \pi^- \pi^0 \text{ decays} = (97.3 \pm 1.7)\%$$

$$CP\text{-even fraction in } D^0 \rightarrow \pi^+ \pi^- \pi^+ \pi^- \text{ decays} = (74.6 \pm 0.8)\%$$

$$CP\text{-even fraction in } D^0 \rightarrow \pi^+ \pi^- 2\pi^0 \text{ decays} = 0.68 \pm 0.08$$

$$CP\text{-even fraction in } D^0 \rightarrow 2\pi^+ 2\pi^- \pi^0 \text{ decays} = 0.44 \pm 0.10$$

$$CP\text{-even fraction in } D^0 \rightarrow \pi^+ \pi^- 3\pi^0 \text{ decays} = 0.52_{-0.27}^{+0.34}$$

$$CP\text{-even fraction in } D^0 \rightarrow 2\pi^+ 2\pi^- 2\pi^0 \text{ decays} = 0.79 \pm 0.26$$

$$CP\text{-even fraction in } D^0 \rightarrow K^+ K^- \pi^0 \text{ decays} = (73 \pm 6)\%$$

$$CP\text{-even fraction in } D^0 \rightarrow K^+ K^- \pi^+ \pi^- \text{ decays} = (74.1 \pm 3.0)\%$$

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

$$A_{CP}(K^+ K^-) = (4 \pm 5) \times 10^{-4}$$

$$A_{CP}(2K_S^0) = (-1.1 \pm 1.9)\% \quad (S = 2.0)$$

$$A_{CP}(\pi^+ \pi^-) = (0.13 \pm 0.14)\%$$

$$A_{CP}(\pi^0 \pi^0) = (0.0 \pm 0.6)\%$$

$$A_{CP}(\rho \gamma) = (6 \pm 15) \times 10^{-2}$$

$$A_{CP}(\phi \gamma) = (-9 \pm 7) \times 10^{-2}$$

$$A_{CP}(\overline{K}^*(892)^0 \gamma) = (-0.3 \pm 2.0) \times 10^{-2}$$

$$\begin{aligned}
A_{CP}(\pi^+\pi^-\pi^0) &= (0.4 \pm 0.4)\% \\
A_{CP}(\eta\pi^+\pi^-) \text{ in } D^0, \bar{D}^0 \rightarrow \eta\pi^+\pi^- &= (0.9 \pm 1.3) \times 10^{-2} \\
A_{CP}(\rho(770)^+\pi^- \rightarrow \pi^+\pi^-\pi^0) &= (1.2 \pm 0.9)\% [i] \\
A_{CP}(\rho(770)^0\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (-3.1 \pm 3.0)\% [i] \\
A_{CP}(\rho(770)^-\pi^+ \rightarrow \pi^+\pi^-\pi^0) &= (-1.0 \pm 1.7)\% [i] \\
A_{CP}(\rho(1450)^+\pi^- \rightarrow \pi^+\pi^-\pi^0) &= (0 \pm 70)\% [i] \\
A_{CP}(\rho(1450)^0\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (-20 \pm 40)\% [i] \\
A_{CP}(\rho(1450)^-\pi^+ \rightarrow \pi^+\pi^-\pi^0) &= (6 \pm 9)\% [i] \\
A_{CP}(\rho(1700)^+\pi^- \rightarrow \pi^+\pi^-\pi^0) &= (-5 \pm 14)\% [i] \\
A_{CP}(\rho(1700)^0\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (13 \pm 9)\% [i] \\
A_{CP}(\rho(1700)^-\pi^+ \rightarrow \pi^+\pi^-\pi^0) &= (8 \pm 11)\% [i] \\
A_{CP}(f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (0 \pm 35)\% [i] \\
A_{CP}(f_0(1370)\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (25 \pm 18)\% [i] \\
A_{CP}(f_0(1500)\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (0 \pm 18)\% [i] \\
A_{CP}(f_0(1710)\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (0 \pm 24)\% [i] \\
A_{CP}(f_2(1270)\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (-4 \pm 6)\% [i] \\
A_{CP}(\sigma(400)\pi^0 \rightarrow \pi^+\pi^-\pi^0) &= (6 \pm 8)\% [i] \\
A_{CP}(\text{nonresonant } \pi^+\pi^-\pi^0) &= (-13 \pm 23)\% [i] \\
A_{CP}(\pi^+\pi^-2\pi^0) \text{ in } D^0, \bar{D}^0 \rightarrow \pi^+\pi^-2\pi^0 &= (-2.5 \pm 2.0)\% \\
A_{CP}(a_1(1260)^+\pi^- \rightarrow 2\pi^+2\pi^-) &= (5 \pm 6)\% \\
A_{CP}(a_1(1260)^-\pi^+ \rightarrow 2\pi^+2\pi^-) &= (14 \pm 18)\% \\
A_{CP}(\pi(1300)^+\pi^- \rightarrow 2\pi^+2\pi^-) &= (-2 \pm 15)\% \\
A_{CP}(\pi(1300)^-\pi^+ \rightarrow 2\pi^+2\pi^-) &= (-6 \pm 30)\% \\
A_{CP}(a_1(1640)^+\pi^- \rightarrow 2\pi^+2\pi^-) &= (9 \pm 26)\% \\
A_{CP}(\pi_2(1670)^+\pi^- \rightarrow 2\pi^+2\pi^-) &= (7 \pm 18)\% \\
A_{CP}(\sigma f_0(1370) \rightarrow 2\pi^+2\pi^-) &= (-15 \pm 19)\% \\
A_{CP}(\sigma\rho(770)^0 \rightarrow 2\pi^+2\pi^-) &= (3 \pm 27)\% \\
A_{CP}(2\rho(770)^0 \rightarrow 2\pi^+2\pi^-) &= (-6 \pm 6)\% \\
A_{CP}(2f_2(1270) \rightarrow 2\pi^+2\pi^-) &= (-28 \pm 24)\% \\
A_{CP}(\pi^+\pi^-\pi^0\eta) \text{ in } D^0, \bar{D}^0 \rightarrow \pi^+\pi^-\pi^0\eta &= (-6 \pm 6) \times 10^{-2} \\
A_{CP}(K^+K^-\pi^0) &= (-1.0 \pm 1.7)\% \\
A_{CP}(K^*(892)^+K^- \rightarrow K^+K^-\pi^0) &= (-0.9 \pm 1.3)\% [i] \\
A_{CP}(K^*(1410)^+K^- \rightarrow K^+K^-\pi^0) &= (-21 \pm 24)\% [i] \\
A_{CP}((K^+\pi^0)_{S\text{-wave}}K^- \rightarrow K^+K^-\pi^0) &= (7 \pm 15)\% [i] \\
A_{CP}(\phi(1020)\pi^0 \rightarrow K^+K^-\pi^0) &= (1.1 \pm 2.2)\% [i] \\
A_{CP}(f_0(980)\pi^0 \rightarrow K^+K^-\pi^0) &= (-3 \pm 19)\% [i] \\
A_{CP}(a_0(980)^0\pi^0 \rightarrow K^+K^-\pi^0) &= (-5 \pm 16)\% [i] \\
A_{CP}(f'_2(1525)\pi^0 \rightarrow K^+K^-\pi^0) &= (0 \pm 160)\% [i] \\
A_{CP}(K^*(892)^-K^+ \rightarrow K^+K^-\pi^0) &= (-5 \pm 4)\% [i] \\
A_{CP}(K^*(1410)^-K^+ \rightarrow K^+K^-\pi^0) &= (-17 \pm 29)\% [i] \\
A_{CP}((K^-\pi^0)_{S\text{-wave}}K^+ \rightarrow K^+K^-\pi^0) &= (-10 \pm 40)\% [i] \\
A_{CP}(K^+K^-\eta) \text{ in } D^0, \bar{D}^0 \rightarrow K^+K^-\eta &= (-1.4 \pm 3.5) \times 10^{-2}
\end{aligned}$$

$$\begin{aligned}
& A_{CP}(\phi(1020)\eta \rightarrow K^+ K^- \eta) \text{ in } D^0, \bar{D}^0 \rightarrow \phi(1020)\eta = (-2 \pm 4) \times 10^{-2} \\
& A_{CP}(K_S^0 \pi^0) = (-0.20 \pm 0.17)\% \\
& A_{CP}(K_S^0 \eta) = (0.5 \pm 0.5)\% \\
& A_{CP}(K_S^0 \eta') = (1.0 \pm 0.7)\% \\
& A_{CP}(K_S^0 \phi) = (-3 \pm 9)\% \\
& A_{CP}(K^- \pi^+) = (0.2 \pm 0.5)\% \\
& A_{CP}(K^+ \pi^-) = (-0.9 \pm 1.4)\% \\
& A_{CP}(D_{CP}(\pm 1) \rightarrow K^\mp \pi^\pm) = (13.1 \pm 1.0)\% \\
& A_{CP}(K^- \pi^+ \pi^0) = (0.1 \pm 0.5)\% \\
& A_{CP}(K^+ \pi^- \pi^0) = (0 \pm 5)\% \\
& A_{CP}(K_S^0 \pi^+ \pi^-) = (-0.1 \pm 0.8)\% \\
& A_{CP}(K^\mp \pi^\pm \eta) \text{ in } D^0, \bar{D}^0 \rightarrow K^\mp \pi^\pm \eta = (-1.9 \pm 1.6) \times 10^{-2} \\
& A_{CP}(K_S^0 \pi^0 \eta) \text{ in } D^0, \bar{D}^0 \rightarrow K_S^0 \pi^0 \eta = (-3.9 \pm 3.3) \times 10^{-2} \\
& A_{CP}(K^\mp \pi^\pm \pi^0 \eta) \text{ in } D^0, \bar{D}^0 \rightarrow K^\mp \pi^\pm \pi^0 \eta = (-8 \pm 5) \times 10^{-2} \\
& A_{CP}(K^*(892)^- \pi^+ \rightarrow K_S^0 \pi^+ \pi^-) = (0.4 \pm 0.5)\% \\
& A_{CP}(K^*(892)^+ \pi^- \rightarrow K_S^0 \pi^+ \pi^-) = (1 \pm 6)\% \\
& A_{CP}(\bar{K}^0 \rho^0 \rightarrow K_S^0 \pi^+ \pi^-) = (-0.1 \pm 0.5)\% \\
& A_{CP}(\bar{K}^0 \omega \rightarrow K_S^0 \pi^+ \pi^-) = (-13 \pm 7)\% \\
& A_{CP}(\bar{K}^0 f_0(980) \rightarrow K_S^0 \pi^+ \pi^-) = (-0.4 \pm 2.7)\% \\
& A_{CP}(\bar{K}^0 f_2(1270) \rightarrow K_S^0 \pi^+ \pi^-) = (-4 \pm 5)\% \\
& A_{CP}(\bar{K}^0 f_0(1370) \rightarrow K_S^0 \pi^+ \pi^-) = (-1 \pm 9)\% \\
& A_{CP}(\bar{K}^0 \rho^0(1450) \rightarrow K_S^0 \pi^+ \pi^-) = (-4 \pm 10)\% \\
& A_{CP}(\bar{K}^0 f_0(600) \rightarrow K_S^0 \pi^+ \pi^-) = (-3 \pm 5)\% \\
& A_{CP}(K^*(1410)^- \pi^+ \rightarrow K_S^0 \pi^+ \pi^-) = (-2 \pm 9)\% \\
& A_{CP}(K_0^*(1430)^- \pi^+ \rightarrow K_S^0 \pi^+ \pi^-) = (4 \pm 4)\% \\
& A_{CP}(K_0^*(1430)^+ \pi^- \rightarrow K_S^0 \pi^+ \pi^-) = (12 \pm 15)\% \\
& A_{CP}(K_2^*(1430)^- \pi^+ \rightarrow K_S^0 \pi^+ \pi^-) = (3 \pm 6)\% \\
& A_{CP}(K_2^*(1430)^+ \pi^- \rightarrow K_S^0 \pi^+ \pi^-) = (-10 \pm 32)\% \\
& A_{CP}(K^- \pi^+ \pi^+ \pi^-) = (0.2 \pm 0.5)\% \\
& A_{CP}(K^+ \pi^- \pi^+ \pi^-) = (-2 \pm 4)\% \\
& A_{CP}(K^+ K^- \pi^+ \pi^-) = (1.3 \pm 1.7)\% \\
& A_{CP}(2K_S^0 \pi^+ \pi^-) \text{ in } D^0, \bar{D}^0 \rightarrow 2K_S^0 \pi^+ \pi^- = (-2.5 \pm 1.4) \times 10^{-2} \\
& A_{CP}(K_1^*(1270)^+ K^- \rightarrow K^+ K^- \pi^+ \pi^-) = (-2.3 \pm 1.7)\% \\
& A_{CP}(K_1^*(1270)^+ K^- \rightarrow K^{*0} \pi^+ K^-) = (-1 \pm 10)\% \\
& A_{CP}(K_1^*(1270)^- K^+ \rightarrow \bar{K}^{*0} \pi^- K^+) = (-10 \pm 32)\% \\
& A_{CP}(K_1^*(1270)^- K^+ \rightarrow K^+ K^- \pi^+ \pi^-) = (1.7 \pm 3.5)\% \\
& A_{CP}(K_1^*(1270)^+ K^- \rightarrow \rho^0 K^+ K^-) = (-7 \pm 17)\% \\
& A_{CP}(K_1^*(1270)^- K^+ \rightarrow \rho^0 K^- K^+) = (10 \pm 13)\% \\
& A_{CP}(K_1(1400)^+ K^- \rightarrow K^+ K^- \pi^+ \pi^-) = (-4.4 \pm 2.1)\% \\
& A_{CP}(K^*(1410)^+ K^- \rightarrow K^{*0} \pi^+ K^-) = (-20 \pm 17)\%
\end{aligned}$$

$$\begin{aligned}
A_{CP}(K^*(1410)^- K^+ \rightarrow \bar{K}^{*0} \pi^- K^+) &= (-1 \pm 14)\% \\
A_{CP}(K^*(1680)^+ K^- \rightarrow K^+ K^- \pi^+ \pi^-) &= (-17 \pm 29)\% \\
A_{CP}(K^{*0} \bar{K}^{*0}) \text{ in } D^0, \bar{D}^0 \rightarrow K^{*0} \bar{K}^{*0} &= (-5 \pm 14)\% \\
A_{CP}(K^{*0} \bar{K}^{*0} \text{ S-wave}) &= (-3.9 \pm 2.2)\% \\
A_{CP}(\phi \rho^0) \text{ in } D^0, \bar{D}^0 \rightarrow \phi \rho^0 &= (1 \pm 9)\% \\
A_{CP}(\phi \rho^0 \text{ S-wave}) &= (-3 \pm 5)\% \\
A_{CP}(\phi \rho^0 \text{ D-wave}) &= (-37 \pm 19)\% \\
A_{CP}(\phi(\pi^+ \pi^-)_{S\text{-wave}}) &= (6 \pm 6)\% \\
A_{CP}(K^*(892)^0 (K^- \pi^+)_{S\text{-wave}}) &= (-10 \pm 40)\% \\
A_{CP}(K^+ K^- \pi^+ \pi^- \text{ non-resonant}) &= (8 \pm 20)\% \\
A_{CP}((K^- \pi^+)_{P\text{-wave}} (K^+ \pi^-)_{S\text{-wave}}) &= (3 \pm 11)\% \\
A_{CP}(K^+ K^- \mu^+ \mu^-) \text{ in } D^0, \bar{D}^0 \rightarrow K^+ K^- \mu^+ \mu^- &= (-2 \pm 6)\% \\
A_{CP}(\pi^+ \pi^- \mu^+ \mu^-) \text{ in } D^0, \bar{D}^0 \rightarrow \pi^+ \pi^- \mu^+ \mu^- &= (2.9 \pm 2.1)\%
\end{aligned}$$

CP-violation asymmetry difference

$$\Delta A_{CP} = A_{CP}(K^+ K^-) - A_{CP}(\pi^+ \pi^-) = (-0.154 \pm 0.029)\%$$

 χ^2 tests of CP-violation (CPV) p-values

$$\begin{aligned}
\text{Local CPV in } D^0, \bar{D}^0 \rightarrow \pi^+ \pi^- \pi^0 &= 10.6\% \\
\text{Local CPV in } D^0, \bar{D}^0 \rightarrow \pi^+ \pi^- \pi^+ \pi^- &= (0.6 \pm 0.2)\% \\
\text{Local CPV in } D^0, \bar{D}^0 \rightarrow K_S^0 \pi^+ \pi^- &= 96\% \\
\text{Local CPV in } D^0, \bar{D}^0 \rightarrow K_S^0 K^- \pi^0 &= 16.6\% \\
\text{Local CPV in } D^0, \bar{D}^0 \rightarrow K^+ K^- \pi^+ \pi^- &= 9.1\%
\end{aligned}$$

T-violation decay-rate asymmetry

$$\begin{aligned}
A_T(K^+ K^- \pi^+ \pi^-) &= (2.9 \pm 2.2) \times 10^{-3} [b] \\
A_{T\text{viol}}(2K_S^0 \pi^+ \pi^-) \text{ in } D^0, \bar{D}^0 \rightarrow 2K_S^0 \pi^+ \pi^- &= (-1.9 \pm 1.4) \times 10^{-2} \\
A_{T\text{viol}}(K_S^0 \pi^+ \pi^- \pi^0) \text{ in } D^0, \bar{D}^0 \rightarrow K_S^0 \pi^+ \pi^- \pi^0 &= (-0.3_{-1.6}^{+1.4}) \times 10^{-3}
\end{aligned}$$

CPT-violation decay-rate asymmetry

$$A_{CPT}(K^\mp \pi^\pm) = -1.46 \times 10^{-04} \text{ to } 6.6 \times 10^{-05}, \text{ CL} = 95\%$$

Form factors

$$\begin{aligned}
r_V &\equiv V(0)/A_1(0) \text{ in } D^0 \rightarrow K^*(892)^- \ell^+ \nu_\ell = 1.43 \pm 0.06 \\
r_2 &\equiv A_2(0)/A_1(0) \text{ in } D^0 \rightarrow K^*(892)^- \ell^+ \nu_\ell = 0.72 \pm 0.04 \\
r_V &\equiv V(0)/A_1(0) \text{ in } D^0 \rightarrow \rho^- \ell^+ \nu_\ell = 1.55 \pm 0.09 \\
r_2 &\equiv A_2(0)/A_1(0) \text{ in } D^0 \rightarrow \rho^- \ell^+ \nu_\ell = 0.82 \pm 0.06 \\
f_+(0) &\text{ in } D^0 \rightarrow K^- \ell^+ \nu_\ell = 0.736 \pm 0.004 \\
f_+(0) |V_{cs}| &\text{ in } D^0 \rightarrow K^- \ell^+ \nu_\ell = 0.7176 \pm 0.0018 \\
r_1 &\equiv a_1/a_0 \text{ in } D^0 \rightarrow K^- \ell^+ \nu_\ell = -2.40 \pm 0.16 \\
r_2 &\equiv a_2/a_0 \text{ in } D^0 \rightarrow K^- \ell^+ \nu_\ell = 5 \pm 4 \\
f_+(0) &\text{ in } D^0 \rightarrow \pi^- \ell^+ \nu_\ell = 0.637 \pm 0.009 \\
f_+(0) |V_{cd}| &\text{ in } D^0 \rightarrow \pi^- \ell^+ \nu_\ell = 0.1436 \pm 0.0026 \quad (S = 1.5) \\
r_1 &\equiv a_1/a_0 \text{ in } D^0 \rightarrow \pi^- \ell^+ \nu_\ell = -1.97 \pm 0.28 \quad (S = 1.4) \\
r_2 &\equiv a_1/a_0 \text{ in } D^0 \rightarrow \pi^- \ell^+ \nu_\ell = -0.2 \pm 2.2 \quad (S = 1.7)
\end{aligned}$$

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

D^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Topological modes			
0-prongs	[j] (15 $\pm$ 6) %		—
2-prongs	(71 $\pm$ 6) %		—
4-prongs	[k] (14.6 $\pm$ 0.5) %		—
6-prongs	[l] (6.5 $\pm$ 1.3) $\times 10^{-4}$		—
Inclusive modes			
e^+ anything	[n] (6.49 $\pm$ 0.11) %		—
μ^+ anything	(6.8 $\pm$ 0.6) %		—
K^- anything	(54.7 $\pm$ 2.8) %	S=1.3	—
K_S^0 anything	(20.75 $\pm$ 0.23) %		—
K^+ anything	(3.4 $\pm$ 0.4) %		—
$K^*(892)^-$ anything	(15 $\pm$ 9) %		—
$\bar{K}^*(892)^0$ anything	(9 $\pm$ 4) %		—
$K^*(892)^+$ anything	< 3.6 %	CL=90%	—
$K^*(892)^0$ anything	(2.8 $\pm$ 1.3) %		—
η anything	(9.5 $\pm$ 0.9) %		—
η' anything	(2.48 $\pm$ 0.27) %		—
ϕ anything	(1.08 $\pm$ 0.04) %		—
$\pi^+\pi^+\pi^-$ anything	(17.60 $\pm$ 0.25) %		—
invisibles	< 9.4 $\times 10^{-5}$	CL=90%	—
Semileptonic modes			
$K^- e^+ \nu_e$	(3.538 $\pm$ 0.017) %	S=1.1	867
$K^- \mu^+ \nu_\mu$	(3.418 $\pm$ 0.019) %		864
$K^*(892)^- e^+ \nu_e$	(2.16 $\pm$ 0.16) %		719
$K^*(892)^- \mu^+ \nu_\mu$	(2.06 $\pm$ 0.05) %		714
$K^- \pi^0 e^+ \nu_e$	(1.6 $\pm$ 1.3) %		861
$\bar{K}^0 \pi^- e^+ \nu_e$	(1.44 $\pm$ 0.04) %		860
$(\bar{K}^0 \pi^-)_{S\text{-wave}} e^+ \nu_e$	(7.9 $\pm$ 1.7) $\times 10^{-4}$		860
$K^- \pi^0 \mu^+ \nu_\mu$	(7.30 $\pm$ 0.17) $\times 10^{-3}$		849
$(K^- \pi^0)_{S\text{-wave}} \mu^+ \nu_\mu$	(4.21 $\pm$ 0.35) $\times 10^{-4}$		849
$K^- \eta e^+ \nu_e$	(8 $\pm$ 4) $\times 10^{-5}$		773
$K^- \pi^+ \pi^- e^+ \nu_e$	(2.8 $\pm$ 1.4) $\times 10^{-4}$		843
$K_1(1270)^- e^+ \nu_e$	(1.01 $\pm$ 0.18) $\times 10^{-3}$		511

$\bar{K}_1(1270)^- e^+ \nu_e, \bar{K}_1^- \rightarrow K_S^0 \pi^- \pi^0$	$(1.7 \pm_{-0.5}^{+0.6}) \times 10^{-4}$	—	
$K^- \pi^+ \pi^- \mu^+ \nu_\mu$	$< 1.3 \times 10^{-3}$	CL=90%	821
$(\bar{K}^*(892)\pi)^- \mu^+ \nu_\mu$	$< 1.5 \times 10^{-3}$	CL=90%	692
$\pi^- e^+ \nu_e$	$(2.91 \pm 0.04) \times 10^{-3}$		927
$\pi^- \mu^+ \nu_\mu$	$(2.67 \pm 0.12) \times 10^{-3}$	S=1.3	924
$\pi^- \pi^0 e^+ \nu_e$	$(1.45 \pm 0.07) \times 10^{-3}$		922
$\rho^- e^+ \nu_e$	$(1.46 \pm 0.08) \times 10^{-3}$	S=2.0	771
$\rho^- \mu^+ \nu_\mu$	$(1.35 \pm 0.13) \times 10^{-3}$		767
$a(980)^- e^+ \nu_e, a^- \rightarrow \eta \pi^-$	$(1.33 \pm_{-0.30}^{+0.34}) \times 10^{-4}$		—
$K_S^0 K^- e^+ \nu_e$	$< 2.13 \times 10^{-5}$	CL=90%	790
$b_1(1235)^- e^+ \nu_e, b_1^- \rightarrow \omega \pi^-$	$< 1.12 \times 10^{-4}$	CL=90%	—

Hadronic modes with one $\bar{K}$

$K^- \pi^+$	$(3.945 \pm 0.030) \%$	S=1.2	861
$K_S^0 \pi^0$	$(1.240 \pm 0.022) \%$		860
$K_L^0 \pi^0$	$(9.76 \pm 0.32) \times 10^{-3}$		860
$K_L^0 \eta$	$(4.34 \pm 0.16) \times 10^{-3}$		772
$K_L^0 \eta'$	$(8.12 \pm 0.35) \times 10^{-3}$	S=1.3	565
$K_L^0 \omega$	$(1.16 \pm 0.04) \%$		670
$K_S^0 \pi^+ \pi^-$	[c] $(2.86 \pm 0.16) \%$	S=1.1	842
$K_S^0 \rho^0$	$(6.4 \pm_{-0.8}^{+0.6}) \times 10^{-3}$		674
$K_S^0 \omega, \omega \rightarrow \pi^+ \pi^-$	$(2.1 \pm 0.6) \times 10^{-4}$		670
$K_S^0 (\pi^+ \pi^-)_{S\text{-wave}}$	$(3.4 \pm 0.8) \times 10^{-3}$		842
$K_S^0 f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$(1.23 \pm_{-0.23}^{+0.40}) \times 10^{-3}$		549
$K_S^0 f_0(1370), f_0 \rightarrow \pi^+ \pi^-$	$(2.8 \pm_{-1.3}^{+0.9}) \times 10^{-3}$		†
$K_S^0 f_2(1270), f_2 \rightarrow \pi^+ \pi^-$	$(9 \pm_{-6}^{+10}) \times 10^{-5}$		262
$K^*(892)^- \pi^+, K^{*-} \rightarrow K_S^0 \pi^-$	$(1.68 \pm_{-0.16}^{+0.14}) \%$		711
$K_0^*(1430)^- \pi^+, K_0^{*-} \rightarrow K_S^0 \pi^-$	$(2.73 \pm_{-0.32}^{+0.40}) \times 10^{-3}$		378
$K_2^*(1430)^- \pi^+, K_2^{*-} \rightarrow K_S^0 \pi^-$	$(3.4 \pm_{-1.0}^{+1.9}) \times 10^{-4}$		367
$K^*(1680)^- \pi^+, K^{*-} \rightarrow K_S^0 \pi^-$	$(4 \pm 4) \times 10^{-4}$		46
$K^*(892)^+ \pi^-, K^{*+} \rightarrow K_S^0 \pi^+$	[o] $(1.15 \pm_{-0.34}^{+0.60}) \times 10^{-4}$		711

$K_0^*(1430)^+ \pi^-, K_0^{*+} \rightarrow K_S^0 \pi^+$	$[o] < 1.4$	$\times 10^{-5}$	CL=95%	—
$K_2^*(1430)^+ \pi^-, K_2^{*+} \rightarrow K_S^0 \pi^+$	$[o] < 3.4$	$\times 10^{-5}$	CL=95%	—
$K_S^0 \pi^+ \pi^-$ nonresonant	$(2.6 \pm 6.0 \pm 1.6)$	$\times 10^{-4}$		842
$K^- \pi^+ \pi^0$	$[c] (14.4 \pm 0.6)$	%	S=2.2	844
$K^- \rho^+$	(11.2 ± 0.7)	%		676
$K^- \rho(1700)^+, \rho^+ \rightarrow \pi^+ \pi^0$	(8.2 ± 1.8)	$\times 10^{-3}$		†
$K^*(892)^- \pi^+, K^*(892)^- \rightarrow K^- \pi^0$	$(2.31 \pm 0.40 \pm 0.20)$	%		711
$\bar{K}^*(892)^0 \pi^0, \bar{K}^*(892)^0 \rightarrow K^- \pi^+$	(1.95 ± 0.25)	%		711
$K_0^*(1430)^- \pi^+, K_0^{*-} \rightarrow K^- \pi^0$	(4.8 ± 2.2)	$\times 10^{-3}$		378
$\bar{K}_0^*(1430)^0 \pi^0, \bar{K}_0^{*0} \rightarrow K^- \pi^+$	$(5.9 \pm 5.0 \pm 1.6)$	$\times 10^{-3}$		379
$K^*(1680)^- \pi^+, K^{*-} \rightarrow K^- \pi^0$	(1.9 ± 0.7)	$\times 10^{-3}$		46
$K^- \pi^+ \pi^0$ nonresonant	$(1.15 \pm 0.60 \pm 0.20)$	%		844
$K_S^0 2\pi^0$	(9.1 ± 1.1)	$\times 10^{-3}$	S=2.2	843
$K_L^0 \pi^0 \pi^0$	(1.26 ± 0.06)	%		843
$K_S^0 (2\pi^0)_{S-wave}$	(2.6 ± 0.7)	$\times 10^{-3}$		—
$\bar{K}^*(892)^0 \pi^0, \bar{K}^{*0} \rightarrow K_S^0 \pi^0$	(6.0 ± 0.9)	$\times 10^{-3}$		711
$\bar{K}^*(1430)^0 \pi^0, \bar{K}^{*0} \rightarrow K_S^0 \pi^0$	(4 ± 23)	$\times 10^{-5}$		—
$\bar{K}^*(1680)^0 \pi^0, \bar{K}^{*0} \rightarrow K_S^0 \pi^0$	(1.0 ± 0.4)	$\times 10^{-3}$		—
$K_S^0 f_2(1270), f_2 \rightarrow 2\pi^0$	(2.3 ± 1.1)	$\times 10^{-4}$		—
$2K_S^0, \text{one } K_S^0 \rightarrow 2\pi^0$	(3.2 ± 1.1)	$\times 10^{-4}$		—
$K_S^0 3\pi^0$	(7.6 ± 0.4)	$\times 10^{-3}$		815
$K^- 2\pi^+ \pi^-$	$[c] (8.22 \pm 0.14)$	%	S=1.1	813
$K^- \pi^+ \rho^0$ total	(6.86 ± 0.31)	%		609
$K^- \pi^+ \rho^0$ 3-body	(6.1 ± 1.6)	$\times 10^{-3}$		609
$\bar{K}^*(892)^0 \rho^0, \bar{K}^{*0} \rightarrow K^- \pi^+$	(1.01 ± 0.05)	%		416
$\bar{K}^*(892)^0 \rho^0$ transverse,	(1.2 ± 0.4)	%		417
$\bar{K}^{*0} \rightarrow K^- \pi^+$				
$K^- a_1(1260)^+, a_1^+ \rightarrow \rho^0 \pi^+$	(4.32 ± 0.32)	%		327
$K_1(1270)^- \pi^+, K_1^- \rightarrow K^- \pi^+ \pi^-$ total	(3.9 ± 0.4)	$\times 10^{-3}$		—

$K_1(1270)^- \pi^+, K_1^- \rightarrow \bar{K}^*(892)^0 \pi^-, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(6.6 \pm 2.3) \times 10^{-4}$	484
$K^- 2\pi^+ \pi^-$ nonresonant	$(1.81 \pm 0.07) \%$	813
$K_S^0 \pi^+ \pi^- \pi^0$ [p]	$(5.3 \pm 0.6) \%$	813
$K_S^0 \eta, \eta \rightarrow \pi^+ \pi^- \pi^0$	$(1.17 \pm 0.03) \times 10^{-3}$	772
$K_S^0 \omega, \omega \rightarrow \pi^+ \pi^- \pi^0$	$(9.9 \pm 0.6) \times 10^{-3}$	670
$K^- \pi^+ 2\pi^0$	$(8.86 \pm 0.23) \%$	815
$K^- \pi^+ 3\pi^0$	$(9.5 \pm 0.4) \times 10^{-3}$	774
$K_S^0 \pi^+ \pi^- 2\pi^0$	$(1.27 \pm 0.06) \%$	771
$K^- 2\pi^+ \pi^- \pi^0$	$(4.3 \pm 0.4) \%$	771
$\bar{K}^*(892)^0 \pi^+ \pi^- \pi^0, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(1.3 \pm 0.6) \%$	643
$\bar{K}^*(892)^0 \omega, \bar{K}^{*0} \rightarrow K^- \pi^+, \omega \rightarrow \pi^+ \pi^- \pi^0$	$(6.5 \pm 3.0) \times 10^{-3}$	410
$K^- \pi^+ \omega$	$(3.39 \pm 0.10) \%$	605
$\bar{K}^*(892)^0 \omega$	$(1.1 \pm 0.5) \%$	410
$K_S^0 \pi^0 \omega$	$(8.5 \pm 0.6) \times 10^{-3}$	605
$K_S^0 \eta \pi^0$	$(1.01 \pm 0.05) \%$	721
$K_S^0 a_0(980), a_0 \rightarrow \eta \pi^0$	$(1.20 \pm 0.28) \%$	—
$\bar{K}^*(892)^0 \eta, \bar{K}^{*0} \rightarrow K_S^0 \pi^0$	$(2.9 \pm 0.7) \times 10^{-3}$	—
$K^- \pi^+ \eta$	$(1.88 \pm 0.05) \%$	S=1.4 721
$K^*(892)^0 \eta, K^{*0} \rightarrow K^- \pi^+$	$(8.9 \pm_{-0.6}^{+0.8}) \times 10^{-3}$	—
$a_0(980)^+ K^-, a_0^+ \rightarrow \eta \pi^+$	$(7.4 \pm_{-0.7}^{+0.9}) \times 10^{-3}$	—
$K_2^*(1980)^- \pi^+, K_2^{*-} \rightarrow K^- \eta$	$(2.2 \pm_{-1.9}^{+1.7}) \times 10^{-4}$	—
$K^- \pi^+ \pi^0 \eta$	$(4.49 \pm 0.27) \times 10^{-3}$	656
$K_S^0 \pi^+ \pi^- \eta$	$(2.80 \pm 0.21) \times 10^{-3}$	651
$K_S^0 2\pi^0 \eta$	$(1.76 \pm 0.26) \times 10^{-3}$	656
$K_S^0 2\pi^+ 2\pi^-$	$(2.72 \pm 0.29) \times 10^{-3}$	768
$K_S^0 \rho^0 \pi^+ \pi^-, \text{no } K^*(892)^-$	$(1.1 \pm 0.7) \times 10^{-3}$	—
$K^*(892)^- 2\pi^+ \pi^-, K^*(892)^- \rightarrow K_S^0 \pi^-, \text{no } \rho^0$	$(5 \pm 8) \times 10^{-4}$	642
$K^*(892)^- \rho^0 \pi^+, K^*(892)^- \rightarrow K_S^0 \pi^-$	$(1.6 \pm 0.6) \times 10^{-3}$	230
$K_S^0 2\pi^+ 2\pi^-$ nonresonant	$< 1.3 \times 10^{-3}$	CL=90% 768
$K^- 3\pi^+ 2\pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	713

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes. These nine modes below are all corrected for unseen decays of the resonances.

$K_S^0 \eta$	$(5.08 \pm 0.13) \times 10^{-3}$	772
$K_S^0 \omega$	$(1.11 \pm 0.06) \%$	670
$K_S^0 \eta'(958)$	$(9.51 \pm 0.32) \times 10^{-3}$	565
$\bar{K}^*(892)^0 \pi^+ \pi^- \pi^0$	$(1.9 \pm 0.9) \%$	643
$\bar{K}^*(892)^0 \eta$	$(1.41 \pm 0.12) \%$	583
$K^- \pi^+ \eta'(958)$	$(6.43 \pm 0.34) \times 10^{-3}$	479
$K_S^0 \eta'(958) \pi^0$	$(2.52 \pm 0.27) \times 10^{-3}$	479
$\bar{K}^*(892)^0 \eta'(958)$	$< 1.0 \times 10^{-3}$	CL=90% 119

Hadronic modes with three K's

$K_S^0 K^+ K^-$	$(4.52 \pm 0.29) \times 10^{-3}$	544
$K_S^0 a_0(980)^0, a_0^0 \rightarrow K^+ K^-$	$(3.0 \pm 0.4) \times 10^{-3}$	—
$K^- a_0(980)^+, a_0^+ \rightarrow K^+ K_S^0$	$(6.1 \pm 1.8) \times 10^{-4}$	—
$K^+ a_0(980)^-, a_0^- \rightarrow K^- K_S^0$	$< 1.1 \times 10^{-4}$	CL=95% —
$K_S^0 f_0(980), f_0 \rightarrow K^+ K^-$	$< 9 \times 10^{-5}$	CL=95% —
$K_S^0 \phi, \phi \rightarrow K^+ K^-$	$(2.08 \pm 0.14) \times 10^{-3}$	520
$K_L^0 \phi$	$(4.07 \pm 0.23) \times 10^{-3}$	521
$K_S^0 f_0(1370), f_0 \rightarrow K^+ K^-$	$(1.7 \pm 1.1) \times 10^{-4}$	—
$3K_S^0$	$(7.6 \pm 0.7) \times 10^{-4}$	S=1.4 539
$K^+ 2K^- \pi^+$	$(2.25 \pm 0.32) \times 10^{-4}$	434
$K^+ K^- \bar{K}^*(892)^0, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(4.5 \pm 1.8) \times 10^{-5}$	†
$K^- \pi^+ \phi, \phi \rightarrow K^+ K^-$	$(4.0 \pm 1.7) \times 10^{-5}$	422
$\phi \bar{K}^*(892)^0, \phi \rightarrow K^+ K^-, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(1.08 \pm 0.20) \times 10^{-4}$	†
$K^+ 2K^- \pi^+$ nonresonant	$(3.4 \pm 1.5) \times 10^{-5}$	434
$2K_S^0 K^\pm \pi^\mp$	$(6.1 \pm 1.3) \times 10^{-4}$	427

Pionic modes

$\pi^+ \pi^-$	$(1.453 \pm 0.024) \times 10^{-3}$	S=1.4 922
$2\pi^0$	$(8.26 \pm 0.25) \times 10^{-4}$	923
$\pi^+ \pi^- \pi^0$	$(1.49 \pm 0.07) \%$	S=2.3 907
$\rho^+ \pi^-$	$(1.01 \pm 0.05) \%$	764
$\rho^0 \pi^0$	$(3.86 \pm 0.24) \times 10^{-3}$	764
$\rho^- \pi^+$	$(5.15 \pm 0.26) \times 10^{-3}$	764
$\rho(1450)^+ \pi^-, \rho^+ \rightarrow \pi^+ \pi^0$	$(1.6 \pm 2.1) \times 10^{-5}$	—
$\rho(1450)^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-$	$(4.5 \pm 2.0) \times 10^{-5}$	—
$\rho(1450)^- \pi^+, \rho^- \rightarrow \pi^- \pi^0$	$(2.7 \pm 0.4) \times 10^{-4}$	—
$\rho(1700)^+ \pi^-, \rho^+ \rightarrow \pi^+ \pi^0$	$(6.1 \pm 1.5) \times 10^{-4}$	—

$\rho(1700)^0 \pi^0, \rho^0 \rightarrow \pi^+ \pi^-$	$(7.4 \pm 1.8) \times 10^{-4}$	—
$\rho(1700)^- \pi^+, \rho^- \rightarrow \pi^- \pi^0$	$(4.8 \pm 1.1) \times 10^{-4}$	—
$f_0(980) \pi^0, f_0 \rightarrow \pi^+ \pi^-$	$(3.7 \pm 0.9) \times 10^{-5}$	—
$f_0(500) \pi^0, f_0 \rightarrow \pi^+ \pi^-$	$(1.22 \pm 0.22) \times 10^{-4}$	—
$f_0(1370) \pi^0, f_0 \rightarrow \pi^+ \pi^-$	$(5.5 \pm 2.1) \times 10^{-5}$	—
$f_0(1500) \pi^0, f_0 \rightarrow \pi^+ \pi^-$	$(5.8 \pm 1.6) \times 10^{-5}$	—
$f_0(1710) \pi^0, f_0 \rightarrow \pi^+ \pi^-$	$(4.6 \pm 1.6) \times 10^{-5}$	—
$f_2(1270) \pi^0, f_2 \rightarrow \pi^+ \pi^-$	$(1.96 \pm 0.21) \times 10^{-4}$	—
$\pi^+ \pi^- \pi^0$ nonresonant	$(1.3 \pm 0.4) \times 10^{-4}$	907
$3\pi^0$	$(2.0 \pm 0.5) \times 10^{-4}$	908
$2\pi^+ 2\pi^-$	$(7.55 \pm 0.20) \times 10^{-3}$	880
$a_1(1260)^+ \pi^-, a_1^+ \rightarrow$ $2\pi^+ \pi^-$ total	$(3.13 \pm 0.21) \times 10^{-3}$	—
$a_1(1260)^+ \pi^-, a_1^+ \rightarrow$ $\rho^0 \pi^+$ S-wave	$(1.9 \pm 0.5) \times 10^{-4}$	—
$a_1(1260)^+ \pi^-, a_1^+ \rightarrow$ $\rho^0 \pi^+$ D-wave	$(6.4 \pm 0.7) \times 10^{-4}$	—
$a_1(1260)^- \pi^+, a_1^- \rightarrow$ $\sigma \pi^+$	$(2.3 \pm 0.9) \times 10^{-4}$	—
$a_1(1260)^- \pi^+, a_1^- \rightarrow$ $\rho^0 \pi^-$ S-wave	$(6.0 \pm 3.4) \times 10^{-5}$	—
$\pi(1300)^+ \pi^-, \pi(1300)^+ \rightarrow$ $\sigma \pi^+$	$(5.1 \pm 2.7) \times 10^{-4}$	—
$\pi(1300)^- \pi^+, \pi(1300)^- \rightarrow$ $\sigma \pi^-$	$(2.3 \pm 2.2) \times 10^{-4}$	—
$a_1(1640)^+ \pi^-, a_1^+ \rightarrow$ $\rho^0 \pi^+$ D-wave	$(3.2 \pm 1.6) \times 10^{-4}$	—
$a_1(1640)^+ \pi^-, a_1^+ \rightarrow$ $\sigma \pi^+$	$(1.8 \pm 1.4) \times 10^{-4}$	—
$\pi_2(1670)^+ \pi^-, \pi_2^+ \rightarrow$ $f_2(1270)^0 \pi^+, f_2^0 \rightarrow$ $\pi^+ \pi^-$	$(2.0 \pm 0.9) \times 10^{-4}$	—
$\pi_2(1670)^+ \pi^-, \pi_2^+ \rightarrow$ $\sigma \pi^+$	$(2.6 \pm 1.0) \times 10^{-4}$	—
$2\rho^0$ total	$(1.85 \pm 0.13) \times 10^{-3}$	518
$2\rho^0$, parallel helicities	$(8.3 \pm 3.2) \times 10^{-5}$	—
$2\rho^0$, perpendicular helicities	$(4.8 \pm 0.6) \times 10^{-4}$	—
$2\rho^0$, longitudinal helicities	$(1.27 \pm 0.10) \times 10^{-3}$	—
$2\rho(770)^0$, S-wave	$(1.8 \pm 1.3) \times 10^{-4}$	—
$2\rho(770)^0$, P-wave	$(5.3 \pm 1.3) \times 10^{-4}$	—
$2\rho(770)^0$, D-wave	$(6.2 \pm 3.0) \times 10^{-4}$	—
Resonant $(\pi^+ \pi^-) \pi^+ \pi^-$	$(1.51 \pm 0.12) \times 10^{-3}$	—
3-body total	$(6.2 \pm 0.9) \times 10^{-4}$	—

$\sigma \rho(770)^0$	$(5.0 \pm 2.5) \times 10^{-4}$	—
$f_0(980)\pi^+\pi^-, f_0 \rightarrow \pi^+\pi^-$	$(1.8 \pm 0.5) \times 10^{-4}$	—
$f_2(1270)\pi^+\pi^-, f_2 \rightarrow \pi^+\pi^-$	$(3.7 \pm 0.6) \times 10^{-4}$	—
$2f_2(1270), f_2 \rightarrow \pi^+\pi^-$	$(1.6 \pm 1.8) \times 10^{-4}$	—
$f_0(1370)\sigma, f_0 \rightarrow \pi^+\pi^-$	$(1.6 \pm 0.5) \times 10^{-3}$	—
$\pi^+\pi^- 2\pi^0$	$(1.002 \pm 0.031) \%$	882
$4\pi^0$	$(7.6 \pm 1.1) \times 10^{-4}$	883
$\eta\pi^0$ [q]	$(6.3 \pm 0.6) \times 10^{-4}$	S=1.1 846
$\omega\pi^0$ [q]	$(1.17 \pm 0.35) \times 10^{-4}$	761
$\omega\eta$	$(1.98 \pm 0.18) \times 10^{-3}$	S=1.1 648
$2\pi^+ 2\pi^- \pi^0$	$(3.46 \pm 0.21) \times 10^{-3}$	844
$\pi^+\pi^- 3\pi^0$	$(1.53 \pm 0.21) \times 10^{-3}$	847
$2\pi^+ 2\pi^- 2\pi^0$	$(4.8 \pm 0.4) \times 10^{-3}$	798
$\eta\pi^+\pi^-$ [q]	$(1.16 \pm 0.07) \times 10^{-3}$	827
$\rho(770)^0\eta, \rho^0 \rightarrow \pi^+\pi^-$	$(1.77 \pm 0.25) \times 10^{-4}$	—
$a_0(980)^-\pi^+, a_0^- \rightarrow \pi^-\eta$	$(6.9 \pm 1.9) \times 10^{-5}$	—
$a_0(980)^+\pi^-, a_0^+ \rightarrow \pi^+\eta$	$(5.1 \pm 0.8) \times 10^{-4}$	—
$a_2(1320)^+\pi^-, a_2^+ \rightarrow \pi^+\eta$	$(2.4 \pm 1.4) \times 10^{-5}$	—
$a_2(1700)^+\pi^-, a_2^+ \rightarrow \pi^+\eta$	$(6 \pm 4) \times 10^{-5}$	—
$(\pi^+\pi^-)_{S\text{-wave}}\eta$	$(4.5 \pm 3.2) \times 10^{-5}$	827
$\omega\pi^+\pi^-$ [q]	$(1.33 \pm 0.20) \times 10^{-3}$	738
$\omega\pi^0\pi^0$	$< 1.10 \times 10^{-3}$	CL=90% 740
$\eta 2\pi^0$	$(3.8 \pm 1.3) \times 10^{-4}$	829
$\pi^+\pi^-\pi^0\eta$	$(3.23 \pm 0.22) \times 10^{-3}$	797
$\eta 3\pi^0$	$(2.36 \pm 0.28) \times 10^{-3}$	799
$\eta 2\pi^+ 2\pi^-$	$(6.0 \pm 1.2) \times 10^{-4}$	751
$3\pi^+ 3\pi^-$	$(4.3 \pm 1.2) \times 10^{-4}$	795
$\eta'(958)\pi^0$	$(9.2 \pm 1.0) \times 10^{-4}$	678
$\eta'(958)\pi^+\pi^-$	$(4.5 \pm 1.7) \times 10^{-4}$	650
2η	$(2.11 \pm 0.19) \times 10^{-3}$	S=2.3 754
$2\eta\pi^0$	$(7.3 \pm 2.2) \times 10^{-4}$	699
$2\eta\pi^+\pi^-$	$(8.5 \pm 1.4) \times 10^{-4}$	623
3η	$< 1.3 \times 10^{-4}$	CL=90% 421
$\eta\eta'(958)$	$(1.01 \pm 0.19) \times 10^{-3}$	537

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

K^+K^-	$(4.08 \pm 0.06) \times 10^{-3}$	S=1.6 791
$2K_S^0$	$(1.41 \pm 0.05) \times 10^{-4}$	S=1.1 789
$K_S^0 K^- \pi^+$	$(3.4 \pm 0.5) \times 10^{-3}$	S=1.1 739
$\bar{K}^*(892)^0 K_S^0, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(8.3 \pm 1.6) \times 10^{-5}$	608

$K^*(892)^+ K^-, K^{*+} \rightarrow K_S^0 \pi^+$	$(1.92 \pm 0.30) \times 10^{-3}$	—	
$\bar{K}^*(1410)^0 K_S^0, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(1.3 \pm 1.9) \times 10^{-4}$	—	
$K^*(1410)^+ K^-, K^{*+} \rightarrow K_S^0 \pi^+$	$(3.2 \pm 1.9) \times 10^{-4}$	—	
$(K^- \pi^+)_{S\text{-wave}} K_S^0$	$(6.1 \pm 2.9) \times 10^{-4}$	739	
$(K_S^0 \pi^+)_{S\text{-wave}} K^-$	$(4.0 \pm 1.0) \times 10^{-4}$	739	
$a_0(980)^- \pi^+, a_0^- \rightarrow K_S^0 K^-$	$(1.4 \pm 1.4) \times 10^{-4}$	—	
$a_0(1450)^- \pi^+, a_0^- \rightarrow K_S^0 K^-$	$(2.5 \pm 2.0) \times 10^{-5}$	—	
$a_2(1320)^- \pi^+, a_2^- \rightarrow K_S^0 K^-$	$(5 \pm 5) \times 10^{-6}$	—	
$\rho(1450)^- \pi^+, \rho^- \rightarrow K_S^0 K^-$	$(4.7 \pm 2.6) \times 10^{-5}$	—	
$K_S^0 K^+ \pi^-$	$(2.21 \pm 0.34) \times 10^{-3}$	S=1.1	739
$K^*(892)^0 K_S^0, K^{*0} \rightarrow K^+ \pi^-$	$(1.14 \pm 0.21) \times 10^{-4}$	608	
$K^*(892)^- K^+, K^{*-} \rightarrow K_S^0 \pi^-$	$(6.4 \pm 1.0) \times 10^{-4}$	—	
$K^*(1410)^0 K_S^0, K^{*0} \rightarrow K^+ \pi^+$	$(5 \pm 8) \times 10^{-5}$	—	
$K^*(1410)^- K^+, K^{*-} \rightarrow K_S^0 \pi^-$	$(2.6 \pm 2.1) \times 10^{-4}$	—	
$(K^+ \pi^-)_{S\text{-wave}} K_S^0$	$(3.8 \pm 1.9) \times 10^{-4}$	739	
$(K_S^0 \pi^-)_{S\text{-wave}} K^+$	$(1.4 \pm 0.6) \times 10^{-4}$	739	
$a_0(980)^+ \pi^-, a_0^+ \rightarrow K_S^0 K^+$	$(6 \pm 4) \times 10^{-4}$	—	
$a_0(1450)^+ \pi^-, a_0^+ \rightarrow K_S^0 K^+$	$(3.3 \pm 2.6) \times 10^{-5}$	—	
$\rho(1700)^+ \pi^-, \rho^+ \rightarrow K_S^0 K^+$	$(1.2 \pm 0.6) \times 10^{-5}$	—	
$K^+ K^- \pi^0$	$(3.42 \pm 0.15) \times 10^{-3}$	743	
$K^*(892)^+ K^-, K^*(892)^+ \rightarrow K^+ \pi^0$	$(1.52 \pm 0.08) \times 10^{-3}$	—	
$K^*(892)^- K^+, K^*(892)^- \rightarrow K^- \pi^0$	$(5.4 \pm 0.4) \times 10^{-4}$	—	
$(K^+ \pi^0)_{S\text{-wave}} K^-$	$(2.43 \pm 0.18) \times 10^{-3}$	743	
$(K^- \pi^0)_{S\text{-wave}} K^+$	$(1.3 \pm 0.5) \times 10^{-4}$	743	
$f_0(980) \pi^0, f_0 \rightarrow K^+ K^-$	$(3.6 \pm 0.6) \times 10^{-4}$	—	
$\phi \pi^0, \phi \rightarrow K^+ K^-$	$(6.6 \pm 0.4) \times 10^{-4}$	—	
$2K_S^0 \pi^0$	$< 1.45 \times 10^{-4}$	CL=90%	740
$K^+ K^- \eta$	$(5.9 \pm 1.9) \times 10^{-5}$	514	
$\phi(1020) \eta$	$(1.81 \pm 0.12) \times 10^{-4}$	489	
$K^+ K^- \eta \text{ nonresonant}$	$(9.9 \pm_{-0.8}^{+0.9}) \times 10^{-5}$	514	

$2K_S^0 \eta$	$(1.3 \pm 0.6) \times 10^{-4}$	508
$K^+ K^- \pi^0 \pi^0$	$(6.9 \pm 0.8) \times 10^{-4}$	681
$K^+ K^- \pi^+ \pi^-$	$(2.47 \pm 0.11) \times 10^{-3}$	677
$\phi(\pi^+ \pi^-)_{S\text{-wave}}, \phi \rightarrow K^+ K^-$	$(10 \pm 5) \times 10^{-5}$	614
$(\phi \rho^0)_{S\text{-wave}}, \phi \rightarrow K^+ K^-$	$(6.9 \pm 0.6) \times 10^{-4}$	250
$(\phi \rho^0)_{P\text{-wave}}, \phi \rightarrow K^+ K^-$	$(4.0 \pm 1.9) \times 10^{-5}$	—
$(\phi \rho^0)_{D\text{-wave}}, \phi \rightarrow K^+ K^-$	$(4.2 \pm 1.4) \times 10^{-5}$	—
$(K^*(892)^0 \bar{K}^*(892)^0)_{S\text{-wave}}, K^{*0} \rightarrow K^\pm \pi^\mp$	$(2.24 \pm 0.13) \times 10^{-4}$	—
$(K^*(892)^0 \bar{K}^*(892)^0)_{P\text{-wave}}, K^* \rightarrow K^\pm \pi^\mp$	$(1.20 \pm 0.08) \times 10^{-4}$	—
$(K^*(892)^0 \bar{K}^*(892)^0)_{D\text{-wave}}, K^* \rightarrow K^\pm \pi^\mp$	$(4.7 \pm 0.4) \times 10^{-5}$	—
$K^*(892)^0 (K^- \pi^+)_{S\text{-wave}}, K^* \rightarrow K^\pm \pi^\mp$	$(1.4 \pm 0.6) \times 10^{-4}$	—
3-body, $K^{*0} \rightarrow K^+ \pi^-$		
$K_1(1270)^+ K^-, K_1^+ \rightarrow K^{*0} \pi^+$	$(1.4 \pm 0.9) \times 10^{-4}$	—
$K_1(1270)^+ K^-, K_1^+ \rightarrow K^*(1430)^0 \pi^+, K^{*0} \rightarrow K^+ \pi^-$	$(1.5 \pm 0.5) \times 10^{-4}$	—
$K_1(1270)^+ K^-, K_1^+ \rightarrow \rho^0 K^+$	$(2.2 \pm 0.6) \times 10^{-4}$	—
$K_1(1270)^+ K^-, K_1^+ \rightarrow \omega(782) K^+, \omega \rightarrow \pi^+ \pi^-$	$(1.5 \pm 1.2) \times 10^{-5}$	—
$K_1(1270)^- K^+, K_1^- \rightarrow \rho^0 K^-$	$(1.3 \pm 0.4) \times 10^{-4}$	—
$K_1(1400)^+ K^-, K_1^+ \rightarrow K^*(892)^0 \pi^+, K^{*0} \rightarrow K^+ \pi^-$	$(4.6 \pm 0.4) \times 10^{-4}$	—
$K^*(1410)^- K^+, K^{*-} \rightarrow \bar{K}^{*0} \pi^-$	$(7.0 \pm 1.1) \times 10^{-5}$	—
$K_1(1680)^+ K^-, K_1^+ \rightarrow K^{*0} \pi^+, K^{*0} \rightarrow K^+ \pi^-$	$(8.9 \pm 3.2) \times 10^{-5}$	—
$K^+ K^- \pi^+ \pi^-$ non-resonant	$(2.7 \pm 0.6) \times 10^{-4}$	—
$2K_S^0 \pi^+ \pi^-$	$(5.3 \pm 0.9) \times 10^{-4}$	673
$K_S^0 K^- \pi^+ \pi^0$	$(1.32 \pm 0.16) \times 10^{-3}$	677
$K_S^0 K^+ \pi^- \pi^0$	$(6.5 \pm 0.7) \times 10^{-4}$	677
$K_S^0 K^- 2\pi^+ \pi^-$	$< 1.5 \times 10^{-4}$	CL=90% 595
$K^+ K^- \pi^+ \pi^- \pi^0$	$(3.1 \pm 2.0) \times 10^{-3}$	600

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

$\phi \pi^0$	$(1.17 \pm 0.04) \times 10^{-3}$	645
$\phi \eta$	$(1.8 \pm 0.5) \times 10^{-4}$	489

$\phi\omega$		$(6.5 \pm 1.0) \times 10^{-4}$		238
Radiative modes				
$\rho^0\gamma$		$(1.82 \pm 0.32) \times 10^{-5}$		771
$\omega\gamma$		$< 2.4 \times 10^{-4}$	CL=90%	768
$\phi\gamma$		$(2.81 \pm 0.19) \times 10^{-5}$		654
$\overline{K}^*(892)^0\gamma$		$(4.1 \pm 0.7) \times 10^{-4}$		719
Doubly Cabibbo suppressed (DC) modes or $\Delta C = 2$ forbidden via mixing (C2M) modes				
$K^+\ell^-\bar{\nu}_\ell$ via $\overline{D}^0$	$[r]$	$< 2.2 \times 10^{-5}$	CL=90%	—
K^+ or $K^*(892)^+\ell^-\bar{\nu}_\ell$ via $\overline{D}^0$		$< 6 \times 10^{-5}$	CL=90%	—
$K^+\pi^-$	DC	$(1.50 \pm 0.07) \times 10^{-4}$	S=3.0	861
$K^+\pi^-$ via DCS		$(1.362 \pm 0.025) \times 10^{-4}$		—
$K^+\pi^-$ via $\overline{D}^0$		$< 1.6 \times 10^{-5}$	CL=95%	861
$K_S^0\pi^+\pi^-$ in $D^0 \rightarrow \overline{D}^0$		$< 1.8 \times 10^{-4}$	CL=95%	—
$K^*(892)^+\pi^-$, $K^{*+} \rightarrow K_S^0\pi^+$	DC	$(1.15 \pm_{-0.34}^{+0.60}) \times 10^{-4}$		711
$K_0^*(1430)^+\pi^-$, $K_0^{*+} \rightarrow K_S^0\pi^+$	DC	$< 1.4 \times 10^{-5}$		—
$K_2^*(1430)^+\pi^-$, $K_2^{*+} \rightarrow K_S^0\pi^+$	DC	$< 3.4 \times 10^{-5}$		—
$K^+\pi^-\pi^0$	DC	$(3.06 \pm 0.16) \times 10^{-4}$	S=1.4	844
$K^+\pi^-\pi^0$ via $\overline{D}^0$		$(7.6 \pm_{-0.6}^{+0.5}) \times 10^{-4}$		—
$K^+\pi^-2\pi^0$		$< 3.6 \times 10^{-4}$	CL=90%	815
$K^+\pi^+2\pi^-$ via DCS		$(2.49 \pm 0.07) \times 10^{-4}$		—
$K^+\pi^+2\pi^-$	DC	$(2.65 \pm 0.06) \times 10^{-4}$		813
$K^+\pi^+2\pi^-$ via $\overline{D}^0$		$(7.9 \pm 3.0) \times 10^{-6}$		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	$< 8.5 \times 10^{-7}$	CL=90%	932
e^+e^-	C1	$< 7.9 \times 10^{-8}$	CL=90%	932
$\mu^+\mu^-$	C1	$< 3.1 \times 10^{-9}$	CL=90%	926
$\pi^0e^+e^-$	C1	$< 4 \times 10^{-6}$	CL=90%	928
$\pi^0\mu^+\mu^-$	C1	$< 1.8 \times 10^{-4}$	CL=90%	915
$\pi^0\nu\bar{\nu}$		$< 2.1 \times 10^{-4}$	CL=90%	928
ηe^+e^-	C1	$< 3 \times 10^{-6}$	CL=90%	852
$\eta\mu^+\mu^-$	C1	$< 5.3 \times 10^{-4}$	CL=90%	838
$\pi^+\pi^-e^+e^-$	C1	$< 7 \times 10^{-6}$	CL=90%	922
$\rho^0e^+e^-$	C1	$< 1.0 \times 10^{-4}$	CL=90%	771

$\pi^+\pi^-\mu^+\mu^-$	<i>C1</i>	$(9.6 \pm 1.2) \times 10^{-7}$		894
$\pi^+\pi^-\mu^+\mu^-$ (non-res)		$< 5.5 \times 10^{-7}$	CL=90%	—
$\rho^0\mu^+\mu^-$	<i>C1</i>	$< 2.2 \times 10^{-5}$	CL=90%	754
ωe^+e^-	<i>C1</i>	$< 6 \times 10^{-6}$	CL=90%	768
$\omega\mu^+\mu^-$	<i>C1</i>	$< 8.3 \times 10^{-4}$	CL=90%	751
$K^-K^+e^+e^-$	<i>C1</i>	$< 1.1 \times 10^{-5}$	CL=90%	791
ϕe^+e^-	<i>C1</i>	$< 5.2 \times 10^{-5}$	CL=90%	654
$K^-K^+\mu^+\mu^-$	<i>C1</i>	$(1.54 \pm 0.32) \times 10^{-7}$		710
$K^-K^+\mu^+\mu^-$ (non-res)		$< 3.3 \times 10^{-5}$	CL=90%	—
$\phi\mu^+\mu^-$	<i>C1</i>	$< 3.1 \times 10^{-5}$	CL=90%	631
$\overline{K}^0 e^+e^-$		$[h] < 2.4 \times 10^{-5}$	CL=90%	866
$\overline{K}^0 \mu^+\mu^-$		$[h] < 2.6 \times 10^{-4}$	CL=90%	852
$K^-\pi^+e^+e^-$, $675 < m_{ee} < 875$ MeV		$(4.0 \pm 0.5) \times 10^{-6}$		—
$K^-\pi^+e^+e^-$, $1.005 < m_{ee} < 1.035$ GeV		$< 5 \times 10^{-7}$	CL=90%	—
$\overline{K}^*(892)^0 e^+e^-$		$[h] < 4.7 \times 10^{-5}$	CL=90%	719
$K^-\pi^+\mu^+\mu^-$	<i>C1</i>	$< 3.59 \times 10^{-4}$	CL=90%	829
$K^-\pi^+\mu^+\mu^-$, $675 < m_{\mu\mu} < 875$ MeV		$(4.2 \pm 0.4) \times 10^{-6}$		—
$\overline{K}^*(892)^0 \mu^+\mu^-$		$[h] < 2.4 \times 10^{-5}$	CL=90%	700
$\pi^+\pi^-\pi^0\mu^+\mu^-$	<i>C1</i>	$< 8.1 \times 10^{-4}$	CL=90%	863
$\mu^\pm e^\mp$	<i>LF</i>	$[s] < 1.3 \times 10^{-8}$	CL=90%	929
$\pi^0 e^\pm \mu^\mp$	<i>LF</i>	$[s] < 8.0 \times 10^{-7}$	CL=90%	924
$\eta e^\pm \mu^\mp$	<i>LF</i>	$[s] < 2.25 \times 10^{-6}$	CL=90%	848
$\pi^+\pi^-e^\pm \mu^\mp$	<i>LF</i>	$[s] < 1.71 \times 10^{-6}$	CL=90%	911
$\rho^0 e^\pm \mu^\mp$	<i>LF</i>	$[s] < 5.0 \times 10^{-7}$	CL=90%	767
$\omega e^\pm \mu^\mp$	<i>LF</i>	$[s] < 1.71 \times 10^{-6}$	CL=90%	764
$K^-K^+e^\pm \mu^\mp$	<i>LF</i>	$[s] < 1.00 \times 10^{-6}$	CL=90%	754
$\phi e^\pm \mu^\mp$	<i>LF</i>	$[s] < 5.1 \times 10^{-7}$	CL=90%	648
$\overline{K}^0 e^\pm \mu^\mp$	<i>LF</i>	$[s] < 1.74 \times 10^{-6}$	CL=90%	863
$K^-\pi^+e^\pm \mu^\mp$	<i>LF</i>	$[s] < 1.90 \times 10^{-6}$	CL=90%	848
$\overline{K}^*(892)^0 e^\pm \mu^\mp$	<i>LF</i>	$[s] < 1.25 \times 10^{-6}$	CL=90%	714
$2\pi^-2e^+$	<i>L</i>	$< 9.1 \times 10^{-7}$	CL=90%	922
$2\pi^-2\mu^+$	<i>L</i>	$< 1.52 \times 10^{-6}$	CL=90%	894
$K^-\pi^-2e^+$	<i>L</i>	$< 5.0 \times 10^{-7}$	CL=90%	861
$K^-\pi^-2\mu^+$	<i>L</i>	$< 5.3 \times 10^{-7}$	CL=90%	829
$2K^-2e^+$	<i>L</i>	$< 3.4 \times 10^{-7}$	CL=90%	791
$2K^-2\mu^+$	<i>L</i>	$< 1.0 \times 10^{-7}$	CL=90%	710
$\pi^-\pi^-e^+\mu^+$	<i>L</i>	$< 3.06 \times 10^{-6}$	CL=90%	911
$K^-\pi^-e^+\mu^+$	<i>L</i>	$< 2.10 \times 10^{-6}$	CL=90%	848
$2K^-e^+\mu^+$	<i>L</i>	$< 5.8 \times 10^{-7}$	CL=90%	754
pe^-	<i>L,B</i>	$< 5.5 \times 10^{-7}$	CL=90%	696
$\overline{p}e^+$	<i>L,B</i>	$< 6.9 \times 10^{-7}$	CL=90%	696

$p\mu^-$	L,B	< 5.1	$\times 10^{-7}$	CL=90%	691
$\bar{p}\mu^+$	L,B	< 6.3	$\times 10^{-7}$	CL=90%	691

 $D^*(2007)^0$

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

Mass $m = 2006.85 \pm 0.05$ MeV ($S = 1.1$)

$m_{D^{*0}} - m_{D^0} = 142.014 \pm 0.030$ MeV ($S = 1.5$)

Full width $\Gamma < 2.1$ MeV, CL = 90%

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

$D^*(2007)^0$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
$D^0\pi^0$	$(64.7 \pm 0.9) \%$		43
$D^0\gamma$	$(35.3 \pm 0.9) \%$		137
$D^0e^+e^-$	$(3.91 \pm 0.33) \times 10^{-3}$		137
$\mu^+\mu^-$	$< 2.5 \times 10^{-8}$	90%	998
e^+e^-	$< 1.7 \times 10^{-6}$	90%	1003

 $D^*(2010)^\pm$

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

Mass $m = 2010.26 \pm 0.05$ MeV

$m_{D^{*}(2010)^+} - m_{D^+} = 140.603 \pm 0.015$ MeV

$m_{D^{*}(2010)^+} - m_{D^0} = 145.4258 \pm 0.0017$ MeV

Full width $\Gamma = 83.4 \pm 1.8$ keV

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

$D^*(2010)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
$D^0\pi^+$	$(67.7 \pm 0.5) \%$		39
$D^+\pi^0$	$(30.7 \pm 0.5) \%$		38
$D^+\gamma$	$(1.6 \pm 0.4) \%$		136
$e^+\nu_e$	$< 1.1 \times 10^{-5}$	90%	1005
$\mu^+\nu_\mu$	$< 4.3 \times 10^{-6}$	90%	1002

 $D_0^*(2300)$

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

was $D_0^*(2400)$

Mass $m = 2343 \pm 10$ MeV ($S = 1.5$)

Full width $\Gamma = 229 \pm 16$ MeV

$D_0^*(2300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D\pi^\pm$	seen	411

 $D_1(2420)$

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

Mass $m = 2422.1 \pm 0.6$ MeV ($S = 1.7$)

$m_{D_1(2420)^0} - m_{D^{*+}} = 411.8 \pm 0.6$ MeV ($S = 1.7$)

$m_{D_1(2420)^\pm} - m_{D_1(2420)^0} = 4 \pm 4$ MeV

Full width $\Gamma = 31.3 \pm 1.9$ MeV ($S = 2.8$)

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

$D_1(2420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2007)^0\pi$	seen	359

 $D_1(2430)^0$

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

Mass $m = 2412 \pm 9$ MeV

Full width $\Gamma = 314 \pm 29$ MeV

$D_1(2430)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+\pi^-$	seen	345

 $D_2^*(2460)$

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

Mass $m = 2461.1 \pm 0.8$ MeV ($S = 6.3$)

$m_{D_2^*(2460)^0} - m_{D^+} = 591.5 \pm 0.8$ MeV ($S = 6.0$)

$m_{D_2^*(2460)^0} - m_{D^{*+}} = 450.9 \pm 0.8$ MeV ($S = 6.0$)

$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV

Full width $\Gamma = 47.3 \pm 0.8$ MeV ($S = 1.5$)

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

$D_2^*(2460)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D\pi^-$	seen	509
$D^*(2010)\pi^-$	seen	389

$D_3^*(2750)$

$$I(J^P) = \frac{1}{2}(3^-)$$

Mass $m = 2763.1 \pm 3.2$ MeV (S = 2.1)Full width $\Gamma = 66 \pm 5$ MeV

$D_3^*(2750)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D\pi$	seen	743
$D^+\pi^-$	seen	739
$D^0\pi^\pm$	seen	743
$D^*\pi$	seen	639
$D^{*+}\pi^-$	seen	639

NOTES

- [a] This result applies to $Z^0 \rightarrow c\bar{c}$ decays only. Here ℓ^+ is an average (not a sum) of e^+ and μ^+ decays.
- [b] See the Particle Listings for the (complicated) definition of this quantity.
- [c] 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.
- [d] These subfractions of the $K^-2\pi^+$ mode are uncertain: see the Particle Listings.
- [e] See the listings under " $D \rightarrow K\pi\pi\pi$ partial wave analyses" and our 2008 Review (Physics Letters **B667** 1 (2008)) for measurements of submodes of this mode.
- [f] The unseen decay modes of the resonances are included.
- [g] This is *not* a test for the $\Delta C=1$ weak neutral current, but leads to the $\pi^+\ell^+\ell^-$ final state.
- [h] This mode is not a useful test for a $\Delta C=1$ weak neutral current because both quarks must change flavor in this decay.
- [i] In the 2010 Review, the values for these quantities were given using a measure of the asymmetry that was inconsistent with the usual definition.
- [j] This value is obtained by subtracting the branching fractions for 2-, 4- and 6-prongs from unity.
- [k] This is the sum of our $K^-2\pi^+\pi^-$, $K^-2\pi^+\pi^-\pi^0$, $\bar{K}^02\pi^+2\pi^-$, $K^+2K^-\pi^+$, $2\pi^+2\pi^-$, $2\pi^+2\pi^-\pi^0$, $K^+K^-\pi^+\pi^-$, and $K^+K^-\pi^+\pi^-\pi^0$, branching fractions.
- [l] This is the sum of our $K^-3\pi^+2\pi^-$ and $3\pi^+3\pi^-$ branching fractions.
- [n] 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 6.17 ± 0.17 %.

- [o] This is a doubly Cabibbo-suppressed mode.
- [p] Submodes of the $D^0 \rightarrow K_S^0 \pi^+ \pi^- \pi^0$ 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.
- [q] This branching fraction includes all the decay modes of the resonance in the final state.
- [r] This limit assumes the average of $B(D^0 \rightarrow K^- e^+ \nu_e)$ and $B(D^0 \rightarrow K^- \mu^+ \nu_\mu)$ for the $B(D^0 \rightarrow K^- \ell^+ \nu_\ell)$ value.
- [s] The value is for the sum of the charge states or particle/antiparticle states indicated.