LIGHT UNFLAVORED MESONS ($S = C = B = 0$)

For $I = 1$ (π, b, ρ, a): $u\overline{d}$, $(u\overline{u}-d\overline{d})/\sqrt{2}$, $d\overline{u}$;
for $I = 0$ (η, η', h, h', ω, ϕ, f, f'): $c_1(u\overline{u} + d\overline{d}) + c_2(s\overline{s})$

$\pi^{\pm}$

$I^G(J^P) = 1^-(0^-)$

Mass $m = 139.57039 \pm 0.00018$ MeV (S = 1.8)
Mean life $\tau = (2.6033 \pm 0.0005) \times 10^{-8}$ s (S = 1.2)
$c\tau = 7.8045$ m

$\pi^{\pm} \to \ell^{\pm}\nu\gamma$ form factors [a]

$F_V = 0.0254 \pm 0.0017$
$F_A = 0.0119 \pm 0.0001$
F_V slope parameter $a = 0.10 \pm 0.06$
$R = 0.059^{+0.009}_{-0.008}$

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

For decay limits to particles which are not established, see the section on Searches for Axions and Other Very Light Bosons.

π^+ DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\mu^+\nu_\mu$	[b]	(99.98770±0.00004) %		30
$\mu^+\nu_\mu\gamma$	[c]	(2.00 ±0.25) $\times 10^{-4}$		30
$e^+\nu_e$	[b]	(1.230 ±0.004) $\times 10^{-4}$		70
$e^+\nu_e\gamma$	[c]	(7.39 ±0.05) $\times 10^{-7}$		70
$e^+\nu_e\pi^0$		(1.036 ±0.006) $\times 10^{-8}$		4
$e^+\nu_e e^+e^-$		(3.2 ±0.5) $\times 10^{-9}$		70
$\mu^+\nu_\mu\nu\overline{\nu}$		$< 9 \times 10^{-6}$	90%	30
$e^+\nu_e\nu\overline{\nu}$		$< 1.6 \times 10^{-7}$	90%	70
Lepton Family number (LF) or Lepton number (L) violating modes				
$\mu^+\overline{\nu}_e$	L	[d] $< 1.5 \times 10^{-3}$	90%	30
$\mu^+\nu_e$	LF	[d] $< 8.0 \times 10^{-3}$	90%	30
$\mu^-e^+e^+\nu$	LF	$< 1.6 \times 10^{-6}$	90%	30

π^0

$I^G(J^{PC}) = 1^-(0^{-+})$

Mass $m = 134.9768 \pm 0.0005$ MeV (S = 1.1)
$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
Mean life $\tau = (8.43 \pm 0.13) \times 10^{-17}$ s (S = 1.2)
$c\tau = 25.3$ nm

For decay limits to particles which are not established, see the appropriate Search sections (A^0 (axion) and Other Light Boson (X^0) Searches, etc.).

π^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
2γ		(98.823±0.034) %	S=1.5	67
$e^+e^-\gamma$		(1.174±0.035) %	S=1.5	67
γ positronium		(1.82 ±0.29) $\times 10^{-9}$		67
$e^+e^+e^-e^-$		(3.34 ±0.16) $\times 10^{-5}$		67
e^+e^-		(6.46 ±0.33) $\times 10^{-8}$		67
4γ		< 2	$\times 10^{-8}$ CL=90%	67
$\nu\overline{\nu}$	[e]	< 4.4	$\times 10^{-9}$ CL=90%	67
$\nu_e\overline{\nu}_e$		< 1.7	$\times 10^{-6}$ CL=90%	67
$\nu_\mu\overline{\nu}_\mu$		< 1.6	$\times 10^{-6}$ CL=90%	67
$\nu_\tau\overline{\nu}_\tau$		< 2.1	$\times 10^{-6}$ CL=90%	67
$\gamma\nu\overline{\nu}$		< 1.9	$\times 10^{-7}$ CL=90%	67
Charge conjugation (C) or Lepton Family number (LF) violating modes				
3γ	C	< 3.1	$\times 10^{-8}$ CL=90%	67
μ^+e^-	LF	< 3.8	$\times 10^{-10}$ CL=90%	26
μ^-e^+	LF	< 3.2	$\times 10^{-10}$ CL=90%	26
$\mu^+e^- + \mu^-e^+$	LF	< 3.6	$\times 10^{-10}$ CL=90%	26

η

$I^G(J^{PC}) = 0^+(0^{-+})$

Mass $m = 547.862 \pm 0.017$ MeV
Full width $\Gamma = 1.31 \pm 0.05$ keV

C-nonconserving decay parameters

$\pi^+\pi^-\pi^0$	left-right asymmetry	$= (0.09^{+0.11}_{-0.12}) \times 10^{-2}$
$\pi^+\pi^-\pi^0$	sextant asymmetry	$= (0.12^{+0.10}_{-0.11}) \times 10^{-2}$
$\pi^+\pi^-\pi^0$	quadrant asymmetry	$= (-0.09 \pm 0.09) \times 10^{-2}$
$\pi^+\pi^-\gamma$	left-right asymmetry	$= (0.9 \pm 0.4) \times 10^{-2}$
$\pi^+\pi^-\gamma$	β (D-wave)	$= -0.02 \pm 0.07$ (S = 1.3)

CP-nonconserving decay parameters

$\pi^+\pi^-e^+e^-$ decay-plane asymmetry $A_\phi = (-0.6 \pm 3.1) \times 10^{-2}$

Other decay parameters

$\pi^0\pi^0\pi^0$ Dalitz plot $\alpha = -0.0288 \pm 0.0012$ (S = 1.1)
Parameter Λ in $\eta \to \ell^+\ell^-\gamma$ decay = 0.716 ± 0.011 GeV/c^2

η DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Neutral modes			
neutral modes	(71.96±0.30) %	S=1.3	–
2γ	(39.36±0.18) %	S=1.1	274
$3\pi^0$	(32.57±0.21) %	S=1.2	179
$\pi^0 2\gamma$	(2.55±0.22) × 10^{-4}		257
$2\pi^0 2\gamma$	< 1.2 × 10^{-3}	CL=90%	238
4γ	< 2.8 × 10^{-4}	CL=90%	274
invisible	< 1.0 × 10^{-4}	CL=90%	–
Charged modes			
charged modes	(28.04±0.30) %	S=1.3	–
$\pi^+\pi^-\pi^0$	(23.02±0.25) %	S=1.2	174
$\pi^+\pi^-\gamma$	(4.28±0.07) %	S=1.1	236
$e^+e^-\gamma$	(6.9 ±0.4) × 10^{-3}	S=1.2	274
$\mu^+\mu^-\gamma$	(3.1 ±0.4) × 10^{-4}		253
e^+e^-	< 7 × 10^{-7}	CL=90%	274
$\mu^+\mu^-$	(5.8 ±0.8) × 10^{-6}		253
$2e^+2e^-$	(2.40±0.22) × 10^{-5}		274
$\pi^+\pi^- e^+e^-(\gamma)$	(2.68±0.11) × 10^{-4}		235
$e^+e^-\mu^+\mu^-$	< 1.6 × 10^{-4}	CL=90%	253
$2\mu^+2\mu^-$	< 3.6 × 10^{-4}	CL=90%	161
$\mu^+\mu^-\pi^+\pi^-$	< 3.6 × 10^{-4}	CL=90%	113
$\pi^+ e^-\overline{\nu}_e$ + c.c.	< 1.7 × 10^{-4}	CL=90%	256
$\pi^+\pi^- 2\gamma$	< 2.1 × 10^{-3}		236
$\pi^+\pi^-\pi^0\gamma$	< 6 × 10^{-4}	CL=90%	174
$\pi^0\mu^+\mu^-\gamma$	< 3 × 10^{-6}	CL=90%	210
Charge conjugation (*C*), Parity (*P*), Charge conjugation × Parity (*CP*), or Lepton Family number (*LF*) violating modes			
$\pi^0\gamma$	*C* [*f*] < 9 × 10^{-5}	CL=90%	257
$\pi^+\pi^-$	*P*,*CP* < 4.4 × 10^{-6}	CL=90%	236
$2\pi^0$	*P*,*CP* < 3.5 × 10^{-4}	CL=90%	238
$2\pi^0\gamma$	*C* < 5 × 10^{-4}	CL=90%	238
$3\pi^0\gamma$	*C* < 6 × 10^{-5}	CL=90%	179
3γ	*C* < 1.6 × 10^{-5}	CL=90%	274

$4\pi^0$	*P*,*CP*	<	6.9	$\times 10^{-7}$	CL=90%	40
$\pi^0 e^+ e^-$	*C*	[*g*] <	8	$\times 10^{-6}$	CL=90%	257
$\pi^0 \mu^+ \mu^-$	*C*	[*g*] <	5	$\times 10^{-6}$	CL=90%	210
$\mu^+ e^- + \mu^- e^+$	*LF*	<	6	$\times 10^{-6}$	CL=90%	264

$f_0(500)$

$I^G(J^{PC}) = 0^+(0^{++})$

also known as σ; was $f_0(600)$

See the review on "Scalar Mesons below 1 GeV."

Mass (T-Matrix Pole $\sqrt{s}$) = (400–550)$-i$(200–350) MeV
Mass (Breit-Wigner) = 400 to 800 MeV
Full width (Breit-Wigner) = 100 to 800 MeV

$f_0(500)$ DECAY MODES	Fraction (Γ_i/Γ)	*p* (MeV/*c*)
$\pi\pi$	seen	–
$\gamma\gamma$	seen	–

$\rho(770)$

$I^G(J^{PC}) = 1^+(1^{--})$

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 775.26 \pm 0.23$ MeV
Full width $\Gamma = 149.1 \pm 0.8$ MeV

$\rho(770)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	*p* (MeV/*c*)
$\pi\pi$		$\sim$ 100 %		363
		$\rho(770)^\pm$ decays		
$\pi^\pm\gamma$		$(4.5 \pm 0.5) \times 10^{-4}$	S=2.2	375
$\pi^\pm\eta$		$< 6 \times 10^{-3}$	CL=84%	152
$\pi^\pm\pi^+\pi^-\pi^0$		$< 2.0 \times 10^{-3}$	CL=84%	254
		$\rho(770)^0$ decays		
$\pi^+\pi^-\gamma$		$(9.9 \pm 1.6) \times 10^{-3}$		362
$\pi^0\gamma$		$(4.7 \pm 0.8) \times 10^{-4}$	S=1.7	376
$\eta\gamma$		$(3.00 \pm 0.21) \times 10^{-4}$		194
$\pi^0\pi^0\gamma$		$(4.5 \pm 0.8) \times 10^{-5}$		363
$\mu^+\mu^-$	[*h*]	$(4.55 \pm 0.28) \times 10^{-5}$		373
e^+e^-	[*h*]	$(4.72 \pm 0.05) \times 10^{-5}$		388
$\pi^+\pi^-\pi^0$		$(1.01^{+0.54}_{-0.36} \pm 0.34) \times 10^{-4}$		323
$\pi^+\pi^-\pi^+\pi^-$		$(1.8 \pm 0.9) \times 10^{-5}$		251
$\pi^+\pi^-\pi^0\pi^0$		$(1.6 \pm 0.8) \times 10^{-5}$		257

$\pi^0 e^+ e^-$	$<$	1.2	$\times 10^{-5}$	CL=90%	376

$\omega(782)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 782.66 \pm 0.13$ MeV (S = 2.0)
Full width $\Gamma = 8.68 \pm 0.13$ MeV

$\omega(782)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi^+\pi^-\pi^0$	(89.2 $\pm$0.7) %		327
$\pi^0\gamma$	(8.35$\pm$0.27) %	S=2.2	380
$\pi^+\pi^-$	($1.53^{+0.11}_{-0.13}$) %	S=1.2	366
neutrals (excluding $\pi^0\gamma$)	(7^{+8}_{-4}) $\times 10^{-3}$	S=1.1	–
$\eta\gamma$	(4.5 $\pm$0.4) $\times 10^{-4}$	S=1.1	200
$\pi^0 e^+ e^-$	(7.7 $\pm$0.6) $\times 10^{-4}$		380
$\pi^0\mu^+\mu^-$	(1.34$\pm$0.18) $\times 10^{-4}$	S=1.5	349
e^+e^-	(7.38$\pm$0.22) $\times 10^{-5}$	S=1.9	391
$\pi^+\pi^-\pi^0\pi^0$	$<$ 2 $\times 10^{-4}$	CL=90%	262
$\pi^+\pi^-\gamma$	$<$ 3.6 $\times 10^{-3}$	CL=95%	366
$\pi^+\pi^-\pi^+\pi^-$	$<$ 1 $\times 10^{-3}$	CL=90%	256
$\pi^0\pi^0\gamma$	(6.7 $\pm$1.1) $\times 10^{-5}$		367
$\eta\pi^0\gamma$	$<$ 3.3 $\times 10^{-5}$	CL=90%	162
$\mu^+\mu^-$	(7.4 $\pm$1.8) $\times 10^{-5}$		377
3γ	$<$ 1.9 $\times 10^{-4}$	CL=95%	391
Charge conjugation (C) violating modes			
$\eta\pi^0$ C	$<$ 2.1 $\times 10^{-4}$	CL=90%	162
$2\pi^0$ C	$<$ 2.2 $\times 10^{-4}$	CL=90%	367
$3\pi^0$ C	$<$ 2.3 $\times 10^{-4}$	CL=90%	330
invisible	$<$ 7 $\times 10^{-5}$	CL=90%	–

$\eta'(958)$

$I^G(J^{PC}) = 0^+(0^{-+})$

Mass $m = 957.78 \pm 0.06$ MeV
Full width $\Gamma = 0.188 \pm 0.006$ MeV

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\pi^+\pi^-\eta$	(42.5 $\pm$0.5) %		232
$\rho^0\gamma$(including non-resonant $\pi^+\ \pi^-\ \gamma$)	(29.5 $\pm$0.4) %		165
$\pi^0\pi^0\eta$	(22.4 $\pm$0.5) %		239
$\omega\gamma$	(2.52 $\pm$0.07) %		159

$\omega e^+ e^-$	(2.0 ±0.4) × 10^{-4}				159
$\gamma\gamma$	(2.307±0.033) %				479
$3\pi^0$	(2.50 ±0.17) × 10^{-3}				430
$\mu^+\mu^-\gamma$	(1.13 ±0.28) × 10^{-4}				467
$\pi^+\pi^-\mu^+\mu^-$	(2.0 ±0.4) × 10^{-5}				401
$\pi^+\pi^-\pi^0$	(3.61 ±0.17) × 10^{-3}				428
($\pi^+\pi^-\pi^0$) S-wave	(3.8 ±0.5) × 10^{-3}				428
$\pi^\mp\rho^\pm$	(7.4 ±2.3) × 10^{-4}				106
$\pi^0\rho^0$	< 4		%	90%	111
$2(\pi^+\pi^-)$	(8.4 ±0.9) × 10^{-5}				372
$\pi^+\pi^-2\pi^0$	(1.8 ±0.4) × 10^{-4}				376
$2(\pi^+\pi^-)$ neutrals	< 1		%	95%	–
$2(\pi^+\pi^-)\pi^0$	< 1.8		× 10^{-3}	90%	298
$2(\pi^+\pi^-)2\pi^0$	< 1		%	95%	197
$3(\pi^+\pi^-)$	< 3.1		× 10^{-5}	90%	189
$K^\pm\pi^\mp$	< 4		× 10^{-5}	90%	334
$\pi^+\pi^- e^+ e^-$	(2.42 ±0.10) × 10^{-3}				458
$\pi^+ e^-\nu_e$ + c.c.	< 2.1		× 10^{-4}	90%	469
$\gamma e^+ e^-$	(4.91 ±0.27) × 10^{-4}				479
$\pi^0\gamma\gamma$	(3.20 ±0.24) × 10^{-3}				469
$\pi^0\gamma\gamma$(non resonant)	(6.2 ±0.9) × 10^{-4}				–
$\eta\gamma\gamma$	< 1.33		× 10^{-4}	90%	322
$4\pi^0$	< 4.94		× 10^{-5}	90%	380
$e^+ e^-$	< 5.6		× 10^{-9}	90%	479
invisible	< 6		× 10^{-4}	90%	–

Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes

$\pi^+\pi^-$	P,CP		< 1.8	× 10^{-5}	90%	458
$\pi^0\pi^0$	P,CP		< 4	× 10^{-4}	90%	459
$\pi^0 e^+ e^-$	C	[g]	< 1.4	× 10^{-3}	90%	469
$\eta e^+ e^-$	C	[g]	< 2.4	× 10^{-3}	90%	322
3γ	C		< 1.0	× 10^{-4}	90%	479
$\mu^+\mu^-\pi^0$	C	[g]	< 6.0	× 10^{-5}	90%	445
$\mu^+\mu^-\eta$	C	[g]	< 1.5	× 10^{-5}	90%	273
$e\mu$	LF		< 4.7	× 10^{-4}	90%	473

$f_0(980)$

$I^G(J^{PC}) = 0^+(0^{++})$

See the review on "Scalar Mesons below 1 GeV."

T-matrix pole $\sqrt{s}$ = (980–1010) − i (20–35) MeV [i]

Mass m = 990 ± 20 MeV [i]

Full width Γ = 10 to 100 MeV [i]

$f_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	476
$K\overline{K}$	seen	36
$\gamma\gamma$	seen	495

$a_0(980)$

$I^G(J^{PC}) = 1^-(0^{++})$

See the review on "Scalar Mesons below 1 GeV."

T-matrix pole $\sqrt{s}$ = (960–1030) $- i$ (20–70) MeV [i]
Mass $m = 980 \pm 20$ MeV [i]
Full width Γ = 50 to 100 MeV [i]

$a_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	seen	319
$K\overline{K}$	seen	†
$\eta'\pi$	seen	†
$\rho\pi$	not seen	137
$\gamma\gamma$	seen	490

$\phi(1020)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 1019.461 \pm 0.016$ MeV
Full width $\Gamma = 4.249 \pm 0.013$ MeV (S = 1.1)

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
K^+K^-	(49.1 ±0.5) %	S=1.3	127
$K^0_L K^0_S$	(33.9 ±0.4) %	S=1.2	110
$\rho\pi + \pi^+\pi^-\pi^0$	(15.4 ±0.4) %	S=1.2	–
$\eta\gamma$	(1.301±0.025) %	S=1.2	363
$\pi^0\gamma$	(1.32 ±0.05) $\times 10^{-3}$		501
$\ell^+\ell^-$	—		510
e^+e^-	(2.979±0.033) $\times 10^{-4}$	S=1.3	510
$\mu^+\mu^-$	(2.85 ±0.19) $\times 10^{-4}$		499
ηe^+e^-	(1.08 ±0.04) $\times 10^{-4}$		363
$\pi^+\pi^-$	(7.3 ±1.3) $\times 10^{-5}$		490
$\omega\pi^0$	(4.7 ±0.5) $\times 10^{-5}$		171
$\omega\gamma$	$<$ 5 %	CL=84%	209
$\rho\gamma$	$<$ 1.2 $\times 10^{-5}$	CL=90%	215
$\pi^+\pi^-\gamma$	(4.1 ±1.3) $\times 10^{-5}$		490
$f_0(980)\gamma$	(3.22 ±0.19) $\times 10^{-4}$	S=1.1	29

$\pi^0\pi^0\gamma$	(1.12	$\pm$0.06) $\times 10^{-4}$			492
$\pi^+\pi^-\pi^+\pi^-$	(3.9	$^{+2.8}_{-2.2}$) $\times 10^{-6}$			410
$\pi^+\pi^+\pi^-\pi^-\pi^0$	< 4.6		$\times 10^{-6}$	CL=90%	342
$\pi^0 e^+ e^-$	(1.33	$^{+0.07}_{-0.10}$) $\times 10^{-5}$			501
$\pi^0\eta\gamma$	(7.27	$\pm$0.30) $\times 10^{-5}$		S=1.5	346
$a_0(980)\gamma$	(7.6	$\pm$0.6) $\times 10^{-5}$			39
$K^0\overline{K}^0\gamma$	< 1.9		$\times 10^{-8}$	CL=90%	110
$\eta'(958)\gamma$	(6.21	$\pm$0.21) $\times 10^{-5}$			60
$\eta\pi^0\pi^0\gamma$	< 2		$\times 10^{-5}$	CL=90%	293
$\mu^+\mu^-\gamma$	(1.4	$\pm$0.5) $\times 10^{-5}$			499
$\rho\gamma\gamma$	< 1.2		$\times 10^{-4}$	CL=90%	215
$\eta\pi^+\pi^-$	< 1.8		$\times 10^{-5}$	CL=90%	288
$\eta\mu^+\mu^-$	< 9.4		$\times 10^{-6}$	CL=90%	321
$\eta U \to \eta e^+ e^-$	< 1		$\times 10^{-6}$	CL=90%	–
invisible	< 1.7		$\times 10^{-4}$	CL=90%	–

Lepton Family number (LF) violating modes

$e^\pm\mu^\mp$	*LF*	< 2	$\times 10^{-6}$	CL=90%	504

$h_1(1170)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Mass $m = 1166 \pm 6$ MeV
Full width $\Gamma = 375 \pm 35$ MeV

$h_1(1170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	305

$b_1(1235)$

$I^G(J^{PC}) = 1^+(1^{+-})$

Mass $m = 1229.5 \pm 3.2$ MeV (S = 1.6)
Full width $\Gamma = 142 \pm 9$ MeV (S = 1.2)

$b_1(1235)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\omega\pi$	seen		348
[D/S amplitude ratio $= 0.277 \pm 0.027$]			
$\pi^\pm\gamma$	(1.6$\pm$0.4) $\times 10^{-3}$		607
$\eta\rho$	seen		†
$\pi^+\pi^+\pi^-\pi^0$	< 50 %	84%	535
$K^*(892)^\pm K^\mp$	seen		†
$(K\overline{K})^\pm\pi^0$	< 8 %	90%	248
$K^0_S K^0_L \pi^\pm$	< 6 %	90%	235

$K^0_S K^0_S \pi^\pm$	$<$ 2	%	90%	235
$\phi\pi$	$<$ 1.5	%	84%	147

$a_1(1260)$ [j]

$I^G(J^{PC}) = 1^-(1^{++})$

Mass $m = 1230 \pm 40$ MeV [i]
Full width Γ = 250 to 600 MeV [i]

$a_1(1260)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
3π	seen	577
$(\rho\pi)_{S-\text{wave}}$, $\rho \to \pi\pi$	seen	353
$(\rho\pi)_{D-\text{wave}}$, $\rho \to \pi\pi$	seen	353
$(\rho(1450)\pi)_{S-\text{wave}}$, $\rho \to \pi\pi$	seen	†
$(\rho(1450)\pi)_{D-\text{wave}}$, $\rho \to \pi\pi$	seen	†
$f_0(500)\pi$, $f_0 \to \pi\pi$	seen	–
$f_0(980)\pi$, $f_0 \to \pi\pi$	not seen	179
$f_0(1370)\pi$, $f_0 \to \pi\pi$	seen	†
$f_2(1270)\pi$, $f_2 \to \pi\pi$	seen	†
$\pi^+\pi^-\pi^0$	seen	576
$\pi^0\pi^0\pi^0$	not seen	577
$K K \pi$	seen	250
$K^*(892) K$	seen	†
$\pi\gamma$	seen	608

$f_2(1270)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1275.5 \pm 0.8$ MeV
Full width $\Gamma = 186.7^{+2.2}_{-2.5}$ MeV (S = 1.4)

$f_2(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$	$(84.2\ ^{+2.9}_{-0.9})$ %	S=1.1	623
$\pi^+\pi^- 2\pi^0$	$(\ 7.7\ ^{+1.1}_{-3.2})$ %	S=1.2	563
$K\overline{K}$	$(\ 4.6\ ^{+0.5}_{-0.4})$ %	S=2.7	404
$2\pi^+ 2\pi^-$	$(\ 2.8\ \pm 0.4\ )$ %	S=1.2	560
$\eta\eta$	$(\ 4.0\ \pm 0.8\ ) \times 10^{-3}$	S=2.1	326
$4\pi^0$	$(\ 3.0\ \pm 1.0\ ) \times 10^{-3}$		565
$\gamma\gamma$	$(\ 1.42 \pm 0.24) \times 10^{-5}$	S=1.4	638
$\eta\pi\pi$	$<$ 8 $\times 10^{-3}$	CL=95%	478
$K^0 K^- \pi^+ +$ c.c.	$<$ 3.4 $\times 10^{-3}$	CL=95%	293
$e^+ e^-$	$<$ 6 $\times 10^{-10}$	CL=90%	638

$f_1(1285)$ $I^G(J^{PC}) = 0^+(1^{++})$

Mass $m = 1281.9 \pm 0.5$ MeV (S = 1.8)
Full width $\Gamma = 22.7 \pm 1.1$ MeV (S = 1.5)

$f_1(1285)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
4π	(32.7± 1.9) %	S=1.2	568
$\pi^0\pi^0\pi^+\pi^-$	(21.8± 1.3) %	S=1.2	566
$2\pi^+2\pi^-$	(10.9± 0.6) %	S=1.2	563
$\rho^0\pi^+\pi^-$	(10.9± 0.6) %	S=1.2	336
$\rho^0\rho^0$	seen		†
$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	568
$\eta\pi^+\pi^-$	(35 ±15) %		479
$\eta\pi\pi$	(52.2± 2.0) %	S=1.2	482
$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	(38 ± 4) %		238
$\eta\pi\pi$ [excluding $a_0(980)\pi$]	(14 ± 4) %		482
$K\overline{K}\pi$	(9.0± 0.4) %	S=1.1	308
$K\overline{K}^*(892)$	not seen		†
$\pi^+\pi^-\pi^0$	(3.0± 0.9) $\times 10^{-3}$		603
$\rho^\pm\pi^\mp$	$< 3.1 \times 10^{-3}$	CL=95%	390
$\gamma\rho^0$	(6.1± 1.0) %	S=1.7	406
$\phi\gamma$	(7.4± 2.6) $\times 10^{-4}$		236
e^+e^-	$< 9.4 \times 10^{-9}$	CL=90%	641

$\eta(1295)$ $I^G(J^{PC}) = 0^+(0^{-+})$

See the review on "Spectroscopy of Light Meson Resonances."
Mass $m = 1294 \pm 4$ MeV (S = 1.6)
Full width $\Gamma = 55 \pm 5$ MeV

$\eta(1295)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi^+\pi^-$	seen	487
$a_0(980)\pi$	seen	248
$\eta\pi^0\pi^0$	seen	490
$\eta(\pi\pi)_{S\text{-wave}}$	seen	–

$\pi(1300)$ $I^G(J^{PC}) = 1^-(0^{-+})$

Mass $m = 1300 \pm 100$ MeV [i]
Full width $\Gamma = 200$ to 600 MeV [i]

$\pi(1300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	404
$\pi(\pi\pi)_{S\text{-wave}}$	seen	–

$a_2(1320)$

$I^G(J^{PC}) = 1^-(2^{++})$

Mass $m = 1318.2 \pm 0.6$ MeV (S = 1.2)
Full width $\Gamma = 107 \pm 5$ MeV [i]

$a_2(1320)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
3π	(70.1 ±2.7) %	S=1.2	624
$\eta\pi$	(14.5 ±1.2) %		535
$\omega\pi\pi$	(10.6 ±3.2) %	S=1.3	366
$K\overline{K}$	(4.9 ±0.8) %		437
$\eta'(958)\pi$	(5.5 ±0.9) $\times 10^{-3}$		288
$\pi^{\pm}\gamma$	(2.91±0.27) $\times 10^{-3}$		652
$\gamma\gamma$	(9.4 ±0.7) $\times 10^{-6}$		659
e^+e^-	< 5 $\times 10^{-9}$	CL=90%	659

$f_0(1370)$

$I^G(J^{PC}) = 0^+(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."
Mass $m = 1200$ to 1500 MeV
Full width $\Gamma = 200$ to 500 MeV

$f_0(1370)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	672
4π	seen	617
$4\pi^0$	seen	617
$2\pi^+2\pi^-$	seen	612
$\pi^+\pi^-2\pi^0$	seen	615
$\rho\rho$	seen	†
$2(\pi\pi)_{S\text{-wave}}$	seen	–
$\pi(1300)\pi$	seen	†
$a_1(1260)\pi$	seen	35
$\eta\eta$	seen	411
$K\overline{K}$	seen	475
$K\overline{K}n\pi$	not seen	†
6π	not seen	508
$\omega\omega$	not seen	†

$\gamma\gamma$	seen	685
e^+e^-	not seen	685

$\pi_1(1400)$

$I^G(J^{PC}) = 1^-(1^{-+})$

Coupled channel analyses favor the existence of only one broad 1^{-+} isovector state consistent with $\pi_1(1600)$ in the 1400–1600 MeV region. See the review on "Spectroscopy of Light Meson Resonances." See also $\pi_1(1600)$.

Mass $m = 1354 \pm 25$ MeV (S = 1.8)
Full width $\Gamma = 330 \pm 35$ MeV

$\pi_1(1400)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi^0$	seen	557
$\eta\pi^-$	seen	556
$\rho(770)\pi$	not seen	442

$\eta(1405)$

$I^G(J^{PC}) = 0^+(0^{-+})$

See the review on "Spectroscopy of Light Meson Resonances." See also $\eta(1475)$.

Mass $m = 1408.8 \pm 2.0$ MeV (S = 2.2)
Full width $\Gamma = 50.1 \pm 2.6$ MeV (S = 1.7)

$\eta(1405)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\overline{K}\pi$	seen		424
$\eta\pi\pi$	seen		562
$a_0(980)\pi$	seen		345
$\eta(\pi\pi)_S$-wave	seen		–
$f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0$	not seen		–
$f_0(980)\eta$	seen		†
4π	seen		639
$\rho\rho$	<58 %	99.85%	†
$\rho^0\gamma$	seen		491
$K^*(892)K$	seen		123

$h_1(1415)$

$I^G(J^{PC}) = 0^-(1^{+-})$

was $h_1(1380)$

Mass $m = 1416 \pm 8$ MeV (S = 1.5)
Full width $\Gamma = 90 \pm 15$ MeV

$f_1(1420)$

$I^G(J^{PC}) = 0^+(1^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 1426.3 \pm 0.9$ MeV (S = 1.1)

Full width $\Gamma = 54.5 \pm 2.6$ MeV

$f_1(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}\pi$	seen	438
$K\overline{K}^*(892)+$ c.c.	seen	163
$\eta\pi\pi$	possibly seen	573
$\phi\gamma$	seen	349

$\omega(1420)$ [k]

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 1410 \pm 60$ MeV [i]

Full width $\Gamma = 290 \pm 190$ MeV [i]

$\omega(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	480
$\omega\pi\pi$	seen	437
$b_1(1235)\pi$	seen	112
e^+e^-	seen	705

$a_0(1450)$

$I^G(J^{PC}) = 1^-(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 1474 \pm 19$ MeV

Full width $\Gamma = 265 \pm 13$ MeV

Branching fractions are given relative to the one **DEFINED AS 1**.

$a_0(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\eta$	0.093 ± 0.020	627
$\pi\eta'(958)$	0.033 ± 0.017	410
$K\overline{K}$	0.082 ± 0.028	547
$\omega\pi\pi$	**DEFINED AS 1**	484
$a_0(980)\pi\pi$	seen	342
$\gamma\gamma$	seen	737

$\rho(1450)$

$I^G(J^{PC}) = 1^+(1^{--})$

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 1465 \pm 25$ MeV [i]

Full width $\Gamma = 400 \pm 60$ MeV [i]

$\rho(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	720
$\pi^+\pi^-$	seen	719
4π	seen	669
e^+e^-	seen	732
$\eta\rho$	seen	311
$a_2(1320)\pi$	not seen	55
$K\overline{K}$	seen	541
K^+K^-	seen	541
$K\overline{K}^*(892)+$ c.c.	possibly seen	229
$\eta\gamma$	seen	630
$f_0(500)\gamma$	not seen	–
$f_0(980)\gamma$	not seen	398
$f_0(1370)\gamma$	not seen	92
$f_2(1270)\gamma$	not seen	177

$\eta(1475)$

$I^G(J^{PC}) = 0^+(0^{-+})$

See the review on "Spectroscopy of Light Meson Resonances." See also $\eta(1405)$.

Mass $m = 1475 \pm 4$ MeV (S = 1.4)

Full width $\Gamma = 90 \pm 9$ MeV (S = 1.6)

$\eta(1475)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}\pi$	seen	477
$K\overline{K}^*(892)+$ c.c.	seen	244
$a_0(980)\pi$	seen	396
$\gamma\gamma$	seen	738
$K^0_S K^0_S \eta$	possibly seen	†
$\gamma\phi(1020)$	possibly seen	385

$f_0(1500)$

$I^G(J^{PC}) = 0^+(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 1506 \pm 6$ MeV (S = 1.4)

Full width $\Gamma = 112 \pm 9$ MeV

$f_0(1500)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\pi\pi$	(34.5±2.2) %	1.2	741
$\pi^+\pi^-$	seen		740
$2\pi^0$	seen		741
4π	(48.9±3.3) %	1.2	692
$4\pi^0$	seen		692
$2\pi^+2\pi^-$	seen		687
$2(\pi\pi)_{S\text{-wave}}$	seen		–
$\rho\rho$	seen		†
$\pi(1300)\pi$	seen		145
$a_1(1260)\pi$	seen		219
$\eta\eta$	(6.0±0.9) %	1.1	517
$\eta\eta'(958)$	(2.2±0.8) %	1.4	20
$K\overline{K}$	(8.5±1.0) %	1.1	569
$\gamma\gamma$	not seen		753

$f_2'(1525)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1517.4 \pm 2.5$ MeV (S = 2.8)

Full width $\Gamma = 86 \pm 5$ MeV (S = 2.2)

$f_2'(1525)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$K\overline{K}$	(87.6±2.2) %	1.1	576
$\eta\eta$	(11.6±2.2) %	1.1	525
$\pi\pi$	$(8.3\pm1.6)\times10^{-3}$		747
$\gamma\gamma$	$(9.5\pm1.1)\times10^{-7}$	1.1	759

$\pi_1(1600)$

$I^G(J^{PC}) = 1^-(1^{-+})$

See the review on "Spectroscopy of Light Meson Resonances" and a note in PDG 06, Journal of Physics **G33** 1 (2006). See also $\pi_1(1400)$.

Mass $m = 1661^{+15}_{-11}$ MeV (S = 1.2)

Full width $\Gamma = 240 \pm 50$ MeV (S = 1.7)

$\pi_1(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	seen	803
$\rho^0\pi^-$	seen	641
$f_2(1270)\pi^-$	not seen	318
$b_1(1235)\pi$	seen	357
$\eta'(958)\pi^-$	seen	543
$f_1(1285)\pi$	seen	314

$a_1(1640)$

$I^G(J^{PC}) = 1^-(1^{++})$

Mass $m = 1655 \pm 16$ MeV (S = 1.2)
Full width $\Gamma = 254 \pm 40$ MeV (S = 1.8)

$a_1(1640)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	seen	800
$f_2(1270)\pi$	seen	314
$\sigma\pi$	seen	–
$\rho\pi_{S-wave}$	seen	638
$\rho\pi_{D-wave}$	seen	638
$\omega\pi\pi$	seen	607
$f_1(1285)\pi$	seen	309
$a_1(1260)\eta$	not seen	†

$\eta_2(1645)$

$I^G(J^{PC}) = 0^+(2^{-+})$

Mass $m = 1617 \pm 5$ MeV
Full width $\Gamma = 181 \pm 11$ MeV

$\eta_2(1645)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$a_2(1320)\pi$	seen	242
$K\overline{K}\pi$	seen	580
$K^*\overline{K}$	seen	404
$\eta\pi^+\pi^-$	seen	685
$a_0(980)\pi$	seen	499
$f_2(1270)\eta$	not seen	†

$\omega(1650)$ [l]

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 1670 \pm 30$ MeV [i]
Full width $\Gamma = 315 \pm 35$ MeV [i]

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	647
$\rho(1450)\pi$	seen	145
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835
$\pi^0\gamma$	not seen	830

$\omega_3(1670)$

$I^G(J^{PC}) = 0^-(3^{--})$

Mass $m = 1667 \pm 4$ MeV
Full width $\Gamma = 168 \pm 10$ MeV

$\omega_3(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	645
$\omega\pi\pi$	seen	615
$b_1(1235)\pi$	possibly seen	361

$\pi_2(1670)$

$I^G(J^{PC}) = 1^-(2^{-+})$

Mass $m = 1670.6^{+2.9}_{-1.2}$ MeV (S = 1.3)
Full width $\Gamma = 258^{+8}_{-9}$ MeV (S = 1.2)

$\pi_2(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
3π	(95.8±1.4) %		808
$f_2(1270)\pi$	(56.3±3.2) %		327
$\rho\pi$	(31 ±4) %		647
$\sigma\pi$	(10 ±4) %		–
$\pi(\pi\pi)_{S\text{-wave}}$	(8.7±3.4) %		–
$\pi^\pm\pi^+\pi^-$	(53 ±4) %		806
$K\overline{K}^*(892)+$ c.c.	(4.2±1.4) %		453
$\omega\rho$	(2.7±1.1) %		302
$\pi^\pm\gamma$	(7.0±1.2) $\times 10^{-4}$		829
$\gamma\gamma$	$<$ 2.8 $\times 10^{-7}$	90%	835
$\eta\pi$	$<$ 5 %		739
$\pi^\pm 2\pi^+ 2\pi^-$	$<$ 5 %		735
$\rho(1450)\pi$	$<$ 3.6 $\times 10^{-3}$	97.7%	145
$b_1(1235)\pi$	$<$ 1.9 $\times 10^{-3}$	97.7%	364
$f_1(1285)\pi$	possibly seen		322
$a_2(1320)\pi$	not seen		291

$\phi(1680)$ $I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 1680 \pm 20$ MeV [i]
Full width $\Gamma = 150 \pm 50$ MeV [i]

$\phi(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}^*(892)+$ c.c.	seen	462
$K^0_S K\pi$	seen	621
$K\overline{K}$	seen	680
e^+e^-	seen	840
$\omega\pi\pi$	not seen	623
$K^+K^-\pi^+\pi^-$	seen	544
$\eta\phi$	seen	290
$\eta\gamma$	seen	751

$\rho_3(1690)$ $I^G(J^{PC}) = 1^+(3^{--})$

Mass $m = 1688.8 \pm 2.1$ MeV
Full width $\Gamma = 161 \pm 10$ MeV (S = 1.5)

$\rho_3(1690)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
4π	(71.1 ± 1.9) %		790
$\pi^\pm\pi^+\pi^-\pi^0$	(67 ±22) %		787
$\omega\pi$	(16 ± 6) %		655
$\pi\pi$	(23.6 ± 1.3) %		834
$K\overline{K}\pi$	(3.8 ± 1.2) %		629
$K\overline{K}$	(1.58± 0.26) %	1.2	685
$\eta\pi^+\pi^-$	seen		727
$\rho(770)\eta$	seen		520
$\pi\pi\rho$	seen		633
$a_2(1320)\pi$	seen		307
$\rho\rho$	seen		335

$\rho(1700)$ $I^G(J^{PC}) = 1^+(1^{--})$

See the review on "Spectroscopy of Light Meson Resonances."
Mass $m = 1720 \pm 20$ MeV [i] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)
Full width $\Gamma = 250 \pm 100$ MeV [i] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)

$\rho(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$2(\pi^+\pi^-)$	seen	803
$\rho\pi\pi$	seen	653
$\rho^0\pi^+\pi^-$	seen	651
$\rho^\pm\pi^\mp\pi^0$	seen	652
$a_1(1260)\pi$	seen	404
$h_1(1170)\pi$	seen	450
$\pi(1300)\pi$	seen	349
$\rho\rho$	seen	372
$\pi^+\pi^-$	seen	849
$\pi\pi$	seen	849
$K\overline{K}^*(892)+$ c.c.	seen	496
$\eta\rho$	seen	545
$a_2(1320)\pi$	not seen	334
$K\overline{K}$	seen	704
e^+e^-	seen	860
$\pi^0\omega$	seen	674
$\pi^0\gamma$	not seen	855

$a_2(1700)$

$I^G(J^{PC}) = 1^-(2^{++})$

Mass $m = 1698 \pm 40$ MeV
Full width $\Gamma = 265 \pm 60$ MeV

$a_2(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	(3.6 $\pm$1.1) %	754
$\gamma\gamma$	(1.13$\pm$0.30) $\times 10^{-6}$	849
$\rho\pi$	seen	664
$f_2(1270)\pi$	seen	350
$K\overline{K}$	(1.9 $\pm$1.2) %	691
$\omega\pi^-\pi^0$	seen	634
$\omega\rho$	seen	338

$f_0(1710)$

$I^G(J^{PC}) = 0^+(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."
Mass $m = 1704 \pm 12$ MeV
Full width $\Gamma = 123 \pm 18$ MeV

$f_0(1710)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	694
$\eta\eta$	seen	652
$\pi\pi$	seen	841
$\gamma\gamma$	seen	852
$\omega\omega$	seen	337

$\pi(1800)$

$I^G(J^{PC}) = 1^-(0^{-+})$

Mass $m = 1810^{+\ 9}_{-\ 11}$ MeV (S = 2.2)
Full width $\Gamma = 215^{+7}_{-8}$ MeV

$\pi(1800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^-\pi^-$	seen	878
$f_0(500)\pi^-$	seen	–
$f_0(980)\pi^-$	seen	624
$f_0(1370)\pi^-$	seen	366
$f_0(1500)\pi^-$	not seen	247
$\rho\pi^-$	not seen	731
$\eta\eta\pi^-$	seen	660
$a_0(980)\eta$	seen	471
$a_2(1320)\eta$	not seen	†
$f_2(1270)\pi$	not seen	441
$f_0(1370)\pi^-$	not seen	366
$f_0(1500)\pi^-$	seen	247
$\eta\eta'(958)\pi^-$	seen	373
$K_0^*(1430)K^-$	seen	†
$K^*(892)K^-$	not seen	568

$\phi_3(1850)$

$I^G(J^{PC}) = 0^-(3^{--})$

Mass $m = 1854 \pm 7$ MeV
Full width $\Gamma = 87^{+28}_{-23}$ MeV (S = 1.2)

$\phi_3(1850)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	785
$K\overline{K}^*(892)+$ c.c.	seen	602

$\eta_2(1870)$

$I^G(J^{PC}) = 0^+(2^{-+})$

Mass $m = 1842 \pm 8$ MeV
Full width $\Gamma = 225 \pm 14$ MeV

$\eta_2(1870)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi\pi$	seen	816
$a_2(1320)\pi$	seen	434
$f_2(1270)\eta$	seen	119
$a_0(980)\pi$	seen	651
$\gamma\gamma$	seen	921

$\pi_2(1880)$

$I^G(J^{PC}) = 1^-(2^{-+})$

Mass $m = 1874^{+26}_{-5}$ MeV (S = 1.6)
Full width $\Gamma = 237^{+33}_{-30}$ MeV (S = 1.2)

$\pi_2(1880)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\eta\pi^-$	seen	702
$a_0(980)\eta$	seen	528
$a_2(1320)\eta$	seen	76
$f_0(1500)\pi$	seen	308
$f_1(1285)\pi$	seen	485
$\omega\pi^-\pi^0$	seen	744

$f_2(1950)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1936 \pm 12$ MeV (S = 1.3)
Full width $\Gamma = 464 \pm 24$ MeV

$f_2(1950)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\overline{K}^*(892)$	seen	377
$\pi^+\pi^-$	seen	958
$\pi^0\pi^0$	seen	959
4π	seen	921
$\eta\eta$	seen	798
$K\overline{K}$	seen	833
$\gamma\gamma$	seen	968
$p\overline{p}$	seen	238

$a_4(1970)$

$I^G(J^{PC}) = 1^-(4^{++})$

was $a_4(2040)$

Mass $m = 1967 \pm 16$ MeV (S = 2.1)
Full width $\Gamma = 324^{+15}_{-18}$ MeV

$a_4(1970)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	851
$\pi^+\pi^-\pi^0$	seen	959
$\rho\pi$	seen	825
$f_2(1270)\pi$	seen	559
$\omega\pi^-\pi^0$	seen	801
$\omega\rho$	seen	601
$\eta\pi$	seen	902
$\eta'(958)\pi$	seen	743

$f_2(2010)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 2011^{+60}_{-80}$ MeV
Full width $\Gamma = 202 \pm 60$ MeV

$f_2(2010)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	†
$K\overline{K}$	seen	876

$f_4(2050)$

$I^G(J^{PC}) = 0^+(4^{++})$

Mass $m = 2018 \pm 11$ MeV (S = 2.1)
Full width $\Gamma = 237 \pm 18$ MeV (S = 1.9)

$f_4(2050)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega\omega$	seen	637
$\pi\pi$	(17.0±1.5) %	1000
$K\overline{K}$	$(\ 6.8^{+3.4}_{-1.8}) \times 10^{-3}$	880
$\eta\eta$	$(\ 2.1\pm0.8) \times 10^{-3}$	848
$4\pi^0$	$<$ 1.2 %	964
$\gamma\gamma$	seen	1009
$a_2(1320)\pi$	seen	567

$\phi(2170)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 2162 \pm 7$ MeV [i] (S = 1.1)
Full width $\Gamma = 100^{+31}_{-23}$ MeV [i] (S = 2.5)

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$e^+ e^-$	seen	1081
$\phi f_0(980)$	seen	399
$K^+ K^- f_0(980) \to K^+ K^- \pi^+ \pi^-$	seen	–
$K^+ K^- f_0(980) \to K^+ K^- \pi^0 \pi^0$	seen	–
$K^{*0} K^\pm \pi^\mp$	not seen	761
$K^*(892)^0 \overline{K}^*(892)^0$	not seen	612

$f_2(2300)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 2297 \pm 28$ MeV
Full width $\Gamma = 149 \pm 40$ MeV

$f_2(2300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	529
$K\overline{K}$	seen	1037
$\gamma\gamma$	seen	1149
$\Lambda\overline{\Lambda}$	seen	273

$f_2(2340)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 2345^{+50}_{-40}$ MeV
Full width $\Gamma = 322^{+70}_{-60}$ MeV

$f_2(2340)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	580
$\eta\eta$	seen	1037

STRANGE MESONS
($S = \pm 1, C = B = 0$)

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

$K^\pm$

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

Mass $m = 493.677 \pm 0.016$ MeV [n] (S = 2.8)
Mean life $\tau = (1.2380 \pm 0.0020) \times 10^{-8}$ s (S = 1.8)
$c\tau = 3.711$ m

CPT violation parameters (Δ = rate difference/sum)

$\Delta(K^\pm \to \mu^\pm \nu_\mu) = (-0.27 \pm 0.21)\%$
$\Delta(K^\pm \to \pi^\pm \pi^0) = (0.4 \pm 0.6)\%$ [o]

CP violation parameters (Δ = rate difference/sum)

$\Delta(K^\pm \to \pi^\pm e^+ e^-) = (-2.2 \pm 1.6) \times 10^{-2}$
$\Delta(K^\pm \to \pi^\pm \mu^+ \mu^-) = 0.010 \pm 0.023$
$\Delta(K^\pm \to \pi^\pm \pi^0 \gamma) = (0.0 \pm 1.2) \times 10^{-3}$
$\Delta(K^\pm \to \pi^\pm \pi^+ \pi^-) = (0.04 \pm 0.06)\%$
$\Delta(K^\pm \to \pi^\pm \pi^0 \pi^0) = (-0.02 \pm 0.28)\%$

T violation parameters

$K^+ \to \pi^0 \mu^+ \nu_\mu \quad P_T = (-1.7 \pm 2.5) \times 10^{-3}$
$K^+ \to \mu^+ \nu_\mu \gamma \quad P_T = (-0.6 \pm 1.9) \times 10^{-2}$
$K^+ \to \pi^0 \mu^+ \nu_\mu \quad \mathrm{Im}(\xi) = -0.006 \pm 0.008$

Slope parameter *g* [p]

(See Particle Listings for quadratic coefficients and alternative parametrization related to $\pi\pi$ scattering)

$K^\pm \to \pi^\pm \pi^+ \pi^- \; g = -0.21134 \pm 0.00017$
$(g_+ - g_-) \,/\, (g_+ + g_-) = (-1.5 \pm 2.2) \times 10^{-4}$
$K^\pm \to \pi^\pm \pi^0 \pi^0 \; g = 0.626 \pm 0.007$
$(g_+ - g_-) \,/\, (g_+ + g_-) = (1.8 \pm 1.8) \times 10^{-4}$

$K^\pm$ decay form factors [a,q]

Assuming μ-e universality

$\lambda_+(K^+_{\mu 3}) = \lambda_+(K^+_{e3}) = (2.959 \pm 0.025) \times 10^{-2}$
$\lambda_0(K^+_{\mu 3}) = (1.76 \pm 0.25) \times 10^{-2}$ (S = 2.7)

Not assuming μ-e universality

$\lambda_+(K^+_{e3}) = (2.956 \pm 0.025) \times 10^{-2}$

$\lambda_+(K^+_{\mu 3}) = (3.09 \pm 0.25) \times 10^{-2}$ (S = 1.5)

$\lambda_0(K^+_{\mu 3}) = (1.73 \pm 0.27) \times 10^{-2}$ (S = 2.6)

K_{e3} form factor quadratic fit

λ'_+ ($K^\pm_{e3}$) linear coeff. $= (2.59 \pm 0.04) \times 10^{-2}$

λ''_+($K^\pm_{e3}$) quadratic coeff. $= (0.186 \pm 0.021) \times 10^{-2}$

λ'_+ (LINEAR $K^\pm_{\mu 3}$ FORM FACTOR FROM QUADRATIC FIT) $= (24 \pm 4) \times 10^{-3}$

λ''_+ (QUADRATIC $K^\pm_{\mu 3}$ FORM FACTOR) $= (1.8 \pm 1.5) \times 10^{-3}$

M_V (VECTOR POLE MASS FOR $K^\pm_{e3}$ DECAY) = 890.3 $\pm$ 2.8 MeV

M_V (VECTOR POLE MASS FOR $K^\pm_{\mu 3}$ DECAY) = 878 $\pm$ 12 MeV

M_S (SCALAR POLE MASS FOR $K^\pm_{\mu 3}$ DECAY) = 1215 $\pm$ 50 MeV

Λ_+ (DISPERSIVE VECTOR FORM FACTOR IN $K^\pm_{e3}$ DECAY) $= (2.460 \pm 0.017) \times 10^{-2}$

Λ_+ (DISPERSIVE VECTOR FORM FACTOR IN $K^\pm_{\mu 3}$ DECAY) $= (25.4 \pm 0.9) \times 10^{-3}$

ln(C) (DISPERSIVE SCALAR FORM FACTOR in $K^\pm_{\mu 3}$ decays) $= (182 \pm 16) \times 10^{-3}$

K^+_{e3} $\left|f_S/f_+\right| = (-0.08^{+0.34}_{-0.40}) \times 10^{-2}$

K^+_{e3} $\left|f_T/f_+\right| = (-1.2^{+1.3}_{-1.1}) \times 10^{-2}$

$K^+_{\mu 3}$ $\left|f_S/f_+\right| = (0.2 \pm 0.6) \times 10^{-2}$

$K^+_{\mu 3}$ $\left|f_T/f_+\right| = (-0.1 \pm 0.7) \times 10^{-2}$

$K^+ \to e^+\nu_e\gamma$ $\left|F_A + F_V\right| = 0.133 \pm 0.008$ (S = 1.3)

$K^+ \to \mu^+\nu_\mu\gamma$ $\left|F_A + F_V\right| = 0.165 \pm 0.013$

$K^+ \to e^+\nu_e\gamma$ $\left|F_A - F_V\right| < 0.49$, CL = 90%

$K^+ \to \mu^+\nu_\mu\gamma$ $\left|F_A - F_V\right| = -0.153 \pm 0.033$ (S = 1.1)

Charge radius

$\langle r \rangle = 0.560 \pm 0.031$ fm

Forward-backward asymmetry

$A_{FB}(K^\pm_{\pi\mu\mu}) = \frac{\Gamma(cos(\theta_{K\mu})>0)-\Gamma(cos(\theta_{K\mu})<0)}{\Gamma(cos(\theta_{K\mu})>0)+\Gamma(cos(\theta_{K\mu})<0)} < 2.3 \times 10^{-2}$, CL = 90%

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

K^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Leptonic and semileptonic modes			
$e^+\nu_e$	$(1.582\pm0.007)\times10^{-5}$		247
$\mu^+\nu_\mu$	(63.56 ± 0.11) %	S=1.2	236
$\pi^0 e^+\nu_e$	(5.07 ± 0.04) %	S=2.1	228
Called K^+_{e3}.			
$\pi^0\mu^+\nu_\mu$	(3.352 ± 0.033) %	S=1.9	215
Called $K^+_{\mu3}$.			
$\pi^0\pi^0 e^+\nu_e$	$(2.55\pm0.04)\times10^{-5}$	S=1.1	206
$\pi^+\pi^- e^+\nu_e$	$(4.247\pm0.024)\times10^{-5}$		203
$\pi^+\pi^-\mu^+\nu_\mu$	$(1.4\pm0.9)\times10^{-5}$		151
$\pi^0\pi^0\pi^0 e^+\nu_e$	$<3.5\times10^{-6}$	CL=90%	135
Hadronic modes			
$\pi^+\pi^0$	(20.67 ± 0.08) %	S=1.2	205
$\pi^+\pi^0\pi^0$	(1.760 ± 0.023) %	S=1.1	133
$\pi^+\pi^+\pi^-$	(5.583 ± 0.024) %		125
Leptonic and semileptonic modes with photons			
$\mu^+\nu_\mu\gamma$	[r,s] $(6.2\pm0.8)\times10^{-3}$		236
$\mu^+\nu_\mu\gamma(\mathrm{SD}^+)$	[a,t] $(1.33\pm0.22)\times10^{-5}$		–
$\mu^+\nu_\mu\gamma(\mathrm{SD}^+\mathrm{INT})$	[a,t] $<2.7\times10^{-5}$	CL=90%	–
$\mu^+\nu_\mu\gamma(\mathrm{SD}^- + \mathrm{SD}^-\mathrm{INT})$	[a,t] $<2.6\times10^{-4}$	CL=90%	–
$e^+\nu_e\gamma$	$(9.4\pm0.4)\times10^{-6}$		247
$\pi^0 e^+\nu_e\gamma$	[r,s] $(2.66\pm0.09)\times10^{-4}$		228
$\pi^0 e^+\nu_e\gamma(\mathrm{SD})$	[a,t] $<5.3\times10^{-5}$	CL=90%	228
$\pi^0\mu^+\nu_\mu\gamma$	[r,s] $(1.25\pm0.25)\times10^{-5}$		215
$\pi^0\pi^0 e^+\nu_e\gamma$	$<5\times10^{-6}$	CL=90%	206
Hadronic modes with photons or $\ell\overline{\ell}$ pairs			
$\pi^+\pi^0\gamma(\mathrm{INT})$	$(-4.2\pm0.9)\times10^{-6}$		–
$\pi^+\pi^0\gamma(\mathrm{DE})$	[r,u] $(6.0\pm0.4)\times10^{-6}$		205
$\pi^+\pi^0 e^+ e^-$	$(4.24\pm0.14)\times10^{-6}$		205
$\pi^+\pi^0\pi^0\gamma$	[r,s] $(7.6\,^{+6.0}_{-3.0})\times10^{-6}$		133
$\pi^+\pi^+\pi^-\gamma$	[r,s] $(7.1\pm0.5)\times10^{-6}$		125
$\pi^+\gamma\gamma$	[r] $(1.01\pm0.06)\times10^{-6}$		227
$\pi^+ 3\gamma$	[r] $<1.0\times10^{-4}$	CL=90%	227
$\pi^+ e^+ e^-\gamma$	$(1.19\pm0.13)\times10^{-8}$		227

Leptonic modes with $\ell\overline{\ell}$ pairs

$e^+\nu_e\nu\overline{\nu}$		$<$	6	$\times 10^{-5}$	CL=90%	247
$\mu^+\nu_\mu\nu\overline{\nu}$		$<$	1.0	$\times 10^{-6}$	CL=90%	236
$e^+\nu_e e^+ e^-$		(	2.48 $\pm$0.20)	$\times 10^{-8}$		247
$\mu^+\nu_\mu e^+ e^-$		(	7.06 $\pm$0.31)	$\times 10^{-8}$		236
$e^+\nu_e\mu^+\mu^-$		(	1.7 $\pm$0.5)	$\times 10^{-8}$		223
$\mu^+\nu_\mu\mu^+\mu^-$		$<$	4.1	$\times 10^{-7}$	CL=90%	185

Lepton family number (LF), Lepton number (L), $\Delta S = \Delta Q$ (SQ) violating modes, or $\Delta S = 1$ weak neutral current ($S1$) modes

$\pi^+\pi^+ e^-\overline{\nu}_e$	SQ		$<$	1.3	$\times 10^{-8}$	CL=90%	203
$\pi^+\pi^+\mu^-\overline{\nu}_\mu$	SQ		$<$	3.0	$\times 10^{-6}$	CL=95%	151
$\pi^+ e^+ e^-$	$S1$		(	3.00 $\pm$0.09)	$\times 10^{-7}$		227
$\pi^+\mu^+\mu^-$	$S1$		(	9.4 $\pm$0.6)	$\times 10^{-8}$	S=2.6	172
$\pi^+\nu\overline{\nu}$	$S1$		(	1.14 $^{+0.40}_{-0.33}$)	$\times 10^{-10}$		227
$\pi^+\pi^0\nu\overline{\nu}$	$S1$		$<$	4.3	$\times 10^{-5}$	CL=90%	205
$\mu^-\nu e^+ e^+$	LF		$<$	2.1	$\times 10^{-8}$	CL=90%	236
$\mu^+\nu_e$	LF	[d]	$<$	4	$\times 10^{-3}$	CL=90%	236
$\pi^+\mu^+ e^-$	LF		$<$	1.3	$\times 10^{-11}$	CL=90%	214
$\pi^+\mu^- e^+$	LF		$<$	6.6	$\times 10^{-11}$	CL=90%	214
$\pi^-\mu^+ e^+$	L		$<$	4.2	$\times 10^{-11}$	CL=90%	214
$\pi^- e^+ e^+$	L		$<$	2.2	$\times 10^{-10}$	CL=90%	227
$\pi^-\mu^+\mu^+$	L		$<$	4.2	$\times 10^{-11}$	CL=90%	172
$\mu^+\overline{\nu}_e$	L	[d]	$<$	3.3	$\times 10^{-3}$	CL=90%	236
$\pi^0 e^+\overline{\nu}_e$	L		$<$	3	$\times 10^{-3}$	CL=90%	228
$\pi^+\gamma$		[v]	$<$	2.3	$\times 10^{-9}$	CL=90%	227

K^0

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

50% K_S, 50% K_L

Mass $m = 497.611 \pm 0.013$ MeV (S = 1.2)

$m_{K^0} - m_{K^\pm} = 3.934 \pm 0.020$ MeV (S = 1.6)

Mean square charge radius

$\langle r^2 \rangle = -0.077 \pm 0.010$ fm^2

T-violation parameters in K^0-$\overline{K}^0$ mixing [q]

Asymmetry A_T in K^0-$\overline{K}^0$ mixing $= (6.6 \pm 1.6) \times 10^{-3}$

CP-violation parameters

Re(ϵ) $= (1.596 \pm 0.013) \times 10^{-3}$

CPT-violation parameters [q]

Re $\delta = (2.5 \pm 2.3) \times 10^{-4}$
Im $\delta = (-1.5 \pm 1.6) \times 10^{-5}$
Re(y), K_{e3} parameter $= (0.4 \pm 2.5) \times 10^{-3}$
Re(x_-), K_{e3} parameter $= (-2.9 \pm 2.0) \times 10^{-3}$
$\left|m_{K^0} - m_{\overline{K}^0}\right| / m_{\text{average}} < 6 \times 10^{-19}$, CL = 90% [x]
$(\Gamma_{K^0} - \Gamma_{\overline{K}^0})/m_{\text{average}} = (8 \pm 8) \times 10^{-18}$

Tests of $\Delta S = \Delta Q$

Re(x_+), K_{e3} parameter $= (-0.9 \pm 3.0) \times 10^{-3}$

K_S^0

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

Mean life $\tau = (0.8954 \pm 0.0004) \times 10^{-10}$ s (S = 1.1) Assuming *CPT*
Mean life $\tau = (0.89564 \pm 0.00033) \times 10^{-10}$ s Not assuming *CPT*
$c\tau = 2.6844$ cm Assuming *CPT*

CP-violation parameters [y]

Im(η_{+-0}) $= -0.002 \pm 0.009$
Im(η_{000}) $= -0.001 \pm 0.016$
$|\eta_{000}| = |A(K_S^0 \to 3\pi^0)/A(K_L^0 \to 3\pi^0)| < 0.0088$, CL = 90%
CP asymmetry *A* in $\pi^+\pi^- e^+ e^-$ $= (-0.4 \pm 0.8)\%$

K_S^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	*p* (MeV/*c*)
Hadronic modes				
$\pi^0\pi^0$		(30.69±0.05) %		209
$\pi^+\pi^-$		(69.20±0.05) %		206
$\pi^+\pi^-\pi^0$		$(3.5\ ^{+1.1}_{-0.9}) \times 10^{-7}$		133
Modes with photons or $\ell\bar{\ell}$ pairs				
$\pi^+\pi^-\gamma$	[s,z]	$(1.79 \pm 0.05) \times 10^{-3}$		206
$\pi^+\pi^- e^+ e^-$		$(4.79 \pm 0.15) \times 10^{-5}$		206
$\pi^0\gamma\gamma$	[z]	$(4.9 \pm 1.8) \times 10^{-8}$		230
$\gamma\gamma$		$(2.63 \pm 0.17) \times 10^{-6}$	S=3.1	249
Semileptonic modes				
$\pi^\pm e^\mp \nu_e$	[aa]	$(7.04 \pm 0.08) \times 10^{-4}$		229

CP violating (*CP*) and $\Delta S = 1$ weak neutral current (*S1*) modes

$3\pi^0$	*CP*		< 2.6	$\times 10^{-8}$	CL=90%	139
$\mu^+\mu^-$	*S1*		< 2.1	$\times 10^{-10}$	CL=90%	225
e^+e^-	*S1*		< 9	$\times 10^{-9}$	CL=90%	249
$\pi^0 e^+ e^-$	*S1*	[z]	$(3.0\ ^{+1.5}_{-1.2}) \times 10^{-9}$			230
$\pi^0 \mu^+ \mu^-$	*S1*		$(2.9\ ^{+1.5}_{-1.2}) \times 10^{-9}$			177

K_L^0

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

$m_{K_L} - m_{K_S}$
$= (0.5293 \pm 0.0009) \times 10^{10}\ \hbar\ \text{s}^{-1}$ (S = 1.3) Assuming *CPT*
$= (3.484 \pm 0.006) \times 10^{-12}$ MeV Assuming *CPT*
$= (0.5289 \pm 0.0010) \times 10^{10}\ \hbar\ \text{s}^{-1}$ Not assuming *CPT*

Mean life $\tau = (5.116 \pm 0.021) \times 10^{-8}$ s (S = 1.1)
$c\tau = 15.34$ m

Slope parameters [p]

(See Particle Listings for other linear and quadratic coefficients)

$K_L^0 \to \pi^+\pi^-\pi^0$: $g = 0.678 \pm 0.008$ (S = 1.5)
$K_L^0 \to \pi^+\pi^-\pi^0$: $h = 0.076 \pm 0.006$
$K_L^0 \to \pi^+\pi^-\pi^0$: $k = 0.0099 \pm 0.0015$
$K_L^0 \to \pi^0\pi^0\pi^0$: $h = (0.6 \pm 1.2) \times 10^{-3}$

K_L decay form factors [q]

Linear parametrization assuming μ-e universality

$\lambda_+(K^0_{\mu 3}) = \lambda_+(K^0_{e3}) = (2.82 \pm 0.04) \times 10^{-2}$ (S = 1.1)
$\lambda_0(K^0_{\mu 3}) = (1.38 \pm 0.18) \times 10^{-2}$ (S = 2.2)

Quadratic parametrization assuming μ-e universality

$\lambda'_+(K^0_{\mu 3}) = \lambda'_+(K^0_{e3}) = (2.40 \pm 0.12) \times 10^{-2}$ (S = 1.2)
$\lambda''_+(K^0_{\mu 3}) = \lambda''_+(K^0_{e3}) = (0.20 \pm 0.05) \times 10^{-2}$ (S = 1.2)
$\lambda_0(K^0_{\mu 3}) = (1.16 \pm 0.09) \times 10^{-2}$ (S = 1.2)

Pole parametrization assuming μ-e universality

$M_V^{\mu}\ (K^0_{\mu 3}) = M_V^{e}\ (K^0_{e3}) = 878 \pm 6$ MeV (S = 1.1)
$M_S^{\mu}\ (K^0_{\mu 3}) = 1252 \pm 90$ MeV (S = 2.6)

Dispersive parametrization assuming μ-e universality

$\Lambda_+ = (2.51 \pm 0.06) \times 10^{-2}$ (S = 1.5)
$\ln(C) = (1.75 \pm 0.18) \times 10^{-1}$ (S = 2.0)

K^0_{e3} $\left|f_S/f_+\right| = (1.5^{+1.4}_{-1.6}) \times 10^{-2}$

K^0_{e3} $\left|f_T/f_+\right| = (5^{+4}_{-5}) \times 10^{-2}$

$K^0_{\mu 3}$ $\left|f_T/f_+\right| = (12 \pm 12) \times 10^{-2}$

$K_L \to \ell^+\ell^-\gamma$, $K_L \to \ell^+\ell^-\ell'^+\ell'^-$: $\alpha_{K^*} = -0.205 \pm 0.022$ (S = 1.8)

$K^0_L \to \ell^+\ell^-\gamma$, $K^0_L \to \ell^+\ell^-\ell'^+\ell'^-$: $\alpha_{DIP} = -1.69 \pm 0.08$ (S = 1.7)

$K_L \to \pi^+\pi^- e^+ e^-$: $a_1/a_2 = -0.737 \pm 0.014$ GeV^2

$K_L \to \pi^0 2\gamma$: $a_V = -0.43 \pm 0.06$ (S = 1.5)

CP-violation parameters [y]

$A_L = (0.332 \pm 0.006)\%$

$\left|\eta_{00}\right| = (2.220 \pm 0.011) \times 10^{-3}$ (S = 1.8)

$\left|\eta_{+-}\right| = (2.232 \pm 0.011) \times 10^{-3}$ (S = 1.8)

$\left|\epsilon\right| = (2.228 \pm 0.011) \times 10^{-3}$ (S = 1.8)

$\left|\eta_{00}/\eta_{+-}\right| = 0.9950 \pm 0.0007$ [bb] (S = 1.6)

$\mathrm{Re}(\epsilon'/\epsilon) = (1.66 \pm 0.23) \times 10^{-3}$ [bb] (S = 1.6)

Assuming *CPT*

$\phi_{+-} = (43.51 \pm 0.05)^\circ$ (S = 1.2)

$\phi_{00} = (43.52 \pm 0.05)^\circ$ (S = 1.3)

$\phi_\epsilon = \phi_{SW} = (43.52 \pm 0.05)^\circ$ (S = 1.2)

$\mathrm{Im}(\epsilon'/\epsilon) = -(\phi_{00} - \phi_{+-})/3 = (-0.002 \pm 0.005)^\circ$ (S = 1.7)

Not assuming *CPT*

$\phi_{+-} = (43.4 \pm 0.5)^\circ$ (S = 1.2)

$\phi_{00} = (43.7 \pm 0.6)^\circ$ (S = 1.2)

$\phi_\epsilon = (43.5 \pm 0.5)^\circ$ (S = 1.3)

CP asymmetry *A* in $K^0_L \to \pi^+\pi^- e^+ e^- = (13.7 \pm 1.5)\%$

β_{CP} from $K^0_L \to e^+ e^- e^+ e^- = -0.19 \pm 0.07$

γ_{CP} from $K^0_L \to e^+ e^- e^+ e^- = 0.01 \pm 0.11$ (S = 1.6)

j for $K^0_L \to \pi^+\pi^-\pi^0 = 0.0012 \pm 0.0008$

f for $K^0_L \to \pi^+\pi^-\pi^0 = 0.004 \pm 0.006$

$\left|\eta_{+-\gamma}\right| = (2.35 \pm 0.07) \times 10^{-3}$

$\phi_{+-\gamma} = (44 \pm 4)^\circ$

$\left|\epsilon'_{+-\gamma}\right|/\epsilon < 0.3$, CL = 90%

$\left|g_{E1}\right|$ for $K^0_L \to \pi^+\pi^-\gamma < 0.21$, CL = 90%

T-violation parameters

$\mathrm{Im}(\xi)$ in $K^0_{\mu 3} = -0.007 \pm 0.026$

CPT invariance tests

$\phi_{00} - \phi_{+-} = (0.34 \pm 0.32)^\circ$
$\mathrm{Re}(\frac{2}{3}\eta_{+-} + \frac{1}{3}\eta_{00}) - \frac{A_L}{2} = (-3 \pm 35) \times 10^{-6}$

$\Delta S = -\Delta Q$ in $K^0_{\ell 3}$ decay

$\mathrm{Re}\ x = -0.002 \pm 0.006$
$\mathrm{Im}\ x = 0.0012 \pm 0.0021$

K^0_L DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Semileptonic modes				
$\pi^\pm e^\mp \nu_e$	[aa]	(40.55 ±0.11) %	S=1.7	229
Called K^0_{e3}.				
$\pi^\pm \mu^\mp \nu_\mu$	[aa]	(27.04 ±0.07) %	S=1.1	216
Called $K^0_{\mu 3}$.				
$(\pi\mu\,\mathrm{atom})\nu$		(1.05 ±0.11) $\times 10^{-7}$		188
$\pi^0\pi^\pm e^\mp \nu$	[aa]	(5.20 ±0.11) $\times 10^{-5}$		207
$\pi^\pm e^\mp \nu e^+ e^-$	[aa]	(1.26 ±0.04) $\times 10^{-5}$		229
Hadronic modes, including Charge conjugation×Parity Violating (*CPV*) modes				
$3\pi^0$		(19.52 ±0.12) %	S=1.6	139
$\pi^+\pi^-\pi^0$		(12.54 ±0.05) %		133
$\pi^+\pi^-$	*CPV* [cc]	(1.967±0.010) $\times 10^{-3}$	S=1.5	206
$\pi^0\pi^0$	*CPV*	(8.64 ±0.06) $\times 10^{-4}$	S=1.8	209
Semileptonic modes with photons				
$\pi^\pm e^\mp \nu_e \gamma$	[s,aa,dd]	(3.79 ±0.06) $\times 10^{-3}$		229
$\pi^\pm \mu^\mp \nu_\mu \gamma$		(5.65 ±0.23) $\times 10^{-4}$		216
Hadronic modes with photons or $\ell\bar{\ell}$ pairs				
$\pi^0\pi^0\gamma$		$<$ 2.43 $\times 10^{-7}$	CL=90%	209
$\pi^+\pi^-\gamma$	[s,dd]	(4.15 ±0.15) $\times 10^{-5}$	S=2.8	206
$\pi^+\pi^-\gamma$(DE)		(2.84 ±0.11) $\times 10^{-5}$	S=2.0	206
$\pi^0 2\gamma$	[dd]	(1.273±0.033) $\times 10^{-6}$		230
$\pi^0\gamma e^+ e^-$		(1.62 ±0.17) $\times 10^{-8}$		230
Other modes with photons or $\ell\bar{\ell}$ pairs				
2γ		(5.47 ±0.04) $\times 10^{-4}$	S=1.1	249
3γ		$<$ 7.4 $\times 10^{-8}$	CL=90%	249
$e^+ e^-\gamma$		(9.4 ±0.4) $\times 10^{-6}$	S=2.0	249
$\mu^+\mu^-\gamma$		(3.59 ±0.11) $\times 10^{-7}$	S=1.3	225

$e^+ e^- \gamma\gamma$	[*dd*]	$(5.95 \pm 0.33) \times 10^{-7}$		249
$\mu^+ \mu^- \gamma\gamma$	[*dd*]	$(1.0 \ ^{+0.8}_{-0.6}) \times 10^{-8}$		225

Charge conjugation × Parity (*CP*) or Lepton Family number (*LF*) violating modes, or $\Delta S = 1$ weak neutral current (*S1*) modes

$\mu^+ \mu^-$	*S1*	$(6.84 \pm 0.11) \times 10^{-9}$			225
$e^+ e^-$	*S1*	$(9 \ ^{+6}_{-4}) \times 10^{-12}$			249
$\pi^+ \pi^- e^+ e^-$	*S1* [*dd*]	$(3.11 \pm 0.19) \times 10^{-7}$			206
$\pi^0 \pi^0 e^+ e^-$	*S1*	< 6.6	$\times 10^{-9}$	CL=90%	209
$\pi^0 \pi^0 \mu^+ \mu^-$	*S1*	< 9.2	$\times 10^{-11}$	CL=90%	57
$\mu^+ \mu^- e^+ e^-$	*S1*	$(2.69 \pm 0.27) \times 10^{-9}$			225
$e^+ e^- e^+ e^-$	*S1*	$(3.56 \pm 0.21) \times 10^{-8}$			249
$\pi^0 \mu^+ \mu^-$	*CP*,*S1* [*ee*]	< 3.8	$\times 10^{-10}$	CL=90%	177
$\pi^0 e^+ e^-$	*CP*,*S1* [*ee*]	< 2.8	$\times 10^{-10}$	CL=90%	230
$\pi^0 \nu\overline{\nu}$	*CP*,*S1* [*ff*]	< 3.0	$\times 10^{-9}$	CL=90%	230
$\pi^0 \pi^0 \nu\overline{\nu}$	*S1*	< 8.1	$\times 10^{-7}$	CL=90%	209
$e^\pm \mu^\mp$	*LF* [*aa*]	< 4.7	$\times 10^{-12}$	CL=90%	238
$e^\pm e^\pm \mu^\mp \mu^\mp$	*LF* [*aa*]	< 4.12	$\times 10^{-11}$	CL=90%	225
$\pi^0 \mu^\pm e^\mp$	*LF* [*aa*]	< 7.6	$\times 10^{-11}$	CL=90%	217
$\pi^0 \pi^0 \mu^\pm e^\mp$	*LF*	< 1.7	$\times 10^{-10}$	CL=90%	159

Lorentz invariance violating modes

$\pi^0 \gamma$		< 1.7	$\times 10^{-7}$	CL=90%	230

$K_0^*(700)$

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

also known as κ; was $K_0^*(800)$

See the review on "Scalar Mesons below 1 GeV."

Mass (T-Matrix Pole $\sqrt{s}$) = (630–730) $- i$ (260–340) MeV
Mass (Breit-Wigner) = 845 ± 17 MeV
Full width (Breit-Wigner) = 468 ± 30 MeV

$K_0^*(700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	100 %	256

$K^*(892)$

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

Mass (T-Matrix Pole $\sqrt{s}$) = (890 ± 14) $- i$ (26 ± 6) MeV
$K^*(892)^\pm$ hadroproduced mass m = 891.67 ± 0.26 MeV
$K^*(892)^\pm$ in τ decays mass m = 895.5 ± 0.8 MeV
$K^*(892)^0$ mass m = 895.55 ± 0.20 MeV (S = 1.7)

$K^*(892)^{\pm}$ hadroproduced full width $\Gamma = 51.4 \pm 0.8$ MeV
$K^*(892)^{\pm}$ in τ decays full width $\Gamma = 46.2 \pm 1.3$ MeV
$K^*(892)^0$ full width $\Gamma = 47.3 \pm 0.5$ MeV (S = 1.9)

$K^*(892)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\pi$	$\sim$ 100 %		289
$K^0\gamma$	(2.46±0.21) $\times 10^{-3}$		307
$K^{\pm}\gamma$	(9.8 ±0.9) $\times 10^{-4}$		309
$K\pi\pi$	< 7 $\times 10^{-4}$	95%	223

$K_1(1270)$

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

Mass $m = 1253 \pm 7$ MeV (S = 2.2)
Full width $\Gamma = 90 \pm 20$ MeV [i]

$K_1(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$K\rho$	(38 ±13) %	2.2	†
$K_0^*(1430)\pi$	(28 ± 4) %		†
$K^*(892)\pi$	(21 ±10) %	2.2	286
$K\omega$	(11.0± 2.0) %		†
$Kf_0(1370)$	(3.0± 2.0) %		†
γK^0	seen		528

$K_1(1400)$

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

Mass $m = 1403 \pm 7$ MeV
Full width $\Gamma = 174 \pm 13$ MeV (S = 1.6)

$K_1(1400)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	(94 ±6) %	402
$K\rho$	(3.0±3.0) %	293
$Kf_0(1370)$	(2.0±2.0) %	†
$K\omega$	(1.0±1.0) %	284
$K_0^*(1430)\pi$	not seen	†
γK^0	seen	613
$K\phi$	seen	†

$K^*(1410)$

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

Mass $m = 1414 \pm 15$ MeV (S = 1.3)
Full width $\Gamma = 232 \pm 21$ MeV (S = 1.1)

$K^*(1410)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K^*(892)\pi$	> 40 %	95%	410
$K\pi$	(6.6±1.3) %		612
$K\rho$	< 7 %	95%	305
γK^0	$< 2.3 \times 10^{-4}$	90%	619
$K\phi$	seen		†

$K_0^*(1430)$

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

Mass $m = 1425 \pm 50$ MeV [i]
Full width $\Gamma = 270 \pm 80$ MeV [i]

$K_0^*(1430)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(93 ±10) %	619
$K\eta$	($8.6^{+\ 2.7}_{-\ 3.4}$) %	486
$K\eta'(958)$	seen	†

$K_2^*(1430)$

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

$K_2^*(1430)^\pm$ mass $m = 1427.3 \pm 1.5$ MeV (S = 1.3)
$K_2^*(1430)^0$ mass $m = 1432.4 \pm 1.3$ MeV
$K_2^*(1430)^\pm$ full width $\Gamma = 100.0 \pm 2.1$ MeV
$K_2^*(1430)^0$ full width $\Gamma = 109 \pm 5$ MeV (S = 1.9)

$K_2^*(1430)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$K\pi$	(49.9±1.2) %		620
$K^*(892)\pi$	(24.7±1.5) %		420
$K^*(892)\pi\pi$	(13.4±2.2) %		373
$K\rho$	(8.7±0.8) %	S=1.2	320
$K\omega$	(2.9±0.8) %		313
$K^+\gamma$	(2.4±0.5) $\times 10^{-3}$	S=1.1	628
$K\eta$	($1.5^{+3.4}_{-1.0}$) $\times 10^{-3}$	S=1.3	488
$K\omega\pi$	$< 7.2 \times 10^{-4}$	CL=95%	106
$K^0\gamma$	$< 9 \times 10^{-4}$	CL=90%	627

$K(1460)$

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

$K(1460)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	seen	–
$K\rho$	seen	–
$K_0^*(1430)\pi$	seen	–
$K\phi$	seen	–

$K_1(1650)$

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

Mass $m = 1650 \pm 50$ MeV
Full width $\Gamma = 150 \pm 50$ MeV

$K^*(1680)$

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

Mass $m = 1718 \pm 18$ MeV
Full width $\Gamma = 322 \pm 110$ MeV (S = 4.2)

$K^*(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(38.7±2.5) %	782
$K\rho$	$(31.4^{+5.0}_{-2.1})$ %	571
$K^*(892)\pi$	$(29.9^{+2.2}_{-5.0})$ %	618
$K\phi$	seen	387
$K\eta$	$(\ 1.4^{+1.0}_{-0.8})$ %	683

$K_2(1770)$ [gg]

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

Mass $m = 1773 \pm 8$ MeV
Full width $\Gamma = 186 \pm 14$ MeV

$K_2(1770)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi\pi$		794
$K_2^*(1430)\pi$	seen	287
$K^*(892)\pi$	seen	654
$Kf_2(1270)$	seen	53
$K\phi$	seen	441
$K\omega$	seen	607

$K_3^*(1780)$

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

Mass $m = 1779 \pm 8$ MeV (S = 1.2)
Full width $\Gamma = 161 \pm 17$ MeV (S = 1.1)

$K_3^*(1780)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\rho$	(31 ± 9) %		616
$K^*(892)\pi$	(20 ± 5) %		657
$K\pi$	(18.8± 1.0) %		815
$K\eta$	(30 ±13) %		721
$K_2^*(1430)\pi$	< 16 %	95%	292

$K_2(1820)$ [gg]

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

Mass $m = 1819 \pm 12$ MeV
Full width $\Gamma = 264 \pm 34$ MeV

$K_2(1820)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi\pi$	seen	819
$K_2^*(1430)\pi$	seen	328
$K^*(892)\pi$	seen	683
$Kf_2(1270)$	seen	191
$K\omega$	seen	640
$K\phi$	seen	483

$K_2^*(1980)$

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

Mass $m = 1994^{+60}_{-50}$ MeV (S = 2.8)
Full width $\Gamma = 348^{+50}_{-30}$ MeV (S = 1.3)

$K_2^*(1980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	possibly seen	791
$K\rho$	possibly seen	762
$Kf_2(1270)$	possibly seen	424
$K\phi$	seen	627
$K\eta$	seen	850

$K_4^*(2045)$

$I(J^P) = \frac{1}{2}(4^+)$

Mass $m = 2048^{+8}_{-9}$ MeV (S = 1.1)
Full width $\Gamma = 199^{+27}_{-19}$ MeV

$K_4^*(2045)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(9.9±1.2) %	960
$K^*(892)\pi\pi$	(9 ±5) %	804
$K^*(892)\pi\pi\pi$	(7 ±5) %	770
$\rho K\pi$	(5.7±3.2) %	744
$\omega K\pi$	(5.0±3.0) %	740
$\phi K\pi$	(2.8±1.4) %	597
$\phi K^*(892)$	(1.4±0.7) %	368

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 $m = 1869.66 \pm 0.05$ MeV
Mean life $\tau = (1033 \pm 5) \times 10^{-15}$ s
$c\tau = 309.8$ μm

c-quark decays

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

CP-violation decay-rate asymmetries

$A_{CP}(\mu^\pm\nu) = (8 \pm 8)\%$
$A_{CP}(K^0_L e^\pm\nu) = (-0.6 \pm 1.6)\%$
$A_{CP}(K^0_S\pi^\pm) = (-0.41 \pm 0.09)\%$
$A_{CP}(K^0_L K^\pm)$ in $D^\pm \to \ K^0_L K^\pm = (-4.2 \pm 3.4) \times 10^{-2}$
$A_{CP}(K^\mp 2\pi^\pm) = (-0.18 \pm 0.16)\%$
$A_{CP}(K^\mp\pi^\pm\pi^\pm\pi^0) = (-0.3 \pm 0.7)\%$
$A_{CP}(K^0_S\pi^\pm\pi^0) = (-0.1 \pm 0.7)\%$
$A_{CP}(K^0_S\pi^\pm\eta)$ in $D^\pm \to \ K^0_S\pi^\pm\eta = (-0.9 \pm 3.1) \times 10^{-2}$
$A_{CP}(K^0_S\pi^\pm\pi^+\pi^-) = (0.0 \pm 1.2)\%$
$A_{CP}(K^\pm\pi^+\pi^-\pi^0)$ in $D^\pm \to \ K^\pm\pi^+\pi^-\pi^0 = -0.04 \pm 0.06$

$A_{CP}(\pi^\pm\pi^0) = (0.4 \pm 1.3)\%$ (S = 1.7)
$A_{CP}(\pi^\pm\eta) = (0.3 \pm 0.8)\%$ (S = 1.2)
$A_{CP}(\pi^\pm\pi^0\eta)$ in $D^\pm \to \pi^\pm\pi^0\eta = (-6 \pm 7) \times 10^{-2}$
$A_{CP}(\pi^\pm\eta\eta)$ in $D^\pm \to \pi^\pm\eta\eta = (8 \pm 9) \times 10^{-2}$
$A_{CP}(\pi^\pm\eta'(958)) = (-0.6 \pm 0.7)\%$
$A_{CP}(\overline{K}^0/K^0K^\pm) = (0.11 \pm 0.17)\%$
$A_{CP}(K^0_S K^\pm) = (-0.01 \pm 0.07)\%$
$A_{CP}(K^0_S K^\pm\pi^0)$ in $D^\pm \to K^0_S K^\pm\pi^0 = (1 \pm 4) \times 10^{-2}$
$A_{CP}(K^0_L K^\pm\pi^0)$ in $D^\pm \to K^0_L K^\pm\pi^0 = (-1 \pm 4) \times 10^{-2}$
$A_{CP}(K^+K^-\pi^\pm) = (0.37 \pm 0.29)\%$
$A_{CP}(K^\pm K^{*0}) = (-0.3 \pm 0.4)\%$
$A_{CP}(\phi\pi^\pm) = (0.01 \pm 0.09)\%$ (S = 1.8)
$A_{CP}(K^\pm K^*_0(1430)^0) = (8^{+7}_{-6})\%$
$A_{CP}(K^\pm K^*_2(1430)^0) = (43^{+20}_{-26})\%$
$A_{CP}(K^\pm K^*_0(700)) = (-12^{+18}_{-13})\%$
$A_{CP}(a_0(1450)^0\pi^\pm) = (-19^{+14}_{-16})\%$
$A_{CP}(\phi(1680)\pi^\pm) = (-9 \pm 26)\%$
$A_{CP}(\pi^+\pi^-\pi^\pm) = (-2 \pm 4)\%$
$A_{CP}(\pi^+\pi^-\pi^\pm\eta)$ in $D^\pm \to \pi^+\pi^-\pi^\pm\eta = (3 \pm 5) \times 10^{-2}$
$A_{CP}(K^0_S K^\pm\pi^+\pi^-) = (-4 \pm 7)\%$
$A_{CP}(K^\pm\pi^0) = (-3 \pm 5)\%$
$A_{CP}(K^\pm\eta)$ in $D^\pm \to K^\pm\eta = (-6 \pm 11) \times 10^{-2}$

χ^2 tests of *CP*-violation (*CPV*)

Local *CPV* in $D^\pm \to \pi^+\pi^-\pi^\pm = 78.1\%$
Local *CPV* in $D^\pm \to K^+K^-\pi^\pm = 31\%$

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

$A_T(K^0_S K^\pm\pi^+\pi^-) = (-12 \pm 11) \times 10^{-3}$ [ii]

D^+ form factors

$f_+(0)|V_{cs}|$ in $\overline{K}^0\ell^+\nu_\ell = 0.719 \pm 0.011$ (S = 1.6)
$r_1 \equiv a_1/a_0$ in $\overline{K}^0\ell^+\nu_\ell = -2.13 \pm 0.14$
$r_2 \equiv a_2/a_0$ in $\overline{K}^0\ell^+\nu_\ell = -3 \pm 12$ (S = 1.5)
$f_+(0)|V_{cd}|$ in $\pi^0\ell^+\nu_\ell = 0.1407 \pm 0.0025$
$r_1 \equiv a_1/a_0$ in $\pi^0\ell^+\nu_\ell = -2.00 \pm 0.13$
$r_2 \equiv a_2/a_0$ in $\pi^0\ell^+\nu_\ell = -4 \pm 5$
$f_+(0)|V_{cd}|$ in $D^+ \to \eta\ell^+\nu_\ell$ (ℓ = e or ν) $= (8.4 \pm 0.4) \times 10^{-2}$
$r_1 \equiv a_1/a_0$ in $D^+ \to \eta e^+\nu_e = -5.3 \pm 2.7$ (S = 1.9)
$r_v \equiv V(0)/A_1(0)$ in $D^+ \to \omega e^+\nu_e = 1.24 \pm 0.11$
$r_2 \equiv A_2(0)/A_1(0)$ in $D^+ \to \omega e^+\nu_e = 1.06 \pm 0.16$

$r_v \equiv V(0)/A_1(0)$ in $D^+,D^0 \to \rho e^+\nu_e = 1.64 \pm 0.10$ (S = 1.2)
$r_2 \equiv A_2(0)/A_1(0)$ in $D^+,D^0 \to \rho e^+\nu_e = 0.84 \pm 0.06$
$r_v \equiv V(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+\nu_\ell = 1.49 \pm 0.05$ (S = 2.1)
$r_2 \equiv A_2(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+\nu_\ell = 0.802 \pm 0.021$
$r_3 \equiv A_3(0)/A_1(0)$ 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	(1.12 ± 0.04) %		–
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 ± 0.17) $\times 10^{-4}$		932
$\tau^+\nu_\tau$	(1.20 ± 0.27) $\times 10^{-3}$		90
$\overline{K}^0 e^+\nu_e$	(8.72 ± 0.09) %		869
$\overline{K}^0 \mu^+\nu_\mu$	(8.76 ± 0.19) %		865
$K^-\pi^+ e^+\nu_e$	(4.02 ± 0.18) %	S=3.2	864
$\overline{K}^*(892)^0 e^+\nu_e$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(3.77 ± 0.17) %		722
$(K^-\pi^+)_{\text{[0.8–1.0]GeV}}\, e^+\nu_e$	(3.39 ± 0.09) %		864
$(K^-\pi^+)_{S-wave}\, e^+\nu_e$	(2.28 ± 0.11) $\times 10^{-3}$		–
$\overline{K}^*(1410)^0 e^+\nu_e$, $\overline{K}^*(1410)^0 \to K^-\pi^+$	< 6 $\times 10^{-3}$	CL=90%	–
$\overline{K}^*_2(1430)^0 e^+\nu_e$, $\overline{K}^*_2(1430)^0 \to K^-\pi^+$	< 5 $\times 10^{-4}$	CL=90%	–

$K^-\pi^+e^+\nu_e$ nonresonant		$<$ 7	$\times 10^{-3}$	CL=90%	864
$\overline{K}^*(892)^0e^+\nu_e$		(5.40 ± 0.10) %		S=1.1	722
$K^-\pi^+\mu^+\nu_\mu$		(3.65 ± 0.34) %			851
$\overline{K}^*(892)^0\mu^+\nu_\mu$, $\overline{K}^*(892)^0 \to K^-\pi^+$		(3.52 ± 0.10) %			717
$K^-\pi^+\mu^+\nu_\mu$ nonresonant		(1.9 ± 0.5)	$\times 10^{-3}$		851
$\overline{K}^*(892)^0\mu^+\nu_\mu$		(5.27 ± 0.15) %			717
$K^-\pi^+\pi^0\mu^+\nu_\mu$		$<$ 1.5	$\times 10^{-3}$	CL=90%	825
$\overline{K}_1(1270)^0e^+\nu_e$, $\overline{K}_1^0 \to K^-\pi^+\pi^0$		(1.06 ± 0.15)	$\times 10^{-3}$		–
$\overline{K}_0^*(1430)^0\mu^+\nu_\mu$		$<$ 2.3	$\times 10^{-4}$	CL=90%	380
$\overline{K}^*(1680)^0\mu^+\nu_\mu$		$<$ 1.5	$\times 10^{-3}$	CL=90%	105
$\pi^0e^+\nu_e$		(3.72 ± 0.17)	$\times 10^{-3}$	S=2.0	930
$\pi^0\mu^+\nu_\mu$		(3.50 ± 0.15)	$\times 10^{-3}$		927
$\eta e^+\nu_e$		(1.11 ± 0.07)	$\times 10^{-3}$		855
$\eta\mu^+\nu_\mu$		(1.04 ± 0.11)	$\times 10^{-3}$		851
$\pi^-\pi^+e^+\nu_e$		(2.45 ± 0.10)	$\times 10^{-3}$		924
$f_0(500)^0e^+\nu_e$, $f_0(500)^0 \to \pi^+\pi^-$		(6.3 ± 0.5)	$\times 10^{-4}$		–
$\rho^0e^+\nu_e$		(2.18 $^{+\ 0.17}_{-\ 0.25}$)	$\times 10^{-3}$		774
$\rho^0\mu^+\nu_\mu$		(2.4 ± 0.4)	$\times 10^{-3}$		770
$\omega e^+\nu_e$		(1.69 ± 0.11)	$\times 10^{-3}$		771
$\omega\mu^+\nu_\mu$		(1.77 ± 0.21)	$\times 10^{-3}$		767
$\eta'(958)e^+\nu_e$		(2.0 ± 0.4)	$\times 10^{-4}$		690
$a(980)^0e^+\nu_e$, $a(980)^0 \to \eta\pi^0$		(1.7 $^{+\ 0.8}_{-\ 0.7}$)	$\times 10^{-4}$		–
$b_1(1235)^0e^+\nu_e$, $b_1^0 \to \omega\pi^0$		$<$ 1.75	$\times 10^{-4}$	CL=90%	–
$\phi e^+\nu_e$		$<$ 1.3	$\times 10^{-5}$	CL=90%	657
$D^0e^+\nu_e$		$<$ 1.0	$\times 10^{-4}$	CL=90%	5

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

$K^0_S\pi^+$		(1.562 ± 0.031) %		S=1.7	863
$K^0_L\pi^+$		(1.46 ± 0.05) %			863
$K^-2\pi^+$	[jj]	(9.38 ± 0.16) %		S=1.6	846
$(K^-\pi^+)_{S-\text{wave}}\pi^+$		(7.52 ± 0.17) %			846
$\overline{K}_0^*(1430)^0\pi^+$, $\overline{K}_0^*(1430)^0 \to K^-\pi^+$	[kk]	(1.25 ± 0.06) %			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
$\overline{K}_2^*(1430)^0\pi^+$, $\overline{K}_2^*(1430)^0 \to K^-\pi^+$	[kk]	(2.3 ± 0.7)	$\times 10^{-4}$		371

$\overline{K}^*(1680)^0\pi^+$, $\overline{K}^*(1680)^0 \to K^-\pi^+$	[kk]	$(2.2 \pm 1.1) \times 10^{-4}$		58
$K^-(2\pi^+)_{I=2}$		(1.45 ± 0.26) %		–
$K^0_S\pi^+\pi^0$	[jj]	(7.36 ± 0.21) %		845
$K^0_S\rho^+$		$(6.14 \,^{+\,0.60}_{-\,0.35})$ %		677
$K^0_S\rho(1450)^+$, $\rho^+ \to \pi^+\pi^0$		$(1.5 \,^{+\,1.2}_{-\,1.4}) \times 10^{-3}$		–
$\overline{K}^*(892)^0\pi^+$, $\overline{K}^*(892)^0 \to K^0_S\pi^0$		$(2.64 \pm 0.32) \times 10^{-3}$		714
$\overline{K}^*_0(1430)^0\pi^+$, $\overline{K}^{*0}_0 \to K^0_S\pi^0$		$(2.7 \pm 0.9) \times 10^{-3}$		–
$\overline{K}^*_0(1680)^0\pi^+$, $\overline{K}^{*0}_0 \to K^0_S\pi^0$		$(10 \,^{+\,7}_{-10}) \times 10^{-4}$		–
$\overline{\kappa}^0\pi^+$, $\overline{\kappa}^0 \to K^0_S\pi^0$		$(6 \,^{+\,5}_{-\,4}) \times 10^{-3}$		–
$K^0_S\pi^+\pi^0$ nonresonant		$(3 \pm 4) \times 10^{-3}$		845
$K^0_S\pi^+\pi^0$ nonresonant and $\overline{\kappa}^0\pi^+$		$(1.37 \,^{+\,0.21}_{-\,0.40})$ %		–
$(K^0_S\pi^0)_{S-\text{wave}}\pi^+$		$(1.27 \,^{+\,0.27}_{-\,0.33})$ %		845
$K^0_S\pi^+\eta$		(1.31 ± 0.05) %		722
$K^0_S\pi^+\eta'(958)$		$(1.90 \pm 0.21) \times 10^{-3}$		481
$K^-2\pi^+\pi^0$	[ll]	(6.25 ± 0.18) %		817
$K^0_S2\pi^+\pi^-$	[ll]	(3.10 ± 0.09) %		814
$K^-2\pi^+\eta$		$(1.35 \pm 0.12) \times 10^{-3}$		657
$K^0_S\pi^+\pi^0\eta$		$(1.22 \pm 0.25) \times 10^{-3}$		657
$K^-3\pi^+\pi^-$	[jj]	$(5.7 \pm 0.5) \times 10^{-3}$	S=1.1	772
$\overline{K}^*(892)^0 2\pi^+\pi^-$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(1.2 \pm 0.4) \times 10^{-3}$		645
$\overline{K}^*(892)^0\rho^0\pi^+$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(2.3 \pm 0.4) \times 10^{-3}$		239
$\overline{K}^*(892)^0 a_1(1260)^+$	[nn]	$(9.3 \pm 1.9) \times 10^{-3}$		†
$K^-\rho^0 2\pi^+$		$(1.72 \pm 0.28) \times 10^{-3}$		524
$K^-3\pi^+\pi^-$ nonresonant		$(4.0 \pm 2.9) \times 10^{-4}$		772
$K^+2K^0_S$		$(2.54 \pm 0.13) \times 10^{-3}$		545
$K^+K^-K^0_S\pi^+$		$(2.4 \pm 0.5) \times 10^{-4}$		436

Pionic modes

$\pi^+\pi^0$		$(1.247 \pm 0.033) \times 10^{-3}$		925
$2\pi^+\pi^-$		$(3.27 \pm 0.18) \times 10^{-3}$		909
$\rho^0\pi^+$		$(8.3 \pm 1.5) \times 10^{-4}$		767
$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$		$(1.83 \pm 0.16) \times 10^{-3}$		909
$\sigma\pi^+$, $\sigma \to \pi^+\pi^-$		$(1.38 \pm 0.12) \times 10^{-3}$		–

$f_0(980)\pi^+$, $f_0(980) \to \pi^+\pi^-$		$(\ 1.56 \pm 0.33\ ) \times 10^{-4}$		669
$f_0(1370)\pi^+$, $f_0(1370) \to \pi^+\pi^-$		$(\ 8 \pm 4\ ) \times 10^{-5}$		–
$f_2(1270)\pi^+$, $f_2(1270) \to \pi^+\pi^-$		$(\ 5.0 \pm 0.9\ ) \times 10^{-4}$		485
$\rho(1450)^0\pi^+$, $\rho(1450)^0 \to \pi^+\pi^-$		$< 8 \times 10^{-5}$	CL=95%	338
$f_0(1500)\pi^+$, $f_0(1500) \to \pi^+\pi^-$		$(\ 1.1 \pm 0.4\ ) \times 10^{-4}$		–
$f_0(1710)\pi^+$, $f_0(1710) \to \pi^+\pi^-$		$< 5 \times 10^{-5}$	CL=95%	–
$f_0(1790)\pi^+$, $f_0(1790) \to \pi^+\pi^-$		$< 7 \times 10^{-5}$	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
$\pi^+ 2\pi^0$		$(\ 4.7 \pm 0.4\ ) \times 10^{-3}$		910
$2\pi^+\pi^-\pi^0$		$(\ 1.16 \pm 0.08\ )\ \%$		883
$3\pi^+ 2\pi^-$		$(\ 1.66 \pm 0.16\ ) \times 10^{-3}$	S=1.1	845
$\eta\pi^+$		$(\ 3.77 \pm 0.09\ ) \times 10^{-3}$		848
$\eta\pi^+\pi^0$		$(\ 2.05 \pm 0.35\ ) \times 10^{-3}$	S=2.2	831
$\eta 2\pi^+\pi^-$		$(\ 3.41 \pm 0.20\ ) \times 10^{-3}$		798
$\eta\pi^+ 2\pi^0$		$(\ 3.20 \pm 0.33\ ) \times 10^{-3}$		801
$\eta\eta\pi^+$		$(\ 2.96 \pm 0.26\ ) \times 10^{-3}$		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 $K\overline{K}$ pair

$K^0_S K^+$		$(\ 3.04 \pm 0.09\ ) \times 10^{-3}$	S=2.2	793
$K^0_L K^+$		$(\ 3.21 \pm 0.16\ ) \times 10^{-3}$		793
$K^0_S K^+\pi^0$		$(\ 5.07 \pm 0.30\ ) \times 10^{-3}$		744
$K^*(892)^+ K^0_S$		$(\ 2.89 \pm 0.30\ ) \times 10^{-3}$		612
$\overline{K}^*(892)^0 K^+$		$(\ 5.2 \pm 1.4\ ) \times 10^{-4}$		613
$K^0_L K^+\pi^0$		$(\ 5.24 \pm 0.31\ ) \times 10^{-3}$		744
$K^+K^-\pi^+$	[jj]	$(\ 9.68 \pm 0.18\ ) \times 10^{-3}$		744
$K^+\overline{K}^*(892)^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(\ 2.49\ ^{+\ 0.08}_{-\ 0.13}\ ) \times 10^{-3}$		613
$K^+\overline{K}^*_0(1430)^0$, $\overline{K}^*_0(1430)^0 \to K^-\pi^+$		$(\ 1.82 \pm 0.35\ ) \times 10^{-3}$		–
$K^+\overline{K}^*_2(1430)^0$, $\overline{K}^*_2 \to K^-\pi^+$		$(\ 1.6\ ^{+\ 1.2}_{-\ 0.8}\ ) \times 10^{-4}$		–

$K^+\overline{K}_0^*(700),\ \overline{K}_0^* \to\ K^-\pi^+$	$(6.8\ {}^{+\ 3.5}_{-\ 2.1}) \times 10^{-4}$		–
$a_0(1450)^0\pi^+,\ a_0^0 \to\ K^+K^-$	$(4.5\ {}^{+\ 7.0}_{-\ 1.8}) \times 10^{-4}$		–
$\phi(1680)\pi^+,\ \phi \to\ K^+K^-$	$(4.9\ {}^{+\ 4.0}_{-\ 1.9}) \times 10^{-5}$		–
$\phi\pi^+,\ \phi \to\ K^+K^-$	$(2.69\ {}^{+\ 0.07}_{-\ 0.08}) \times 10^{-3}$		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
$K_S^0K_S^0\pi^+$	$(2.70 \pm 0.13) \times 10^{-3}$		741
$K_S^0K_S^0\pi^+\pi^0$	$(1.34 \pm 0.21) \times 10^{-3}$		679
$K_S^0K^+\eta$	$(1.8 \pm 0.5) \times 10^{-4}$		516
$K^+K_S^0\pi^+\pi^-$	$(1.89 \pm 0.13) \times 10^{-3}$		678
$K_S^0K^+\pi^0\pi^0$	$(5.8 \pm 1.3) \times 10^{-4}$		683
$K_S^0K^-2\pi^+$	$(2.27 \pm 0.13) \times 10^{-3}$		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 ± 1.0) %		619
$\phi\rho^+$	< 1.5 %	CL=90%	260
$K^+K^-\pi^+\pi^0$ non-ϕ	$(1.5\ {}^{+\ 0.7}_{-\ 0.6})$ %		682

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
$K^+\pi^+\pi^-$	$(4.91 \pm 0.09) \times 10^{-4}$		846
$K^+\rho^0$	$(1.9 \pm 0.5) \times 10^{-4}$		679
$K^*(892)^0\pi^+,\ K^*(892)^0 \to\ K^+\pi^-$	$(2.3 \pm 0.4) \times 10^{-4}$		714
$K^+f_0(980),\ f_0(980) \to\ \pi^+\pi^-$	$(4.4 \pm 2.6) \times 10^{-5}$		–
$K_2^*(1430)^0\pi^+,\ K_2^*(1430)^0 \to\ K^+\pi^-$	$(3.9 \pm 2.7) \times 10^{-5}$		–
$K^+\pi^+\pi^-$ 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
$K^+\omega$	$(5.7\ {}^{+\ 2.5}_{-\ 2.1}) \times 10^{-5}$		675
$2K^+K^-$	$(6.14 \pm 0.11) \times 10^{-5}$		550
$\phi(1020)^0K^+$	$< 2.1 \times 10^{-5}$	CL=90%	–
$K^+\phi(1020),\ \phi \to\ K^+K^-$	$(4.4 \pm 0.6) \times 10^{-6}$		–
$K^+(K^+K^-)_{\ S-wave}$	$(5.77 \pm 0.12) \times 10^{-5}$		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		$\times 10^{-6}$ CL=90%	930
$\pi^+ \pi^0 e^+ e^-$			$<$ 1.4		$\times 10^{-5}$ CL=90%	925
$\pi^+ \phi$, $\phi \to e^+ e^-$		[oo]	(1.7	$^{+\ 1.4}_{-\ 0.9}$)	$\times 10^{-6}$	–
$\pi^+ \mu^+ \mu^-$	$C1$		$<$ 6.7		$\times 10^{-8}$ CL=90%	918
$\pi^+ \phi$, $\phi \to \mu^+ \mu^-$		[oo]	(1.8	$\pm$ 0.8)	$\times 10^{-6}$	–
$\rho^+ \mu^+ \mu^-$	$C1$		$<$ 5.6		$\times 10^{-4}$ CL=90%	757
$K^+ e^+ e^-$		[pp]	$<$ 8.5		$\times 10^{-7}$ CL=90%	870
$K^+ \pi^0 e^+ e^-$			$<$ 1.5		$\times 10^{-5}$ CL=90%	864
$K^0_S \pi^+ e^+ e^-$			$<$ 2.6		$\times 10^{-5}$ CL=90%	–
$K^0_S K^+ e^+ e^-$			$<$ 1.1		$\times 10^{-5}$ CL=90%	792
$K^+ \mu^+ \mu^-$		[pp]	$<$ 5.4		$\times 10^{-8}$ CL=90%	856
$\pi^+ e^+ \mu^-$	LF		$<$ 2.1		$\times 10^{-7}$ CL=90%	927
$\pi^+ e^- \mu^+$	LF		$<$ 2.2		$\times 10^{-7}$ CL=90%	927
$K^+ e^+ \mu^-$	LF		$<$ 7.5		$\times 10^{-8}$ CL=90%	866
$K^+ e^- \mu^+$	LF		$<$ 1.0		$\times 10^{-7}$ CL=90%	866
$\pi^- 2e^+$	L		$<$ 5.3		$\times 10^{-7}$ CL=90%	930
$\pi^- 2\mu^+$	L		$<$ 1.4		$\times 10^{-8}$ CL=90%	918
$\pi^- e^+ \mu^+$	L		$<$ 1.3		$\times 10^{-7}$ CL=90%	927
$\rho^- 2\mu^+$	L		$<$ 5.6		$\times 10^{-4}$ CL=90%	757
$K^- 2e^+$	L		$<$ 9		$\times 10^{-7}$ CL=90%	870
$K^0_S \pi^- 2e^+$			$<$ 3.3		$\times 10^{-6}$ CL=90%	863
$K^- \pi^0 2e^+$			$<$ 8.5		$\times 10^{-6}$ CL=90%	864
$K^- 2\mu^+$	L		$<$ 1.0		$\times 10^{-5}$ CL=90%	856
$K^- e^+ \mu^+$	L		$<$ 1.9		$\times 10^{-6}$ CL=90%	866
$K^*(892)^- 2\mu^+$	L		$<$ 8.5		$\times 10^{-4}$ CL=90%	703
Λe^+	L,B		$<$ 1.1		$\times 10^{-6}$ CL=90%	602
$\overline{\Lambda} e^+$	L,B		$<$ 6.5		$\times 10^{-7}$ CL=90%	602
$\Sigma^0 e^+$	L,B		$<$ 1.7		$\times 10^{-6}$ CL=90%	554
$\overline{\Sigma}^0 e^+$	L,B		$<$ 1.3		$\times 10^{-6}$ CL=90%	554

D^0

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

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
$c\tau = 123.01\ \mu$m

Mixing and related parameters

$\left|m_{D^0_1} - m_{D^0_2}\right| = (0.997 \pm 0.116) \times 10^{10}\ \hbar\ \text{s}^{-1}$
$(\Gamma_{D^0_1} - \Gamma_{D^0_2})/\Gamma = 2y = (1.23 \pm 0.11) \times 10^{-2}$

$|q/p| = 0.995 \pm 0.016$
$A_\Gamma = (0.089 \pm 0.113) \times 10^{-3}$
$\phi^{K^0_S \pi\pi} = 0.02^{+0.04}_{-0.05}$
$K^+\pi^-$ relative strong phase: $\cos\delta = 0.97 \pm 0.11$
$K^-\pi^+\pi^0$ coherence factor $R_{K\pi\pi^0} = 0.792 \pm 0.033$
$K^-\pi^+\pi^0$ average relative strong phase $\delta^{K\pi\pi^0} = (198 \pm 10)^\circ$
$K^-\pi^-2\pi^+$ coherence factor $R_{K3\pi} = 0.52^{+0.10}_{-0.09}$
$K^-\pi^-2\pi^+$ average relative strong phase $\delta^{K3\pi} = (149^{+26}_{-16})^\circ$ (S = 1.4)
$D^0 \to K^-\pi^-2\pi^+$, $R_{K3\pi}$ (y $\cos\delta^{K3\pi}$ − x $\sin\delta^{K3\pi}$) $= (-3.0 \pm 0.7) \times 10^{-3}$ TeV^{-1}
$K^0_S K^+\pi^-$ coherence factor $R_{K^0_S K\pi} = 0.70 \pm 0.08$
$K^0_S K^+\pi^-$ average relative strong phase $\delta^{K^0_S K\pi} = (0 \pm 16)^\circ$
K^*K coherence factor $R_{K^*K} = 0.94 \pm 0.12$
K^*K average relative strong phase $\delta^{K^*K} = (-17 \pm 18)^\circ$

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

$A_{CP}(K^+K^-) = (-0.07 \pm 0.11)\%$
$A_{CP}(2K^0_S) = (-1.9 \pm 1.1)\%$ (S = 1.1)
$A_{CP}(\pi^+\pi^-) = (0.13 \pm 0.14)\%$
$A_{CP}(\pi^0\pi^0) = (0.0 \pm 0.6)\%$
$A_{CP}(\rho\gamma) = (6 \pm 15) \times 10^{-2}$
$A_{CP}(\phi\gamma) = (-9 \pm 7) \times 10^{-2}$
$A_{CP}(\overline{K}^*(892)^0\gamma) = (-0.3 \pm 2.0) \times 10^{-2}$
$A_{CP}(\pi^+\pi^-\pi^0) = (0.3 \pm 0.4)\%$
$A_{CP}(\eta\pi^+\pi^-)$ in D^0, $\overline{D}^0 \to \eta\pi^+\pi^- = (0.9 \pm 1.3) \times 10^{-2}$
$A_{CP}(\rho(770)^+\pi^- \to \pi^+\pi^-\pi^0) = (1.2 \pm 0.9)\%$ [qq]
$A_{CP}(\rho(770)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-3.1 \pm 3.0)\%$ [qq]
$A_{CP}(\rho(770)^-\pi^+ \to \pi^+\pi^-\pi^0) = (-1.0 \pm 1.7)\%$ [qq]
$A_{CP}(\rho(1450)^+\pi^- \to \pi^+\pi^-\pi^0) = (0 \pm 70)\%$ [qq]
$A_{CP}(\rho(1450)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-20 \pm 40)\%$ [qq]
$A_{CP}(\rho(1450)^-\pi^+ \to \pi^+\pi^-\pi^0) = (6 \pm 9)\%$ [qq]
$A_{CP}(\rho(1700)^+\pi^- \to \pi^+\pi^-\pi^0) = (-5 \pm 14)\%$ [qq]
$A_{CP}(\rho(1700)^0\pi^0 \to \pi^+\pi^-\pi^0) = (13 \pm 9)\%$ [qq]
$A_{CP}(\rho(1700)^-\pi^+ \to \pi^+\pi^-\pi^0) = (8 \pm 11)\%$ [qq]
$A_{CP}(f_0(980)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 35)\%$ [qq]
$A_{CP}(f_0(1370)\pi^0 \to \pi^+\pi^-\pi^0) = (25 \pm 18)\%$ [qq]
$A_{CP}(f_0(1500)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 18)\%$ [qq]
$A_{CP}(f_0(1710)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 24)\%$ [qq]
$A_{CP}(f_2(1270)\pi^0 \to \pi^+\pi^-\pi^0) = (-4 \pm 6)\%$ [qq]

$A_{CP}(\sigma(400)\pi^0 \to\ \pi^+\pi^-\pi^0) = (6 \pm 8)\%$ [qq]
$A_{CP}(\text{nonresonant } \pi^+\pi^-\pi^0) = (-13 \pm 23)\%$ [qq]
$A_{CP}(a_1(1260)^+\pi^- \to\ 2\pi^+2\pi^-) = (5 \pm 6)\%$
$A_{CP}(a_1(1260)^-\pi^+ \to\ 2\pi^+2\pi^-) = (14 \pm 18)\%$
$A_{CP}(\pi(1300)^+\pi^- \to\ 2\pi^+2\pi^-) = (-2 \pm 15)\%$
$A_{CP}(\pi(1300)^-\pi^+ \to\ 2\pi^+2\pi^-) = (-6 \pm 30)\%$
$A_{CP}(a_1(1640)^+\pi^- \to\ 2\pi^+2\pi^-) = (9 \pm 26)\%$
$A_{CP}(\pi_2(1670)^+\pi^- \to\ 2\pi^+2\pi^-) = (7 \pm 18)\%$
$A_{CP}(\sigma f_0(1370) \to\ 2\pi^+2\pi^-) = (-15 \pm 19)\%$
$A_{CP}(\sigma\rho(770)^0 \to\ 2\pi^+2\pi^-) = (3 \pm 27)\%$
$A_{CP}(2\rho(770)^0 \to\ 2\pi^+2\pi^-) = (-6 \pm 6)\%$
$A_{CP}(2f_2(1270) \to\ 2\pi^+2\pi^-) = (-28 \pm 24)\%$
$A_{CP}(\pi^+\pi^-\pi^0\eta)$ in D^0, $\overline{D}^0 \to\ \pi^+\pi^-\pi^0\eta = (-6 \pm 6) \times 10^{-2}$
$A_{CP}(K^+K^-\pi^0) = (-1.0 \pm 1.7)\%$
$A_{CP}(K^*(892)^+K^- \to\ K^+K^-\pi^0) = (-0.9 \pm 1.3)\%$ [qq]
$A_{CP}(K^*(1410)^+K^- \to\ K^+K^-\pi^0) = (-21 \pm 24)\%$ [qq]
$A_{CP}((K^+\pi^0)_{S-wave}K^- \to\ K^+K^-\pi^0) = (7 \pm 15)\%$ [qq]
$A_{CP}(\phi(1020)\pi^0 \to\ K^+K^-\pi^0) = (1.1 \pm 2.2)\%$ [qq]
$A_{CP}(f_0(980)\pi^0 \to\ K^+K^-\pi^0) = (-3 \pm 19)\%$ [qq]
$A_{CP}(a_0(980)^0\pi^0 \to\ K^+K^-\pi^0) = (-5 \pm 16)\%$ [qq]
$A_{CP}(f_2'(1525)\pi^0 \to\ K^+K^-\pi^0) = (0 \pm 160)\%$ [qq]
$A_{CP}(K^*(892)^-K^+ \to\ K^+K^-\pi^0) = (-5 \pm 4)\%$ [qq]
$A_{CP}(K^*(1410)^-K^+ \to\ K^+K^-\pi^0) = (-17 \pm 29)\%$ [qq]
$A_{CP}((K^-\pi^0)_{S-wave}K^+ \to\ K^+K^-\pi^0) = (-10 \pm 40)\%$ [qq]
$A_{CP}(K^+K^-\eta)$ in D^0, $\overline{D}^0 \to\ K^+K^-\eta = (-1.4 \pm 3.5) \times 10^{-2}$
$A_{CP}(\phi(1020)\eta \to\ K^+K^-\eta)$ in D^0, $\overline{D}^0 \to\ \phi(1020)\eta = (-2 \pm 4) \times 10^{-2}$
$A_{CP}(K^0_S\pi^0) = (-0.20 \pm 0.17)\%$
$A_{CP}(K^0_S\eta) = (0.5 \pm 0.5)\%$
$A_{CP}(K^0_S\eta') = (1.0 \pm 0.7)\%$
$A_{CP}(K^0_S\phi) = (-3 \pm 9)\%$
$A_{CP}(K^-\pi^+) = (0.2 \pm 0.5)\%$
$A_{CP}(K^+\pi^-) = (-0.9 \pm 1.4)\%$
$A_{CP}(D_{CP(\pm1)} \to\ K^\mp\pi^\pm) = (12.7 \pm 1.5)\%$
$A_{CP}(K^-\pi^+\pi^0) = (0.1 \pm 0.5)\%$
$A_{CP}(K^+\pi^-\pi^0) = (0 \pm 5)\%$
$A_{CP}(K^0_S\pi^+\pi^-) = (-0.1 \pm 0.8)\%$
$A_{CP}(K^\mp\pi^\pm\eta)$ in D^0, $\overline{D}^0 \to\ K^\mp\pi^\pm\eta = (-1.9 \pm 1.6) \times 10^{-2}$
$A_{CP}(K^0_S\pi^0\eta)$ in D^0, $\overline{D}^0 \to\ K^0_S\pi^0\eta = (-3.9 \pm 3.3) \times 10^{-2}$
$A_{CP}(K^\mp\pi^\pm\pi^0\eta)$ in D^0, $\overline{D}^0 \to\ K^\mp\pi^\pm\pi^0\eta = (-8 \pm 5) \times 10^{-2}$
$A_{CP}(K^*(892)^-\pi^+ \to\ K^0_S\pi^+\pi^-) = (0.4 \pm 0.5)\%$
$A_{CP}(K^*(892)^+\pi^- \to\ K^0_S\pi^+\pi^-) = (1 \pm 6)\%$

$A_{CP}(\overline{K}^0\rho^0 \to\ K^0_S\pi^+\pi^-) = (-0.1 \pm 0.5)\%$
$A_{CP}(\overline{K}^0\omega \to\ K^0_S\pi^+\pi^-) = (-13 \pm 7)\%$
$A_{CP}(\overline{K}^0 f_0(980) \to\ K^0_S\pi^+\pi^-) = (-0.4 \pm 2.7)\%$
$A_{CP}(\overline{K}^0 f_2(1270) \to\ K^0_S\pi^+\pi^-) = (-4 \pm 5)\%$
$A_{CP}(\overline{K}^0 f_0(1370) \to\ K^0_S\pi^+\pi^-) = (-1 \pm 9)\%$
$A_{CP}(\overline{K}^0\rho^0(1450) \to\ K^0_S\pi^+\pi^-) = (-4 \pm 10)\%$
$A_{CP}(\overline{K}^0 f_0(600) \to\ K^0_S\pi^+\pi^-) = (-3 \pm 5)\%$
$A_{CP}(K^*(1410)^-\pi^+ \to\ K^0_S\pi^+\pi^-) = (-2 \pm 9)\%$
$A_{CP}(K^*_0(1430)^-\pi^+ \to\ K^0_S\pi^+\pi^-) = (4 \pm 4)\%$
$A_{CP}(K^*_0(1430)^+\pi^- \to\ K^0_S\pi^+\pi^-) = (12 \pm 15)\%$
$A_{CP}(K^*_2(1430)^-\pi^+ \to\ K^0_S\pi^+\pi^-) = (3 \pm 6)\%$
$A_{CP}(K^*_2(1430)^+\pi^- \to\ K^0_S\pi^+\pi^-) = (-10 \pm 32)\%$
$A_{CP}(K^-\pi^+\pi^+\pi^-) = (0.2 \pm 0.5)\%$
$A_{CP}(K^+\pi^-\pi^+\pi^-) = (-2 \pm 4)\%$
$A_{CP}(K^+K^-\pi^+\pi^-) = (1.3 \pm 1.7)\%$
$A_{CP}(K^*_1(1270)^+K^- \to\ K^+K^-\pi^+\pi^-) = (-2.3 \pm 1.7)\%$
$A_{CP}(K^*_1(1270)^+K^- \to\ K^{*0}\pi^+K^-) = (-1 \pm 10)\%$
$A_{CP}(K^*_1(1270)^-K^+ \to\ \overline{K}^{*0}\pi^-K^+) = (-10 \pm 32)\%$
$A_{CP}(K^*_1(1270)^-K^+ \to\ K^+K^-\pi^+\pi^-) = (1.7 \pm 3.5)\%$
$A_{CP}(K^*_1(1270)^+K^- \to\ \rho^0K^+K^-) = (-7 \pm 17)\%$
$A_{CP}(K^*_1(1270)^-K^+ \to\ \rho^0K^-K^+) = (10 \pm 13)\%$
$A_{CP}(K_1(1400)^+K^- \to\ K^+K^-\pi^+\pi^-) = (-4.4 \pm 2.1)\%$
$A_{CP}(K^*(1410)^+K^- \to\ K^{*0}\pi^+K^-) = (-20 \pm 17)\%$
$A_{CP}(K^*(1410)^-K^+ \to\ \overline{K}^{*0}\pi^-K^+) = (-1 \pm 14)\%$
$A_{CP}(K^*(1680)^+K^- \to\ K^+K^-\pi^+\pi^-) = (-17 \pm 29)\%$
$A_{CP}(K^{*0}\overline{K}^{*0})$ in D^0, $\overline{D}^0 \to\ K^{*0}\overline{K}^{*0} = (-5 \pm 14)\%$
$A_{CP}(K^{*0}\overline{K}^{*0}$ S-wave$) = (-3.9 \pm 2.2)\%$
$A_{CP}(\phi\rho^0)$ in D^0, $\overline{D}^0 \to\ \phi\rho^0 = (1 \pm 9)\%$
$A_{CP}(\phi\rho^0$ S-wave$) = (-3 \pm 5)\%$
$A_{CP}(\phi\rho^0$ D-wave$) = (-37 \pm 19)\%$
$A_{CP}(\phi(\pi^+\pi^-)_{S-wave}) = (6 \pm 6)\%$
$A_{CP}(K^*(892)^0(K^-\pi^+)_{S-wave}) = (-10 \pm 40)\%$
$A_{CP}(K^+K^-\pi^+\pi^-$ non-resonant$) = (8 \pm 20)\%$
$A_{CP}((K^-\pi^+)_{P-wave}\ (K^+\pi^-)_{S-wave}) = (3 \pm 11)\%$
$A_{CP}(K^+K^-\mu^+\mu^-)$ in D^0, $\overline{D}^0 \to\ K^+K^-\mu^+\mu^- = (0 \pm 11)\%$
$A_{CP}(\pi^+\pi^-\mu^+\mu^-)$ in D^0, $\overline{D}^0 \to\ \pi^+\pi^-\mu^+\mu^- = (5 \pm 4)\%$

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

CP-even fraction in $D^0 \to\ \pi^+\pi^-\pi^0$ decays $= (97.3 \pm 1.7)\%$
CP-even fraction in $D^0 \to\ K^+K^-\pi^0$ decays $= (73 \pm 6)\%$
CP-even fraction in $D^0 \to\ \pi^+\pi^-\pi^+\pi^-$ decays $= (76.9 \pm 2.3)\%$
CP-even fraction in $D^0 \to\ K^0_S\pi^+\pi^-\pi^0$ decays $= (23.8 \pm 1.7)\%$
CP-even fraction in $D^0 \to\ K^+K^-\pi^+\pi^-$ decays $= (75 \pm 4)\%$

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

Local *CPV* in D^0, $\overline{D}^0 \to \pi^+\pi^-\pi^0 = 4.9\%$
Local *CPV* in D^0, $\overline{D}^0 \to \pi^+\pi^-\pi^+\pi^- = (0.6 \pm 0.2)\%$
Local *CPV* in D^0, $\overline{D}^0 \to K^0_S\pi^+\pi^- = 96\%$
Local *CPV* in D^0, $\overline{D}^0 \to K^+K^-\pi^0 = 16.6\%$
Local *CPV* in D^0, $\overline{D}^0 \to K^+K^-\pi^+\pi^- = 9.1\%$

T-violation decay-rate asymmetry

$A_T(K^+K^-\pi^+\pi^-) = (2.9 \pm 2.2) \times 10^{-3}$ [*ii*]
$A_{\mathrm{Tviol}}(K_S\pi^+\pi^-\pi^0)$ in D^0, $\overline{D}^0 \to K_S\pi^+\pi^-\pi^0 = (-0.3^{+1.4}_{-1.6})\times 10^{-3}$

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 $D^0 \to K^*(892)^-\ell^+\nu_\ell = 1.46 \pm 0.07$
$r_2 \equiv A_2(0)/A_1(0)$ in $D^0 \to K^*(892)^-\ell^+\nu_\ell = 0.68 \pm 0.06$
$f_+(0)$ in $D^0 \to K^-\ell^+\nu_\ell = 0.736 \pm 0.004$
$f_+(0)|V_{cs}|$ in $D^0 \to K^-\ell^+\nu_\ell = 0.7166 \pm 0.0030$
$r_1 \equiv a_1/a_0$ in $D^0 \to K^-\ell^+\nu_\ell = -2.40 \pm 0.16$
$r_2 \equiv a_2/a_0$ in $D^0 \to K^-\ell^+\nu_\ell = 5 \pm 4$
$f_+(0)$ in $D^0 \to \pi^-\ell^+\nu_\ell = 0.637 \pm 0.009$
$f_+(0)|V_{cd}|$ in $D^0 \to \pi^-\ell^+\nu_\ell = 0.1436 \pm 0.0026$ (S = 1.5)
$r_1 \equiv a_1/a_0$ in $D^0 \to \pi^-\ell^+\nu_\ell = -1.97 \pm 0.28$ (S = 1.4)
$r_2 \equiv a_1/a_0$ in $D^0 \to \pi^-\ell^+\nu_\ell = -0.2 \pm 2.2$ (S = 1.7)

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	[*rr*] (15 ± 6) %		–
2-prongs	(71 ± 6) %		–
4-prongs	[*ss*] (14.6 ± 0.5) %		–
6-prongs	[*tt*] (6.5 ± 1.3) $\times 10^{-4}$		–

Inclusive modes

e^+ anything	[uu]	(6.49 ± 0.11) %		–
μ^+ anything		(6.8 ± 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		(1.08 ± 0.04) %		–
invisibles		< 9.4 $\times 10^{-5}$	CL=90%	–

Semileptonic modes

$K^- e^+ \nu_e$		(3.549± 0.026) %	S=1.2	867
$K^- \mu^+ \nu_\mu$		(3.41 ± 0.04) %		864
$K^*(892)^- e^+ \nu_e$		(2.15 ± 0.16) %		719
$K^*(892)^- \mu^+ \nu_\mu$		(1.89 ± 0.24) %		714
$K^- \pi^0 e^+ \nu_e$		(1.6 $^{+\ 1.3}_{-\ 0.5}$) %		861
$\overline{K}^0 \pi^- e^+ \nu_e$		(1.44 ± 0.04) %		860
$(\overline{K}^0 \pi^-)_{S-wave}\, e^+ \nu_e$		(7.9 ± 1.7) $\times 10^{-4}$		860
$K^- \pi^+ \pi^- e^+ \nu_e$		(2.8 $^{+\ 1.4}_{-\ 1.1}$) $\times 10^{-4}$		843
$K_1(1270)^- e^+ \nu_e$		(1.01 ± 0.18) $\times 10^{-3}$		511
$K^- \pi^+ \pi^- \mu^+ \nu_\mu$		< 1.3 $\times 10^{-3}$	CL=90%	821
$(\overline{K}^*(892)\pi)^- \mu^+ \nu_\mu$		< 1.5 $\times 10^{-3}$	CL=90%	692
$\pi^- e^+ \nu_e$		(2.91 ± 0.04) $\times 10^{-3}$		927
$\pi^- \mu^+ \nu_\mu$		(2.67 ± 0.12) $\times 10^{-3}$	S=1.3	924
$\pi^- \pi^0 e^+ \nu_e$		(1.45 ± 0.07) $\times 10^{-3}$		922
$\rho^- e^+ \nu_e$		(1.50 ± 0.12) $\times 10^{-3}$	S=1.9	771
$\rho^- \mu^+ \nu_\mu$		(1.35 ± 0.13) $\times 10^{-3}$		767
$a(980)^- e^+ \nu_e,\ a^- \to \eta \pi^-$		(1.33 $^{+\ 0.34}_{-\ 0.30}$) $\times 10^{-4}$		–
$b_1(1235)^- e^+ \nu_e,\ b_1^- \to \omega \pi^-$		< 1.12 $\times 10^{-4}$	CL=90%	–

Hadronic modes with one $\overline{K}$

$K^- \pi^+$		(3.947± 0.030) %	S=1.2	861
$K^0_S \pi^0$		(1.240± 0.022) %		860
$K^0_L \pi^0$		(10.0 ± 0.7) $\times 10^{-3}$		860
$K^0_S \pi^+ \pi^-$	[jj]	(2.80 ± 0.18) %	S=1.1	842
$K^0_S \rho^0$		(6.3 $^{+\ 0.6}_{-\ 0.8}$) $\times 10^{-3}$		674
$K^0_S \omega,\ \omega \to \pi^+ \pi^-$		(2.0 ± 0.6) $\times 10^{-4}$		670

$K^0_S(\pi^+\pi^-)_{S-wave}$		$(\ 3.3 \pm 0.8\ )\times10^{-3}$		842
$K^0_S f_0(980),\ f_0\to\ \pi^+\pi^-$		$(\ 1.20\ ^{+\ 0.40}_{-\ 0.23}\ )\times10^{-3}$		549
$K^0_S f_0(1370),\ f_0\to\ \pi^+\pi^-$		$(\ 2.8\ ^{+\ 0.9}_{-\ 1.3}\ )\times10^{-3}$		†
$K^0_S f_2(1270),\ f_2\to\ \pi^+\pi^-$		$(\ 9\ ^{+10}_{-\ 6}\ )\times10^{-5}$		262
$K^*(892)^-\pi^+,\ K^{*-}\to\ K^0_S\pi^-$		$(\ 1.64\ ^{+\ 0.14}_{-\ 0.17}\ )\ \%$		711
$K^*_0(1430)^-\pi^+,\ K^{*-}_0\to\ K^0_S\pi^-$		$(\ 2.67\ ^{+\ 0.40}_{-\ 0.33}\ )\times10^{-3}$		378
$K^*_2(1430)^-\pi^+,\ K^{*-}_2\to\ K^0_S\pi^-$		$(\ 3.4\ ^{+\ 1.9}_{-\ 1.0}\ )\times10^{-4}$		367
$K^*(1680)^-\pi^+,\ K^{*-}\to\ K^0_S\pi^-$		$(\ 4.4 \pm 3.5\ )\times10^{-4}$		46
$K^*(892)^+\pi^-,\ K^{*+}\to\ K^0_S\pi^+$	[*vv*]	$(\ 1.13\ ^{+\ 0.60}_{-\ 0.34}\ )\times10^{-4}$		711
$K^*_0(1430)^+\pi^-,\ K^{*+}_0\to\ K^0_S\pi^+$	[*vv*]	$<\ 1.4\times10^{-5}$	CL=95%	–
$K^*_2(1430)^+\pi^-,\ K^{*+}_2\to\ K^0_S\pi^+$	[*vv*]	$<\ 3.4\times10^{-5}$	CL=95%	–
$K^0_S\pi^+\pi^-$ nonresonant		$(\ 2.5\ ^{+\ 6.0}_{-\ 1.6}\ )\times10^{-4}$		842
$K^-\pi^+\pi^0$	[*jj*]	$(14.4 \pm 0.5\ )\ \%$	S=2.0	844
$K^-\rho^+$		$(11.2 \pm 0.7\ )\ \%$		675
$K^-\rho(1700)^+,\ \rho^+\to\ \pi^+\pi^0$		$(\ 8.2 \pm 1.8\ )\times10^{-3}$		†
$K^*(892)^-\pi^+,\ K^*(892)^-\to\ K^-\pi^0$		$(\ 2.31\ ^{+\ 0.40}_{-\ 0.20}\ )\ \%$		711
$\overline{K}^*(892)^0\pi^0,\ \overline{K}^*(892)^0\to\ K^-\pi^+$		$(\ 1.95 \pm 0.24\ )\ \%$		711
$K^*_0(1430)^-\pi^+,\ K^{*-}_0\to\ K^-\pi^0$		$(\ 4.8 \pm 2.2\ )\times10^{-3}$		378
$\overline{K}^*_0(1430)^0\pi^0,\ \overline{K}^{*0}_0\to\ K^-\pi^+$		$(\ 5.9\ ^{+\ 5.0}_{-\ 1.6}\ )\times10^{-3}$		379
$K^*(1680)^-\pi^+,\ K^{*-}\to\ K^-\pi^0$		$(\ 1.9 \pm 0.7\ )\times10^{-3}$		46
$K^-\pi^+\pi^0$ nonresonant		$(\ 1.15\ ^{+\ 0.60}_{-\ 0.20}\ )\ \%$		844
$K^0_S 2\pi^0$		$(\ 9.1 \pm 1.1\ )\times10^{-3}$	S=2.2	843
$K^0_S(2\pi^0)_{S-wave}$		$(\ 2.6 \pm 0.7\ )\times10^{-3}$		–
$\overline{K}^*(892)^0\pi^0,\ \overline{K}^{*0}\to\ K^0_S\pi^0$		$(\ 8.1 \pm 0.7\ )\times10^{-3}$		711
$\overline{K}^*(1430)^0\pi^0,\ \overline{K}^{*0}\to\ K^0_S\pi^0$		$(\ 4\ \pm23\ )\times10^{-5}$		–

$\overline{K}^*(1680)^0\pi^0$, $\overline{K}^{*0} \to K^0_S\pi^0$		$(\ 1.0 \pm 0.4\ ) \times 10^{-3}$		–
$K^0_S f_2(1270)$, $f_2 \to 2\pi^0$		$(\ 2.3 \pm 1.1\ ) \times 10^{-4}$		–
$2K^0_S$, one $K^0_S \to 2\pi^0$		$(\ 3.2 \pm 1.1\ ) \times 10^{-4}$		–
$K^-2\pi^+\pi^-$	[jj]	(8.22 ± 0.14) %	S=1.1	813
$K^-\pi^+\rho^0$ total		(6.87 ± 0.31) %		609
$K^-\pi^+\rho^0$ 3-body		$(\ 6.1 \pm 1.6\ ) \times 10^{-3}$		609
$\overline{K}^*(892)^0\rho^0$, $\overline{K}^{*0} \to K^-\pi^+$		(1.01 ± 0.05) %		416
$\overline{K}^*(892)^0\rho^0$ transverse, $\overline{K}^{*0} \to K^-\pi^+$		(1.2 ± 0.4) %		417
$K^-a_1(1260)^+$, $a_1^+ \to \rho^0\pi^+$		(4.32 ± 0.32) %		327
$K_1(1270)^-\pi^+$, $K_1^- \to K^-\pi^+\pi^-$ total		$(\ 3.9 \pm 0.4\ ) \times 10^{-3}$		–
$K_1(1270)^-\pi^+$, $K_1^- \to \overline{K}^*(892)^0\pi^-$, $\overline{K}^{*0} \to K^-\pi^+$		$(\ 6.6 \pm 2.3\ ) \times 10^{-4}$		484
$K^-2\pi^+\pi^-$ nonresonant		(1.81 ± 0.07) %		813
$K^0_S\pi^+\pi^-\pi^0$	[xx]	(5.2 ± 0.6) %		813
$K^0_S\eta$, $\eta \to \pi^+\pi^-\pi^0$		$(\ 1.17 \pm 0.03\ ) \times 10^{-3}$		772
$K^0_S\omega$, $\omega \to \pi^+\pi^-\pi^0$		$(\ 9.9 \pm 0.6\ ) \times 10^{-3}$		670
$K^-\pi^+2\pi^0$		(8.86 ± 0.23) %		815
$K^-2\pi^+\pi^-\pi^0$		(4.3 ± 0.4) %		771
$\overline{K}^*(892)^0\pi^+\pi^-\pi^0$, $\overline{K}^{*0} \to K^-\pi^+$		(1.3 ± 0.6) %		643
$K^-\pi^+\omega$, $\omega \to \pi^+\pi^-\pi^0$		(2.8 ± 0.5) %		605
$\overline{K}^*(892)^0\omega$, $\overline{K}^{*0} \to K^-\pi^+$, $\omega \to \pi^+\pi^-\pi^0$		$(\ 6.5 \pm 3.0\ ) \times 10^{-3}$		410
$K^0_S\eta\pi^0$		(1.01 ± 0.05) %		721
$K^0_S a_0(980)$, $a_0 \to \eta\pi^0$		(1.20 ± 0.28) %		–
$\overline{K}^*(892)^0\eta$, $\overline{K}^{*0} \to K^0_S\pi^0$		$(\ 2.9 \pm 0.7\ ) \times 10^{-3}$		–
$K^-\pi^+\eta$		(1.88 ± 0.05) %	S=1.4	721
$K^*(892)^0\eta$, $K^{*0} \to K^-\pi^+$		$(\ 8.9\ ^{+\ 0.8}_{-\ 0.6}\ ) \times 10^{-3}$		–
$a_0(980)^+K^-$, $a_0^+ \to \eta\pi^+$		$(\ 7.4\ ^{+\ 0.9}_{-\ 0.7}\ ) \times 10^{-3}$		–
$K_2^*(1980)^-\pi^+$, $K_2^{*-} \to K^-\eta$		$(\ 2.2\ ^{+\ 1.7}_{-\ 1.9}\ ) \times 10^{-4}$		–
$K^-\pi^+\pi^0\eta$		$(\ 4.49 \pm 0.27\ ) \times 10^{-3}$		656
$K^0_S\pi^+\pi^-\eta$		$(\ 2.80 \pm 0.21\ ) \times 10^{-3}$		651
$K^0_S 2\pi^0\eta$		$(\ 1.76 \pm 0.26\ ) \times 10^{-3}$		656
$K^0_S 2\pi^+2\pi^-$		$(\ 2.66 \pm 0.30\ ) \times 10^{-3}$		768

$K^0_S\rho^0\pi^+\pi^-$, no $K^*(892)^-$	(1.1 ± 0.7) $\times 10^{-3}$			–
$K^*(892)^-2\pi^+\pi^-$, $K^*(892)^- \to K^0_S\pi^-$, no ρ^0	(5 ± 7) $\times 10^{-4}$			642
$K^*(892)^-\rho^0\pi^+$, $K^*(892)^- \to K^0_S\pi^-$	(1.6 ± 0.6) $\times 10^{-3}$			230
$K^0_S 2\pi^+2\pi^-$ nonresonant	< 1.2	$\times 10^{-3}$	CL=90%	768
$K^-3\pi^+2\pi^-$	(2.2 ± 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.

$K^0_S\eta$	(5.09 ± 0.13) $\times 10^{-3}$			772
$K^0_S\omega$	(1.11 ± 0.06) %			670
$K^0_S\eta'(958)$	(9.49 ± 0.32) $\times 10^{-3}$			565
$\overline{K}^*(892)^0\pi^+\pi^-\pi^0$	(1.9 ± 0.9) %			643
$\overline{K}^*(892)^0\eta$	(1.41 ± 0.12) %			583
$K^-\pi^+\omega$	(3.1 ± 0.6) %			605
$\overline{K}^*(892)^0\omega$	(1.1 ± 0.5) %			410
$K^-\pi^+\eta'(958)$	(6.43 ± 0.34) $\times 10^{-3}$			479
$K^0_S\eta'(958)\pi^0$	(2.52 ± 0.27) $\times 10^{-3}$			479
$\overline{K}^*(892)^0\eta'(958)$	< 1.0	$\times 10^{-3}$	CL=90%	119

Hadronic modes with three K's

$K^0_S K^+K^-$	(4.42 ± 0.32) $\times 10^{-3}$			544
$K^0_S a_0(980)^0$, $a^0_0 \to K^+K^-$	(2.9 ± 0.4) $\times 10^{-3}$			–
$K^- a_0(980)^+$, $a^+_0 \to K^+K^0_S$	(5.9 ± 1.8) $\times 10^{-4}$			–
$K^+ a_0(980)^-$, $a^-_0 \to K^-K^0_S$	< 1.1	$\times 10^{-4}$	CL=95%	–
$K^0_S f_0(980)$, $f_0 \to K^+K^-$	< 9	$\times 10^{-5}$	CL=95%	–
$K^0_S\phi$, $\phi \to K^+K^-$	(2.03 ± 0.15) $\times 10^{-3}$			520
$K^0_S f_0(1370)$, $f_0 \to K^+K^-$	(1.7 ± 1.1) $\times 10^{-4}$			–
$3K^0_S$	(7.5 ± 0.7) $\times 10^{-4}$		S=1.4	539
$K^+2K^-\pi^+$	(2.25 ± 0.32) $\times 10^{-4}$			434
$K^+K^-\overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^-\pi^+$	(4.5 ± 1.8) $\times 10^{-5}$			†
$K^-\pi^+\phi$, $\phi \to K^+K^-$	(4.0 ± 1.7) $\times 10^{-5}$			422
$\phi\overline{K}^*(892)^0$, $\phi \to K^+K^-$, $\overline{K}^{*0} \to K^-\pi^+$	(1.08 ± 0.21) $\times 10^{-4}$			†
$K^+2K^-\pi^+$ nonresonant	(3.4 ± 1.5) $\times 10^{-5}$			434
$2K^0_S K^\pm\pi^\mp$	(5.9 ± 1.3) $\times 10^{-4}$			427

Pionic modes

$\pi^+\pi^-$	$(1.454 \pm 0.024) \times 10^{-3}$	S=1.4	922
$2\pi^0$	$(8.26 \pm 0.25) \times 10^{-4}$		923
$\pi^+\pi^-\pi^0$	(1.49 ± 0.06) %	S=2.1	907
$\rho^+\pi^-$	(1.01 ± 0.04) %		764
$\rho^0\pi^0$	$(3.86 \pm 0.23) \times 10^{-3}$		764
$\rho^-\pi^+$	$(5.15 \pm 0.25) \times 10^{-3}$		764
$\rho(1450)^+\pi^-,\ \rho^+ \to \pi^+\pi^0$	$(1.6 \pm 2.1) \times 10^{-5}$		–
$\rho(1450)^0\pi^0,\ \rho^0 \to \pi^+\pi^-$	$(4.5 \pm 2.0) \times 10^{-5}$		–
$\rho(1450)^-\pi^+,\ \rho^- \to \pi^-\pi^0$	$(2.7 \pm 0.4) \times 10^{-4}$		–
$\rho(1700)^+\pi^-,\ \rho^+ \to \pi^+\pi^0$	$(6.1 \pm 1.5) \times 10^{-4}$		–
$\rho(1700)^0\pi^0,\ \rho^0 \to \pi^+\pi^-$	$(7.4 \pm 1.8) \times 10^{-4}$		–
$\rho(1700)^-\pi^+,\ \rho^- \to \pi^-\pi^0$	$(4.8 \pm 1.1) \times 10^{-4}$		–
$f_0(980)\pi^0,\ f_0 \to \pi^+\pi^-$	$(3.7 \pm 0.9) \times 10^{-5}$		–
$f_0(500)\pi^0,\ f_0 \to \pi^+\pi^-$	$(1.22 \pm 0.22) \times 10^{-4}$		–
$f_0(1370)\pi^0,\ f_0 \to \pi^+\pi^-$	$(5.5 \pm 2.1) \times 10^{-5}$		–
$f_0(1500)\pi^0,\ f_0 \to \pi^+\pi^-$	$(5.8 \pm 1.6) \times 10^{-5}$		–
$f_0(1710)\pi^0,\ f_0 \to \pi^+\pi^-$	$(4.6 \pm 1.6) \times 10^{-5}$		–
$f_2(1270)\pi^0,\ f_2 \to \pi^+\pi^-$	$(1.97 \pm 0.21) \times 10^{-4}$		–
$\pi^+\pi^-\pi^0$ nonresonant	$(1.3 \pm 0.4) \times 10^{-4}$		907
$3\pi^0$	$(2.0 \pm 0.5) \times 10^{-4}$		908
$2\pi^+2\pi^-$	$(7.56 \pm 0.20) \times 10^{-3}$		880
$a_1(1260)^+\pi^-,\ a_1^+ \to 2\pi^+\pi^-$ total	$(4.53 \pm 0.31) \times 10^{-3}$		–
$a_1(1260)^+\pi^-,\ a_1^+ \to \rho^0\pi^+$ S-wave	$(3.13 \pm 0.21) \times 10^{-3}$		–
$a_1(1260)^+\pi^-,\ a_1^+ \to \rho^0\pi^+$ D-wave	$(1.9 \pm 0.5) \times 10^{-4}$		–
$a_1(1260)^+\pi^-,\ a_1^+ \to \sigma\pi^+$	$(6.4 \pm 0.7) \times 10^{-4}$		–
$a_1(1260)^-\pi^+,\ a_1^- \to \rho^0\pi^-$ S-wave	$(2.3 \pm 0.9) \times 10^{-4}$		–
$a_1(1260)^-\pi^+,\ a_1^- \to \sigma\pi^-$	$(6.0 \pm 3.4) \times 10^{-5}$		–
$\pi(1300)^+\pi^-,\ \pi(1300)^+ \to \sigma\pi^+$	$(5.1 \pm 2.7) \times 10^{-4}$		–
$\pi(1300)^-\pi^+,\ \pi(1300)^- \to \sigma\pi^-$	$(2.3 \pm 2.2) \times 10^{-4}$		–
$a_1(1640)^+\pi^-,\ a_1^+ \to \rho^0\pi^+$ D-wave	$(3.2 \pm 1.6) \times 10^{-4}$		–
$a_1(1640)^+\pi^-,\ a_1^+ \to \sigma\pi^+$	$(1.8 \pm 1.4) \times 10^{-4}$		–
$\pi_2(1670)^+\pi^-,\ \pi_2^+ \to f_2(1270)^0\pi^+,\ f_2^0 \to \pi^+\pi^-$	$(2.0 \pm 0.9) \times 10^{-4}$		–
$\pi_2(1670)^+\pi^-,\ \pi_2^+ \to \sigma\pi^+$	$(2.6 \pm 1.0) \times 10^{-4}$		–

$2\rho^0$ 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 $(\pi^+\pi^-)\pi^+\pi^-$ 3-body total		$(1.51 \pm 0.12) \times 10^{-3}$		–
$\sigma\pi^+\pi^-$		$(6.2 \pm 0.9) \times 10^{-4}$		–
$\sigma\rho(770)^0$		$(5.0 \pm 2.5) \times 10^{-4}$		–
$f_0(980)\pi^+\pi^-$, $f_0 \to \pi^+\pi^-$		$(1.8 \pm 0.5) \times 10^{-4}$		–
$f_2(1270)\pi^+\pi^-$, $f_2 \to \pi^+\pi^-$		$(3.7 \pm 0.6) \times 10^{-4}$		–
$2f_2(1270)$, $f_2 \to \pi^+\pi^-$		$(1.6 \pm 1.8) \times 10^{-4}$		–
$f_0(1370)\sigma$, $f_0 \to \pi^+\pi^-$		$(1.6 \pm 0.5) \times 10^{-3}$		–
$\pi^+\pi^-2\pi^0$		(1.02 ± 0.09) %		882
$\eta\pi^0$	[yy]	$(6.3 \pm 0.6) \times 10^{-4}$	S=1.1	846
$\omega\pi^0$	[yy]	$(1.17 \pm 0.35) \times 10^{-4}$		761
$\omega\eta$		$(1.98 \pm 0.18) \times 10^{-3}$	S=1.1	648
$2\pi^+2\pi^-\pi^0$		$(4.2 \pm 0.5) \times 10^{-3}$		844
$\eta\pi^+\pi^-$	[yy]	$(1.16 \pm 0.07) \times 10^{-3}$		827
$\omega\pi^+\pi^-$	[yy]	$(1.33 \pm 0.20) \times 10^{-3}$		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
$3\pi^+3\pi^-$		$(4.3 \pm 1.2) \times 10^{-4}$		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=2.2	754
$2\eta\pi^0$		$(7.3 \pm 2.2) \times 10^{-4}$		699
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 $K\overline{K}$ pair

K^+K^-		$(4.08 \pm 0.06) \times 10^{-3}$	S=1.6	791
$2K^0_S$		$(1.41 \pm 0.05) \times 10^{-4}$	S=1.1	789
$K^0_S K^-\pi^+$		$(3.3 \pm 0.5) \times 10^{-3}$	S=1.1	739
$\overline{K}^*(892)^0 K^0_S$, $\overline{K}^{*0} \to K^-\pi^+$		$(8.2 \pm 1.6) \times 10^{-5}$		608
$K^*(892)^+K^-$, $K^{*+} \to K^0_S\pi^+$		$(1.89 \pm 0.30) \times 10^{-3}$		–

$\overline{K}^*(1410)^0 K^0_S$, $\overline{K}^{*0} \to K^-\pi^+$	$(1.3 \pm 1.9) \times 10^{-4}$		–
$K^*(1410)^+ K^-$, $K^{*+} \to K^0_S\pi^+$	$(3.2 \pm 1.9) \times 10^{-4}$		–
$(K^-\pi^+)_{S-wave} K^0_S$	$(6.0 \pm 2.9) \times 10^{-4}$		739
$(K^0_S\pi^+)_{S-wave} K^-$	$(3.9 \pm 1.0) \times 10^{-4}$		739
$a_0(980)^-\pi^+$, $a_0^- \to K^0_S K^-$	$(1.3 \pm 1.4) \times 10^{-4}$		–
$a_0(1450)^-\pi^+$, $a_0^- \to K^0_S K^-$	$(2.5 \pm 2.0) \times 10^{-5}$		–
$a_2(1320)^-\pi^+$, $a_2^- \to K^0_S K^-$	$(5 \pm 5) \times 10^{-6}$		–
$\rho(1450)^-\pi^+$, $\rho^- \to K^0_S K^-$	$(4.6 \pm 2.5) \times 10^{-5}$		–
$K^0_S K^+\pi^-$	$(2.17 \pm 0.34) \times 10^{-3}$	S=1.1	739
$K^*(892)^0 K^0_S$, $K^{*0} \to K^+\pi^-$	$(1.12 \pm 0.21) \times 10^{-4}$		608
$K^*(892)^- K^+$, $K^{*-} \to K^0_S\pi^-$	$(6.2 \pm 1.0) \times 10^{-4}$		–
$K^*(1410)^0 K^0_S$, $K^{*0} \to K^+\pi^+$	$(5 \pm 8) \times 10^{-5}$		–
$K^*(1410)^- K^+$, $K^{*-} \to K^0_S\pi^-$	$(2.6 \pm 2.0) \times 10^{-4}$		–
$(K^+\pi^-)_{S-wave} K^0_S$	$(3.7 \pm 1.9) \times 10^{-4}$		739
$(K^0_S\pi^-)_{S-wave} K^+$	$(1.4 \pm 0.6) \times 10^{-4}$		739
$a_0(980)^+\pi^-$, $a_0^+ \to K^0_S K^+$	$(6 \pm 4) \times 10^{-4}$		–
$a_0(1450)^+\pi^-$, $a_0^+ \to K^0_S K^+$	$(3.2 \pm 2.5) \times 10^{-5}$		–
$\rho(1700)^+\pi^-$, $\rho^+ \to K^0_S K^+$	$(1.1 \pm 0.6) \times 10^{-5}$		–
$K^+K^-\pi^0$	$(3.42 \pm 0.14) \times 10^{-3}$		743
$K^*(892)^+ K^-$, $K^*(892)^+ \to K^+\pi^0$	$(1.52 \pm 0.07) \times 10^{-3}$		–
$K^*(892)^- K^+$, $K^*(892)^- \to K^-\pi^0$	$(5.4 \pm 0.4) \times 10^{-4}$		–
$(K^+\pi^0)_{S-wave} K^-$	$(2.43 \pm 0.18) \times 10^{-3}$		743
$(K^-\pi^0)_{S-wave} K^+$	$(1.3 \pm 0.5) \times 10^{-4}$		743
$f_0(980)\pi^0$, $f_0 \to K^+K^-$	$(3.6 \pm 0.6) \times 10^{-4}$		–
$\phi\pi^0$, $\phi \to K^+K^-$	$(6.6 \pm 0.4) \times 10^{-4}$		–
$2K^0_S\pi^0$	$< 5.9 \times 10^{-4}$		740
$K^+K^-\eta$	$(5.9 \pm 1.9) \times 10^{-5}$		514
$\phi(1020)\eta$	$(1.84 \pm 0.12) \times 10^{-4}$		489
$K^+K^-\eta$nonresonant	$(9.9 \,^{+\,0.9}_{-\,0.8}) \times 10^{-5}$		514
$2K^0_S\eta$	$(1.3 \pm 0.6) \times 10^{-4}$		508
$K^+K^-\pi^0\pi^0$	$(6.9 \pm 0.8) \times 10^{-4}$		681

$K^+K^-\pi^+\pi^-$	$(\ 2.47 \pm 0.11\ )\times10^{-3}$		677
$\phi(\pi^+\pi^-)_{S-wave},\ \phi\to K^+K^-$	$(10 \pm 5\ )\times10^{-5}$		614
$(\phi\rho^0)_{S-wave},\ \phi\to K^+K^-$	$(\ 6.9 \pm 0.6\ )\times10^{-4}$		250
$(\phi\rho^0)_{P-wave},\ \phi\to K^+K^-$	$(\ 4.0 \pm 1.9\ )\times10^{-5}$		–
$(\phi\rho^0)_{D-wave},\ \phi\to K^+K^-$	$(\ 4.2 \pm 1.4\ )\times10^{-5}$		–
$(K^*(892)^0\overline{K}^*(892)^0)_{S-wave},\ K^{*0}\to K^\pm\pi^\mp$	$(\ 2.24 \pm 0.13\ )\times10^{-4}$		–
$(K^*(892)^0\overline{K}^*(892)^0)_{P-wave},\ K^*\to K^\pm\pi^\mp$	$(\ 1.20 \pm 0.08\ )\times10^{-4}$		–
$(K^*(892)^0\overline{K}^*(892)^0)_{D-wave},\ K^*\to K^\pm\pi^\mp$	$(\ 4.7 \pm 0.4\ )\times10^{-5}$		–
$K^*(892)^0(K^-\pi^+)_{S-wave}$ 3-body, $K^{*0}\to K^+\pi^-$	$(\ 1.4 \pm 0.6\ )\times10^{-4}$		–
$K_1(1270)^+K^-,\ K_1^+\to K^{*0}\pi^+$	$(\ 1.4 \pm 0.9\ )\times10^{-4}$		–
$K_1(1270)^+K^-,\ K_1^+\to K^*(1430)^0\pi^+,\ K^{*0}\to K^+\pi^-$	$(\ 1.5 \pm 0.5\ )\times10^{-4}$		–
$K_1(1270)^+K^-,\ K_1^+\to \rho^0K^+$	$(\ 2.2 \pm 0.6\ )\times10^{-4}$		–
$K_1(1270)^+K^-,\ K_1^+\to \omega(782)K^+,\ \omega\to\pi^+\pi^-$	$(\ 1.5 \pm 1.2\ )\times10^{-5}$		–
$K_1(1270)^-K^+,\ K_1^-\to \rho^0K^-$	$(\ 1.3 \pm 0.4\ )\times10^{-4}$		–
$K_1(1400)^+K^-,\ K_1^+\to K^*(892)^0\pi^+,\ K^{*0}\to K^+\pi^-$	$(\ 4.6 \pm 0.4\ )\times10^{-4}$		–
$K^*(1410)^-K^+,\ K^{*-}\to \overline{K}^{*0}\pi^-$	$(\ 7.0 \pm 1.1\ )\times10^{-5}$		–
$K_1(1680)^+K^-,\ K_1^+\to K^{*0}\pi^+,\ K^{*0}\to K^+\pi^-$	$(\ 8.9 \pm 3.2\ )\times10^{-5}$		–
$K^+K^-\pi^+\pi^-$ non-resonant	$(\ 2.7 \pm 0.6\ )\times10^{-4}$		–
$2K_S^0\pi^+\pi^-$	$(\ 5.3 \pm 0.9\ )\times10^{-4}$		673
$K_S^0K^-\pi^+\pi^0$	$(\ 1.32 \pm 0.16\ )\times10^{-3}$		677
$K_S^0K^+\pi^-\pi^0$	$(\ 6.5 \pm 0.7\ )\times10^{-4}$		677
$K_S^0K^-2\pi^+\pi^-$	$< 1.4 \times10^{-4}$	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.

$\phi\pi^0$	$(\ 1.17 \pm 0.04\ )\times10^{-3}$		645
$\phi\eta$	$(\ 1.8 \pm 0.5\ )\times10^{-4}$		489
$\phi\omega$	$(\ 6.5 \pm 1.0\ )\times10^{-4}$		238

Radiative modes

$\rho^0\gamma$		$(\ 1.82 \pm 0.32\ )\times10^{-5}$			771
$\omega\gamma$		$<\ 2.4$	$\times10^{-4}$	CL=90%	768
$\phi\gamma$		$(\ 2.81 \pm 0.19\ )\times10^{-5}$			654
$\overline{K}^*(892)^0\gamma$		$(\ 4.1 \pm 0.7\ )\times10^{-4}$			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*	$(\ 1.50 \pm 0.07\ )\times10^{-4}$		S=3.0	861
$K^+\pi^-$ via DCS		$(\ 1.363\pm 0.025)\times10^{-4}$			–
$K^+\pi^-$ via $\overline{D}^0$		$<\ 1.6$	$\times10^{-5}$	CL=95%	861
$K^0_S\pi^+\pi^-$ in $D^0 \to \overline{D}^0$		$<\ 1.8$	$\times10^{-4}$	CL=95%	–
$K^*(892)^+\pi^-,\ K^{*+}\to K^0_S\pi^+$	*DC*	$(\ 1.13\ ^{+\ 0.60}_{-\ 0.34}\ )\times10^{-4}$			711
$K^*_0(1430)^+\pi^-,\ K^{*+}_0\to K^0_S\pi^+$	*DC*	$<\ 1.4$	$\times10^{-5}$		–
$K^*_2(1430)^+\pi^-,\ K^{*+}_2\to K^0_S\pi^+$	*DC*	$<\ 3.4$	$\times10^{-5}$		–
$K^+\pi^-\pi^0$	*DC*	$(\ 3.05 \pm 0.15\ )\times10^{-4}$			844
$K^+\pi^-\pi^0$ via $\overline{D}^0$		$(\ 7.6\ ^{+\ 0.5}_{-\ 0.6}\ )\times10^{-4}$			–
$K^+\pi^+2\pi^-$ via DCS		$(\ 2.49 \pm 0.07\ )\times10^{-4}$			–
$K^+\pi^+2\pi^-$	*DC*	$(\ 2.65 \pm 0.06\ )\times10^{-4}$			813
$K^+\pi^+2\pi^-$ via $\overline{D}^0$		$(\ 7.9 \pm 3.0\ )\times10^{-6}$			812
μ^- anything via $\overline{D}^0$		$<\ 4$	$\times10^{-4}$	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*	$<\ 8.5$	$\times10^{-7}$	CL=90%	932
e^+e^-	*C1*	$<\ 7.9$	$\times10^{-8}$	CL=90%	932
$\mu^+\mu^-$	*C1*	$<\ 6.2$	$\times10^{-9}$	CL=90%	926
$\pi^0 e^+e^-$	*C1*	$<\ 4$	$\times10^{-6}$	CL=90%	928
$\pi^0\mu^+\mu^-$	*C1*	$<\ 1.8$	$\times10^{-4}$	CL=90%	915
ηe^+e^-	*C1*	$<\ 3$	$\times10^{-6}$	CL=90%	852
$\eta\mu^+\mu^-$	*C1*	$<\ 5.3$	$\times10^{-4}$	CL=90%	838
$\pi^+\pi^- e^+e^-$	*C1*	$<\ 7$	$\times10^{-6}$	CL=90%	922
$\rho^0 e^+e^-$	*C1*	$<\ 1.0$	$\times10^{-4}$	CL=90%	771
$\pi^+\pi^-\mu^+\mu^-$	*C1*	$(\ 9.6 \pm 1.2\ )\times10^{-7}$			894
$\pi^+\pi^-\mu^+\mu^-$ (non-res)		$<\ 5.5$	$\times10^{-7}$	CL=90%	–
$\rho^0\mu^+\mu^-$	*C1*	$<\ 2.2$	$\times10^{-5}$	CL=90%	754
ωe^+e^-	*C1*	$<\ 6$	$\times10^{-6}$	CL=90%	768

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

$D^*(2007)^0$

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

Mass $m = 2006.85 \pm 0.05$ 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%

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

$D^*(2007)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^0$	(64.7 ±0.9) %	43
$D^0\gamma$	(35.3 ±0.9) %	137
$D^0 e^+ e^-$	(3.91±0.33) × 10^{-3}	137

$D^*(2010)^\pm$

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

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)	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

$D_0^*(2300)$

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

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)

$\overline{D}_1(2420)$ 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 $m = 2461.1^{+0.7}_{-0.8}$ MeV (S = 6.2)
$m_{D_2^*(2460)^0} - m_{D^+} = 591.5^{+0.7}_{-0.8}$ MeV (S = 5.9)
$m_{D_2^*(2460)^0} - m_{D^{*+}} = 450.9^{+0.7}_{-0.8}$ MeV (S = 5.9)
$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV
Full width $\Gamma = 47.3 \pm 0.8$ MeV (S = 1.5)

$\overline{D}_2^*(2460)$ 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

CHARMED, STRANGE MESONS ($C = \pm 1, S = \pm 1$) (including possibly non-$q\overline{q}$ states)

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

$D_s^\pm$

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

Mass $m = 1968.35 \pm 0.07$ MeV
$m_{D_s^\pm} - m_{D^\pm} = 98.69 \pm 0.05$ MeV
Mean life $\tau = (504 \pm 4) \times 10^{-15}$ s (S = 1.2)
$c\tau = 151.2\ \mu$m

CP-violating decay-rate asymmetries

$A_{CP}(\mu^\pm\nu) = (-0.2 \pm 2.5)\%$
$A_{CP}(\tau^\pm\nu)$ in $D_s^+ \to \tau^+\nu_\tau$, $D_s^- \to \tau^-\overline{\nu}_\tau = (3 \pm 5)\%$
$A_{CP}(K^\pm K_S^0) = (0.09 \pm 0.26)\%$
$A_{CP}(K^\pm K_L^0)$ in $D_s^\pm \to K^\pm K_L^0 = (-1.1 \pm 2.7) \times 10^{-2}$
$A_{CP}(K^+K^-\pi^\pm) = (-0.5 \pm 0.9)\%$
$A_{CP}(\phi\pi^\pm) = (-0.38 \pm 0.27)\%$
$A_{CP}(K^\pm K_S^0\pi^0) = (-2 \pm 6)\%$
$A_{CP}(2K_S^0\pi^\pm) = (3 \pm 5)\%$
$A_{CP}(K^+K^-\pi^\pm\pi^0) = (0.0 \pm 3.0)\%$
$A_{CP}(K^\pm K_S^0\pi^+\pi^-) = (-6 \pm 5)\%$
$A_{CP}(K_S^0 K^\mp 2\pi^\pm) = (4.1 \pm 2.8)\%$
$A_{CP}(\pi^+\pi^-\pi^\pm) = (-0.7 \pm 3.1)\%$
$A_{CP}(\pi^\pm\eta) = (0.3 \pm 0.4)\%$
$A_{CP}(\pi^\pm\eta') = (-0.9 \pm 0.5)\%$
$A_{CP}(\eta\pi^\pm\pi^0) = (-1 \pm 4)\%$
$A_{CP}(\eta'\pi^\pm\pi^0) = (0 \pm 8)\%$
$A_{CP}(K^\pm\pi^0) = (2 \pm 4)\%$ (S = 1.2)

$A_{CP}(\overline{K}^0/K^0\pi^\pm) = (0.4 \pm 0.5)\%$
$A_{CP}(K^0_S\pi^\pm) = (0.20 \pm 0.18)\%$
$A_{CP}(K^\pm\pi^+\pi^-) = (4 \pm 5)\%$
$A_{CP}(K^0_S\pi^+\pi^0)$ in $D_s^\pm \to K^0_S\pi^+\pi^0 = (3 \pm 6)\%$
$A_{CP}(K^\pm\eta) = (1.8 \pm 1.9)\%$
$A_{CP}(K^\pm\eta'(958)) = (6 \pm 19)\%$

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

$A_T(K^0_S K^\pm\pi^+\pi^-) = (-14 \pm 8) \times 10^{-3}$ [ii]

$D_s^+ \to \phi\ell^+\nu_\ell$ form factors

$r_2 = 0.84 \pm 0.11$ (S = 2.4)
$r_v = 1.80 \pm 0.08$
$\Gamma_L/\Gamma_T = 0.72 \pm 0.18$
$f_+(0)\,|V_{cs}|$ in $D_s^+ \to \eta e^+\nu_e = 0.446 \pm 0.007$
$f_+(0)\,|V_{cs}|$ in $D_s^+ \to \eta' e^+\nu_e = 0.48 \pm 0.05$
$f_+(0)|V_{cd}|$ in $D_s^+ \to K^0 e^+\nu_e = 0.162 \pm 0.019$
$r_v \equiv V(0)/A_1(0)$ in $D_s^+ \to K^*(892)^0 e^+\nu_e = 1.7 \pm 0.4$
$r_2 \equiv A_2(0)/A_1(0)$ in $D_s^+ \to K^*(892)^0 e^+\nu_e = 0.77 \pm 0.29$
$f_{D_s^+}\,|V_{cs}|$ in $D_s^+ \to \mu^+\nu_\mu = 243 \pm 5$ MeV
$f_{D_s^+}\,|V_{cs}|$ in $D_s^+ \to \tau^+\nu_\tau = 245.3 \pm 3.0$ MeV

Unless otherwise noted, the branching fractions for modes with a resonance in the final state include all the decay modes of the resonance. D_s^- modes are charge conjugates of the modes below.

D_s^+ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	*p* (MeV/*c*)
Inclusive modes				
e^+ semileptonic	[*bbb*]	(6.33 ±0.15) %		–
π^+ anything		(119.3 ±1.4) %		–
π^- anything		(43.2 ±0.9) %		–
π^0 anything		(123 ±7) %		–
K^- anything		(18.7 ±0.5) %		–
K^+ anything		(28.9 ±0.7) %		–
K^0_S anything		(19.0 ±1.1) %		–
η anything	[*ccc*]	(29.9 ±2.8) %		–
ω anything		(6.1 ±1.4) %		–
η' anything	[*ddd*]	(10.3 ±1.4) %	S=1.1	–
$f_0(980)$ anything, $f_0 \to \pi^+\pi^-$		< 1.3 %	CL=90%	–
ϕ anything		(15.7 ±1.0) %		–
K^+K^- anything		(15.8 ±0.7) %		–
$K^0_S K^+$ anything		(5.8 ±0.5) %		–

$K^0_S K^-$ anything		(	1.9	±0.4	) %		–
$2K^0_S$ anything		(	1.70	±0.32	) %		–
$2K^+$ anything		<	2.6		$\times 10^{-3}$	CL=90%	–
$2K^-$ anything		<	6		$\times 10^{-4}$	CL=90%	–

Leptonic and semileptonic modes

$e^+\nu_e$		<	8.3		$\times 10^{-5}$	CL=90%	984
$\mu^+\nu_\mu$		(	5.43	±0.15	) $\times 10^{-3}$		981
$\tau^+\nu_\tau$		(	5.32	±0.11	) %		182
$\gamma e^+\nu_e$		<	1.3		$\times 10^{-4}$	CL=90%	984
$K^+K^-e^+\nu_e$				—			851
$\phi e^+\nu_e$	[*eee*]	(	2.39	±0.16	) %	S=1.3	720
$\phi\mu^+\nu_\mu$		(	1.9	±0.5	) %		715
$\eta e^+\nu_e$ + $\eta'(958)e^+\nu_e$	[*eee*]	(	3.03	±0.24	) %		–
$\eta e^+\nu_e$	[*eee*]	(	2.32	±0.08	) %		908
$\eta'(958)e^+\nu_e$	[*eee*]	(	8.0	±0.7	) $\times 10^{-3}$		751
$\eta\mu^+\nu_\mu$		(	2.4	±0.5	) %		905
$\eta'(958)\mu^+\nu_\mu$		(	1.1	±0.5	) %		747
$\omega e^+\nu_e$	[*fff*]	<	2.0		$\times 10^{-3}$	CL=90%	829
$K^0 e^+\nu_e$		(	3.4	±0.4	) $\times 10^{-3}$		921
$K^*(892)^0 e^+\nu_e$	[*eee*]	(	2.15	±0.28	) $\times 10^{-3}$	S=1.1	782
$a_0(980)^0 e^+\nu_e$, $a_0(980)^0 \to \pi^0\eta$		<	1.2		$\times 10^{-4}$	CL=90%	–

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

$K^+K^0_S$		(	1.453	±0.035) %			850
$K^+K^0_L$		(	1.49	±0.06	) %		850
$K^+\overline{K}^0$		(	2.95	±0.14	) %		850
$K^+K^-\pi^+$	[*jj*]	(	5.38	±0.10	) %	S=1.1	805
$\phi\pi^+$	[*eee,ggg*]	(	4.5	±0.4	) %		712
$\phi\pi^+$, $\phi \to K^+K^-$	[*ggg*]	(	2.22	±0.06	) %		712
$K^+\overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^-\pi^+$		(	2.58	±0.06	) %		416
$f_0(980)\pi^+$, $f_0 \to K^+K^-$		(	1.11	±0.19	) %		732
$f_0(1370)\pi^+$, $f_0 \to K^+K^-$		(	7.1	±2.9	) $\times 10^{-4}$		–
$f_0(1710)\pi^+$, $f_0 \to K^+K^-$		(	6.7	±2.8	) $\times 10^{-4}$		198
$K^+\overline{K}^*_0(1430)^0$, $\overline{K}^*_0 \to K^-\pi^+$		(	1.76	±0.25	) $\times 10^{-3}$		218
$K^+K^0_S\pi^0$		(	1.52	±0.22	) %		805
$2K^0_S\pi^+$		(	7.7	±0.6	) $\times 10^{-3}$		802
$K^0\overline{K}^0\pi^+$				—			802
$K^*(892)^+\overline{K}^0$	[*eee*]	(	5.4	±1.2	) %		683
$K^+K^-\pi^+\pi^0$		(	5.50	±0.24	) %	S=1.3	748
$\phi\rho^+$	[*eee*]	(	5.59	±0.34	) %		401

$\overline{K}_1(1270)^0 K^+$, $\overline{K}_1(1270)^0 \to K^- \rho^+$		(5.7 ±0.6) × 10^{-3}			–
$\overline{K}_1(1270)^0 K^+$, $\overline{K}_1(1270)^0 \to K^*(892)\pi$		(1.31 ±0.25) %			–
$\overline{K}_1(1400)^0 K^+$, $\overline{K}_1(1400)^0 \to K^*(892)\pi$		(2.0 ±0.4) %			–
$a_0(980)^0 \rho^+$, $a_0(980)^0 \to K^+ K^-$		(1.9 ±0.4) × 10^{-3}			–
$f_1(1420)^0 \pi^+$, $f_1(1420)^0 \to K^*(892)^\mp K^\pm$		(3.9 ±0.7) × 10^{-3}			–
$f_1(1420)^0 \pi^+$, $f_1(1420)^0 \to a_0(980)^0 \pi^0$, $a_0(980)^0 \to K^+ K^-$		(4.0 ±1.4) × 10^{-4}			–
$\eta(1475)\pi^+$, $\eta(1475) \to a_0(980)^0 \pi^0$, $a_0(980)^0 \to K^+ K^-$		(7.0 ±2.8) × 10^{-4}			–
$K^0_S K^- 2\pi^+$		(1.53 ±0.08) %		S=1.5	744
$K^*(892)^+ \overline{K}^*(892)^0$	[*eee*]	(5.64 ±0.35) %			417
$\eta(1475) K^0_S$, $\eta \to K^*(892)^0 \pi^+$, $K^{*0} \to K^- \pi^+$		(3.4 ±1.0) × 10^{-4}			–
$\eta(1475)\pi^+$, $\eta \to \overline{K}^*(892)^+ K^-$, $\overline{K}^{*+} \to K^0_S \pi^+$		(3.4 ±1.0) × 10^{-4}			–
$\eta(1475)\pi^+$, $\eta \to a_0(980)^- \pi^+$, $a_0^- \to K^0_S K^-$		(1.7 ±0.9) × 10^{-3}			–
$f_1(1285)\pi^+$, $f_1 \to a_0(980)^- \pi^+$, $a_0^- \to K^0_S K^-$		(3.4 ±0.8) × 10^{-4}			–
$K^+ K^0_S \pi^+ \pi^-$		(9.5 ±0.8) × 10^{-3}		S=1.1	744
$K^+ K^- 2\pi^+ \pi^-$		(8.6 ±1.5) × 10^{-3}			673
$\phi 2\pi^+ \pi^-$	[*eee*]	(1.21 ±0.16) %			640
$\phi \rho^0 \pi^+$, $\phi \to K^+ K^-$		(6.4 ±1.3) × 10^{-3}			181
$\phi a_1(1260)^+$, $\phi \to K^+ K^-$, $a_1^+ \to \rho^0 \pi^+$		(7.4 ±1.2) × 10^{-3}			†
$\phi 2\pi^+ \pi^-$ non-ρ, $\phi \to K^+ K^-$		(1.8 ±0.7) × 10^{-3}			–
$K^+ K^- \rho^0 \pi^+$ non-ϕ		< 2.6	× 10^{-4}	CL=90%	249
$K^+ K^- 2\pi^+ \pi^-$ nonresonant		(9 ±7) × 10^{-4}			673
$2K^0_S 2\pi^+ \pi^-$		(7.8 ±3.3) × 10^{-4}			669

Hadronic modes without K's

$\pi^+\pi^0$		$<$ 1.2	$\times 10^{-4}$	CL=90%	975
$2\pi^+\pi^-$		(1.08 $\pm$0.04) %			959
$\rho^0\pi^+$		(1.9 $\pm$1.2) $\times 10^{-4}$			825
$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$	[*hhh*]	(9.0 $\pm$0.4) $\times 10^{-3}$			959
$f_2(1270)\pi^+$, $f_2 \to \pi^+\pi^-$		(1.09 $\pm$0.19) $\times 10^{-3}$			559
$\rho(1450)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		(2.9 $\pm$1.9) $\times 10^{-4}$			421
$\pi^+ 2\pi^0$		(6.5 $\pm$1.3) $\times 10^{-3}$			961
$2\pi^+\pi^-\pi^0$		—			935
$\eta\pi^+$	[*eee*]	(1.68 $\pm$0.09) %		S=1.1	902
$\omega\pi^+$	[*eee*]	(1.92 $\pm$0.30) $\times 10^{-3}$			822
$3\pi^+ 2\pi^-$		(7.9 $\pm$0.8) $\times 10^{-3}$			899
$2\pi^+\pi^- 2\pi^0$		—			902
$\eta\rho^+$	[*eee*]	(8.9 $\pm$0.8) %			724
$\eta\pi^+\pi^0$		(9.5 $\pm$0.5) %			885
$\eta(\pi^+\pi^0)$ $P-wave$		(5.1 $\pm$3.1) $\times 10^{-3}$			885
$2\pi^+\pi^-\eta$		(3.12 $\pm$0.16) %			855
$a_1(1260)^+\eta$, $a_1^+ \to$ $\rho(770)^0\pi^+$, $\rho^0 \to$ $\pi^+\pi^-$		(1.73 $\pm$0.16) %			–
$a_1(1260)^+\eta$, $a_1^+ \to$ $f_0(500)\pi^+$, $f_0 \to \pi^+\pi^-$		(2.5 $\pm$0.9) $\times 10^{-3}$			–
$a_0(980)^{+0}\pi^{0+}$, $a_0(980)^{+0} \to \eta\pi^{+0}$		(2.2 $\pm$0.4) %			–
$a_0(980)^+\rho(770)^0$, $a_0^+ \to$ $\eta\pi^+$		(2.1 $\pm$0.9) $\times 10^{-3}$			–
$\eta(1405)\pi^+$, $\eta(1405) \to$ $a_0(980)^-\pi^+$, $a_0^- \to$ $\eta\pi^-$		(2.2 $\pm$0.7) $\times 10^{-4}$			–
$\eta(1405)\pi^+$, $\eta(1405) \to$ $a_0(980)^+\pi^-$, $a_0^+ \to$ $\eta\pi^+$		(2.2 $\pm$0.7) $\times 10^{-4}$			–
$f_1(1420)\pi^+$, $f_1 \to$ $a_0(980)^-\pi^+$, $a_0^- \to$ $\eta\pi^-$		(5.9 $\pm$1.8) $\times 10^{-4}$			–
$f_1(1420)\pi^+$, $f_1 \to$ $a_0(980)^+\pi^-$, $a_0^+ \to$ $\eta\pi^+$		(5.3 $\pm$1.8) $\times 10^{-4}$			–
$\omega\pi^+\pi^0$	[*eee*]	(2.8 $\pm$0.7) %			802
$3\pi^+ 2\pi^-\pi^0$		(4.9 $\pm$3.2) %			856
$\omega 2\pi^+\pi^-$	[*eee*]	(1.6 $\pm$0.5) %			766
$\eta'(958)\pi^+$	[*ddd,eee*]	(3.94 $\pm$0.25) %			743
$3\pi^+ 2\pi^- 2\pi^0$		—			803

$\omega\eta\pi^+$	[*eee*]	<	2.13		%	CL=90%		654
$\eta'(958)\rho^+$	[*ddd*,*eee*]	(	5.8	±1.5)	%			465
$\eta'(958)\pi^+\pi^0$		(	5.6	±0.8)	%			720
$\eta'(958)\pi^+\pi^0$ nonresonant		<	5.1		%	CL=90%		720

Modes with one or three K's

$K^+\pi^0$		(	7.4	±0.5)	× 10^{-4}			917
$K^0_S\pi^+$		(	1.10	±0.05)	× 10^{-3}			916
$K^+\eta$	[*eee*]	(	1.73	±0.08)	× 10^{-3}			835
$K^+\omega$	[*eee*]	(	8.7	±2.5)	× 10^{-4}			741
$K^+\eta'(958)$	[*eee*]	(	2.64	±0.24)	× 10^{-3}			646
$K^+\pi^+\pi^-$		(	6.5	±0.4)	× 10^{-3}			900
$K^+\rho^0$		(	2.5	±0.4)	× 10^{-3}			745
$K^+\rho(1450)^0$, $\rho^0\to\ \pi^+\pi^-$		(	6.9	±2.4)	× 10^{-4}			–
$K^*(892)^0\pi^+$, $K^{*0}\to$ $K^+\pi^-$		(	1.40	±0.24)	× 10^{-3}			775
$K^*(1410)^0\pi^+$, $K^{*0}\to$ $K^+\pi^-$		(	1.22	±0.28)	× 10^{-3}			–
$K^*(1430)^0\pi^+$, $K^{*0}\to$ $K^+\pi^-$		(	5.0	±3.4)	× 10^{-4}			–
$K^+\pi^+\pi^-$ nonresonant		(	1.03	±0.34)	× 10^{-3}			900
$K^0\pi^+\pi^0$		(	1.08	±0.06)	%			899
$K^0_S 2\pi^+\pi^-$		(	2.8	±1.0)	× 10^{-3}			870
$K^+\omega\pi^0$	[*eee*]	<	8.2		× 10^{-3}	CL=90%		684
$K^+\omega\pi^+\pi^-$	[*eee*]	<	5.4		× 10^{-3}	CL=90%		603
$K^+\omega\eta$	[*eee*]	<	7.9		× 10^{-3}	CL=90%		366
$2K^+K^-$		(	2.15	±0.20)	× 10^{-4}			628
ϕK^+, $\phi\to\ K^+K^-$		(	8.8	±2.0)	× 10^{-5}			–

Doubly Cabibbo-suppressed modes

$2K^+\pi^-$		(	1.276	±0.031)	× 10^{-4}			805
$K^+K^*(892)^0$, $K^{*0}\to$ $K^+\pi^-$		(	6.0	±3.4)	× 10^{-5}			–

Baryon-antibaryon mode

$p\overline{n}$		(	1.22	±0.11)	× 10^{-3}			295
$p\overline{p}e^+\nu_e$		<	2.0		× 10^{-4}	CL=90%		296

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

$\pi^+e^+e^-$	[*pp*]	<	5.5		× 10^{-6}	CL=90%		979
$\pi^+\phi$, $\phi\to\ e^+e^-$	[*oo*]	(	6	$^{+8}_{-4}$)	× 10^{-6}			–
$\pi^+\mu^+\mu^-$	[*pp*]	<	1.8		× 10^{-7}	CL=90%		968
$K^+e^+e^-$	*C1*	<	3.7		× 10^{-6}	CL=90%		922
$K^+\mu^+\mu^-$	*C1*	<	1.4		× 10^{-7}	CL=90%		909

$K^*(892)^+\mu^+\mu^-$	*C1*	<	1.4	$\times 10^{-3}$ CL=90%	765
$\pi^+ e^+ \mu^-$	*LF*	<	1.1	$\times 10^{-6}$ CL=90%	976
$\pi^+ e^- \mu^+$	*LF*	<	9.4	$\times 10^{-7}$ CL=90%	976
$K^+ e^+ \mu^-$	*LF*	<	7.9	$\times 10^{-7}$ CL=90%	919
$K^+ e^- \mu^+$	*LF*	<	5.6	$\times 10^{-7}$ CL=90%	919
$\pi^- 2e^+$	*L*	<	1.4	$\times 10^{-6}$ CL=90%	979
$\pi^- 2\mu^+$	*L*	<	8.6	$\times 10^{-8}$ CL=90%	968
$\pi^- e^+ \mu^+$	*L*	<	6.3	$\times 10^{-7}$ CL=90%	976
$K^- 2e^+$	*L*	<	7.7	$\times 10^{-7}$ CL=90%	922
$K^- 2\mu^+$	*L*	<	2.6	$\times 10^{-8}$ CL=90%	909
$K^- e^+ \mu^+$	*L*	<	2.6	$\times 10^{-7}$ CL=90%	919
$K^*(892)^- 2\mu^+$	*L*	<	1.4	$\times 10^{-3}$ CL=90%	765

$D_s^{*\pm}$

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

J^P is natural, width and decay modes consistent with 1^-.

Mass $m = 2112.2 \pm 0.4$ MeV
$m_{D_s^{*\pm}} - m_{D_s^{\pm}} = 143.8 \pm 0.4$ MeV
Full width $\Gamma < 1.9$ MeV, CL = 90%

D_s^{*-} modes are charge conjugates of the modes below.

D_s^{*+} DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D_s^+\gamma$	(93.5±0.7) %	139
$D_s^+\pi^0$	(5.8±0.7) %	48
$D_s^+ e^+ e^-$	(6.7±1.6) $\times 10^{-3}$	139

$D_{s0}^*(2317)^{\pm}$

$I(J^P) = 0(0^+)$
J, P need confirmation.

J^P is natural, low mass consistent with 0^+.

See the review on "Heavy Non-$q\overline{q}$ Mesons."

Mass $m = 2317.8 \pm 0.5$ MeV
$m_{D_{s0}^*(2317)^{\pm}} - m_{D_s^{\pm}} = 349.4 \pm 0.5$ MeV
Full width $\Gamma < 3.8$ MeV, CL = 95%

$D_{s0}^*(2317)^-$ modes are charge conjugates of modes below.

$D_{s0}^*(2317)^{\pm}$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D_s^+\pi^0$	(100^{+0}_{-20}) %		298
$D_s^+\gamma$	< 5 %	90%	323

$D_s^*(2112)^+\gamma$	$<$ 6	%	90%	–
$D_s^+\gamma\gamma$	$<$ 18	%	95%	323
$D_s^*(2112)^+\pi^0$	$<$ 11	%	90%	–
$D_s^+\pi^+\pi^-$	$<$ 4	$\times 10^{-3}$	90%	194
$D_s^+\pi^0\pi^0$	not seen			205

$D_{s1}(2460)^\pm$

$I(J^P) = 0(1^+)$

See the review on "Heavy Non-$q\overline{q}$ Mesons."

Mass $m = 2459.5 \pm 0.6$ MeV (S = 1.1)
$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}} = 347.3 \pm 0.7$ MeV (S = 1.2)
$m_{D_{s1}(2460)^\pm} - m_{D_s^\pm} = 491.1 \pm 0.6$ MeV (S = 1.1)
Full width $\Gamma < 3.5$ MeV, CL = 95%

$D_{s1}(2460)^-$ modes are charge conjugates of the modes below.

$D_{s1}(2460)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D_s^{*+}\pi^0$	(48 ±11) %		297
$D_s^+\gamma$	(18 ± 4) %		442
$D_s^+\pi^+\pi^-$	(4.3± 1.3) %	S=1.1	363
$D_s^{*+}\gamma$	$<$ 8 %	CL=90%	323
$D_{s0}^*(2317)^+\gamma$	($3.7^{+\ 5.0}_{-\ 2.4}$) %		138

$D_{s1}(2536)^\pm$

$I(J^P) = 0(1^+)$
J, P need confirmation.

Mass $m = 2535.11 \pm 0.06$ MeV
$m_{D_{s1}(2536)^\pm} - m_{D_s^*(2111)} = 422.9 \pm 0.4$ MeV
$m_{D_{s1}(2536)^\pm} - m_{D^*(2010)^\pm} = 524.85 \pm 0.04$ MeV
$m_{D_{s1}(2536)^\pm} - m_{D^*(2007)^0} = 528.26 \pm 0.05$ MeV (S = 1.2)
Full width $\Gamma = 0.92 \pm 0.05$ MeV

Branching fractions are given relative to the one **DEFINED AS 1**.
$D_{s1}(2536)^-$ modes are charge conjugates of the modes below.

$D_{s1}(2536)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D^*(2010)^+K^0$	0.85 ±0.12		149
$(D^*(2010)^+K^0)_{S-wave}$	0.61 ±0.09		149
$D^+\pi^-K^+$	0.028±0.005		176

$D^*(2007)^0 K^+$	**DEFINED AS 1**		167
$D^+ K^0$	<0.34	90%	381
$D^0 K^+$	<0.12	90%	391
$D_s^{*+}\gamma$	possibly seen		388
$D_s^+ \pi^+ \pi^-$	seen		437

$D_{s2}^*(2573)$

$I(J^P) = 0(2^+)$

Mass $m = 2569.1 \pm 0.8$ MeV (S = 2.4)
$m_{D_{s2}^*(2573)} - m_{D^0} = 704 \pm 3.2$ MeV
Full width $\Gamma = 16.9 \pm 0.7$ MeV

$D_{s2}^*(2573)^-$ modes are charge conjugates of the modes below.

$D_{s2}^*(2573)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	431
$D^*(2007)^0 K^+$	not seen	238
$D^+ K_S^0$	seen	422
$D^{*+} K_S^0$	seen	225

$D_{s1}^*(2700)^\pm$

$I(J^P) = 0(1^-)$

Mass $m = 2714 \pm 5$ MeV (S = 1.5)
Full width $\Gamma = 122 \pm 10$ MeV

$D_{s1}^*(2700)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	579
$D^+ K_S^0$	seen	573
$D^{*0} K^+$	seen	438
$D^{*+} K_S^0$	seen	431

$D_{s3}^*(2860)^\pm$

$I(J^P) = 0(3^-)$

Mass $m = 2860 \pm 7$ MeV
Full width $\Gamma = 53 \pm 10$ MeV

$D_{s3}^*(2860)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	710
$D^+ K_S^0$	seen	704

$D^{*0}K^+$	seen	589
$D^{*+}K^0_S$	seen	584

BOTTOM MESONS ($B = \pm 1$)

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

B-particle organization

Many measurements of B decays involve admixtures of B hadrons. Previously we arbitrarily included such admixtures in the $B^\pm$ section, but because of their importance we have created two new sections: "$B^\pm/B^0$ Admixture" for $\Upsilon(4S)$ results and "$B^\pm/B^0/B^0_s$/b-baryon Admixture" for results at higher energies. Most inclusive decay branching fractions and χ_b at high energy are found in the Admixture sections. B^0-$\overline{B}^0$ mixing data are found in the B^0 section, while B^0_s-$\overline{B}^0_s$ mixing data and B-$\overline{B}$ mixing data for a B^0/B^0_s admixture are found in the B^0_s section. CP-violation data are found in the $B^\pm$, B^0, and $B^\pm$ B^0 Admixture sections. b-baryons are found near the end of the Baryon section.

The organization of the B sections is now as follows, where bullets indicate particle sections and brackets indicate reviews.

- $B^\pm$

  mass, mean life, CP violation, branching fractions
- B^0

  mass, mean life, B^0-$\overline{B}^0$ mixing, CP violation, branching fractions
- $B^\pm/B^0$ Admixtures

  CP violation, branching fractions
- $B^\pm/B^0/B^0_s$/b-baryon Admixtures

  mean life, production fractions, branching fractions
- B^*

  mass

- $B_1(5721)^+$
  mass
- $B_1(5721)^0$
  mass
- $B_2^*(5747)^+$
  mass
- $B_2^*(5747)^0$
  mass
- $B_J^*(5970)^+$
  mass
- $B_J^*(5970)^0$
  mass
- B_s^0
  mass, mean life, B_s^0-$\overline{B}_s^0$ mixing, *CP* violation, branching fractions
- B_s^*
  mass
- $B_{s1}(5830)^0$
  mass
- $B_{s2}^*(5840)^0$
  mass
- $B_c^\pm$
  mass, mean life, branching fractions

At the end of Baryon Listings:

- Λ_b
  mass, mean life, branching fractions
- $\Lambda_b(5912)^0$
  mass, mean life
- $\Lambda_b(5920)^0$
  mass, mean life
- Σ_b
  mass
- Σ_b^*
  mass

- Ξ_b^0, Ξ_b^-

  mass, mean life, branching fractions
- $\Xi_b'(5935)^-$

  mass
- $\Xi_b(5945)^0$

  mass
- $\Xi_b^*(5955)^-$

  mass
- Ω_b^-

  mass, branching fractions
- *b*-baryon Admixture

  mean life, branching fractions

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

I, *J*, *P* need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m_{B^\pm} = 5279.34 \pm 0.12$ MeV
Mean life $\tau_{B^\pm} = (1.638 \pm 0.004) \times 10^{-12}$ s
$c\tau = 491.1$ μm

CP violation

$A_{CP}(B^+ \to J/\psi(1S)K^+) = (1.8 \pm 3.0) \times 10^{-3}$ (S = 1.5)
$A_{CP}(B^+ \to J/\psi(1S)\pi^+) = (1.8 \pm 1.2) \times 10^{-2}$ (S = 1.3)
$A_{CP}(B^+ \to J/\psi\rho^+) = -0.05 \pm 0.05$
$A_{CP}(B^+ \to J/\psi K^*(892)^+) = -0.048 \pm 0.033$
$A_{CP}(B^+ \to \eta_c K^+) = 0.01 \pm 0.07$ (S = 2.2)
$A_{CP}(B^+ \to \psi(2S)\pi^+) = 0.03 \pm 0.06$
$A_{CP}(B^+ \to \psi(2S)K^+) = 0.012 \pm 0.020$ (S = 1.5)
$A_{CP}(B^+ \to \psi(2S)K^*(892)^+) = 0.08 \pm 0.21$
$A_{CP}(B^+ \to \chi_{c1}(1P)\pi^+) = 0.07 \pm 0.18$
$A_{CP}(B^+ \to \chi_{c0}K^+) = -0.20 \pm 0.18$ (S = 1.5)
$A_{CP}(B^+ \to \chi_{c1}K^+) = -0.009 \pm 0.033$
$A_{CP}(B^+ \to \chi_{c1}K^*(892)^+) = 0.5 \pm 0.5$
$A_{CP}(B^+ \to D^0\ell^+\nu_\ell) = (-0.14 \pm 0.20) \times 10^{-2}$
$A_{CP}(B^+ \to \overline{D}^0\pi^+) = -0.007 \pm 0.007$
$A_{CP}(B^+ \to D_{CP(+1)}\pi^+) = -0.0080 \pm 0.0024$
$A_{CP}(B^+ \to D_{CP(-1)}\pi^+) = 0.017 \pm 0.026$

$A_{CP}([K^{\mp}\pi^{\pm}\pi^{+}\pi^{-}]_D\pi^{+}) = 0.02 \pm 0.05$
$A_{CP}(B^{+} \to\ [\pi^{+}\pi^{+}\pi^{-}\pi^{-}]_D K^{+}) = 0.10 \pm 0.04$
$A_{CP}(B^{+} \to\ [\pi^{+}\pi^{-}\pi^{+}\pi^{-}]_D K^{*}(892)^{+}) = 0.02 \pm 0.11$
$A_{CP}(B^{+} \to\ \overline{D}^{0} K^{+}) = -0.017 \pm 0.005$
$A_{CP}([K^{\mp}\pi^{\pm}\pi^{+}\pi^{-}]_D K^{+}) = -0.31 \pm 0.11$
$A_{CP}(B^{+} \to\ [\pi^{+}\pi^{+}\pi^{-}\pi^{-}]_D\pi^{+}) = (-4 \pm 8) \times 10^{-3}$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_D K^{+}) = -0.58 \pm 0.21$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}\pi^{0}]_D K^{+}) = 0.07 \pm 0.30$ (S = 1.5)
$A_{CP}(B^{+} \to\ [K^{+}K^{-}\pi^{0}]_D K^{+}) = 0.30 \pm 0.20$
$A_{CP}(B^{+} \to\ [\pi^{+}\pi^{-}\pi^{0}]_D K^{+}) = 0.05 \pm 0.09$
$A_{CP}(B^{+} \to\ \overline{D}^{0} K^{*}(892)^{+}) = -0.007 \pm 0.019$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_{\overline{D}} K^{*}(892)^{+}) = -0.75 \pm 0.16$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}\pi^{-}\pi^{+}]_{\overline{D}} K^{*}(892)^{+}) = -0.45 \pm 0.25$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_D\pi^{+}) = 0.00 \pm 0.09$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}\pi^{0}]_D\pi^{+}) = 0.35 \pm 0.16$
$A_{CP}(B^{+} \to\ [K^{+}K^{-}\pi^{0}]_D\pi^{+}) = -0.03 \pm 0.04$
$A_{CP}(B^{+} \to\ [\pi^{+}\pi^{-}\pi^{0}]_D\pi^{+}) = -0.016 \pm 0.020$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_{(D\pi)}\pi^{+}) = -0.09 \pm 0.27$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_{(D\gamma)}\pi^{+}) = -0.7 \pm 0.6$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_{(D\pi)} K^{+}) = 0.8 \pm 0.4$
$A_{CP}(B^{+} \to\ [K^{-}\pi^{+}]_{(D\gamma)} K^{+}) = 0.4 \pm 1.0$
$A_{CP}(B^{+} \to\ [\pi^{+}\pi^{-}\pi^{0}]_D K^{+}) = -0.02 \pm 0.15$
$A_{CP}(B^{+} \to\ [K^{0}_{S}K^{+}\pi^{-}]_D K^{+}) = 0.10 \pm 0.09$
$A_{CP}(B^{+} \to\ [K^{0}_{S}K^{-}\pi^{+}]_D K^{+}) = -0.04 \pm 0.08$
$A_{CP}(B^{+} \to\ [K^{0}_{S}K^{-}\pi^{+}]_D\pi^{+}) = 0.003 \pm 0.015$
$A_{CP}(B^{+} \to\ [K^{0}_{S}K^{+}\pi^{-}]_D\pi^{+}) = -0.034 \pm 0.020$
$A_{CP}(B^{+} \to\ [K^{*}(892)^{-}K^{+}]_D K^{+}) = 0.08 \pm 0.05$
$A_{CP}(B^{+} \to\ [K^{*}(892)^{+}K^{-}]_D K^{+}) = 0.02 \pm 0.10$
$A_{CP}(B^{+} \to\ [K^{*}(892)^{+}K^{-}]_D\pi^{+}) = 0.007 \pm 0.017$
$A_{CP}(B^{+} \to\ [K^{*}(892)^{-}K^{+}]_D\pi^{+}) = -0.020 \pm 0.011$
$\boldsymbol{A_{CP}(B^{+} \to\ D_{CP(+1)} K^{+})} = 0.132 \pm 0.015$ (S = 1.8)
$A_{ADS}(B^{+} \to\ D K^{+}) = -0.451 \pm 0.026$
$A_{ADS}(B^{+} \to\ D\pi^{+}) = 0.129 \pm 0.014$
$A_{ADS}(B^{+} \to\ D^{*}(D\gamma) K^{+}) = -0.6 \pm 1.3$
$A_{ADS}(B^{+} \to\ D^{*}(D\pi^{0}) K^{+}) = 0.72 \pm 0.29$
$A_{ADS}(B^{+} \to\ D^{*}(D\gamma)\pi^{+}) = 0.08 \pm 0.13$
$A_{ADS}(B^{+} \to\ D^{*}(D\pi^{0})\pi^{+}) = -0.14 \pm 0.06$
$A_{ADS}(B^{+} \to\ [K^{-}\pi^{+}]_D K^{+}\pi^{-}\pi^{+}) = -0.33 \pm 0.35$
$A_{ADS}(B^{+} \to\ [K^{-}\pi^{+}]_D\pi^{+}\pi^{-}\pi^{+}) = -0.01 \pm 0.09$
$A_{CP}(B^{+} \to\ D_{CP(-1)} K^{+}) = -0.10 \pm 0.07$
$A_{CP}(B^{+} \to\ [K^{+}K^{-}]_D K^{+}\pi^{-}\pi^{+}) = -0.04 \pm 0.06$

$A_{CP}(B^+ \to [\pi^+\pi^-]_D K^+\pi^-\pi^+) = -0.05 \pm 0.10$
$A_{CP}(B^+ \to [K^-\pi^+]_D K^+\pi^-\pi^+) = 0.013 \pm 0.023$
$A_{CP}(B^+ \to [K^+K^-]_D \pi^+\pi^-\pi^+) = -0.019 \pm 0.015$
$A_{CP}(B^+ \to [\pi^+\pi^-]_D \pi^+\pi^-\pi^+) = -0.013 \pm 0.019$
$A_{CP}(B^+ \to [K^-\pi^+]_D \pi^+\pi^-\pi^+) = -0.002 \pm 0.011$
$A_{CP}(B^+ \to \overline{D}^{*0}\pi^+) = -0.0004 \pm 0.0021 \quad (S = 1.1)$
$A_{CP}(B^+ \to (D^*_{CP(+1)})^0\pi^+) = 0.010 \pm 0.007$
$A_{CP}(B^+ \to (D^*_{CP(-1)})^0\pi^+) = -0.09 \pm 0.05$
$A_{CP}(B^+ \to D^{*0}K^+) = 0.012 \pm 0.010 \quad (S = 1.5)$
$A_{CP}(B^+ \to D^{*0}_{CP(+1)}K^+) = -0.09 \pm 0.05 \quad (S = 2.6)$
$A_{CP}(B^+ \to D^*_{CP(-1)}K^+) = 0.07 \pm 0.10$
$A_{CP}(B^+ \to D_{CP(+1)}K^*(892)^+) = 0.08 \pm 0.06$
$A_{CP}(B^+ \to D_{CP(-1)}K^*(892)^+) = -0.23 \pm 0.22$
$A_{CP}(B^+ \to D_s^+\phi) = 0.0 \pm 0.4$
$A_{CP}(B^+ \to D_s^+\overline{D}^0) = (-0.4 \pm 0.7)\%$
$A_{CP}(B^+ \to D^{*+}\overline{D}^{*0}) = -0.15 \pm 0.11$
$A_{CP}(B^+ \to D^{*+}\overline{D}^0) = -0.06 \pm 0.13$
$A_{CP}(B^+ \to D^+\overline{D}^{*0}) = 0.13 \pm 0.18$
$A_{CP}(B^+ \to D^+\overline{D}^0) = 0.016 \pm 0.025$
$A_{CP}(B^+ \to K^0_S\pi^+) = -0.017 \pm 0.016$
$A_{CP}(B^+ \to K^+\pi^0) = 0.030 \pm 0.013$
$A_{CP}(B^+ \to \eta' K^+) = 0.004 \pm 0.011$
$A_{CP}(B^+ \to \eta' K^*(892)^+) = -0.26 \pm 0.27$
$A_{CP}(B^+ \to \eta' K^*_0(1430)^+) = 0.06 \pm 0.20$
$A_{CP}(B^+ \to \eta' K^*_2(1430)^+) = 0.15 \pm 0.13$
$\boldsymbol{A_{CP}(B^+ \to \eta K^+) = -0.37 \pm 0.08}$
$A_{CP}(B^+ \to \eta K^*(892)^+) = 0.02 \pm 0.06$
$A_{CP}(B^+ \to \eta K^*_0(1430)^+) = 0.05 \pm 0.13$
$A_{CP}(B^+ \to \eta K^*_2(1430)^+) = -0.45 \pm 0.30$
$A_{CP}(B^+ \to \omega K^+) = -0.02 \pm 0.04$
$A_{CP}(B^+ \to \omega K^{*+}) = 0.29 \pm 0.35$
$A_{CP}(B^+ \to \omega(K\pi)^{*+}_0) = -0.10 \pm 0.09$
$A_{CP}(B^+ \to \omega K^*_2(1430)^+) = 0.14 \pm 0.15$
$A_{CP}(B^+ \to K^{*0}\pi^+) = -0.04 \pm 0.09 \quad (S = 2.1)$
$A_{CP}(B^+ \to K^*(892)^+\pi^0) = -0.39 \pm 0.21 \quad (S = 1.6)$
$\boldsymbol{A_{CP}(B^+ \to K^+\pi^-\pi^+) = 0.027 \pm 0.008}$
$A_{CP}(B^+ \to K^+K^-K^+ \text{nonresonant}) = 0.06 \pm 0.05$
$A_{CP}(B^+ \to f(980)^0 K^+) = -0.08 \pm 0.09$
$\boldsymbol{A_{CP}(B^+ \to f_2(1270)K^+) = -0.68^{+0.19}_{-0.17}}$
$A_{CP}(B^+ \to f_0(1500)K^+) = 0.28 \pm 0.30$

$A_{CP}(B^+ \to f_2'(1525)^0 K^+) = -0.08^{+0.05}_{-0.04}$
$\boldsymbol{A_{CP}(B^+ \to \rho^0 K^+)} = 0.37 \pm 0.10$
$A_{CP}(B^+ \to K^0 \pi^+ \pi^0) = 0.07 \pm 0.06$
$A_{CP}(B^+ \to K_0^*(1430)^0 \pi^+) = 0.061 \pm 0.032$
$A_{CP}(B^+ \to K_0^*(1430)^+ \pi^0) = 0.26^{+0.18}_{-0.14}$
$A_{CP}(B^+ \to K_2^*(1430)^0 \pi^+) = 0.05^{+0.29}_{-0.24}$
$A_{CP}(B^+ \to K^+ \pi^0 \pi^0) = -0.06 \pm 0.07$
$A_{CP}(B^+ \to K^0 \rho^+) = -0.03 \pm 0.15$
$A_{CP}(B^+ \to K^{*+} \pi^+ \pi^-) = 0.07 \pm 0.08$
$A_{CP}(B^+ \to \rho^0 K^*(892)^+) = 0.31 \pm 0.13$
$A_{CP}(B^+ \to K^*(892)^+ f_0(980)) = -0.15 \pm 0.12$
$A_{CP}(B^+ \to a_1^+ K^0) = 0.12 \pm 0.11$
$A_{CP}(B^+ \to b_1^+ K^0) = -0.03 \pm 0.15$
$A_{CP}(B^+ \to K^*(892)^0 \rho^+) = -0.01 \pm 0.16$
$A_{CP}(B^+ \to b_1^0 K^+) = -0.46 \pm 0.20$
$A_{CP}(B^+ \to K^0 K^+) = 0.04 \pm 0.14$
$A_{CP}(B^+ \to K_S^0 K^+) = -0.21 \pm 0.14$
$A_{CP}(B^+ \to K^+ K_S^0 K_S^0) = 0.025 \pm 0.031$
$\boldsymbol{A_{CP}(B^+ \to K^+ K^- \pi^+)} = -0.122 \pm 0.021$
$A_{CP}(B^+ \to K^+ K^- \pi^+ \text{ nonresonant}) = -0.11 \pm 0.06$
$A_{CP}(B^+ \to K^+ \overline{K}^*(892)^0) = 0.12 \pm 0.10$
$A_{CP}(B^+ \to K^+ \overline{K}_0^*(1430)^0) = 0.10 \pm 0.17$
$A_{CP}(B^+ \to \phi \pi^+) = 0.1 \pm 0.5$
$A_{CP}(B^+ \to \pi^+ (K^+ K^-)_{S-wave}) = -0.66 \pm 0.04$
$\boldsymbol{A_{CP}(B^+ \to K^+ K^- K^+)} = -0.033 \pm 0.008$
$A_{CP}(B^+ \to \phi K^+) = 0.024 \pm 0.028 \quad (S = 2.3)$
$A_{CP}(B^+ \to X_0(1550) K^+) = -0.04 \pm 0.07$
$A_{CP}(B^+ \to K^{*+} K^+ K^-) = 0.11 \pm 0.09$
$A_{CP}(B^+ \to \phi K^*(892)^+) = -0.01 \pm 0.08$
$A_{CP}(B^+ \to \phi (K\pi)_0^{*+}) = 0.04 \pm 0.16$
$A_{CP}(B^+ \to \phi K_1(1270)^+) = 0.15 \pm 0.20$
$A_{CP}(B^+ \to \phi K_2^*(1430)^+) = -0.23 \pm 0.20$
$A_{CP}(B^+ \to K^+ \phi \phi) = -0.08 \pm 0.07$
$A_{CP}(B^+ \to K^+ [\phi\phi]_{\eta_c}) = 0.10 \pm 0.08$
$A_{CP}(B^+ \to K^*(892)^+ \gamma) = 0.014 \pm 0.018$
$A_{CP}(B^+ \to X_s \gamma) = 0.028 \pm 0.019$
$A_{CP}(B^+ \to \eta K^+ \gamma) = -0.12 \pm 0.07$
$A_{CP}(B^+ \to \phi K^+ \gamma) = -0.13 \pm 0.11 \quad (S = 1.1)$
$A_{CP}(B^+ \to \rho^+ \gamma) = -0.11 \pm 0.33$
$A_{CP}(B^+ \to \pi^+ \pi^0) = 0.03 \pm 0.04$
$\boldsymbol{A_{CP}(B^+ \to \pi^+ \pi^- \pi^+)} = 0.057 \pm 0.013$

$A_{CP}(B^+ \to \rho^0\pi^+) = 0.009 \pm 0.019$
$A_{CP}(B^+ \to f_2(1270)\pi^+) = 0.40 \pm 0.06$
$A_{CP}(B^+ \to \rho^0(1450)\pi^+) = -0.11 \pm 0.05$
$A_{CP}(B^+ \to \rho_3(1690)\pi^+) = -0.80 \pm 0.28$
$A_{CP}(B^+ \to f_0(1370)\pi^+) = 0.72 \pm 0.22$
$A_{CP}(B^+ \to \pi^+\pi^-\pi^+ \text{ nonresonant}) = -0.14^{+0.23}_{-0.16}$
$A_{CP}(B^+ \to \rho^+\pi^0) = 0.02 \pm 0.11$
$A_{CP}(B^+ \to \rho^+\rho^0) = -0.05 \pm 0.05$
$A_{CP}(B^+ \to \omega\pi^+) = -0.04 \pm 0.05$
$A_{CP}(B^+ \to \omega\rho^+) = -0.20 \pm 0.09$
$A_{CP}(B^+ \to \eta\pi^+) = -0.14 \pm 0.07$ (S = 1.4)
$A_{CP}(B^+ \to \eta\rho^+) = 0.11 \pm 0.11$
$A_{CP}(B^+ \to \eta'\pi^+) = 0.06 \pm 0.16$
$A_{CP}(B^+ \to \eta'\rho^+) = 0.26 \pm 0.17$
$A_{CP}(B^+ \to b_1^0\pi^+) = 0.05 \pm 0.16$
$A_{CP}(B^+ \to p\overline{p}\pi^+) = 0.00 \pm 0.04$
$A_{CP}(B^+ \to p\overline{p}K^+) = 0.00 \pm 0.04$ (S = 2.2)
$A_{CP}(B^+ \to p\overline{p}K^*(892)^+) = 0.21 \pm 0.16$ (S = 1.4)
$A_{CP}(B^+ \to p\overline{\Lambda}\gamma) = 0.17 \pm 0.17$
$A_{CP}(B^+ \to p\overline{\Lambda}\pi^0) = 0.01 \pm 0.17$
$A_{CP}(B^+ \to K^+\ell^+\ell^-) = -0.02 \pm 0.08$
$A_{CP}(B^+ \to K^+e^+e^-) = 0.14 \pm 0.14$
$A_{CP}(B^+ \to K^+\mu^+\mu^-) = 0.011 \pm 0.017$
$A_{CP}(B^+ \to \pi^+\mu^+\mu^-) = -0.11 \pm 0.12$
$A_{CP}(B^+ \to K^{*+}\ell^+\ell^-) = -0.09 \pm 0.14$
$A_{CP}(B^+ \to K^*e^+e^-) = -0.14 \pm 0.23$
$A_{CP}(B^+ \to K^*\mu^+\mu^-) = -0.12 \pm 0.24$
$\gamma = (65.9^{+3.3}_{-3.5})^\circ$
$r_B(B^+ \to D^0K^+) = 0.0994 \pm 0.0026$
$\delta_B(B^+ \to D^0K^+) = (127.7^{+3.6}_{-3.9})^\circ$
$r_B(B^+ \to D^0K^{*+}) = 0.101^{+0.016}_{-0.034}$
$\delta_B(B^+ \to D^0K^{*+}) = (48^{+59}_{-16})^\circ$
$r_B(B^+ \to D^{*0}K^+) = 0.104^{+0.013}_{-0.014}$
$\delta_B(B^+ \to D^{*0}K^+) = (314.8^{+7.9}_{-9.9})^\circ$

B^- modes are charge conjugates of the modes below. Modes which do not identify the charge state of the B are listed in the $B^\pm/B^0$ ADMIXTURE section.

The branching fractions listed below assume 50% $B^0\overline{B}^0$ and 50% B^+B^- production at the $\Upsilon(4S)$. We have attempted to bring older measurements up to date by rescaling their assumed $\Upsilon(4S)$ production ratio to 50:50

and their assumed D, D_s, D^*, and ψ branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

For inclusive branching fractions, *e.g.*, $B \to D^{\pm} X$, the values usually are multiplicities, not branching fractions. They can be greater than one.

B^+ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Semileptonic and leptonic modes				
$\ell^+ \nu_\ell X$	[iii]	(10.99 ± 0.28) %		–
$e^+ \nu_e X_c$		(10.8 ± 0.4) %		–
$\ell^+ \nu_\ell X_u$		(1.65 ± 0.21) $\times 10^{-3}$		–
$D \ell^+ \nu_\ell X$		(9.6 ± 0.7) %		–
$\overline{D}^0 \ell^+ \nu_\ell$	[iii]	(2.30 ± 0.09) %		2310
$\overline{D}^0 \tau^+ \nu_\tau$		(7.7 ± 2.5) $\times 10^{-3}$		1911
$\overline{D}^*(2007)^0 \ell^+ \nu_\ell$	[iii]	(5.58 ± 0.22) %		2258
$\overline{D}^*(2007)^0 \tau^+ \nu_\tau$		(1.88 ± 0.20) %		1839
$D^- \pi^+ \ell^+ \nu_\ell$		(4.4 ± 0.4) $\times 10^{-3}$		2306
$\overline{D}_0^*(2420)^0 \ell^+ \nu_\ell$, $\overline{D}_0^{*0} \to D^- \pi^+$		(2.5 ± 0.5) $\times 10^{-3}$		–
$\overline{D}_2^*(2460)^0 \ell^+ \nu_\ell$, $\overline{D}_2^{*0} \to D^- \pi^+$		(1.53 ± 0.16) $\times 10^{-3}$		2065
$D^{(*)-} \mathrm{n}\pi^+ \ell^+ \nu_\ell (\mathrm{n} \geq 1)$		(1.85 ± 0.25) %		–
$D^{*-} \pi^+ \ell^+ \nu_\ell$		(6.0 ± 0.4) $\times 10^{-3}$		2254
$\overline{D}_1(2420)^0 \ell^+ \nu_\ell$, $\overline{D}_1^0 \to D^{*-} \pi^+$		(3.03 ± 0.20) $\times 10^{-3}$		2084
$\overline{D}_1'(2430)^0 \ell^+ \nu_\ell$, $\overline{D}_1'^0 \to D^{*-} \pi^+$		(2.7 ± 0.6) $\times 10^{-3}$		–
$\overline{D}_2^*(2460)^0 \ell^+ \nu_\ell$, $\overline{D}_2^{*0} \to D^{*-} \pi^+$		(1.01 ± 0.24) $\times 10^{-3}$	S=2.0	2065
$\overline{D}^0 \pi^+ \pi^- \ell^+ \nu_\ell$		(1.6 ± 0.4) $\times 10^{-3}$		2301
$\overline{D}^{*0} \pi^+ \pi^- \ell^+ \nu_\ell$		(8 ± 5) $\times 10^{-4}$		2248
$D_s^{(*)-} K^+ \ell^+ \nu_\ell$		(6.1 ± 1.0) $\times 10^{-4}$		–
$D_s^- K^+ \ell^+ \nu_\ell$		(3.0 $^{+\ 1.4}_{-\ 1.2}$) $\times 10^{-4}$		2242
$D_s^{*-} K^+ \ell^+ \nu_\ell$		(2.9 ± 1.9) $\times 10^{-4}$		2185
$\pi^0 \ell^+ \nu_\ell$		(7.80 ± 0.27) $\times 10^{-5}$		2638
$\eta \ell^+ \nu_\ell$		(3.9 ± 0.5) $\times 10^{-5}$		2611
$\eta' \ell^+ \nu_\ell$		(2.3 ± 0.8) $\times 10^{-5}$		2553
$\omega \ell^+ \nu_\ell$	[iii]	(1.19 ± 0.09) $\times 10^{-4}$		2582

$\rho^0 \ell^+ \nu_\ell$	[iii]	$(1.58 \pm 0.11) \times 10^{-4}$			2583
$\pi^+ \pi^- \ell^+ \nu_\ell$		$(2.3 \pm 0.4) \times 10^{-4}$			2636
$p \overline{p} \ell^+ \nu_\ell$		$(5.8 \, {}^{+\,2.6}_{-\,2.3}) \times 10^{-6}$			2467
$p \overline{p} \mu^+ \nu_\mu$		$(5.32 \pm 0.34) \times 10^{-6}$			2446
$p \overline{p} e^+ \nu_e$		$(8.2 \, {}^{+\,4.0}_{-\,3.3}) \times 10^{-6}$			2467
$e^+ \nu_e$		$< 9.8 \times 10^{-7}$	CL=90%		2640
$\mu^+ \nu_\mu$		$< 8.6 \times 10^{-7}$	CL=90%		2639
$\tau^+ \nu_\tau$		$(1.09 \pm 0.24) \times 10^{-4}$	S=1.2		2341
$\ell^+ \nu_\ell \gamma$		$< 3.0 \times 10^{-6}$	CL=90%		2640
$e^+ \nu_e \gamma$		$< 4.3 \times 10^{-6}$	CL=90%		2640
$\mu^+ \nu_\mu \gamma$		$< 3.4 \times 10^{-6}$	CL=90%		2639
$\mu^+ \mu^- \mu^+ \nu_\mu$		$< 1.6 \times 10^{-8}$	CL=95%		2634

Inclusive modes

$D^0 X$		(8.6 ± 0.7) %			–
$\overline{D}^0 X$		(79 ± 4) %			–
$D^+ X$		(2.5 ± 0.5) %			–
$D^- X$		(9.9 ± 1.2) %			–
$D_s^+ X$		$(7.9 \, {}^{+\,1.4}_{-\,1.3})$ %			–
$D_s^- X$		$(1.10 \, {}^{+\,0.40}_{-\,0.32})$ %			–
$\Lambda_c^+ X$		$(2.1 \, {}^{+\,0.9}_{-\,0.6})$ %			–
$\overline{\Lambda}_c^- X$		$(2.8 \, {}^{+\,1.1}_{-\,0.9})$ %			–
$\overline{c} X$		(97 ± 4) %			–
$c X$		$(23.4 \, {}^{+\,2.2}_{-\,1.8})$ %			–
$c / \overline{c} X$		(120 ± 6) %			–

D, D^*, or D_s modes

$\overline{D}^0 \pi^+$		$(4.68 \pm 0.13) \times 10^{-3}$			2308
$D_{CP(+1)} \pi^+$	[jjj]	$(2.05 \pm 0.20) \times 10^{-3}$			–
$D_{CP(-1)} \pi^+$	[jjj]	$(2.1 \pm 0.4) \times 10^{-3}$			–
$\overline{D}^0 \rho^+$		(1.34 ± 0.18) %			2237
$\overline{D}^0 K^+$		$(3.69 \pm 0.16) \times 10^{-4}$			2281
$D_{CP(+1)} K^+$	[jjj]	$(1.83 \pm 0.08) \times 10^{-4}$			–
$D_{CP(-1)} K^+$	[jjj]	$(1.99 \pm 0.19) \times 10^{-4}$			–
$D^0 K^+$		$(3.64 \pm 0.25) \times 10^{-6}$			2281
$[K^- \pi^+]_D K^+$	[kkk]	$< 2.8 \times 10^{-7}$	CL=90%		–
$[K^+ \pi^-]_D K^+$	[kkk]	$< 2.0 \times 10^{-5}$	CL=90%		–
$[K^- \pi^+ \pi^0]_D K^+$		seen			–
$[K^+ \pi^- \pi^0]_D K^+$		seen			–
$[K^- \pi^+ \pi^+ \pi^-]_D K^+$		seen			–

$[K^+\pi^-\pi^+\pi^-]_D K^+$		seen			–
$[K^-\pi^+]_D\pi^+$	[kkk]	$(\ 6.3 \pm 1.1\ )\times10^{-7}$			–
$[K^+\pi^-]_D\pi^+$		$(\ 1.7 \pm 0.4\ )\times10^{-4}$			–
$[K^-\pi^+\pi^0]_D\pi^+$		seen			–
$[K^+\pi^-\pi^0]_D\pi^+$		seen			–
$[K^-\pi^+\pi^+\pi^-]_D\pi^+$		seen			–
$[K^+\pi^-\pi^+\pi^-]_D\pi^+$		seen			–
$[\pi^+\pi^-\pi^0]_D K^-$		$(\ 4.6 \pm 0.9\ )\times10^{-6}$			–
$[K^0_S K^+\pi^-]_D K^+$		seen			–
$[K^0_S K^-\pi^+]_D K^+$		seen			–
$[K^*(892)^+ K^-]_D K^+$		seen			–
$[K^0_S K^-\pi^+]_D\pi^+$		seen			–
$[K^*(892)^+ K^-]_D\pi^+$		seen			–
$[K^0_S K^+\pi^-]_D\pi^+$		seen			–
$[K^*(892)^- K^+]_D\pi^+$		seen			–
$\overline{D}^0 K^*(892)^+$		$(\ 5.3 \pm 0.4\ )\times10^{-4}$			2213
$D_{CP(-1)} K^*(892)^+$	[jjj]	$(\ 2.7 \pm 0.8\ )\times10^{-4}$			–
$D_{CP(+1)} K^*(892)^+$	[jjj]	$(\ 6.2 \pm 0.7\ )\times10^{-4}$			–
$D^0 K^*(892)^+$		$(\ 5.4\ ^{+\ 1.8}_{-\ 4.0}\ )\times10^{-6}$			2213
$\overline{D}^0 K^+\pi^+\pi^-$		$(\ 5.2 \pm 2.1\ )\times10^{-4}$			2237
$\overline{D}^0 K^+\overline{K}^0$		$(\ 5.5 \pm 1.6\ )\times10^{-4}$			2189
$\overline{D}^0 K^+\overline{K}^*(892)^0$		$(\ 7.5 \pm 1.7\ )\times10^{-4}$			2072
$\overline{D}^0\pi^+\pi^+\pi^-$		$(\ 5.6 \pm 2.1\ )\times10^{-3}$	S=3.6		2289
$\overline{D}^0\pi^+\pi^+\pi^-$ nonresonant		$(\ 5 \pm 4\ )\times10^{-3}$			2289
$\overline{D}^0\pi^+\rho^0$		$(\ 4.2 \pm 3.0\ )\times10^{-3}$			2208
$\overline{D}^0 a_1(1260)^+$		$(\ 4 \pm 4\ )\times10^{-3}$			2123
$\overline{D}^0\omega\pi^+$		$(\ 4.1 \pm 0.9\ )\times10^{-3}$			2206
$D^*(2010)^-\pi^+\pi^+$		$(\ 1.35 \pm 0.22\ )\times10^{-3}$			2247
$D^*(2010)^- K^+\pi^+$		$(\ 8.2 \pm 1.4\ )\times10^{-5}$			2206
$\overline{D}_1(2420)^0\pi^+,\ \overline{D}^0_1\to D^*(2010)^-\pi^+$		$(\ 8.4 \pm 1.5\ )\times10^{-4}$			2081
$D^-\pi^+\pi^+$		$(\ 1.07 \pm 0.05\ )\times10^{-3}$			2299
$D^- K^+\pi^+$		$(\ 7.7 \pm 0.5\ )\times10^{-5}$			2260
$D^*_0(2300)^0 K^+,\ D^{*0}_0\to D^-\pi^+$		$(\ 6.1 \pm 2.4\ )\times10^{-6}$			–
$D^*_2(2460)^0 K^+,\ D^{*0}_2\to D^-\pi^+$		$(\ 2.32 \pm 0.23\ )\times10^{-5}$			–
$D^*_1(2760)^0 K^+,\ D^{*0}_1\to D^-\pi^+$		$(\ 3.6 \pm 1.2\ )\times10^{-6}$			–
$D^+ K^0$		$< 2.9 \times10^{-6}$	CL=90%		2278
$D^+ K^+\pi^-$		$(\ 5.6 \pm 1.1\ )\times10^{-6}$			2260
$D^*_2(2460)^0 K^+,\ D^{*0}_2\to D^+\pi^-$		$< 6.3 \times10^{-7}$	CL=90%		–

$D^+ K^{*0}$		$<$	4.9			$\times 10^{-7}$	CL=90%		2211
$D^+ \overline{K}^{*0}$		$<$	1.4			$\times 10^{-6}$	CL=90%		2211
$\overline{D}^*(2007)^0 \pi^+$		(	5.18	$\pm$	0.15	$\times 10^{-3}$			2256
$\overline{D}^{*0}_{CP(+1)} \pi^+$	[III]	(	2.9	$\pm$	0.6	$\times 10^{-3}$			–
$D^{*0}_{CP(-1)} \pi^+$	[III]	(	2.6	$\pm$	1.0	$\times 10^{-3}$			–
$\overline{D}^*(2007)^0 \omega \pi^+$		(	4.5	$\pm$	1.2	$\times 10^{-3}$			2149
$\overline{D}^*(2007)^0 \rho^+$		(	9.8	$\pm$	1.7	$\times 10^{-3}$			2181
$\overline{D}^*(2007)^0 K^+$		(	4.20	$^+_-$	$^{0.31}_{0.28}$	$\times 10^{-4}$			2227
$\overline{D}^{*0}_{CP(+1)} K^+$	[III]	(	2.75	$\pm$	0.35	$\times 10^{-4}$			–
$\overline{D}^{*0}_{CP(-1)} K^+$	[III]	(	2.31	$\pm$	0.31	$\times 10^{-4}$			–
$D^*(2007)^0 K^+$		(	4.5	$\pm$	1.2	$\times 10^{-6}$			2227
$\overline{D}^*(2007)^0 K^*(892)^+$		(	8.1	$\pm$	1.4	$\times 10^{-4}$			2156
$\overline{D}^*(2007)^0 K^+ \overline{K}^0$		$<$	1.06			$\times 10^{-3}$	CL=90%		2132
$\overline{D}^*(2007)^0 K^+ \overline{K}^*(892)^0$		(	1.5	$\pm$	0.4	$\times 10^{-3}$			2009
$\overline{D}^*(2007)^0 \pi^+ \pi^+ \pi^-$		(	1.03	$\pm$	0.12	%			2236
$\overline{D}^*(2007)^0 a_1(1260)^+$		(	1.9	$\pm$	0.5	%			2063
$\overline{D}^*(2007)^0 \pi^- \pi^+ \pi^+ \pi^0$		(	1.8	$\pm$	0.4	%			2219
$\overline{D}^{*0} 3\pi^+ 2\pi^-$		(	5.7	$\pm$	1.2	$\times 10^{-3}$			2196
$D^*(2010)^+ \pi^0$		$<$	3.6			$\times 10^{-6}$			2255
$D^*(2010)^+ K^0$		$<$	9.0			$\times 10^{-6}$	CL=90%		2225
$D^*(2010)^- \pi^+ \pi^+ \pi^0$		(	1.5	$\pm$	0.7	%			2235
$D^*(2010)^- \pi^+ \pi^+ \pi^+ \pi^-$		(	2.6	$\pm$	0.4	$\times 10^{-3}$			2217
$\overline{D}^{**0} \pi^+$	[nnn]	(	5.7	$\pm$	1.2	$\times 10^{-3}$			–
$\overline{D}_1^*(2420)^0 \pi^+$		(	1.5	$\pm$	0.6	$\times 10^{-3}$		S=1.3	2081
$\overline{D}_1(2420)^0 \pi^+ \times$ B($\overline{D}_1^0 \to$ $\overline{D}^0 \pi^+ \pi^-$)		(	2.5	$^+_-$	$^{1.6}_{1.4}$	$\times 10^{-4}$		S=3.9	2081
$\overline{D}_1(2420)^0 \pi^+ \times$ B($\overline{D}_1^0 \to$ $\overline{D}^0 \pi^+ \pi^-$ (nonresonant))		(	2.2	$\pm$	1.0	$\times 10^{-4}$			2081
$\overline{D}_1(2430)^0 \pi^+$, $\overline{D}_1^0 \to$ $D^*(2010)^- \pi^+$		(	3.5	$\pm$	0.6	$\times 10^{-4}$			2079
$\overline{D}(2550)^0 \pi^+$, $\overline{D}^0 \to$ $D^*(2010)^- \pi^+$		(	7.2	$\pm$	1.4	$\times 10^{-5}$			–
$\overline{D}_J^*(2600)^0 \pi^+$, $\overline{D}_J^{*0} \to$ $D^*(2010)^- \pi^+$		(	6.8	$\pm$	1.3	$\times 10^{-5}$			–
$\overline{D}_2^*(2462)^0 \pi^+$, $\overline{D}_2^{*0} \to D^- \pi^+$		(	3.56	$\pm$	0.24	$\times 10^{-4}$			–
$\overline{D}_2^*(2462)^0 \pi^+$, $\overline{D}_2^{*0} \to$ $\overline{D}^0 \pi^- \pi^+$		(	2.2	$\pm$	1.0	$\times 10^{-4}$			–
$\overline{D}_2^*(2462)^0 \pi^+$, $\overline{D}_2^{*0} \to$ $\overline{D}^0 \pi^- \pi^+$ (nonresonant)		$<$	1.7			$\times 10^{-4}$	CL=90%		–
$\overline{D}_2^*(2462)^0 \pi^+$, $\overline{D}_2^{*0} \to$ $D^*(2010)^- \pi^+$		(	2.2	$\pm$	1.1	$\times 10^{-4}$			–

$\overline{D}_0^*(2400)^0\pi^+$ $\times$ B($\overline{D}_0^*(2400)^0 \to D^-\pi^+$)	(6.4 ± 1.4) $\times 10^{-4}$				2136
$\overline{D}_1(2421)^0\pi^+$, $\overline{D}_1^0 \to D^{*-}\pi^+$	(7.4 ± 1.0) $\times 10^{-4}$				–
$\overline{D}_2^*(2462)^0\pi^+$, $\overline{D}_2^{*0} \to D^{*-}\pi^+$	(1.98 ± 0.30) $\times 10^{-4}$				–
$\overline{D}_1'(2427)^0\pi^+$, $\overline{D}_1'^0 \to D^{*-}\pi^+$	(3.5 ± 0.9) $\times 10^{-4}$			S=1.5	–
$\overline{D}_1(2420)^0\pi^+ \times$B($\overline{D}_1^0 \to \overline{D}^{*0}\pi^+\pi^-$)	< 6		$\times 10^{-6}$	CL=90%	2081
$\overline{D}_1^*(2420)^0\rho^+$	< 1.4		$\times 10^{-3}$	CL=90%	1996
$\overline{D}_2^*(2460)^0\pi^+$	< 1.3		$\times 10^{-3}$	CL=90%	2063
$\overline{D}_2^*(2460)^0\pi^+ \times$B($\overline{D}_2^{*0} \to \overline{D}^{*0}\pi^+\pi^-$)	< 2.2		$\times 10^{-5}$	CL=90%	2063
$\overline{D}_1^*(2680)^0\pi^+$, $\overline{D}_1^*(2680)^0 \to D^-\pi^+$	(8.4 ± 2.1) $\times 10^{-5}$				–
$\overline{D}(2740)^0\pi^+$, $\overline{D}^0 \to D^*(2010)^-\pi^+$	(3.3 ± 1.5) $\times 10^{-5}$				–
$\overline{D}_3^*(2750)^0\pi^+$, $\overline{D}_3^{*0} \to D^*(2010)^-\pi^+$	(1.10 ± 0.32) $\times 10^{-5}$				1913
$\overline{D}_3^*(2760)^0\pi^+$, $\overline{D}_3^*(2760)^0\pi^+ \to D^-\pi^+$	(1.00 ± 0.22) $\times 10^{-5}$				–
$\overline{D}_2^*(3000)^0\pi^+$, $\overline{D}_2^*(3000)^0\pi^+ \to D^-\pi^+$	(2.0 ± 1.4) $\times 10^{-6}$				–
$\overline{D}_2^*(2460)^0\rho^+$	< 4.7		$\times 10^{-3}$	CL=90%	1977
$\overline{D}^0 D_s^+$	(9.0 ± 0.9) $\times 10^{-3}$				1815
$D_{s0}^*(2317)^+\overline{D}^0$, $D_{s0}^{*+} \to D_s^+\pi^0$	(8.0 $^{+1.6}_{-1.3}$) $\times 10^{-4}$				1605
$D_{s0}(2317)^+\overline{D}^0 \times$ B($D_{s0}(2317)^+ \to D_s^{*+}\gamma$)	< 7.6		$\times 10^{-4}$	CL=90%	1605
$D_{s0}(2317)^+\overline{D}^*(2007)^0 \times$ B($D_{s0}(2317)^+ \to D_s^+\pi^0$)	(9 ± 7) $\times 10^{-4}$				1511
$D_{sJ}(2457)^+\overline{D}^0$	(3.1 $^{+1.0}_{-0.9}$) $\times 10^{-3}$				–
$D_{sJ}(2457)^+\overline{D}^0 \times$ B($D_{sJ}(2457)^+ \to D_s^+\gamma$)	(4.6 $^{+1.3}_{-1.1}$) $\times 10^{-4}$				–
$D_{sJ}(2457)^+\overline{D}^0 \times$ B($D_{sJ}(2457)^+ \to D_s^+\pi^+\pi^-$)	< 2.2		$\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+\overline{D}^0 \times$ B($D_{sJ}(2457)^+ \to D_s^+\pi^0$)	< 2.7		$\times 10^{-4}$	CL=90%	–

$D_{sJ}(2457)^+\overline{D}^0\times$ B($D_{sJ}(2457)^+ \to\ D_s^{*+}\gamma$)	$<$	9.8			$\times10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+\overline{D}^*(2007)^0$	(	1.20	$\pm$	0.30)	%		–
$D_{sJ}(2457)^+\overline{D}^*(2007)^0\times$ B($D_{sJ}(2457)^+ \to\ D_s^+\gamma$)	(	1.4	$^+_-$	$^{0.7}_{0.6}$)	$\times10^{-3}$		–
$\overline{D}^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+ \to$ $D^*(2007)^0K^+$ + $D^*(2010)^+K^0$)	(	4.0	$\pm$	1.0)	$\times10^{-4}$		1447
$\overline{D}^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+ \to$ $D^*(2007)^0K^+$)	(	2.2	$\pm$	0.7)	$\times10^{-4}$		1447
$\overline{D}^*(2007)^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+ \to$ $D^*(2007)^0K^+$)	(	5.5	$\pm$	1.6)	$\times10^{-4}$		1339
$\overline{D}^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+ \to\ D^{*+}K^0$)	(	2.3	$\pm$	1.1)	$\times10^{-4}$		1447
$\overline{D}^0 D_{sJ}(2700)^+\times$ B($D_{sJ}(2700)^+ \to\ D^0K^+$)	(	5.6	$\pm$	1.8)	$\times10^{-4}$	S=1.7	–
$\overline{D}^{*0} D_{s1}(2536)^+,\ D_{s1}^+ \to$ $D^{*+}K^0$	(	3.9	$\pm$	2.6)	$\times10^{-4}$		1339
$\overline{D}^0 D_{sJ}(2573)^+,\ D_{sJ}^+ \to$ D^0K^+	(	8	$\pm$	15)	$\times10^{-6}$		–
$\overline{D}^{*0} D_{sJ}(2573),\ D_{sJ}^+ \to$ D^0K^+	$<$	2			$\times10^{-4}$	CL=90%	1306
$\overline{D}^*(2007)^0 D_{sJ}(2573),\ D_{sJ}^+ \to$ D^0K^+	$<$	5			$\times10^{-4}$	CL=90%	1306
$\overline{D}^0 D_s^{*+}$	(	7.6	$\pm$	1.6)	$\times10^{-3}$		1734
$\overline{D}^*(2007)^0 D_s^+$	(	8.2	$\pm$	1.7)	$\times10^{-3}$		1737
$\overline{D}^*(2007)^0 D_s^{*+}$	(	1.71	$\pm$	0.24)	%		1651
$D_s^{(*)+}\overline{D}^{**0}$	(	2.7	$\pm$	1.2)	%		–
$\overline{D}^*(2007)^0 D^*(2010)^+$	(	8.1	$\pm$	1.7)	$\times10^{-4}$		1713
$\overline{D}^0 D^*(2010)^+$ + $\overline{D}^*(2007)^0 D^+$	$<$	1.30			%	CL=90%	1792
$\overline{D}^0 D^*(2010)^+$	(	3.9	$\pm$	0.5)	$\times10^{-4}$		1792
$\overline{D}^0 D^+$	(	3.8	$\pm$	0.4)	$\times10^{-4}$		1866
$\overline{D}^0 D^+K^0$	(	1.55	$\pm$	0.21)	$\times10^{-3}$		1571
$D^+\overline{D}^*(2007)^0$	(	6.3	$\pm$	1.7)	$\times10^{-4}$		1791
$\overline{D}^*(2007)^0 D^+K^0$	(	2.1	$\pm$	0.5)	$\times10^{-3}$		1475
$\overline{D}^0 D^*(2010)^+K^0$	(	3.8	$\pm$	0.4)	$\times10^{-3}$		1476
$\overline{D}^*(2007)^0 D^*(2010)^+K^0$	(	9.2	$\pm$	1.2)	$\times10^{-3}$		1362
$\overline{D}^0 D^0K^+$	(	1.45	$\pm$	0.33)	$\times10^{-3}$	S=2.6	1577
$\overline{D}^*(2007)^0 D^0K^+$	(	2.26	$\pm$	0.23)	$\times10^{-3}$		1481

$\overline{D}^0 D^*(2007)^0 K^+$	(6.3 ± 0.5) $\times 10^{-3}$				1481
$\overline{D}^*(2007)^0 D^*(2007)^0 K^+$	(1.12 ± 0.13) %				1368
$D^- D^+ K^+$	(2.2 ± 0.7) $\times 10^{-4}$				1571
$X_0(2900) D^+,\ X_0 \to D^- K^+$	(1.2 ± 0.5) $\times 10^{-5}$				–
$X_1(2900) D^+,\ X_1 \to D^- K^+$	(6.7 ± 2.3) $\times 10^{-5}$				–
$D^- D^+ K^+$ nonresonant	(5.3 ± 1.8) $\times 10^{-5}$				1571
$D^- D^*(2010)^+ K^+$	(6.3 ± 1.1) $\times 10^{-4}$				1475
$D^*(2010)^- D^+ K^+$	(6.0 ± 1.3) $\times 10^{-4}$				1475
$D^*(2010)^- D^*(2010)^+ K^+$	(1.32 ± 0.18) $\times 10^{-3}$				1363
$(\overline{D}+\overline{D}^*)(D+D^*)K$	(4.05 ± 0.30) %				–
$D_s^+ \pi^0$	(1.6 ± 0.5) $\times 10^{-5}$				2270
$D_s^{*+} \pi^0$	< 2.6		$\times 10^{-4}$	CL=90%	2215
$D_s^+ \eta$	< 4		$\times 10^{-4}$	CL=90%	2235
$D_s^{*+} \eta$	< 6		$\times 10^{-4}$	CL=90%	2178
$D_s^+ \rho^0$	< 3.0		$\times 10^{-4}$	CL=90%	2197
$D_s^{*+} \rho^0$	< 4		$\times 10^{-4}$	CL=90%	2138
$D_s^+ \omega$	< 4		$\times 10^{-4}$	CL=90%	2195
$D_s^{*+} \omega$	< 6		$\times 10^{-4}$	CL=90%	2136
$D_s^+ a_1(1260)^0$	< 1.8		$\times 10^{-3}$	CL=90%	2079
$D_s^{*+} a_1(1260)^0$	< 1.3		$\times 10^{-3}$	CL=90%	2015
$D_s^+ K^+ K^-$	(7.2 ± 1.1) $\times 10^{-6}$				2149
$D_s^+ \phi$	< 4.2		$\times 10^{-7}$	CL=90%	2141
$D_s^{*+} \phi$	< 1.2		$\times 10^{-5}$	CL=90%	2079
$D_s^+ \overline{K}^0$	< 8		$\times 10^{-4}$	CL=90%	2242
$D_s^{*+} \overline{K}^0$	< 9		$\times 10^{-4}$	CL=90%	2185
$D_s^+ \overline{K}^*(892)^0$	< 4.4		$\times 10^{-6}$	CL=90%	2172
$D_s^+ K^{*0}$	< 3.5		$\times 10^{-6}$	CL=90%	2172
$D_s^{*+} \overline{K}^*(892)^0$	< 3.5		$\times 10^{-4}$	CL=90%	2112
$D_s^- \pi^+ K^+$	(1.80 ± 0.22) $\times 10^{-4}$				2222
$D_s^{*-} \pi^+ K^+$	(1.45 ± 0.24) $\times 10^{-4}$				2164
$D_s^- \pi^+ K^*(892)^+$	< 5		$\times 10^{-3}$	CL=90%	2138
$D_s^{*-} \pi^+ K^*(892)^+$	< 7		$\times 10^{-3}$	CL=90%	2076
$D_s^- K^+ K^+$	(9.7 ± 2.1) $\times 10^{-6}$				2149
$D_s^{*-} K^+ K^+$	< 1.5		$\times 10^{-5}$	CL=90%	2088

Charmonium modes

$\eta_c K^+$	(1.09 ± 0.08) $\times 10^{-3}$				1751
$\eta_c K^+,\ \eta_c \to K_S^0 K^\mp \pi^\pm$	(2.7 ± 0.6) $\times 10^{-5}$				–
$\eta_c K^*(892)^+$	(1.1 $^{+\ 0.5}_{-\ 0.4}$) $\times 10^{-3}$				1646
$\eta_c K^+ \pi^+ \pi^-$	< 3.9		$\times 10^{-4}$	CL=90%	1684

$\eta_c K^+ \omega(782)$		$<$	5.3		$\times 10^{-4}$	CL=90%	1475
$\eta_c K^+ \eta$		$<$	2.2		$\times 10^{-4}$	CL=90%	1588
$\eta_c K^+ \pi^0$		$<$	6.2		$\times 10^{-5}$	CL=90%	1723
$\eta_c(2S) K^+$		(	4.4	$\pm$ 1.0)	$\times 10^{-4}$		1320
$\eta_c(2S) K^+,\ \eta_c \to\ p\overline{p}$		(	3.5	$\pm$ 0.8)	$\times 10^{-8}$		–
$\eta_c(2S) K^+,\ \eta_c \to\ K^0_S K^\mp \pi^\pm$		(	3.4	$^{+\ 2.3}_{-\ 1.6}$)	$\times 10^{-6}$		–
$\eta_c(2S) K^+,\ \eta_c \to\ p\overline{p}\pi^+\pi^-$		(	1.12	$\pm$ 0.18)	$\times 10^{-6}$		–
$h_c(1P) K^+,\ h_c \to\ J/\psi\pi^+\pi^-$		$<$	3.4		$\times 10^{-6}$	CL=90%	1401
$X(3730)^0 K^+,\ X^0 \to\ \eta_c\eta$		$<$	4.6		$\times 10^{-5}$	CL=90%	–
$X(3730)^0 K^+,\ X^0 \to\ \eta_c\pi^0$		$<$	5.7		$\times 10^{-6}$	CL=90%	–
$\eta_{c2}(1D) K^+,\ \eta_{c2} \to\ h_c\gamma$		$<$	3.7		$\times 10^{-5}$	CL=90%	–
$\eta_{c2}(1D)\pi^+ K^0_S,\ \eta_{c2} \to\ h_c\gamma$		$<$	1.1		$\times 10^{-4}$	CL=90%	–
$\psi_2(3823) K^+,\ \psi_2 \to\ J/\psi\pi^+\pi^-$		(	2.8	$\pm$ 0.6)	$\times 10^{-7}$		–
$\chi_{c1}(3872) K^+$		(	2.1	$\pm$ 0.7)	$\times 10^{-4}$		1141
$\chi_{c0}(3915) K^+$		$<$	2.8		$\times 10^{-4}$	CL=90%	1101
$\chi_{c0}(3915) K^+,\ \chi_{c0} \to\ D^+D^-$		(	8.1	$\pm$ 3.3)	$\times 10^{-6}$		–
$\chi_{c0}(3915) K^+,\ \chi_{c0} \to\ \eta_c\eta$		$<$	4.7		$\times 10^{-5}$	CL=90%	–
$(Xchi)_{c0}(3915) K^+,\ \chi_{c0} \to\ \eta_c\pi^0$		$<$	1.7		$\times 10^{-5}$	CL=90%	–
$X(4014)^0 K^+,\ X^0 \to\ \eta_c\eta$		$<$	3.9		$\times 10^{-5}$	CL=90%	–
$X(4014)^0 K^+,\ X^0 \to\ \eta_c\pi^0$		$<$	1.2		$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^0 K^+,\ Z_c^0 \to\ \eta_c\pi^+\pi^-$		$<$	4.7		$\times 10^{-5}$	CL=90%	–
$X(4020)^0 K^+,\ X^0 \to\ \eta_c\pi^+\pi^-$		$<$	1.6		$\times 10^{-5}$	CL=90%	–
$\chi_{c1}(3872) K^*(892)^+$		$<$	6		$\times 10^{-4}$	CL=90%	940
$\chi_{c1}(3872)^+ K^0,\ \chi_{c1}^+ \to\ J/\psi(1S)\pi^+\pi^0$	[*ooo*]	$<$	6.1		$\times 10^{-6}$	CL=90%	–
$\chi_{c1}(3872) K^0\pi^+$		(	2.8	$\pm$ 1.2)	$\times 10^{-4}$		1085
$Z_c(4430)^+ K^0,\ Z_c^+ \to\ J/\psi\pi^+$		$<$	1.5		$\times 10^{-5}$	CL=95%	–
$Z_c(4430)^+ K^0,\ Z_c^+ \to\ \psi(2S)\pi^+$		$<$	4.7		$\times 10^{-5}$	CL=95%	–
$\psi(4230)^0 K^+,\ \psi^0 \to\ J/\psi\pi^+\pi^-$		$<$	1.56		$\times 10^{-5}$	CL=95%	–
$\chi_{c0}(3915) K^+,\ \chi_{c0} \to\ J/\psi\gamma$		$<$	1.4		$\times 10^{-5}$	CL=90%	–
$\chi_{c0}(3915) K^+,\ \chi_{c0} \to\ \chi_{c1}(1P)\pi^0$		$<$	3.8		$\times 10^{-5}$	CL=90%	–
$X(3930)^0 K^+,\ X^0 \to\ J/\psi\gamma$		$<$	2.5		$\times 10^{-6}$	CL=90%	–
$J/\psi(1S) K^+$		(	1.020	$\pm$ 0.019)	$\times 10^{-3}$		1684
$J/\psi(1S) K^0\pi^+$		(	1.14	$\pm$ 0.11)	$\times 10^{-3}$		1651
$J/\psi(1S) K^+\pi^+\pi^-$		(	8.1	$\pm$ 1.3)	$\times 10^{-4}$	S=2.5	1612

$J/\psi(1S)K^+K^-K^+$	(	3.37	± 0.29)	$\times 10^{-5}$		1252
$\chi_{c0}(3915)K^+,\ \chi_{c0}\to\ p\overline{p}$	<	7.1		$\times 10^{-8}$	CL=95%	–
$J/\psi(1S)K^*(892)^+$	(	1.43	± 0.08)	$\times 10^{-3}$		1571
$J/\psi(1S)K(1270)^+$	(	1.8	± 0.5)	$\times 10^{-3}$		1402
$J/\psi(1S)K(1400)^+$	<	5		$\times 10^{-4}$	CL=90%	1308
$J/\psi(1S)\eta K^+$	(	1.24	± 0.14)	$\times 10^{-4}$		1510
$\chi_{c1-odd}(3872)K^+,$ $\chi_{c1-odd}\to\ J/\psi\eta$	<	3.8		$\times 10^{-6}$	CL=90%	–
$\psi(4160)K^+,\ \psi\to\ J/\psi\eta$	<	7.4		$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)\eta' K^+$	<	8.8		$\times 10^{-5}$	CL=90%	1273
$J/\psi(1S)\phi K^+$	(	5.0	± 0.4)	$\times 10^{-5}$		1227
$J/\psi(1S)K_1(1650),\ K_1\to$ ϕK^+	(	6	$^{+10}_{-\ 6}$)	$\times 10^{-6}$		–
$J/\psi(1S)K^*(1680)^+,\ K^*\to$ ϕK^+	(	3.4	$^{+\ 1.9}_{-\ 2.2}$)	$\times 10^{-6}$		–
$J/\psi(1S)K_2^*(1980),\ K_2^*\to$ ϕK^+	(	1.5	$^{+\ 0.9}_{-\ 0.5}$)	$\times 10^{-6}$		–
$J/\psi(1S)K(1830)^+,$ $K(1830)^+\to\ \phi K^+$	(	1.3	$^{+\ 1.3}_{-\ 1.1}$)	$\times 10^{-6}$		–
$\chi_{c1}(4140)K^+,\ \chi_{c1}\to$ $J/\psi(1S)\phi$	(	10	± 4)	$\times 10^{-6}$		–
$\chi_{c1}(4274)K^+,\ \chi_{c1}\to$ $J/\psi(1S)\phi$	(	3.6	$^{+\ 2.2}_{-\ 1.8}$)	$\times 10^{-6}$		–
$\chi_{c0}(4500)K^+,\ \chi_c^0\to$ $J/\psi(1S)\phi$	(	3.3	$^{+\ 2.1}_{-\ 1.7}$)	$\times 10^{-6}$		–
$\chi_{c0}(4700)K^+,\ \chi_{c0}\to$ $J/\psi(1S)\phi$	(	6	$^{+\ 5}_{-\ 4}$)	$\times 10^{-6}$		–
$J/\psi(1S)\omega K^+$	(	3.20	$^{+\ 0.60}_{-\ 0.32}$)	$\times 10^{-4}$		1388
$\chi_{c0}(3915)K^+,\ \chi_{c0}\to$ $J/\psi\omega$	(	3.0	$^{+\ 0.9}_{-\ 0.7}$)	$\times 10^{-5}$		1103
$J/\psi(1S)\pi^+$	(	3.92	± 0.08)	$\times 10^{-5}$		1728
$J/\psi(1S)\pi^+\pi^+\pi^+\pi^-\pi^-$	(	1.17	± 0.13)	$\times 10^{-5}$		1635
$\psi(2S)\pi^+\pi^+\pi^-$	(	1.9	± 0.4)	$\times 10^{-5}$		1304
$J/\psi(1S)\rho^+$	(	4.1	± 0.5)	$\times 10^{-5}$	S=1.4	1611
$J/\psi(1S)\pi^+\pi^0$ nonresonant	<	7.3		$\times 10^{-6}$	CL=90%	1717
$J/\psi(1S)a_1(1260)^+$	<	1.2		$\times 10^{-3}$	CL=90%	1415
$J/\psi(1S)p\overline{p}\pi^+$	<	5.0		$\times 10^{-7}$	CL=90%	643
$J/\psi(1S)p\overline{\Lambda}$	(	1.46	± 0.12)	$\times 10^{-5}$		567
$J/\psi(1S)\overline{\Sigma}^0 p$	<	1.1		$\times 10^{-5}$	CL=90%	–
$J/\psi(1S)D^+$	<	1.2		$\times 10^{-4}$	CL=90%	871
$J/\psi(1S)\overline{D}^0\pi^+$	<	2.5		$\times 10^{-5}$	CL=90%	665

$\psi(2S)\pi^+$	(	2.44 ± 0.30)	$\times 10^{-5}$			1347
$\psi(2S)K^+$	(	6.24 ± 0.20)	$\times 10^{-4}$			1284
$\psi(2S)K^*(892)^+$	(	6.7 ± 1.4)	$\times 10^{-4}$		S=1.3	1116
$\psi(2S)K^+\pi^+\pi^-$	(	4.3 ± 0.5)	$\times 10^{-4}$			1179
$\psi(2S)\phi(1020)K^+$	(	4.0 ± 0.7)	$\times 10^{-6}$			418
$\psi(3770)K^+$	(	4.3 ± 1.1)	$\times 10^{-4}$			1218
$\psi(3770)K+,\psi \to D^0\overline{D}^0$	(	1.5 ± 0.5)	$\times 10^{-4}$		S=1.4	1218
$\psi(3770)K+,\psi \to D^+D^-$	(	9.4 ± 3.5)	$\times 10^{-5}$			1218
$\psi(3770)K^+,\ \psi \to p\overline{p}$	<	2	$\times 10^{-7}$		CL=95%	–
$\psi(4040)K^+$	<	1.3	$\times 10^{-4}$		CL=90%	1003
$\psi(4040)K^+,\ \psi \to D^+D^-$	(	1.1 ± 0.5)	$\times 10^{-5}$			–
$\psi(4160)K^+$	(	5.1 ± 2.7)	$\times 10^{-4}$			868
$\psi(4160)K^+,\ \psi \to \overline{D}^0D^0$	(	8 ± 5)	$\times 10^{-5}$			–
$\psi(4160)K^+,\ \psi \to D^+D^-$	(	1.5 ± 0.6)	$\times 10^{-5}$			–
$\psi(4415)K^+,\ \psi \to D^+D^-$	(	2.0 ± 0.8)	$\times 10^{-5}$			–
$\chi_{c0}\pi^+,\ \chi_{c0} \to \pi^+\pi^-$	<	1	$\times 10^{-7}$		CL=90%	1531
$\chi_{c0}K^+$	(	1.51 $^{+0.15}_{-0.13}$)	$\times 10^{-4}$			1478
$\chi_{c0}K^*(892)^+$	<	2.1	$\times 10^{-4}$		CL=90%	1341
$\chi_{c1}(1P)\pi^+$	(	2.2 ± 0.5)	$\times 10^{-5}$			1468
$\chi_{c1}(1P)K^+$	(	4.74 ± 0.22)	$\times 10^{-4}$			1412
$\chi_{c1}(1P)K^*(892)^+$	(	3.0 ± 0.6)	$\times 10^{-4}$		S=1.1	1265
$\chi_{c1}(1P)K^0\pi^+$	(	5.8 ± 0.4)	$\times 10^{-4}$			1370
$\chi_{c1}(1P)K^+\pi^0$	(	3.29 ± 0.35)	$\times 10^{-4}$			1373
$\chi_{c1}(1P)K^+\pi^+\pi^-$	(	3.74 ± 0.30)	$\times 10^{-4}$			1319
$\chi_{c1}(2P)K^+,\ \chi_{c1}(2P) \to \pi^+\pi^-\chi_{c1}(1P)$	<	1.1	$\times 10^{-5}$		CL=90%	–
$\chi_{c2}K^+$	(	1.1 ± 0.4)	$\times 10^{-5}$			1379
$\chi_{c2}K^+,\ \chi_{c2} \to p\overline{p}\pi^+\pi^-$	<	1.9	$\times 10^{-7}$			–
$\chi_{c2}K^*(892)^+$	<	1.2	$\times 10^{-4}$		CL=90%	1228
$\chi_{c2}K^0\pi^+$	(	1.16 ± 0.25)	$\times 10^{-4}$			1336
$\chi_{c2}K^+\pi^0$	<	6.2	$\times 10^{-5}$		CL=90%	1339
$\chi_{c2}K^+\pi^+\pi^-$	(	1.34 ± 0.19)	$\times 10^{-4}$			1284
$\chi_{c2}(3930)K^+,\ \chi_{c2} \to D^+D^-$	(	1.6 ± 0.6)	$\times 10^{-5}$			–
$\chi_{c2}(3930)\pi^+,\ \chi_{c2} \to \pi^+\pi^-$	<	1	$\times 10^{-7}$		CL=90%	1437
$h_c(1P)K^+$	(	3.7 ± 1.2)	$\times 10^{-5}$			1401
$h_c(1P)K^+,\ h_c \to p\overline{p}$	<	6.4	$\times 10^{-8}$		CL=95%	–

K or K^* modes

$K^0\pi^+$	(	2.37 ± 0.08)	$\times 10^{-5}$			2614
$K^+\pi^0$	(	1.29 ± 0.05)	$\times 10^{-5}$			2615
$\eta' K^+$	(	7.04 ± 0.25)	$\times 10^{-5}$			2528
$\eta' K^*(892)^+$	(	4.8 $^{+1.8}_{-1.6}$)	$\times 10^{-6}$			2472
$\eta' K_0^*(1430)^+$	(	5.2 ± 2.1)	$\times 10^{-6}$			–

$\eta' K_2^*(1430)^+$	(2.8 ± 0.5) $\times 10^{-5}$				2346
ηK^+	(2.4 ± 0.4) $\times 10^{-6}$			S=1.7	2588
$\eta K^*(892)^+$	(1.93 ± 0.16) $\times 10^{-5}$				2534
$\eta K_0^*(1430)^+$	(1.8 ± 0.4) $\times 10^{-5}$				–
$\eta K_2^*(1430)^+$	(9.1 ± 3.0) $\times 10^{-6}$				2414
$\eta(1295) K^+ \times$ B($\eta(1295) \to \eta\pi\pi$)	(2.9 $^{+0.8}_{-0.7}$) $\times 10^{-6}$				2455
$\eta(1405) K^+ \times$ B($\eta(1405) \to \eta\pi\pi$)	< 1.3		$\times 10^{-6}$	CL=90%	2425
$\eta(1405) K^+ \times$ B($\eta(1405) \to K^* K$)	< 1.2		$\times 10^{-6}$	CL=90%	2425
$\eta(1475) K^+ \times$ B($\eta(1475) \to K^* K$)	(1.38 $^{+0.21}_{-0.18}$) $\times 10^{-5}$				2407
$f_1(1285) K^+$	< 2.0		$\times 10^{-6}$	CL=90%	2458
$f_1(1420) K^+ \times$ B($f_1(1420) \to \eta\pi\pi$)	< 2.9		$\times 10^{-6}$	CL=90%	2420
$f_1(1420) K^+ \times$ B($f_1(1420) \to K^* K$)	< 4.1		$\times 10^{-6}$	CL=90%	2420
$\phi(1680) K^+ \times$ B($\phi(1680) \to K^* K$)	< 3.4		$\times 10^{-6}$	CL=90%	2344
$f_0(1500) K^+$	(3.7 ± 2.2) $\times 10^{-6}$				2398
ωK^+	(6.5 ± 0.4) $\times 10^{-6}$				2558
$\omega K^*(892)^+$	< 7.4		$\times 10^{-6}$	CL=90%	2503
$\omega (K\pi)_0^{*+}$	(2.8 ± 0.4) $\times 10^{-5}$				–
$\omega K_0^*(1430)^+$	(2.4 ± 0.5) $\times 10^{-5}$				–
$\omega K_2^*(1430)^+$	(2.1 ± 0.4) $\times 10^{-5}$				2379
$a_0(980)^+ K^0 \times$B($a_0(980)^+ \to \eta\pi^+$)	< 3.9		$\times 10^{-6}$	CL=90%	–
$a_0(980)^0 K^+ \times$B($a_0(980)^0 \to \eta\pi^0$)	< 2.5		$\times 10^{-6}$	CL=90%	–
$K^*(892)^0 \pi^+$	(1.01 ± 0.08) $\times 10^{-5}$				2562
$K^*(892)^+ \pi^0$	(6.8 ± 0.9) $\times 10^{-6}$				2563
$K^+ \pi^- \pi^+$	(5.10 ± 0.29) $\times 10^{-5}$				2609
$K^+ \pi^- \pi^+$ nonresonant	(1.63 $^{+0.21}_{-0.15}$) $\times 10^{-5}$				2609
$\omega(782) K^+$	(6 ± 9) $\times 10^{-6}$				2558
$K^+ f_0(980) \times$ B($f_0(980) \to \pi^+\pi^-$)	(9.4 $^{+1.0}_{-1.2}$) $\times 10^{-6}$				2522
$f_2(1270)^0 K^+$	(1.07 ± 0.27) $\times 10^{-6}$				–
$f_0(1370)^0 K^+ \times$ B($f_0(1370)^0 \to \pi^+\pi^-$)	< 1.07		$\times 10^{-5}$	CL=90%	–
$\rho^0(1450) K^+ \times$ B($\rho^0(1450) \to \pi^+\pi^-$)	< 1.17		$\times 10^{-5}$	CL=90%	–

$f_2'(1525)K^+\times$ B($f_2'(1525)\to\ \pi^+\pi^-$)	$<$	3.4			$\times10^{-6}$	CL=90%	2394
$K^+\rho^0$	(	3.7	$\pm$	0.5)	$\times10^{-6}$		2559
$K_0^*(1430)^0\pi^+$	(	3.9	$^{+\ 0.6}_{-\ 0.5}$	)	$\times10^{-5}$	S=1.4	2445
$K_2^*(1430)^0\pi^+$	(	5.6	$^{+\ 2.2}_{-\ 1.5}$	)	$\times10^{-6}$		2445
$K^*(1410)^0\pi^+$	$<$	4.5			$\times10^{-5}$	CL=90%	2448
$K^*(1680)^0\pi^+$	$<$	1.2			$\times10^{-5}$	CL=90%	2358
$K^+\pi^0\pi^0$	(	1.62	$\pm$	0.19)	$\times10^{-5}$		2610
$f_0(980)K^+\times$ B($f_0\to\ \pi^0\pi^0$)	(	2.8	$\pm$	0.8)	$\times10^{-6}$		2522
$K^-\pi^+\pi^+$	$<$	4.6			$\times10^{-8}$	CL=90%	2609
$K^-\pi^+\pi^+$ nonresonant	$<$	5.6			$\times10^{-5}$	CL=90%	2609
$K_1(1270)^0\pi^+$	$<$	4.0			$\times10^{-5}$	CL=90%	2489
$K_1(1400)^0\pi^+$	$<$	3.9			$\times10^{-5}$	CL=90%	2451
$K^0\pi^+\pi^0$	$<$	6.6			$\times10^{-5}$	CL=90%	2609
$K_0^*(1430)^+\pi^0$	(	1.19	$^{+\ 0.20}_{-\ 0.23}$	)	$\times10^{-5}$		–
$K^0\rho^+$	(	7.3	$^{+\ 1.0}_{-\ 1.2}$	)	$\times10^{-6}$		2558
$K^*(892)^+\pi^+\pi^-$	(	7.5	$\pm$	1.0)	$\times10^{-5}$		2557
$K^*(892)^+\rho^0$	(	4.6	$\pm$	1.1)	$\times10^{-6}$		2504
$K^*(892)^+f_0(980)$	(	4.2	$\pm$	0.7)	$\times10^{-6}$		2466
$a_1^+K^0$	(	3.5	$\pm$	0.7)	$\times10^{-5}$		–
$b_1^+K^0\times$ B($b_1^+\to\ \omega\pi^+$)	(	9.6	$\pm$	1.9)	$\times10^{-6}$		–
$K^*(892)^0\rho^+$	(	9.2	$\pm$	1.5)	$\times10^{-6}$		2504
$K_1(1400)^+\rho^0$	$<$	7.8			$\times10^{-4}$	CL=90%	2388
$K_2^*(1430)^+\rho^0$	$<$	1.5			$\times10^{-3}$	CL=90%	2381
$b_1^0K^+\times$ B($b_1^0\to\ \omega\pi^0$)	(	9.1	$\pm$	2.0)	$\times10^{-6}$		–
$b_1^+K^{*0}\times$ B($b_1^+\to\ \omega\pi^+$)	$<$	5.9			$\times10^{-6}$	CL=90%	–
$b_1^0K^{*+}\times$ B($b_1^0\to\ \omega\pi^0$)	$<$	6.7			$\times10^{-6}$	CL=90%	–
$K^+\overline{K}^0$	(	1.31	$\pm$	0.17)	$\times10^{-6}$	S=1.2	2593
$\overline{K}^0K^+\pi^0$	$<$	2.4			$\times10^{-5}$	CL=90%	2578
$K^+K_S^0K_S^0$	(	1.05	$\pm$	0.04)	$\times10^{-5}$		2521
$f_0(980)K^+,\ f_0\to\ K_S^0K_S^0$	(	1.47	$\pm$	0.33)	$\times10^{-5}$		–
$f_0(1710)K^+,\ f_0\to\ K_S^0K_S^0$	(	4.8	$^{+\ 4.0}_{-\ 2.6}$	)	$\times10^{-7}$		–
$K^+K_S^0K_S^0$ nonresonant	(	2.0	$\pm$	0.4)	$\times10^{-5}$		2521
$K_S^0K_S^0\pi^+$	$<$	5.1			$\times10^{-7}$	CL=90%	2577
$K^+K^-\pi^+$	(	5.2	$\pm$	0.4)	$\times10^{-6}$		2578
$K^+K^-\pi^+$ nonresonant	(	1.68	$\pm$	0.26)	$\times10^{-6}$		2578
$K^+\overline{K}^*(892)^0$	(	5.9	$\pm$	0.8)	$\times10^{-7}$		2540
$K^+\overline{K}_0^*(1430)^0$	(	3.8	$\pm$	1.3)	$\times10^{-7}$		2421
$\pi^+(K^+K^-)_{\ S-wave}$	(	8.5	$\pm$	0.9)	$\times10^{-7}$		2578
$K^+K^+\pi^-$	$<$	1.1			$\times10^{-8}$	CL=90%	2578

$K^+K^+\pi^-$ nonresonant	$<$	8.79			$\times 10^{-5}$	CL=90%	2578
$f_2'(1525)K^+$	(	1.8	$\pm$	0.5)	$\times 10^{-6}$	S=1.1	2394
$K^{*+}\pi^+K^-$	$<$	1.18			$\times 10^{-5}$	CL=90%	2524
$K^*(892)^+K^*(892)^0$	(	9.1	$\pm$	2.9)	$\times 10^{-7}$		2485
$K^{*+}K^+\pi^-$	$<$	6.1			$\times 10^{-6}$	CL=90%	2524
$K^+K^-K^+$	(	3.40	$\pm$	0.14)	$\times 10^{-5}$	S=1.4	2523
$K^+\phi$	(	8.8	$^+_-$	$^{0.7}_{0.6}$)	$\times 10^{-6}$	S=1.1	2516
$f_0(980)K^+\times$ B($f_0(980)\to K^+K^-$)	(	9.4	$\pm$	3.2)	$\times 10^{-6}$		2522
$a_2(1320)K^+\times$ B($a_2(1320)\to K^+K^-$)	$<$	1.1			$\times 10^{-6}$	CL=90%	2449
$X_0(1550)K^+\times$ B($X_0(1550)\to K^+K^-$)	(	4.3	$\pm$	0.7)	$\times 10^{-6}$		–
$\phi(1680)K^+\times$ B($\phi(1680)\to K^+K^-$)	$<$	8			$\times 10^{-7}$	CL=90%	2344
$f_0(1710)K^+\times$ B($f_0(1710)\to K^+K^-$)	(	1.1	$\pm$	0.6)	$\times 10^{-6}$		2336
$K^+K^-K^+$ nonresonant	(	2.38	$^+_-$	$^{0.28}_{0.50}$)	$\times 10^{-5}$		2523
$K^*(892)^+K^+K^-$	(	3.6	$\pm$	0.5)	$\times 10^{-5}$		2466
$K^*(892)^+\phi$	(	10.0	$\pm$	2.0)	$\times 10^{-6}$	S=1.7	2460
$\phi(K\pi)_0^{*+}$	(	8.3	$\pm$	1.6)	$\times 10^{-6}$		–
$\phi K_1(1270)^+$	(	6.1	$\pm$	1.9)	$\times 10^{-6}$		2380
$\phi K_1(1400)^+$	$<$	3.2			$\times 10^{-6}$	CL=90%	2339
$\phi K^*(1410)^+$	$<$	4.3			$\times 10^{-6}$	CL=90%	–
$\phi K_0^*(1430)^+$	(	7.0	$\pm$	1.6)	$\times 10^{-6}$		–
$\phi K_2^*(1430)^+$	(	8.4	$\pm$	2.1)	$\times 10^{-6}$		2332
$\phi K_2^*(1770)^+$	$<$	1.50			$\times 10^{-5}$	CL=90%	–
$\phi K_2^*(1820)^+$	$<$	1.63			$\times 10^{-5}$	CL=90%	–
$a_1^+K^{*0}$	$<$	3.6			$\times 10^{-6}$	CL=90%	–
$K^+\phi\phi$	(	4.2	$\pm$	0.8)	$\times 10^{-6}$	S=2.2	2306
$\eta'\eta'K^+$	$<$	2.5			$\times 10^{-5}$	CL=90%	2338
$\omega\phi K^+$	$<$	1.9			$\times 10^{-6}$	CL=90%	2374
$X(1812)K^+\times$ B($X\to\omega\phi$)	$<$	3.2			$\times 10^{-7}$	CL=90%	–
$K^*(892)^+\gamma$	(	3.92	$\pm$	0.22)	$\times 10^{-5}$	S=1.7	2564
$K_1(1270)^+\gamma$	(	4.4	$^+_-$	$^{0.7}_{0.6}$)	$\times 10^{-5}$		2491
$\eta K^+\gamma$	(	7.9	$\pm$	0.9)	$\times 10^{-6}$		2588
$\eta' K^+\gamma$	(	2.9	$^+_-$	$^{1.0}_{0.9}$)	$\times 10^{-6}$		2528
$\phi K^+\gamma$	(	2.7	$\pm$	0.4)	$\times 10^{-6}$	S=1.2	2516
$K^+\pi^-\pi^+\gamma$	(	2.58	$\pm$	0.15)	$\times 10^{-5}$	S=1.3	2609
$K^*(892)^0\pi^+\gamma$	(	2.33	$\pm$	0.12)	$\times 10^{-5}$		2562
$K^+\rho^0\gamma$	(	8.2	$\pm$	0.9)	$\times 10^{-6}$		2559

$(K^+\pi^-)_{\rm NR}\,\pi^+\gamma$	(	9.9	$^{+\ 1.7}_{-\ 2.0}$	$\times 10^{-6}$		2609
$K^0\pi^+\pi^0\gamma$	(	4.6	$\pm$ 0.5	$\times 10^{-5}$		2609
$K_1(1400)^+\gamma$	(	10	$^{+\ 5}_{-\ 4}$	$\times 10^{-6}$		2453
$K^*(1410)^+\gamma$	(	2.7	$^{+\ 0.8}_{-\ 0.6}$	$\times 10^{-5}$		–
$K_0^*(1430)^0\pi^+\gamma$	(	1.32	$^{+\ 0.26}_{-\ 0.32}$	$\times 10^{-6}$		2445
$K_2^*(1430)^+\gamma$	(	1.4	$\pm$ 0.4	$\times 10^{-5}$		2447
$K^*(1680)^+\gamma$	(	6.7	$^{+\ 1.7}_{-\ 1.4}$	$\times 10^{-5}$		2360
$K_3^*(1780)^+\gamma$	$<$	3.9		$\times 10^{-5}$	CL=90%	2340
$K_4^*(2045)^+\gamma$	$<$	9.9		$\times 10^{-3}$	CL=90%	2242

Light unflavored meson modes

$\rho^+\gamma$	(	9.8	$\pm$ 2.5	$\times 10^{-7}$		2583
$\pi^+\pi^0$	(	5.5	$\pm$ 0.4	$\times 10^{-6}$	S=1.2	2636
$\pi^+\pi^+\pi^-$	(	1.52	$\pm$ 0.14	$\times 10^{-5}$		2630
$\rho^0\pi^+$	(	8.3	$\pm$ 1.2	$\times 10^{-6}$		2581
$\pi^+ f_0(980),\ f_0 \to \pi^+\pi^-$	$<$	1.5		$\times 10^{-6}$	CL=90%	2545
$\pi^+ f_2(1270)$	(	2.2	$^{+\ 0.7}_{-\ 0.4}$	$\times 10^{-6}$		2484
$\rho(1450)^0\pi^+,\ \rho^0 \to \pi^+\pi^-$	(	1.4	$^{+\ 0.6}_{-\ 0.9}$	$\times 10^{-6}$		2434
$\rho(1450)^0\pi^+,\ \rho^0 \to K^+K^-$	(	1.60	$\pm$ 0.14	$\times 10^{-6}$		–
$f_0(1370)\pi^+,\ f_0 \to \pi^+\pi^-$	$<$	4.0		$\times 10^{-6}$	CL=90%	2460
$f_0(500)\pi^+,\ f_0 \to \pi^+\pi^-$	$<$	4.1		$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^-\pi^+$ nonresonant	(	5.3	$^{+\ 1.5}_{-\ 1.1}$	$\times 10^{-6}$		2630
$\pi^+\pi^0\pi^0$	$<$	8.9		$\times 10^{-4}$	CL=90%	2631
$\rho^+\pi^0$	(	1.09	$\pm$ 0.14	$\times 10^{-5}$		2581
$\pi^+\pi^-\pi^+\pi^0$	$<$	4.0		$\times 10^{-3}$	CL=90%	2622
$\rho^+\rho^0$	(	2.40	$\pm$ 0.19	$\times 10^{-5}$		2523
$\rho^+ f_0(980),\ f_0 \to \pi^+\pi^-$	$<$	2.0		$\times 10^{-6}$	CL=90%	2486
$a_1(1260)^+\pi^0$	(	2.6	$\pm$ 0.7	$\times 10^{-5}$		2494
$a_1(1260)^0\pi^+$	(	2.0	$\pm$ 0.6	$\times 10^{-5}$		2494
$\omega\pi^+$	(	6.9	$\pm$ 0.5	$\times 10^{-6}$		2580
$\omega\rho^+$	(	1.59	$\pm$ 0.21	$\times 10^{-5}$		2522
$\eta\pi^+$	(	4.02	$\pm$ 0.27	$\times 10^{-6}$		2609
$\eta\rho^+$	(	7.0	$\pm$ 2.9	$\times 10^{-6}$	S=2.8	2553
$\eta'\pi^+$	(	2.7	$\pm$ 0.9	$\times 10^{-6}$	S=1.9	2551
$\eta'\rho^+$	(	9.7	$\pm$ 2.2	$\times 10^{-6}$		2492
$\phi\pi^+$	(	3.2	$\pm$ 1.5	$\times 10^{-8}$		2539
$\phi\rho^+$	$<$	3.0		$\times 10^{-6}$	CL=90%	2480
$a_0(980)^0\pi^+,\ a_0^0 \to \eta\pi^0$	$<$	5.8		$\times 10^{-6}$	CL=90%	–
$a_0(980)^+\pi^0,\ a_0^+ \to \eta\pi^+$	$<$	1.4		$\times 10^{-6}$	CL=90%	–

$\pi^+\pi^+\pi^+\pi^-\pi^-$	$<$	8.6		$\times 10^{-4}$	CL=90%	2608
$\rho^0 a_1(1260)^+$	$<$	6.2		$\times 10^{-4}$	CL=90%	2433
$\rho^0 a_2(1320)^+$	$<$	7.2		$\times 10^{-4}$	CL=90%	2410
$b_1^0\pi^+,\ b_1^0 \to\ \omega\pi^0$	(	6.7	$\pm$ 2.0)	$\times 10^{-6}$		–
$b_1^+\pi^0,\ b_1^+ \to\ \omega\pi^+$	$<$	3.3		$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0$	$<$	6.3		$\times 10^{-3}$	CL=90%	2592
$b_1^+\rho^0,\ b_1^+ \to\ \omega\pi^+$	$<$	5.2		$\times 10^{-6}$	CL=90%	–
$a_1(1260)^+ a_1(1260)^0$	$<$	1.3		%	CL=90%	2336
$b_1^0\rho^+,\ b_1^0 \to\ \omega\pi^0$	$<$	3.3		$\times 10^{-6}$	CL=90%	–

Charged particle ($h^\pm$) modes

$h^\pm = K^\pm$ or $\pi^\pm$

$h^+\pi^0$	(	1.6	$^{+\ 0.7}_{-\ 0.6}$)	$\times 10^{-5}$		2636
ωh^+	(	1.38	$^{+\ 0.27}_{-\ 0.24}$)	$\times 10^{-5}$		2580
$h^+ X^0$(Familon)	$<$	4.9		$\times 10^{-5}$	CL=90%	–
$K^+ X^0,\ X^0 \to\ \mu^+\mu^-$	$<$	1		$\times 10^{-7}$	CL=95%	–

Baryon modes

$p\overline{p}\pi^+$	(	1.62	$\pm$ 0.20)	$\times 10^{-6}$		2439
$p\overline{p}\pi^+$ nonresonant	$<$	5.3		$\times 10^{-5}$	CL=90%	2439
$p\overline{p}\pi^+\pi^0$	(	4.6	$\pm$ 1.3)	$\times 10^{-6}$		2407
$p\overline{p}K^+$	(	5.9	$\pm$ 0.5)	$\times 10^{-6}$	S=1.5	2348
$\Theta(1710)^{++}\overline{p},\ \Theta^{++} \to\ pK^+$	[*ppp*] $<$	9.1		$\times 10^{-8}$	CL=90%	–
$f_J(2220)K^+,\ f_J \to\ p\overline{p}$	[*ppp*] $<$	4.1		$\times 10^{-7}$	CL=90%	2135
$p\overline{\Lambda}(1520)$	(	3.1	$\pm$ 0.6)	$\times 10^{-7}$		2322
$p\overline{p}K^+$ nonresonant	$<$	8.9		$\times 10^{-5}$	CL=90%	2348
$p\overline{p}K^*(892)^+$	(	3.6	$^{+\ 0.8}_{-\ 0.7}$)	$\times 10^{-6}$		2215
$f_J(2220)K^{*+},\ f_J \to\ p\overline{p}$	$<$	7.7		$\times 10^{-7}$	CL=90%	2059
$p\overline{\Lambda}$	(	2.4	$^{+\ 1.0}_{-\ 0.9}$)	$\times 10^{-7}$		2430
$p\overline{\Lambda}\gamma$	(	2.4	$^{+\ 0.5}_{-\ 0.4}$)	$\times 10^{-6}$		2430
$p\overline{\Lambda}\pi^0$	(	3.0	$^{+\ 0.7}_{-\ 0.6}$)	$\times 10^{-6}$		2402
$p\overline{\Sigma}(1385)^0$	$<$	4.7		$\times 10^{-7}$	CL=90%	2362
$\Delta^+\overline{\Lambda}$	$<$	8.2		$\times 10^{-7}$	CL=90%	–
$p\overline{\Sigma}\gamma$	$<$	4.6		$\times 10^{-6}$	CL=90%	2413
$p\overline{\Lambda}\pi^+\pi^-$	(	1.13	$\pm$ 0.13)	$\times 10^{-5}$		2367
$p\overline{\Lambda}\pi^+\pi^-$ nonresonant	(	5.9	$\pm$ 1.1)	$\times 10^{-6}$		2367
$p\overline{\Lambda}\rho^0,\ \rho^0 \to\ \pi^+\pi^-$	(	4.8	$\pm$ 0.9)	$\times 10^{-6}$		2214
$p\overline{\Lambda}f_2(1270),\ f_2 \to\ \pi^+\pi^-$	(	2.0	$\pm$ 0.8)	$\times 10^{-6}$		2026
$p\overline{\Lambda}K^+K^-$	(	4.1	$\pm$ 0.7)	$\times 10^{-6}$		2132

$p\overline{\Lambda}\phi$		(	8.0	$\pm$	2.2	) $\times 10^{-7}$		2119
$\overline{p}\Lambda K^+K^-$		(	3.7	$\pm$	0.6	) $\times 10^{-6}$		2132
$\Lambda\overline{\Lambda}\pi^+$		$<$	9.4			$\times 10^{-7}$	CL=90%	2358
$\Lambda\overline{\Lambda}K^+$		(	3.4	$\pm$	0.6	) $\times 10^{-6}$		2251
$\Lambda\overline{\Lambda}K^{*+}$		(	2.2	$^{+\ 1.2}_{-\ 0.9}$		) $\times 10^{-6}$		2098
$\Lambda(1520)\overline{\Lambda}K^+$		(	2.2	$\pm$	0.7	) $\times 10^{-6}$		2126
$\Lambda\overline{\Lambda}(1520)K^+$		$<$	2.08			$\times 10^{-6}$		2126
$\overline{\Delta}^0 p$		$<$	1.38			$\times 10^{-6}$	CL=90%	2403
$\Delta^{++}\overline{p}$		$<$	1.4			$\times 10^{-7}$	CL=90%	2403
$D^+ p\overline{p}$		$<$	1.5			$\times 10^{-5}$	CL=90%	1860
$D^*(2010)^+ p\overline{p}$		$<$	1.5			$\times 10^{-5}$	CL=90%	1786
$\overline{D}^0 p\overline{p}\pi^+$		(	3.72	$\pm$	0.27	) $\times 10^{-4}$		1789
$\overline{D}^{*0} p\overline{p}\pi^+$		(	3.73	$\pm$	0.32	) $\times 10^{-4}$		1709
$D^- p\overline{p}\pi^+\pi^-$		(	1.66	$\pm$	0.30	) $\times 10^{-4}$		1705
$D^{*-} p\overline{p}\pi^+\pi^-$		(	1.86	$\pm$	0.25	) $\times 10^{-4}$		1621
$p\overline{\Lambda}^0\overline{D}^0$		(	1.43	$\pm$	0.32	) $\times 10^{-5}$		–
$p\overline{\Lambda}^0\overline{D}^*(2007)^0$		$<$	5			$\times 10^{-5}$	CL=90%	–
$\overline{\Lambda}_c^- p\pi^+$		(	2.3	$\pm$	0.4	) $\times 10^{-4}$	S=2.2	1980
$\overline{\Lambda}_c^- \Delta(1232)^{++}$		$<$	1.9			$\times 10^{-5}$	CL=90%	1928
$\overline{\Lambda}_c^- \Delta_X(1600)^{++}$		(	4.7	$\pm$	1.0	) $\times 10^{-5}$		–
$\overline{\Lambda}_c^- \Delta_X(2420)^{++}$		(	3.7	$\pm$	0.8	) $\times 10^{-5}$		–
$(\overline{\Lambda}_c^- p)_s\pi^+$	[qqq]	(	3.1	$\pm$	0.7	) $\times 10^{-5}$		–
$\overline{\Sigma}_c(2520)^0 p$		$<$	3			$\times 10^{-6}$	CL=90%	1904
$\overline{\Sigma}_c(2800)^0 p$		(	2.6	$\pm$	0.9	) $\times 10^{-5}$		–
$\overline{\Lambda}_c^- p\pi^+\pi^0$		(	1.8	$\pm$	0.6	) $\times 10^{-3}$		1935
$\overline{\Lambda}_c^- p\pi^+\pi^+\pi^-$		(	2.2	$\pm$	0.7	) $\times 10^{-3}$		1880
$\overline{\Lambda}_c^- p\pi^+\pi^+\pi^-\pi^0$		$<$	1.34			%	CL=90%	1823
$\Lambda_c^+\Lambda_c^- K^+$		(	4.9	$\pm$	0.7	) $\times 10^{-4}$		739
$\Xi_c(2930)\Lambda_c^+,\ \Xi_c \to\ K^+\Lambda_c^-$		(	1.7	$\pm$	0.5	) $\times 10^{-4}$		–
$\overline{\Sigma}_c(2455)^0 p$		(	2.9	$\pm$	0.7	) $\times 10^{-5}$		1938
$\overline{\Sigma}_c(2455)^0 p\pi^0$		(	3.5	$\pm$	1.1	) $\times 10^{-4}$		1896
$\overline{\Sigma}_c(2455)^0 p\pi^-\pi^+$		(	3.5	$\pm$	1.1	) $\times 10^{-4}$		1845
$\overline{\Sigma}_c(2455)^{--} p\pi^+\pi^+$		(	2.37	$\pm$	0.20	) $\times 10^{-4}$		1845
$\overline{\Lambda}_c(2593)^-/\overline{\Lambda}_c(2625)^- p\pi^+$		$<$	1.9			$\times 10^{-4}$	CL=90%	–
$\overline{\Xi}_c^0\Lambda_c^+$		(	9.5	$\pm$	2.3	) $\times 10^{-4}$		1144
$\overline{\Xi}_c^0\Lambda_c^+,\ \overline{\Xi}_c^0 \to\ \overline{\Xi}^+\pi^-$		(	1.76	$\pm$	0.29	) $\times 10^{-5}$		1144
$\overline{\Xi}_c^0\Lambda_c^+,\ \overline{\Xi}_c^0 \to\ \Lambda K^+\pi^-$		(	1.14	$\pm$	0.26	) $\times 10^{-5}$		1144
$\overline{\Xi}_c^0\Lambda_c^+,\ \overline{\Xi}_c^0 \to\ pK^-K^-\pi^+$		(	5.5	$\pm$	1.9	) $\times 10^{-6}$		–
$\Lambda_c^+\overline{\Xi}_c'^0$		$<$	6.5			$\times 10^{-4}$	CL=90%	1023
$\Lambda_c^+\overline{\Xi}_c(2645)^0$		$<$	7.9			$\times 10^{-4}$	CL=90%	–
$\Lambda_c^+\overline{\Xi}_c(2790)^0$		(	1.1	$\pm$	0.4	) $\times 10^{-3}$		–

Lepton Family number (*LF*) or Lepton number (*L*) or Baryon number (*B*) violating modes, or/and $\Delta B = 1$ weak neutral current (*B1*) modes

$\pi^+ \ell^+ \ell^-$	*B1*		<	4.9		$\times 10^{-8}$	CL=90%	2638
$\pi^+ e^+ e^-$	*B1*		<	8.0		$\times 10^{-8}$	CL=90%	2638
$\pi^+ \mu^+ \mu^-$	*B1*		(	1.78	± 0.23)	$\times 10^{-8}$		2634
$\pi^+ \nu \overline{\nu}$	*B1*		<	1.4		$\times 10^{-5}$	CL=90%	2638
$K^+ \ell^+ \ell^-$	*B1*	[*iii*]	(	4.7	± 0.5)	$\times 10^{-7}$	S=2.3	2617
$K^+ e^+ e^-$	*B1*		(	5.6	± 0.6)	$\times 10^{-7}$		2617
$K^+ \mu^+ \mu^-$	*B1*		(	4.53	± 0.35)	$\times 10^{-7}$	S=1.8	2612
$K^+ \mu^+ \mu^-$ nonresonant	*B1*		(	4.37	± 0.27)	$\times 10^{-7}$		2612
$K^+ \tau^+ \tau^-$	*B1*		<	2.25		$\times 10^{-3}$	CL=90%	1687
$K^+ \overline{\nu} \nu$	*B1*		<	1.6		$\times 10^{-5}$	CL=90%	2617
$\rho^+ \nu \overline{\nu}$	*B1*		<	3.0		$\times 10^{-5}$	CL=90%	2583
$K^*(892)^+ \ell^+ \ell^-$	*B1*	[*iii*]	(	1.01	± 0.11)	$\times 10^{-6}$	S=1.1	2564
$K^*(892)^+ e^+ e^-$	*B1*		(	1.55	$^{+\ 0.40}_{-\ 0.31}$)	$\times 10^{-6}$		2564
$K^*(892)^+ \mu^+ \mu^-$	*B1*		(	9.6	± 1.0)	$\times 10^{-7}$		2560
$K^*(892)^+ \nu \overline{\nu}$	*B1*		<	4.0		$\times 10^{-5}$	CL=90%	2564
$K^+ \pi^+ \pi^- \mu^+ \mu^-$	*B1*		(	4.3	± 0.4)	$\times 10^{-7}$		2593
$\phi K^+ \mu^+ \mu^-$	*B1*		(	7.9	$^{+\ 2.1}_{-\ 1.7}$)	$\times 10^{-8}$		2490
$\overline{\Lambda} p \nu \overline{\nu}$			<	3.0		$\times 10^{-5}$	CL=90%	2430
$\pi^+ e^+ \mu^-$	*LF*		<	6.4		$\times 10^{-3}$	CL=90%	2637
$\pi^+ e^- \mu^+$	*LF*		<	6.4		$\times 10^{-3}$	CL=90%	2637
$\pi^+ e^\pm \mu^\mp$	*LF*		<	1.7		$\times 10^{-7}$	CL=90%	2637
$\pi^+ e^+ \tau^-$	*LF*		<	7.4		$\times 10^{-5}$	CL=90%	2338
$\pi^+ e^- \tau^+$	*LF*		<	2.0		$\times 10^{-5}$	CL=90%	2338
$\pi^+ e^\pm \tau^\mp$	*LF*		<	7.5		$\times 10^{-5}$	CL=90%	2338
$\pi^+ \mu^+ \tau^-$	*LF*		<	6.2		$\times 10^{-5}$	CL=90%	2334
$\pi^+ \mu^- \tau^+$	*LF*		<	4.5		$\times 10^{-5}$	CL=90%	2334
$\pi^+ \mu^\pm \tau^\mp$	*LF*		<	7.2		$\times 10^{-5}$	CL=90%	2334
$K^+ e^+ \mu^-$	*LF*		<	7.0		$\times 10^{-9}$	CL=90%	2616
$K^+ e^- \mu^+$	*LF*		<	6.4		$\times 10^{-9}$	CL=90%	2616
$K^+ e^\pm \mu^\mp$	*LF*		<	9.1		$\times 10^{-8}$	CL=90%	2616
$K^+ e^+ \tau^-$	*LF*		<	4.3		$\times 10^{-5}$	CL=90%	2312
$K^+ e^- \tau^+$	*LF*		<	1.5		$\times 10^{-5}$	CL=90%	2312
$K^+ e^\pm \tau^\mp$	*LF*		<	3.0		$\times 10^{-5}$	CL=90%	2312
$K^+ \mu^+ \tau^-$	*LF*		<	4.5		$\times 10^{-5}$	CL=90%	2298
$K^+ \mu^- \tau^+$	*LF*		<	2.8		$\times 10^{-5}$	CL=90%	2298
$K^+ \mu^\pm \tau^\mp$	*LF*		<	4.8		$\times 10^{-5}$	CL=90%	2298
$K^*(892)^+ e^+ \mu^-$	*LF*		<	1.3		$\times 10^{-6}$	CL=90%	2563
$K^*(892)^+ e^- \mu^+$	*LF*		<	9.9		$\times 10^{-7}$	CL=90%	2563
$K^*(892)^+ e^\pm \mu^\mp$	*LF*		<	1.4		$\times 10^{-6}$	CL=90%	2563
$\pi^- e^+ e^+$	*L*		<	2.3		$\times 10^{-8}$	CL=90%	2638

$\pi^- \mu^+ \mu^+$	L	$<$	4.0	$\times 10^{-9}$	CL=95%	2634
$\pi^- e^+ \mu^+$	L	$<$	1.5	$\times 10^{-7}$	CL=90%	2637
$\rho^- e^+ e^+$	L	$<$	1.7	$\times 10^{-7}$	CL=90%	2583
$\rho^- \mu^+ \mu^+$	L	$<$	4.2	$\times 10^{-7}$	CL=90%	2578
$\rho^- e^+ \mu^+$	L	$<$	4.7	$\times 10^{-7}$	CL=90%	2582
$K^- e^+ e^+$	L	$<$	3.0	$\times 10^{-8}$	CL=90%	2617
$K^- \mu^+ \mu^+$	L	$<$	4.1	$\times 10^{-8}$	CL=90%	2612
$K^- e^+ \mu^+$	L	$<$	1.6	$\times 10^{-7}$	CL=90%	2616
$K^*(892)^- e^+ e^+$	L	$<$	4.0	$\times 10^{-7}$	CL=90%	2564
$K^*(892)^- \mu^+ \mu^+$	L	$<$	5.9	$\times 10^{-7}$	CL=90%	2560
$K^*(892)^- e^+ \mu^+$	L	$<$	3.0	$\times 10^{-7}$	CL=90%	2563
$D^- e^+ e^+$	L	$<$	2.6	$\times 10^{-6}$	CL=90%	2309
$D^- e^+ \mu^+$	L	$<$	1.8	$\times 10^{-6}$	CL=90%	2307
$D^- \mu^+ \mu^+$	L	$<$	6.9	$\times 10^{-7}$	CL=95%	2303
$D^{*-} \mu^+ \mu^+$	L	$<$	2.4	$\times 10^{-6}$	CL=95%	2251
$D_s^- \mu^+ \mu^+$	L	$<$	5.8	$\times 10^{-7}$	CL=95%	2267
$\overline{D}{}^0 \pi^- \mu^+ \mu^+$	L	$<$	1.5	$\times 10^{-6}$	CL=95%	2295
$\Lambda^0 \mu^+$	L,B	$<$	6	$\times 10^{-8}$	CL=90%	–
$\Lambda^0 e^+$	L,B	$<$	3.2	$\times 10^{-8}$	CL=90%	–
$\overline{\Lambda}{}^0 \mu^+$	L,B	$<$	6	$\times 10^{-8}$	CL=90%	–
$\overline{\Lambda}{}^0 e^+$	L,B	$<$	8	$\times 10^{-8}$	CL=90%	–

B^0

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m_{B^0} = 5279.66 \pm 0.12$ MeV
$m_{B^0} - m_{B^\pm} = 0.32 \pm 0.05$ MeV
Mean life $\tau_{B^0} = (1.519 \pm 0.004) \times 10^{-12}$ s
$c\tau = 455.4$ μm
$\tau_{B^+}/\tau_{B^0} = 1.076 \pm 0.004$ (direct measurements)

B^0-$\overline{B}{}^0$ mixing parameters

χ_d (B^0-$\overline{B}{}^0$ mixing probability) $= 0.1858 \pm 0.0011$
$\Delta m_{B^0} = m_{B^0_H} - m_{B^0_L} = (0.5065 \pm 0.0019) \times 10^{12}$ $\hbar$ s^{-1}
$= (3.334 \pm 0.013) \times 10^{-10}$ MeV
$x_d = \Delta m_{B^0}/\Gamma_{B^0} = 0.769 \pm 0.004$
Re$(\lambda_{CP} \,/\, |\lambda_{CP}|)$ Re(z) $= 0.047 \pm 0.022$
$\Delta\Gamma$ Re(z) $= -0.007 \pm 0.004$ ps^{-1}
Re(z) $= (-4 \pm 4) \times 10^{-2}$ (S = 1.4)
Im(z) $= (-0.8 \pm 0.4) \times 10^{-2}$

CP violation parameters

$\mathrm{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2) = (-0.5 \pm 0.4) \times 10^{-3}$
$A_{T/CP}(B^0 \leftrightarrow \overline{B}^0) = 0.005 \pm 0.018$
$A_{CP}(B^0 \to\ D^*(2010)^+ D^-) = 0.013 \pm 0.014$
$A_{CP}(B^0 \to\ [K^+K^-]_D K^*(892)^0) = -0.05 \pm 0.10$
$A_{CP}(B^0 \to\ [K^+\pi^-]_D K^*(892)^0) = 0.047 \pm 0.029$
$A_{CP}(B^0 \to\ [K^+\pi^-\pi^+\pi^-]_D K^*(892)^0) = 0.037 \pm 0.034$
$A_{CP}(B^0 \to\ [K^-\pi^+]_D K^*(892)^0) = 0.19 \pm 0.19$
$A_{CP}(B^0 \to\ [K^-\pi^+\pi^+\pi^-]_D K^*(892)^0) = -0.01 \pm 0.24$
$R_d^+ = \Gamma(B^0 \to\ [\pi^+K^-]_D K^{*0}) \,/\, \Gamma(B^0 \to\ [\pi^-K^+]_D K^{*0}) = 0.064 \pm 0.021$
$R_d^- = \Gamma(\overline{B}^0 \to\ [\pi^-K^+]_D K^{*0}) \,/\, \Gamma(\overline{B}^0 \to\ [\pi^+K^-]_D K^{*0}) = 0.095 \pm 0.021$
$A_{CP}(B^0 \to\ [\pi^+\pi^-]_D K^*(892)^0) = -0.18 \pm 0.14$
$A_{CP}(B^0 \to\ [\pi^+\pi^-\pi^+\pi^-]_D K^*(892)^0) = -0.03 \pm 0.15$
$R_d^+ = \Gamma(B^0 \to\ [\pi^+K^-\pi^+\pi^-]_D K^{*0}) \,/\, \Gamma(B^0 \to [\pi^-K^+\pi^+\pi^-]_D K^{*0}) = 0.074 \pm 0.026$
$R_d^- = \Gamma(\overline{B}^0 \to\ [\pi^-K^+\pi^+\pi^-]_D K^{*0}) \,/\, \Gamma(\overline{B}^0 \to [\pi^+K^-\pi^+\pi^-]_D K^{*0}) = 0.072 \pm 0.025$
$\boldsymbol{A_{CP}\,(B^0 \to\ K^+\pi^-)} = -0.0834 \pm 0.0032$
$A_{CP}(B^0 \to\ \eta' K^*(892)^0) = -0.07 \pm 0.18$
$A_{CP}(B^0 \to\ \eta' K_0^*(1430)^0) = -0.19 \pm 0.17$
$A_{CP}(B^0 \to\ \eta' K_2^*(1430)^0) = 0.14 \pm 0.18$
$\boldsymbol{A_{CP}(B^0 \to\ \eta K^*(892)^0)} = 0.19 \pm 0.05$
$A_{CP}(B^0 \to\ \eta K_0^*(1430)^0) = 0.06 \pm 0.13$
$A_{CP}(B^0 \to\ \eta K_2^*(1430)^0) = -0.07 \pm 0.19$
$A_{CP}(B^0 \to\ b_1 K^+) = -0.07 \pm 0.12$
$A_{CP}(B^0 \to\ \omega K^{*0}) = 0.45 \pm 0.25$
$A_{CP}(B^0 \to\ \omega (K\pi)_0^{*0}) = -0.07 \pm 0.09$
$A_{CP}(B^0 \to\ \omega K_2^*(1430)^0) = -0.37 \pm 0.17$
$A_{CP}(B^0 \to\ K^+\pi^-\pi^0) = (0 \pm 6) \times 10^{-2}$
$A_{CP}(B^0 \to\ \rho^- K^+) = 0.20 \pm 0.11$
$A_{CP}(B^0 \to\ \rho(1450)^- K^+) = -0.10 \pm 0.33$
$A_{CP}(B^0 \to\ \rho(1700)^- K^+) = -0.4 \pm 0.6$
$A_{CP}(B^0 \to\ K^+\pi^-\pi^0 \text{ nonresonant}) = 0.10 \pm 0.18$
$A_{CP}(B^0 \to\ K^0\pi^+\pi^-) = -0.01 \pm 0.05$
$\boldsymbol{A_{CP}(B^0 \to\ K^*(892)^+\pi^-)} = -0.27 \pm 0.04$
$A_{CP}(B^0 \to\ (K\pi)_0^{*+}\pi^-) = 0.02 \pm 0.04$
$A_{CP}(B^0 \to\ K_2^*(1430)^+\pi^-) = -0.29 \pm 0.24$
$A_{CP}(B^0 \to\ K^*(1680)^+\pi^-) = -0.07 \pm 0.14$

$A_{CP}(B^0 \to\ f_0(980)K^0_S) = 0.28 \pm 0.31$
$A_{CP}(B^0 \to\ (K\pi)^{*0}_0\pi^0) = -0.15 \pm 0.11$
$A_{CP}(B^0 \to\ K^{*0}\pi^0) = -0.15 \pm 0.13$
$A_{CP}(B^0 \to\ K^*(892)^0\pi^+\pi^-) = 0.07 \pm 0.05$
$A_{CP}(B^0 \to\ K^*(892)^0\rho^0) = -0.06 \pm 0.09$
$A_{CP}(B^0 \to\ K^{*0}f_0(980)) = 0.07 \pm 0.10$
$A_{CP}(B^0 \to\ K^{*+}\rho^-) = 0.21 \pm 0.15$
$A_{CP}(B^0 \to\ K^*(892)^0K^+K^-) = 0.01 \pm 0.05$
$A_{CP}(B^0 \to\ a_1^-K^+) = -0.16 \pm 0.12$
$A_{CP}(B^0 \to\ K^0K^0) = -0.6 \pm 0.7$
$A_{CP}(B^0 \to\ K^*(892)^0\phi) = 0.00 \pm 0.04$
$A_{CP}(B^0 \to\ K^*(892)^0K^-\pi^+) = 0.2 \pm 0.4$
$A_{CP}(B^0 \to\ \phi(K\pi)^{*0}_0) = 0.12 \pm 0.08$
$A_{CP}(B^0 \to\ \phi K^*_2(1430)^0) = -0.11 \pm 0.10$
$A_{CP}(B^0 \to\ K^*(892)^0\gamma) = -0.006 \pm 0.011$
$A_{CP}(B^0 \to\ K^*_2(1430)^0\gamma) = -0.08 \pm 0.15$
$A_{CP}(B^0 \to\ X_s\gamma) = -0.009 \pm 0.018$
$A_{CP}(B^0 \to\ \rho^+\pi^-) = 0.13 \pm 0.06$ (S = 1.1)
$A_{CP}(B^0 \to\ \rho^-\pi^+) = -0.08 \pm 0.08$
$A_{CP}(B^0 \to\ a_1(1260)^\pm\pi^\mp) = -0.07 \pm 0.06$
$A_{CP}(B^0 \to\ b_1^-\pi^+) = -0.05 \pm 0.10$
$A_{CP}(B^0 \to\ p\overline{p}K^*(892)^0) = 0.05 \pm 0.12$
$A_{CP}(B^0 \to\ p\overline{\Lambda}\pi^-) = 0.04 \pm 0.07$
$A_{CP}(B^0 \to\ K^{*0}\ell^+\ell^-) = -0.05 \pm 0.10$
$A_{CP}(B^0 \to\ K^{*0}e^+e^-) = -0.21 \pm 0.19$
$A_{CP}(B^0 \to\ K^{*0}\mu^+\mu^-) = -0.034 \pm 0.024$
$C_{D^{*-}D^+}\ (B^0 \to\ D^*(2010)^-D^+) = -0.02 \pm 0.08$
$\boldsymbol{S_{D^{*-}D^+}\ (B^0 \to\ D^*(2010)^-D^+)} = -0.83 \pm 0.09$
$C_{D^{*+}D^-}\ (B^0 \to\ D^*(2010)^+D^-) = -0.03 \pm 0.09$ (S = 1.1)
$\boldsymbol{S_{D^{*+}D^-}\ (B^0 \to\ D^*(2010)^+D^-)} = -0.80 \pm 0.09$
$C_{D^{*+}D^{*-}}\ (B^0 \to\ D^{*+}D^{*-}) = 0.01 \pm 0.09$ (S = 1.6)
$\boldsymbol{S_{D^{*+}D^{*-}}\ (B^0 \to\ D^{*+}D^{*-})} = -0.59 \pm 0.14$ (S = 1.8)
$C_+\ (B^0 \to\ D^{*+}D^{*-}) = 0.00 \pm 0.10$ (S = 1.6)
$\boldsymbol{S_+\ (B^0 \to\ D^{*+}D^{*-})} = -0.73 \pm 0.09$
$C_-\ (B^0 \to\ D^{*+}D^{*-}) = 0.19 \pm 0.31$
$S_-\ (B^0 \to\ D^{*+}D^{*-}) = 0.1 \pm 1.6$ (S = 3.5)
$C\ (B^0 \to\ D^*(2010)^+D^*(2010)^-K^0_S) = 0.01 \pm 0.29$
$S\ (B^0 \to\ D^*(2010)^+D^*(2010)^-K^0_S) = 0.1 \pm 0.4$
$C_{D^+D^-}\ (B^0 \to\ D^+D^-) = -0.22 \pm 0.24$ (S = 2.5)
$\boldsymbol{S_{D^+D^-}\ (B^0 \to\ D^+D^-)} = -0.76^{+0.15}_{-0.13}$ (S = 1.2)
$C_{J/\psi(1S)\pi^0}\ (B^0 \to\ J/\psi(1S)\pi^0) = 0.03 \pm 0.17$ (S = 1.5)

$\boldsymbol{S_{J/\psi(1S)\pi^0}\ (B^0 \to\ J/\psi(1S)\pi^0)} = -0.88 \pm 0.32$ (S = 2.2)
$C(B^0 \to\ J/\psi(1S)\rho^0) = -0.06 \pm 0.06$
$\boldsymbol{S(B^0 \to\ J/\psi(1S)\rho^0)} = -0.66^{+0.16}_{-0.12}$
$C_{D^{(*)}_{CP}h^0}\ (B^0 \to\ D^{(*)}_{CP}h^0) = -0.02 \pm 0.08$
$\boldsymbol{S_{D^{(*)}_{CP}h^0}\ (B^0 \to\ D^{(*)}_{CP}h^0)} = -0.66 \pm 0.12$
$C_{K^0\pi^0}\ (B^0 \to\ K^0\pi^0) = 0.00 \pm 0.13$ (S = 1.4)
$\boldsymbol{S_{K^0\pi^0}\ (B^0 \to\ K^0\pi^0)} = 0.58 \pm 0.17$
$C_{\eta'(958)K^0_S}\ (B^0 \to\ \eta'(958)K^0_S) = -0.04 \pm 0.20$ (S = 2.5)
$S_{\eta'(958)K^0_S}\ (B^0 \to\ \eta'(958)K^0_S) = 0.43 \pm 0.17$ (S = 1.5)
$C_{\eta' K^0}\ (B^0 \to\ \eta' K^0) = -0.06 \pm 0.04$
$\boldsymbol{S_{\eta' K^0}\ (B^0 \to\ \eta' K^0)} = 0.63 \pm 0.06$
$C_{\omega K^0_S}\ (B^0 \to\ \omega K^0_S) = 0.0 \pm 0.4$ (S = 3.0)
$S_{\omega K^0_S}\ (B^0 \to\ \omega K^0_S) = 0.70 \pm 0.21$
$C\ (B^0 \to\ K^0_S\pi^0\pi^0) = -0.21 \pm 0.20$
$S\ (B^0 \to\ K^0_S\pi^0\pi^0) = 0.89^{+0.27}_{-0.30}$
$C_{\rho^0 K^0_S}\ (B^0 \to\ \rho^0 K^0_S) = -0.04 \pm 0.20$
$S_{\rho^0 K^0_S}\ (B^0 \to\ \rho^0 K^0_S) = 0.50^{+0.17}_{-0.21}$
$C_{f_0 K^0_S}\ (B^0 \to\ f_0(980)K^0_S) = 0.29 \pm 0.20$
$\boldsymbol{S_{f_0 K^0_S}\ (B^0 \to\ f_0(980)K^0_S)} = -0.50 \pm 0.16$
$S_{f_2 K^0_S}\ (B^0 \to\ f_2(1270)K^0_S) = -0.5 \pm 0.5$
$C_{f_2 K^0_S}\ (B^0 \to\ f_2(1270)K^0_S) = 0.3 \pm 0.4$
$S_{f_x K^0_S}\ (B^0 \to\ f_x(1300)K^0_S) = -0.2 \pm 0.5$
$C_{f_x K^0_S}\ (B^0 \to\ f_x(1300)K^0_S) = 0.13 \pm 0.35$
$S_{K^0\pi^+\pi^-}\ (B^0 \to\ K^0\pi^+\pi^-\text{nonresonant}) = -0.01 \pm 0.33$
$C_{K^0\pi^+\pi^-}\ (B^0 \to\ K^0\pi^+\pi^-\text{nonresonant}) = 0.01 \pm 0.26$
$C_{K^0_S K^0_S}\ (B^0 \to\ K^0_S K^0_S) = 0.0 \pm 0.4$ (S = 1.4)
$S_{K^0_S K^0_S}\ (B^0 \to\ K^0_S K^0_S) = -0.8 \pm 0.5$
$C_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{nonresonant}) = 0.06 \pm 0.08$
$\boldsymbol{S_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{nonresonant})} = -0.66 \pm 0.11$
$C_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{inclusive}) = 0.01 \pm 0.09$
$\boldsymbol{S_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{inclusive})} = -0.65 \pm 0.12$
$C_{\phi K^0_S}\ (B^0 \to\ \phi K^0_S) = 0.01 \pm 0.14$

$\boldsymbol{S_{\phi K^0_S}\ (B^0 \to\ \phi K^0_S)} = 0.59 \pm 0.14$
$C_{K_S K_S K_S}(B^0 \to\ K_S K_S K_S) = -0.14 \pm 0.12$
$S_{K_S K_S K_S}(B^0 \to\ K_S K_S K_S) = -0.82 \pm 0.17$
$C_{K^0_S \pi^0 \gamma}(B^0 \to\ K^0_S \pi^0 \gamma) = 0.36 \pm 0.33$
$S_{K^0_S \pi^0 \gamma}(B^0 \to\ K^0_S \pi^0 \gamma) = -0.8 \pm 0.6$
$C_{K^0_S \pi^+ \pi^- \gamma}(B^0 \to\ K^0_S \pi^+ \pi^- \gamma) = -0.39 \pm 0.20$
$S_{K^0_S \pi^+ \pi^- \gamma}(B^0 \to\ K^0_S \pi^+ \pi^- \gamma) = 0.14 \pm 0.25$
$C_{K^{*0}\gamma}\ (B^0 \to\ K^*(892)^0 \gamma) = -0.04 \pm 0.16$ (S = 1.2)
$S_{K^{*0}\gamma}\ (B^0 \to\ K^*(892)^0 \gamma) = -0.15 \pm 0.22$
$C_{\eta K^0 \gamma}\ (B^0 \to\ \eta K^0 \gamma) = 0.1 \pm 0.4$ (S = 1.4)
$S_{\eta K^0 \gamma}\ (B^0 \to\ \eta K^0 \gamma) = -0.5 \pm 0.5$ (S = 1.2)
$C_{K^0 \phi \gamma}\ (B^0 \to\ K^0 \phi \gamma) = -0.3 \pm 0.6$
$S_{K^0 \phi \gamma}\ (B^0 \to\ K^0 \phi \gamma) = 0.7^{+0.7}_{-1.1}$
$C(B^0 \to\ K^0_S \rho^0 \gamma) = -0.05 \pm 0.19$
$S(B^0 \to\ K^0_S \rho^0 \gamma) = -0.04 \pm 0.23$
$C\ (B^0 \to\ \rho^0 \gamma) = 0.4 \pm 0.5$
$S\ (B^0 \to\ \rho^0 \gamma) = -0.8 \pm 0.7$
$\boldsymbol{C_{\pi\pi}\ (B^0 \to\ \pi^+ \pi^-)} = -0.314 \pm 0.030$
$\boldsymbol{S_{\pi\pi}\ (B^0 \to\ \pi^+ \pi^-)} = -0.670 \pm 0.030$
$C_{\pi^0 \pi^0}(B^0 \to\ \pi^0 \pi^0) = -0.33 \pm 0.22$
$C_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-) = -0.03 \pm 0.07$ (S = 1.2)
$S_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-) = 0.05 \pm 0.07$
$\boldsymbol{\Delta C_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-)} = 0.27 \pm 0.06$
$\Delta S_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-) = 0.01 \pm 0.08$
$C_{\rho^0 \pi^0}\ (B^0 \to\ \rho^0 \pi^0) = 0.27 \pm 0.24$
$S_{\rho^0 \pi^0}\ (B^0 \to\ \rho^0 \pi^0) = -0.23 \pm 0.34$
$C_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = -0.05 \pm 0.11$
$S_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = -0.2 \pm 0.4$ (S = 3.2)
$\boldsymbol{\Delta C_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-)} = 0.43 \pm 0.14$ (S = 1.3)
$\Delta S_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = -0.11 \pm 0.12$
$C\ (B^0 \to\ b_1^- K^+) = -0.22 \pm 0.24$
$\boldsymbol{\Delta C\ (B^0 \to\ b_1^- \pi^+)} = -1.04 \pm 0.24$
$C_{\rho^0 \rho^0}\ (B^0 \to\ \rho^0 \rho^0) = 0.2 \pm 0.9$
$S_{\rho^0 \rho^0}\ (B^0 \to\ \rho^0 \rho^0) = 0.3 \pm 0.7$
$C_{\rho\rho}\ (B^0 \to\ \rho^+ \rho^-) = 0.00 \pm 0.09$
$S_{\rho\rho}\ (B^0 \to\ \rho^+ \rho^-) = -0.14 \pm 0.13$
$\left|\lambda\right|\ (B^0 \to\ J/\psi K^*(892)^0) < 0.25$, CL = 95%

$\cos 2\beta\ (B^0 \to\ J/\psi K^*(892)^0) = 1.7^{+0.7}_{-0.9}$ (S = 1.6)
$\cos 2\beta\ (B^0 \to\ [K^0_S\pi^+\pi^-]_{D^{(*)}}\ h^0) = 0.91 \pm 0.25$
$(S_+ + S_-)/2\ (B^0 \to\ D^{*-}\pi^+) = -0.039 \pm 0.011$
$(S_- - S_+)/2\ (B^0 \to\ D^{*-}\pi^+) = -0.009 \pm 0.015$
$(S_+ + S_-)/2\ (B^0 \to\ D^-\pi^+) = -0.046 \pm 0.023$
$(S_- - S_+)/2\ (B^0 \to\ D^-\pi^+) = -0.022 \pm 0.021$
$S_+\ (B^0 \to\ D^-\pi^+) = 0.058 \pm 0.023$
$S_-\ (B^0 \to\ D^+\pi^-) = 0.038 \pm 0.021$
$(S_+ + S_-)/2\ (B^0 \to\ D^-\rho^+) = -0.024 \pm 0.032$
$(S_- - S_+)/2\ (B^0 \to\ D^-\rho^+) = -0.10 \pm 0.06$
$C_{\eta_c K^0_S}\ (B^0 \to\ \eta_c K^0_S) = 0.08 \pm 0.13$
$S_{\eta_c K^0_S}\ (B^0 \to\ \eta_c K^0_S) = 0.93 \pm 0.17$
$C_{c\overline{c}K^{(*)0}}\ (B^0 \to\ c\overline{c}K^{(*)0}) = (-0.5 \pm 1.5) \times 10^{-2}$
$\sin(2\beta) = 0.699 \pm 0.017$
$C_{J/\psi(\mathrm{nS})K^0}\ (B^0 \to\ J/\psi(\mathrm{nS})K^0) = (-0.8 \pm 1.7) \times 10^{-2}$
$S_{J/\psi(\mathrm{nS})K^0}\ (B^0 \to\ J/\psi(\mathrm{nS})K^0) = 0.701 \pm 0.017$
$C_{J/\psi K^{*0}}\ (B^0 \to\ J/\psi K^{*0}) = 0.03 \pm 0.10$
$S_{J/\psi K^{*0}}\ (B^0 \to\ J/\psi K^{*0}) = 0.60 \pm 0.25$
$C_{\chi_{c0}K^0_S}\ (B^0 \to\ \chi_{c0}K^0_S) = -0.3^{+0.5}_{-0.4}$
$S_{\chi_{c0}K^0_S}\ (B^0 \to\ \chi_{c0}K^0_S) = -0.7 \pm 0.5$
$C_{\chi_{c1}K^0_S}\ (B^0 \to\ \chi_{c1}K^0_S) = 0.06 \pm 0.07$
$S_{\chi_{c1}K^0_S}\ (B^0 \to\ \chi_{c1}K^0_S) = 0.63 \pm 0.10$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ \phi K^0) = 0.22 \pm 0.30$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ \phi K^*_0(1430)^0) = 0.97^{+0.03}_{-0.52}$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ K^+K^-K^0_S) = 0.77^{+0.13}_{-0.12}$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ [K^0_S\pi^+\pi^-]_{D^{(*)}}\ h^0) = 0.80 \pm 0.16$
$\beta_{\mathrm{eff}}(B^0 \to\ [K^0_S\pi^+\pi^-]_{D^{(*)}}\ h^0) = (22 \pm 5)^\circ$
$2\beta_{\mathrm{eff}}(B^0 \to\ J/\psi\rho^0) = (42^{+10}_{-11})^\circ$
$|\lambda|\ (B^0 \to\ [K^0_S\pi^+\pi^-]_{D^{(*)}}\ h^0) = 1.01 \pm 0.08$
$|\sin(2\beta+\gamma)| > 0.40$, CL = 90%
$2\ \beta + \gamma = (83 \pm 60)^\circ$
$\alpha = (85.2^{+4.8}_{-4.3})^\circ$
$x_+(B^0 \to\ DK^{*0}) = 0.04 \pm 0.17$
$x_-(B^0 \to\ DK^{*0}) = -0.16 \pm 0.14$
$y_+(B^0 \to\ DK^{*0}) = -0.68 \pm 0.22$
$y_-(B^0 \to\ DK^{*0}) = 0.20 \pm 0.25$ (S = 1.2)
$r_{B^0}(B^0 \to\ DK^{*0}) = 0.257^{+0.021}_{-0.023}$
$\delta_{B^0}(B^0 \to\ DK^{*0}) = (194.1^{+9.6}_{-8.8})^\circ$

$\overline{B}^0$ modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing. Modes which do not identify the charge state of the B are listed in the $B^{\pm}/B^0$ ADMIXTURE section.

The branching fractions listed below assume 50% $B^0\overline{B}^0$ and 50% B^+B^- production at the $\Upsilon(4S)$. We have attempted to bring older measurements up to date by rescaling their assumed $\Upsilon(4S)$ production ratio to 50:50 and their assumed D, D_s, D^*, and ψ branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

For inclusive branching fractions, *e.g.*, $B \to D^{\pm} X$, the values usually are multiplicities, not branching fractions. They can be greater than one.

B^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\ell^+ \nu_\ell X$	[*iii*]	(10.33 ± 0.28) %		–
$e^+ \nu_e X_c$		(10.1 ± 0.4) %		–
$\ell^+ \nu_\ell X_u$		(1.51 ± 0.19) × 10^{-3}		–
$D \ell^+ \nu_\ell X$		(9.3 ± 0.8) %		–
$D^- \ell^+ \nu_\ell$	[*iii*]	(2.24 ± 0.09) %		2309
$D^- \tau^+ \nu_\tau$		(1.05 ± 0.23) %		1909
$D^*(2010)^- \ell^+ \nu_\ell$	[*iii*]	(4.97 ± 0.12) %		2257
$D^*(2010)^- \tau^+ \nu_\tau$		(1.58 ± 0.09) %	S=1.1	1838
$\overline{D}^0 \pi^- \ell^+ \nu_\ell$		(4.1 ± 0.5) × 10^{-3}		2308
$D_0^*(2300)^- \ell^+ \nu_\ell$, $D_0^{*-} \to \overline{D}^0 \pi^-$		(3.0 ± 1.2) × 10^{-3}	S=1.8	–
$D_2^*(2460)^- \ell^+ \nu_\ell$, $D_2^{*-} \to \overline{D}^0 \pi^-$		(1.21 ± 0.33) × 10^{-3}	S=1.8	2065
$\overline{D}^{(*)} \mathrm{n}\pi \ell^+ \nu_\ell (\mathrm{n} \geq 1)$		(2.3 ± 0.5) %		–
$\overline{D}^{*0} \pi^- \ell^+ \nu_\ell$		(5.8 ± 0.8) × 10^{-3}	S=1.4	2256
$D_1(2420)^- \ell^+ \nu_\ell$, $D_1^- \to \overline{D}^{*0} \pi^-$		(2.80 ± 0.28) × 10^{-3}		–
$D_1'(2430)^- \ell^+ \nu_\ell$, $D_1'^- \to \overline{D}^{*0} \pi^-$		(3.1 ± 0.9) × 10^{-3}		–
$D_2^*(2460)^- \ell^+ \nu_\ell$, $D_2^{*-} \to \overline{D}^{*0} \pi^-$		(6.8 ± 1.2) × 10^{-4}		2065
$D^- \pi^+ \pi^- \ell^+ \nu_\ell$		(1.3 ± 0.5) × 10^{-3}		2299
$D^{*-} \pi^+ \pi^- \ell^+ \nu_\ell$		(1.4 ± 0.5) × 10^{-3}		2247
$\rho^- \ell^+ \nu_\ell$	[*iii*]	(2.94 ± 0.21) × 10^{-4}		2583
$\pi^- \ell^+ \nu_\ell$	[*iii*]	(1.50 ± 0.06) × 10^{-4}		2638
$\pi^- \tau^+ \nu_\tau$		< 2.5 × 10^{-4}	CL=90%	2339

Inclusive modes

$K^\pm X$	(78 ± 8) %		–
$D^0 X$	(8.1 ± 1.5) %		–
$\overline{D}{}^0 X$	(47.4 ± 2.8) %		–
$D^+ X$	< 3.9 %	CL=90%	–
$D^- X$	(36.9 ± 3.3) %		–
$D_s^+ X$	(10.3 $^{+\ 2.1}_{-\ 1.8}$) %		–
$D_s^- X$	< 2.6 %	CL=90%	–
$\Lambda_c^+ X$	< 3.1 %	CL=90%	–
$\overline{\Lambda}{}_c^- X$	(5.0 $^{+\ 2.1}_{-\ 1.5}$) %		–
$\overline{c} X$	(95 ± 5) %		–
$c X$	(24.6 ± 3.1) %		–
$\overline{c}/c X$	(119 ± 6) %		–

D, D^*, or D_s modes

$D^-\pi^+$	(2.51± 0.08) $\times 10^{-3}$		2306
$D^-\rho^+$	(7.6 ± 1.2) $\times 10^{-3}$		2235
$D^- K^0\pi^+$	(4.9 ± 0.9) $\times 10^{-4}$		2259
$D^- K^*(892)^+$	(4.5 ± 0.7) $\times 10^{-4}$		2211
$D^-\omega\pi^+$	(2.8 ± 0.6) $\times 10^{-3}$		2204
$D^- K^+$	(2.05± 0.08) $\times 10^{-4}$		2279
$D^- K^+\pi^+\pi^-$	(3.5 ± 0.8) $\times 10^{-4}$		2236
$D^- K^+\overline{K}{}^0$	< 3.1 $\times 10^{-4}$	CL=90%	2188
$D^- K^+\overline{K}{}^*(892)^0$	(8.8 ± 1.9) $\times 10^{-4}$		2070
$\overline{D}{}^0\pi^+\pi^-$	(8.8 ± 0.5) $\times 10^{-4}$		2301
$D^*(2010)^-\pi^+$	(2.74± 0.13) $\times 10^{-3}$		2255
$\overline{D}{}^0 K^+ K^-$	(6.1 ± 0.5) $\times 10^{-5}$		2191
$D^-\pi^+\pi^+\pi^-$	(6.0 ± 0.6) $\times 10^{-3}$		2287
($D^-\pi^+\pi^+\pi^-$) nonresonant	(3.9 ± 1.9) $\times 10^{-3}$		2287
$D^-\pi^+\rho^0$	(1.1 ± 1.0) $\times 10^{-3}$		2206
$D^- a_1(1260)^+$	(6.0 ± 3.3) $\times 10^{-3}$		2121
$D^*(2010)^-\pi^+\pi^0$	(1.5 ± 0.5) %		2248
$D^*(2010)^-\rho^+$	(6.8 ± 0.9) $\times 10^{-3}$		2180
$D^*(2010)^- K^+$	(2.12± 0.15) $\times 10^{-4}$		2226
$D^*(2010)^- K^0\pi^+$	(3.0 ± 0.8) $\times 10^{-4}$		2205
$D^*(2010)^- K^*(892)^+$	(3.3 ± 0.6) $\times 10^{-4}$		2155
$D^*(2010)^- K^+\overline{K}{}^0$	< 4.7 $\times 10^{-4}$	CL=90%	2131
$D^*(2010)^- K^+\overline{K}{}^*(892)^0$	(1.29± 0.33) $\times 10^{-3}$		2007
$D^*(2010)^-\pi^+\pi^+\pi^-$	(7.21± 0.29) $\times 10^{-3}$		2235
($D^*(2010)^-\pi^+\pi^+\pi^-$) non-resonant	(0.0 ± 2.5) $\times 10^{-3}$		2235
$D^*(2010)^-\pi^+\rho^0$	(5.7 ± 3.2) $\times 10^{-3}$		2150
$D^*(2010)^- a_1(1260)^+$	(1.30± 0.27) %		2061

$\overline{D}_1(2420)^0\pi^-\pi^+,\ \overline{D}_1^0\to D^{*-}\pi^+$		$(\ 1.47\pm\ 0.35)\times10^{-4}$			–
$D^*(2010)^-K^+\pi^-\pi^+$		$(\ 4.7\ \pm\ 0.4\ )\times10^{-4}$			2181
$D^*(2010)^-\pi^+\pi^+\pi^-\pi^0$		$(\ 1.76\pm\ 0.27)$ %			2218
$D^{*-}3\pi^+2\pi^-$		$(\ 4.7\ \pm\ 0.9\ )\times10^{-3}$			2195
$D^*(2010)^-\omega\pi^+$		$(\ 2.46\pm\ 0.18)\times10^{-3}$		S=1.2	2148
$\overline{D}_1(2430)^0\omega,\ \overline{D}_1^0\to D^{*-}\pi^+$		$(\ 2.7\ {}^{+\ 0.8}_{-\ 0.4}\ )\times10^{-4}$			1992
$D^{*-}\rho(1450)^+,\ \rho^+\to\ \omega\pi^+$		$(\ 1.07{}^{+\ 0.40}_{-\ 0.34})\times10^{-3}$			–
$\overline{D}_1(2420)^0\omega,\ \overline{D}_1^0\to D^{*-}\pi^+$		$(\ 7.0\ \pm\ 2.2\ )\times10^{-5}$			1995
$\overline{D}_2^*(2460)^0\omega,\ \overline{D}_2^0\to D^{*-}\pi^+$		$(\ 4.0\ \pm\ 1.4\ )\times10^{-5}$			1975
$D^{*-}b_1(1235)^+,\ b_1^+\to\omega\pi^+$		$<\ 7$	$\times10^{-5}$	CL=90%	–
$\overline{D}^{**-}\pi^+$	[nnn]	$(\ 1.9\ \pm\ 0.9\ )\times10^{-3}$			–
$D_1(2420)^-\pi^+,\ D_1^-\to D^-\pi^+\pi^-$		$(\ 9.9\ {}^{+\ 2.0}_{-\ 2.5}\ )\times10^{-5}$			–
$D_1(2420)^-\pi^+,\ D_1^-\to D^{*-}\pi^+\pi^-$		$<\ 3.3$	$\times10^{-5}$	CL=90%	–
$\overline{D}_2^*(2460)^-\pi^+,\ (D_2^*)^-\to D^0\pi^-$		$(\ 2.38\pm\ 0.16)\times10^{-4}$			2062
$\overline{D}_0^*(2400)^-\pi^+,\ (D_0^*)^-\to D^0\pi^-$		$(\ 7.6\ \pm\ 0.8\ )\times10^{-5}$			2090
$D_2^*(2460)^-\pi^+,\ (D_2^*)^-\to D^{*-}\pi^+\pi^-$		$<\ 2.4$	$\times10^{-5}$	CL=90%	–
$\overline{D}_2^*(2460)^-\rho^+$		$<\ 4.9$	$\times10^{-3}$	CL=90%	1974
$D^0\overline{D}^0$		$(\ 1.4\ \pm\ 0.7\ )\times10^{-5}$			1868
$D^{*0}\overline{D}^0$		$<\ 2.9$	$\times10^{-4}$	CL=90%	1794
D^-D^+		$(\ 2.11\pm\ 0.18)\times10^{-4}$			1864
$D^\pm D^{*\mp}$ (CP-averaged)		$(\ 6.1\ \pm\ 0.6\ )\times10^{-4}$			–
$D^-D_s^+$		$(\ 7.2\ \pm\ 0.8\ )\times10^{-3}$			1812
$D^*(2010)^-D_s^+$		$(\ 8.0\ \pm\ 1.1\ )\times10^{-3}$			1735
$D^-D_s^{*+}$		$(\ 7.4\ \pm\ 1.6\ )\times10^{-3}$			1732
$D^*(2010)^-D_s^{*+}$		$(\ 1.77\pm\ 0.14)$ %			1649
$D_{s0}(2317)^-K^+,\ D_{s0}^-\to D_s^-\pi^0$		$(\ 4.2\ \pm\ 1.4\ )\times10^{-5}$			2097
$D_{s0}(2317)^-\pi^+,\ D_{s0}^-\to D_s^-\pi^0$		$<\ 2.5$	$\times10^{-5}$	CL=90%	2128
$D_{sJ}(2457)^-K^+,\ D_{sJ}^-\to D_s^-\pi^0$		$<\ 9.4$	$\times10^{-6}$	CL=90%	–

$D_{sJ}(2457)^-\pi^+$, $D_{sJ}^- \to D_s^-\pi^0$	$<$	4.0	$\times 10^{-6}$	CL=90%	–
$D_s^- D_s^+$	$<$	3.6	$\times 10^{-5}$	CL=90%	1759
$D_s^{*-} D_s^+$	$<$	1.3	$\times 10^{-4}$	CL=90%	1674
$D_s^{*-} D_s^{*+}$	$<$	2.4	$\times 10^{-4}$	CL=90%	1583
$D_{s0}^*(2317)^+ D^-$, $D_{s0}^{*+} \to D_s^+\pi^0$	(	1.06 ± 0.16)	$\times 10^{-3}$	S=1.1	1602
$D_{s0}(2317)^+ D^-$, $D_{s0}^+ \to D_s^{*+}\gamma$	$<$	9.5	$\times 10^{-4}$	CL=90%	–
$D_{s0}(2317)^+ D^*(2010)^-$, $D_{s0}^+ \to D_s^+\pi^0$	(	1.5 ± 0.6)	$\times 10^{-3}$		1509
$D_{sJ}(2457)^+ D^-$	(	3.5 ± 1.1)	$\times 10^{-3}$		–
$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^+\gamma$	(	$6.5\ ^{+\ 1.7}_{-\ 1.4}$)	$\times 10^{-4}$		–
$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^{*+}\gamma$	$<$	6.0	$\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^+\pi^+\pi^-$	$<$	2.0	$\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^+\pi^0$	$<$	3.6	$\times 10^{-4}$	CL=90%	–
$D^*(2010)^- D_{sJ}(2457)^+$	(	9.3 ± 2.2)	$\times 10^{-3}$		–
$D_{sJ}(2457)^+ D^*(2010)$, $D_{sJ}^+ \to D_s^+\gamma$	(	$2.3\ ^{+\ 0.9}_{-\ 0.7}$)	$\times 10^{-3}$		–
$D^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0}K^+ + D^{*+}K^0$	(	2.8 ± 0.7)	$\times 10^{-4}$		1444
$D^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0}K^+$	(	1.7 ± 0.6)	$\times 10^{-4}$		1444
$D^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*+}K^0$	(	2.6 ± 1.1)	$\times 10^{-4}$		1444
$D^*(2010)^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0}K^+ + D^{*+}K^0$	(	5.0 ± 1.4)	$\times 10^{-4}$		1336
$D^*(2010)^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0}K^+$	(	3.3 ± 1.1)	$\times 10^{-4}$		1336
$D^{*-} D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*+}K^0$	(	5.0 ± 1.7)	$\times 10^{-4}$		1336
$D^- D_{sJ}(2573)^+$, $D_{sJ}^+ \to D^0K^+$	(	3.4 ± 1.8)	$\times 10^{-5}$		1414
$D^*(2010)^- D_{sJ}(2573)^+$, $D_{sJ}^+ \to D^0K^+$	$<$	2	$\times 10^{-4}$	CL=90%	1304

$D^- D_{sJ}(2700)^+$, $D_{sJ}^+ \to D^0 K^+$	(7.1 ± 1.2) × 10^{-4}			–
$D^+ \pi^-$	(7.3 ± 1.2) × 10^{-7}			2306
$D_s^+ \pi^-$	(2.03± 0.18) × 10^{-5}			2270
$D_s^{*+} \pi^-$	(2.1 ± 0.4) × 10^{-5}	S=1.4		2215
$D_s^+ \rho^-$	< 2.4 × 10^{-5}	CL=90%		2197
$D_s^{*+} \rho^-$	(4.1 ± 1.3) × 10^{-5}			2138
$D_s^+ a_0^-$	< 1.9 × 10^{-5}	CL=90%		–
$D_s^{*+} a_0^-$	< 3.6 × 10^{-5}	CL=90%		–
$D_s^+ a_1(1260)^-$	< 2.1 × 10^{-3}	CL=90%		2080
$D_s^{*+} a_1(1260)^-$	< 1.7 × 10^{-3}	CL=90%		2015
$D_s^+ a_2^-$	< 1.9 × 10^{-4}	CL=90%		–
$D_s^{*+} a_2^-$	< 2.0 × 10^{-4}	CL=90%		–
$D_s^- K^+$	(2.7 ± 0.5) × 10^{-5}	S=2.7		2242
$D_s^{*-} K^+$	(2.19± 0.30) × 10^{-5}			2185
$D_s^- K^*(892)^+$	(3.5 ± 1.0) × 10^{-5}			2172
$D_s^{*-} K^*(892)^+$	($3.2 \,^{+\,1.5}_{-\,1.3}$) × 10^{-5}			2112
$D_s^- \pi^+ K^0$	(9.7 ± 1.4) × 10^{-5}			2222
$D_s^{*-} \pi^+ K^0$	< 1.10 × 10^{-4}	CL=90%		2164
$D_s^- K^+ \pi^+ \pi^-$	(1.7 ± 0.5) × 10^{-4}			2198
$D_s^- \pi^+ K^*(892)^0$	< 3.0 × 10^{-3}	CL=90%		2138
$D_s^{*-} \pi^+ K^*(892)^0$	< 1.6 × 10^{-3}	CL=90%		2076
$\overline{D}{}^0 K^0$	(5.2 ± 0.7) × 10^{-5}			2280
$\overline{D}{}^0 K^+ \pi^-$	(8.8 ± 1.7) × 10^{-5}			2261
$\overline{D}{}^0 K^*(892)^0$	(4.5 ± 0.6) × 10^{-5}			2213
$\overline{D}{}^0 K^*(1410)^0$	< 6.7 × 10^{-5}	CL=90%		2062
$\overline{D}{}^0 K_0^*(1430)^0$	(7 ± 7) × 10^{-6}			2058
$\overline{D}{}^0 K_2^*(1430)^0$	(2.1 ± 0.9) × 10^{-5}			2057
$D_0^*(2300)^- K^+$, $D_0^{*-} \to \overline{D}{}^0 \pi^-$	(1.9 ± 0.9) × 10^{-5}			–
$D_2^*(2460)^- K^+$, $D_2^{*-} \to \overline{D}{}^0 \pi^-$	(2.03± 0.35) × 10^{-5}			2029
$D_3^*(2760)^- K^+$, $D_3^{*-} \to \overline{D}{}^0 \pi^-$	< 1.0 × 10^{-6}	CL=90%		–
$\overline{D}{}^0 K^+ \pi^-$ nonresonant	< 3.7 × 10^{-5}	CL=90%		2261
$[K^+ K^-]_D K^*(892)^0$	(4.2 ± 0.7) × 10^{-5}			–
$[\pi^+ \pi^-]_D K^*(892)^0$	(6.0 ± 1.1) × 10^{-5}			–
$[\pi^+ \pi^- \pi^+ \pi^-]_D K^{*0}$	(4.6 ± 0.9) × 10^{-5}			–
$\overline{D}{}^0 \pi^0$	(2.63± 0.14) × 10^{-4}			2308
$\overline{D}{}^0 \rho^0$	(3.21± 0.21) × 10^{-4}			2237
$\overline{D}{}^0 f_2$	(1.56± 0.21) × 10^{-4}			–

$\overline{D}^0\eta$	(2.36± 0.32) $\times 10^{-4}$	S=2.5		2274
$\overline{D}^0\eta'$	(1.38± 0.16) $\times 10^{-4}$	S=1.3		2198
$\overline{D}^0\omega$	(2.54± 0.16) $\times 10^{-4}$			2235
$D^0\phi$	$<$ 2.3 $\times 10^{-6}$	CL=95%		2183
$D^0K^+\pi^-$	(5.3 ± 3.2) $\times 10^{-6}$			2261
$D^0K^*(892)^0$	(3.0 ± 0.6) $\times 10^{-6}$			2213
$\overline{D}^{*0}\gamma$	$<$ 2.5 $\times 10^{-5}$	CL=90%		2258
$\overline{D}^*(2007)^0\pi^0$	(2.2 ± 0.6) $\times 10^{-4}$	S=2.6		2256
$\overline{D}^*(2007)^0\rho^0$	$<$ 5.1 $\times 10^{-4}$	CL=90%		2182
$\overline{D}^*(2007)^0\eta$	(2.3 ± 0.6) $\times 10^{-4}$	S=2.8		2220
$\overline{D}^*(2007)^0\eta'$	(1.40± 0.22) $\times 10^{-4}$			2141
$\overline{D}^*(2007)^0\pi^+\pi^-$	(6.2 ± 2.2) $\times 10^{-4}$			2249
$\overline{D}^*(2007)^0K^0$	(3.6 ± 1.2) $\times 10^{-5}$			2227
$\overline{D}^*(2007)^0K^*(892)^0$	$<$ 6.9 $\times 10^{-5}$	CL=90%		2157
$D^*(2007)^0K^*(892)^0$	$<$ 4.0 $\times 10^{-5}$	CL=90%		2157
$D^*(2007)^0\pi^+\pi^+\pi^-\pi^-$	(2.7 ± 0.5) $\times 10^{-3}$			2219
$D^*(2010)^+D^*(2010)^-$	(8.0 ± 0.6) $\times 10^{-4}$			1711
$\overline{D}^*(2007)^0\omega$	(3.6 ± 1.1) $\times 10^{-4}$	S=3.1		2180
$D^*(2010)^+D^-$	(6.1 ± 1.5) $\times 10^{-4}$	S=1.6		1790
$D^*(2007)^0\overline{D}^*(2007)^0$	$<$ 9 $\times 10^{-5}$	CL=90%		1715
$D^-D^0K^+$	(1.07± 0.11) $\times 10^{-3}$			1574
$D^-D^*(2007)^0K^+$	(3.5 ± 0.4) $\times 10^{-3}$			1478
$D^*(2010)^-D^0K^+$	(2.47± 0.21) $\times 10^{-3}$			1479
$D^*(2010)^-D^*(2007)^0K^+$	(1.06± 0.09) %			1366
$D^-D^+K^0$	(7.5 ± 1.7) $\times 10^{-4}$			1568
$D^*(2010)^-D^+K^0$ + $D^-D^*(2010)^+K^0$	(6.4 ± 0.5) $\times 10^{-3}$			1473
$D^*(2010)^-D^*(2010)^+K^0$	(8.1 ± 0.7) $\times 10^{-3}$			1360
$D^{*-}D_{s1}(2536)^+$, $D^+_{s1}\to D^{*+}K^0$	(8.0 ± 2.4) $\times 10^{-4}$			1336
$\overline{D}^0D^0K^0$	(2.7 ± 1.1) $\times 10^{-4}$			1574
$D^0\overline{D}^0K^+\pi^-$	(3.5 ± 0.5) $\times 10^{-4}$			1476
$\overline{D}^0D^*(2007)^0K^0$ + $\overline{D}^*(2007)^0D^0K^0$	(1.1 ± 0.5) $\times 10^{-3}$			1478
$\overline{D}^*(2007)^0D^*(2007)^0K^0$	(2.4 ± 0.9) $\times 10^{-3}$			1365
$(\overline{D}+\overline{D}^*)(D+D^*)K$	(3.68± 0.26) %			–

Charmonium modes

η_cK^0	(8.0 ± 1.1) $\times 10^{-4}$			1751
$\eta_c(1S)K^+\pi^-$	(6.0 ± 0.7) $\times 10^{-4}$			1722
$\eta_c(1S)K^+\pi^-$(NR)	(6.2 ± 1.3) $\times 10^{-5}$			–
$X(4100)^-K^+$, $X^-\to\eta_c\pi^-$	(2.0 ± 1.0) $\times 10^{-5}$			–
$\eta_c(1S)K^*(1410)^0$	(1.9 ± 1.5) $\times 10^{-4}$			1395
$\eta_c(1S)K^*_0(1430)^0$	(1.6 ± 0.4) $\times 10^{-4}$			1388

$\eta_c(1S)K_2^*(1430)^0$	(	$5.0\ ^{+\ 2.3}_{-\ 2.7}$	$\times 10^{-5}$		1386
$\eta_c(1S)K^*(1680)^0$	(	3 ± 4	$\times 10^{-5}$		1166
$\eta_c(1S)K_0^*(1950)^0$	(	$4.4\ ^{+\ 3.0}_{-\ 4.0}$	$\times 10^{-5}$		–
$\eta_c K^*(892)^0$	(	$5.2\ ^{+\ 0.8}_{-\ 0.9}$	$\times 10^{-4}$	S=1.6	1646
$\eta_c(2S)K_S^0,\ \eta_c \to\ p\overline{p}\pi^+\pi^-$	(	$4.2\ ^{+\ 1.4}_{-\ 1.2}$	$\times 10^{-7}$		–
$\eta_c(2S)K^{*0}$	$<$	3.9	$\times 10^{-4}$	CL=90%	1159
$h_c(1P)K_S^0$	$<$	1.4	$\times 10^{-5}$		1401
$h_c(1P)K^{*0}$	$<$	4	$\times 10^{-4}$	CL=90%	1253
$J/\psi(1S)K^0$	(	8.91 ± 0.21	$\times 10^{-4}$		1683
$J/\psi(1S)K^+\pi^-$	(	1.15 ± 0.05	$\times 10^{-3}$		1652
$J/\psi(1S)K^*(892)^0$	(	1.27 ± 0.05	$\times 10^{-3}$		1572
$J/\psi(1S)\eta K_S^0$	(	5.4 ± 0.9	$\times 10^{-5}$		1508
$J/\psi(1S)\eta' K_S^0$	$<$	2.5	$\times 10^{-5}$	CL=90%	1271
$J/\psi(1S)\phi K^0$	(	4.9 ± 1.0	$\times 10^{-5}$	S=1.3	1224
$J/\psi(1S)\omega K^0$	(	2.3 ± 0.4	$\times 10^{-4}$		1386
$\chi_{c0}(3915),\ \chi_{c0} \to\ J/\psi\omega$	(	2.1 ± 0.9	$\times 10^{-5}$		1102
$J/\psi(1S)K(1270)^0$	(	1.3 ± 0.5	$\times 10^{-3}$		1402
$J/\psi(1S)\pi^0$	(	1.66 ± 0.10	$\times 10^{-5}$		1728
$J/\psi(1S)\eta$	(	1.08 ± 0.23	$\times 10^{-5}$	S=1.5	1673
$J/\psi(1S)\pi^+\pi^-$	(	4.00 ± 0.15	$\times 10^{-5}$		1716
$J/\psi(1S)\pi^+\pi^-$ nonresonant	$<$	1.2	$\times 10^{-5}$	CL=90%	1716
$J/\psi(1S)f_0(500),\ f_0 \to\ \pi\pi$	(	$8.8\ ^{+\ 1.2}_{-\ 1.6}$	$\times 10^{-6}$		–
$J/\psi(1S)f_2$	(	$3.3\ ^{+\ 0.5}_{-\ 0.6}$	$\times 10^{-6}$	S=1.5	–
$J/\psi(1S)\rho^0$	(	$2.55^{+\ 0.18}_{-\ 0.16}$	$\times 10^{-5}$		1612
$J/\psi(1S)f_0(980),\ f_0 \to\ \pi^+\pi^-$	$<$	1.1	$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)\rho(1450)^0,\ \rho^0 \to\ \pi\pi$	(	$2.9\ ^{+\ 1.6}_{-\ 0.7}$	$\times 10^{-6}$		–
$J/\psi\rho(1700)^0,\ \rho^0 \to\ \pi^+\pi^-$	(	2.0 ± 1.3	$\times 10^{-6}$		–
$J/\psi(1S)\omega$	(	$1.8\ ^{+\ 0.7}_{-\ 0.5}$	$\times 10^{-5}$		1609
$J/\psi(1S)K^+K^-$	(	2.54 ± 0.35	$\times 10^{-6}$		1534
$J/\psi(1S)a_0(980),\ a_0 \to\ K^+K^-$	(	4.7 ± 3.4	$\times 10^{-7}$		–
$J/\psi(1S)\phi$	$<$	1.1	$\times 10^{-7}$	CL=90%	1520
$J/\psi(1S)\eta'(958)$	(	7.6 ± 2.4	$\times 10^{-6}$		1546
$J/\psi(1S)K^0\pi^+\pi^-$	(	4.5 ± 0.4	$\times 10^{-4}$		1611
$J/\psi(1S)K^0K^-\pi^+ +$ c.c.	$<$	2.1	$\times 10^{-5}$	CL=90%	1467
$J/\psi(1S)K^0K^+K^-$	(	2.5 ± 0.7	$\times 10^{-5}$	S=1.8	1249
$J/\psi(1S)K^0\rho^0$	(	5.4 ± 3.0	$\times 10^{-4}$		1390

$J/\psi(1S)\,K^*(892)^+\,\pi^-$		(	8 ± 4)	$\times 10^{-4}$		1515
$J/\psi(1S)\,\pi^+\,\pi^-\,\pi^+\,\pi^-$		(	1.44± 0.12)	$\times 10^{-5}$		1670
$J/\psi(1S)\,f_1(1285)$		(	8.4 ± 2.1)	$\times 10^{-6}$		1385
$J/\psi(1S)\,K^*(892)^0\,\pi^+\,\pi^-$		(	6.6 ± 2.2)	$\times 10^{-4}$		1447
$\eta_{c2}(1D)\,K^0_S,\ \eta_{c2}\to\ h_c\,\gamma$		<	3.5	$\times 10^{-5}$	CL=90%	–
$\eta_{c2}(1D)\,\pi^-\,K^+,\ \eta_{c2}\to\ h_c\,\gamma$		<	1.0	$\times 10^{-4}$	CL=90%	–
$\chi_{c1}(3872)^-\,K^+$		<	5	$\times 10^{-4}$	CL=90%	–
$\chi_{c1}(3872)^-\,K^+,$ $\chi_{c1}(3872)^-\to$ $J/\psi(1S)\,\pi^-\,\pi^0$	[ooo]	<	4.2	$\times 10^{-6}$	CL=90%	–
$\chi_{c1}(3872)\,K^0$		(	1.1 ± 0.4)	$\times 10^{-4}$		1140
$\chi_{c1}(3872)\,K^*(892)^0$		(	1.0 ± 0.5)	$\times 10^{-4}$		940
$\chi_{c1}(3872)\,K^+\,\pi^-$		(	2.1 ± 0.8)	$\times 10^{-4}$		1087
$\chi_{c1}(3872)\,\gamma$		<	1.3	$\times 10^{-5}$	CL=90%	1220
$Z_c(4430)^\pm\,K^\mp,\ Z_c^\pm\to$ $\psi(2S)\,\pi^\pm$		(	6.0 $^{+\ 3.0}_{-\ 2.4}$)	$\times 10^{-5}$		583
$Z_c(4430)^\pm\,K^\mp,\ Z_c^\pm\to$ $J/\psi\,\pi^\pm$		(	5.4 $^{+\ 4.0}_{-\ 1.2}$)	$\times 10^{-6}$		583
$Z_c(3900)^\pm\,K^\mp,\ Z_c^\pm\to$ $J/\psi\,\pi^\pm$		<	9	$\times 10^{-7}$		–
$Z_c(4200)^\pm\,K^\mp,\ X^\pm\to$ $J/\psi\,\pi^\pm$		(	2.2 $^{+\ 1.3}_{-\ 0.8}$)	$\times 10^{-5}$		–
$J/\psi(1S)\,p\overline{p}$		(	4.5 ± 0.6)	$\times 10^{-7}$		862
$J/\psi(1S)\,\gamma$		<	1.5	$\times 10^{-6}$	CL=90%	1732
$J/\psi(1S)\,\overline{D}^0$		<	1.3	$\times 10^{-5}$	CL=90%	877
$\psi(2S)\,\pi^0$		(	1.17± 0.19)	$\times 10^{-5}$		1348
$\psi(2S)\,K^0$		(	5.8 ± 0.5)	$\times 10^{-4}$		1283
$\psi(3770)\,K^0,\ \psi\to\ \overline{D}^0\,D^0$		<	1.23	$\times 10^{-4}$	CL=90%	1217
$\psi(3770)\,K^0,\ \psi\to\ D^-\,D^+$		<	1.88	$\times 10^{-4}$	CL=90%	1217
$\psi(2S)\,\pi^+\,\pi^-$		(	2.24± 0.35)	$\times 10^{-5}$		1332
$\psi(2S)\,K^+\,\pi^-$		(	5.8 ± 0.4)	$\times 10^{-4}$		1239
$\psi(2S)\,K^*(892)^0$		(	5.9 ± 0.4)	$\times 10^{-4}$		1116
$\chi_{c0}\,K^0$		(	1.9 ± 0.4)	$\times 10^{-4}$		1477
$\chi_{c0}\,K^*(892)^0$		(	1.7 ± 0.4)	$\times 10^{-4}$		1342
$\chi_{c1}\,\pi^0$		(	1.12± 0.28)	$\times 10^{-5}$		1468
$\chi_{c1}\,K^0$		(	3.95± 0.27)	$\times 10^{-4}$		1411
$\chi_{c1}\,\pi^-\,K^+$		(	4.97± 0.30)	$\times 10^{-4}$		1371
$\chi_{c1}\,K^*(892)^0$		(	2.38± 0.19)	$\times 10^{-4}$	S=1.2	1265
$X(4051)^-\,K^+,\ X^-\to$ $\chi_{c1}\,\pi^-$		(	3.0 $^{+\ 4.0}_{-\ 1.8}$)	$\times 10^{-5}$		–
$X(4248)^-\,K^+,\ X^-\to$ $\chi_{c1}\,\pi^-$		(	4.0 $^{+20.0}_{-\ 1.0}$)	$\times 10^{-5}$		–

$\chi_{c1}\pi^+\pi^- K^0$	(	3.2 ± 0.5)	$\times 10^{-4}$		1318
$\chi_{c1}\pi^-\pi^0 K^+$	(	3.5 ± 0.6)	$\times 10^{-4}$		1321
$\chi_{c2} K^0$	<	1.5	$\times 10^{-5}$	CL=90%	1379
$\chi_{c2} K^*(892)^0$	(	4.9 ± 1.2)	$\times 10^{-5}$	S=1.1	1228
$\chi_{c2}\pi^- K^+$	(	7.2 ± 1.0)	$\times 10^{-5}$		1338
$\chi_{c2}\pi^+\pi^- K^0$	<	1.70	$\times 10^{-4}$	CL=90%	1282
$\chi_{c2}\pi^-\pi^0 K^+$	<	7.4	$\times 10^{-5}$	CL=90%	1286
$\psi(4660) K^0,\ \psi \to\ \Lambda_c^+ \Lambda_c^-$	<	2.3	$\times 10^{-4}$	CL=90%	–
$\psi(4230)^0 K^0,\ \psi^0 \to$ $J/\psi\pi^+\pi^-$	<	1.7	$\times 10^{-5}$	CL=90%	–

K or *K** modes

$K^+\pi^-$	(	1.96± 0.05)	$\times 10^{-5}$		2615
$K^0\pi^0$	(	9.9 ± 0.5)	$\times 10^{-6}$		2615
$\eta' K^0$	(	6.6 ± 0.4)	$\times 10^{-5}$	S=1.4	2528
$\eta' K^*(892)^0$	(	2.8 ± 0.6)	$\times 10^{-6}$		2472
$\eta' K_0^*(1430)^0$	(	6.3 ± 1.6)	$\times 10^{-6}$		2346
$\eta' K_2^*(1430)^0$	(	1.37± 0.32)	$\times 10^{-5}$		2346
ηK^0	(	$1.23^{+\ 0.27}_{-\ 0.24}$)	$\times 10^{-6}$		2587
$\eta K^*(892)^0$	(	1.59± 0.10)	$\times 10^{-5}$		2534
$\eta K_0^*(1430)^0$	(	1.10± 0.22)	$\times 10^{-5}$		2415
$\eta K_2^*(1430)^0$	(	9.6 ± 2.1)	$\times 10^{-6}$		2414
ωK^0	(	4.8 ± 0.4)	$\times 10^{-6}$		2557
$a_0(980)^0 K^0,\ a_0^0 \to\ \eta\pi^0$	<	7.8	$\times 10^{-6}$	CL=90%	–
$b_1^0 K^0,\ b_1^0 \to\ \omega\pi^0$	<	7.8	$\times 10^{-6}$	CL=90%	–
$a_0(980)^\pm K^\mp,\ a_0^\pm \to\ \eta\pi^\pm$	<	1.9	$\times 10^{-6}$	CL=90%	–
$b_1^- K^+,\ b_1^- \to\ \omega\pi^-$	(	7.4 ± 1.4)	$\times 10^{-6}$		–
$b_1^0 K^{*0},\ b_1^0 \to\ \omega\pi^0$	<	8.0	$\times 10^{-6}$	CL=90%	–
$b_1^- K^{*+},\ b_1^- \to\ \omega\pi^-$	<	5.0	$\times 10^{-6}$	CL=90%	–
$a_0(1450)^\pm K^\mp,\ a_0^\pm \to\ \eta\pi^\pm$	<	3.1	$\times 10^{-6}$	CL=90%	–
$K_S^0 X^0$(Familon)	<	5.3	$\times 10^{-5}$	CL=90%	–
$\omega K^*(892)^0$	(	2.0 ± 0.5)	$\times 10^{-6}$		2503
$\omega(K\pi)_0^{*0}$	(	1.84± 0.25)	$\times 10^{-5}$		–
$\omega K_0^*(1430)^0$	(	1.60± 0.34)	$\times 10^{-5}$		2380
$\omega K_2^*(1430)^0$	(	1.01± 0.23)	$\times 10^{-5}$		2380
$\omega K^+\pi^-$ nonresonant	(	5.1 ± 1.0)	$\times 10^{-6}$		2542
$K^+\pi^-\pi^0$	(	3.78± 0.32)	$\times 10^{-5}$		2609
$K^+\rho^-$	(	7.0 ± 0.9)	$\times 10^{-6}$		2559
$K^+\rho(1450)^-$	(	2.4 ± 1.2)	$\times 10^{-6}$		–
$K^+\rho(1700)^-$	(	6 ± 7)	$\times 10^{-7}$		–
$(K^+\pi^-\pi^0)$ nonresonant	(	2.8 ± 0.6)	$\times 10^{-6}$		2609
$(K\pi)_0^{*+}\pi^-,\ (K\pi)_0^{*+} \to$ $K^+\pi^0$	(	3.4 ± 0.5)	$\times 10^{-5}$		–

$(K\pi)_0^{*0}\pi^0,\ (K\pi)_0^{*0}\to K^+\pi^-$		$(\ 8.6\ \pm\ 1.7\ )\times10^{-6}$			–
$K_2^*(1430)^0\pi^0$		$<\ 4.0$	$\times10^{-6}$	CL=90%	2445
$K^*(1680)^0\pi^0$		$<\ 7.5$	$\times10^{-6}$	CL=90%	2358
$K_x^{*0}\pi^0$	[rrr]	$(\ 6.1\ \pm\ 1.6\ )\times10^{-6}$			–
$K^0\pi^+\pi^-$		$(\ 4.97\pm\ 0.18)\times10^{-5}$			2609
$K^0\pi^+\pi^-$ nonresonant		$(\ 1.39^{+\ 0.26}_{-\ 0.18})\times10^{-5}$		S=1.6	2609
$K^0\rho^0$		$(\ 3.4\ \pm\ 1.1\ )\times10^{-6}$		S=2.3	2558
$K^*(892)^+\pi^-$		$(\ 7.5\ \pm\ 0.4\ )\times10^{-6}$			2563
$K_0^*(1430)^+\pi^-$		$(\ 3.3\ \pm\ 0.7\ )\times10^{-5}$		S=2.0	–
$K_x^{*+}\pi^-$	[rrr]	$(\ 5.1\ \pm\ 1.6\ )\times10^{-6}$			–
$K^*(1410)^+\pi^-,\ K^{*+}\to K^0\pi^+$		$<\ 3.8$	$\times10^{-6}$	CL=90%	–
$(K\pi)_0^{*+}\pi^-,\ (K\pi)_0^{*+}\to K^0\pi^+$		$(\ 1.62\pm\ 0.13)\times10^{-5}$			–
$f_0(980)K^0,\ f_0\to\pi^+\pi^-$		$(\ 8.1\ \pm\ 0.8\ )\times10^{-6}$		S=1.3	2522
$K^0 f_0(500)$		$(\ 1.6\ ^{+\ 2.5}_{-\ 1.6}\ )\times10^{-7}$			–
$K^0 f_0(1500)$		$(\ 1.3\ \pm\ 0.8\ )\times10^{-6}$			2397
$f_2(1270)K^0$		$(\ 2.7\ ^{+\ 1.3}_{-\ 1.2}\ )\times10^{-6}$			2459
$f_x(1300)K0, f_x\to\pi^+\pi^-$		$(\ 1.8\ \pm\ 0.7\ )\times10^{-6}$			–
$K^*(892)^0\pi^0$		$(\ 3.3\ \pm\ 0.6\ )\times10^{-6}$			2563
$K_2^*(1430)^+\pi^-$		$(\ 3.65\pm\ 0.34)\times10^{-6}$			2445
$K^*(1680)^+\pi^-$		$(\ 1.41\pm\ 0.10)\times10^{-5}$			2358
$K^+\pi^-\pi^+\pi^-$	[sss]	$<\ 2.3$	$\times10^{-4}$	CL=90%	2600
$\rho^0K^+\pi^-$		$(\ 2.8\ \pm\ 0.7\ )\times10^{-6}$			2543
$f_0(980)K^+\pi^-,\ f_0\to\pi\pi$		$(\ 1.4\ ^{+\ 0.5}_{-\ 0.6}\ )\times10^{-6}$			2506
$K^+\pi^-\pi^+\pi^-$ nonresonant		$<\ 2.1$	$\times10^{-6}$	CL=90%	2600
$K^*(892)^0\pi^+\pi^-$		$(\ 5.5\ \pm\ 0.5\ )\times10^{-5}$			2557
$K^*(892)^0\rho^0$		$(\ 3.9\ \pm\ 1.3\ )\times10^{-6}$		S=1.9	2504
$K^*(892)^0 f_0(980),\ f_0\to\pi\pi$		$(\ 3.9\ ^{+\ 2.1}_{-\ 1.8}\ )\times10^{-6}$		S=3.9	2466
$K_1(1270)^+\pi^-$		$<\ 3.0$	$\times10^{-5}$	CL=90%	2489
$K_1(1400)^+\pi^-$		$<\ 2.7$	$\times10^{-5}$	CL=90%	2451
$a_1(1260)^-K^+$	[sss]	$(\ 1.6\ \pm\ 0.4\ )\times10^{-5}$			2471
$K^*(892)^+\rho^-$		$(\ 1.03\pm\ 0.26)\times10^{-5}$			2504
$K_0^*(1430)^+\rho^-$		$(\ 2.8\ \pm\ 1.2\ )\times10^{-5}$			–
$K_1(1400)^0\rho^0$		$<\ 3.0$	$\times10^{-3}$	CL=90%	2388
$K_0^*(1430)^0\rho^0$		$(\ 2.7\ \pm\ 0.6\ )\times10^{-5}$			2381
$K_0^*(1430)^0 f_0(980),\ f_0\to\pi\pi$		$(\ 2.7\ \pm\ 0.9\ )\times10^{-6}$			–
$K_2^*(1430)^0 f_0(980),\ f_0\to\pi\pi$		$(\ 8.6\ \pm\ 2.0\ )\times10^{-6}$			–
K^+K^-		$(\ 7.8\ \pm\ 1.5\ )\times10^{-8}$			2593
$K^0\overline{K}^0$		$(\ 1.21\pm\ 0.16)\times10^{-6}$			2593

$K^0 K^- \pi^+$	(	6.7 ± 0.5) $\times 10^{-6}$			2578
$K^*(892)^\pm K^\mp$	<	4	$\times 10^{-7}$	CL=90%	2540
$\overline{K}^{*0} K^0 + K^{*0} \overline{K}^0$	<	9.6	$\times 10^{-7}$	CL=90%	–
$K^+ K^- \pi^0$	(	2.2 ± 0.6) $\times 10^{-6}$			2579
$K^0_S K^0_S \pi^0$	<	9	$\times 10^{-7}$	CL=90%	2578
$K^0_S K^0_S \eta$	<	1.0	$\times 10^{-6}$	CL=90%	2515
$K^0_S K^0_S \eta'$	<	2.0	$\times 10^{-6}$	CL=90%	2453
$K^0 K^+ K^-$	(	2.68± 0.11) $\times 10^{-5}$			2522
$K^0 \phi$	(	7.3 ± 0.7) $\times 10^{-6}$			2516
$f_0(980) K^0$, $f_0 \to K^+ K^-$	(	$7.0 \,^{+\,3.5}_{-\,3.0}$) $\times 10^{-6}$			–
$f_0(1500) K^0$	(	$1.3 \,^{+\,0.7}_{-\,0.5}$) $\times 10^{-5}$			2397
$f'_2(1525)^0 K^0$	(	$3 \,^{+\,5}_{-\,4}$) $\times 10^{-7}$			–
$f_0(1710) K^0$, $f_0 \to K^+ K^-$	(	4.4 ± 0.9) $\times 10^{-6}$			–
$K^0 K^+ K^-$ nonresonant	(	3.3 ± 1.0) $\times 10^{-5}$			2522
$K^0_S K^0_S K^0_S$	(	6.0 ± 0.5) $\times 10^{-6}$		S=1.1	2521
$f_0(980) K^0$, $f_0 \to K^0_S K^0_S$	(	2.7 ± 1.8) $\times 10^{-6}$			–
$f_0(1710) K^0$, $f_0 \to K^0_S K^0_S$	(	$5.0 \,^{+\,5.0}_{-\,2.6}$) $\times 10^{-7}$			–
$f_2(2010) K^0$, $f_2 \to K^0_S K^0_S$	(	5 ± 6) $\times 10^{-7}$			–
$K^0_S K^0_S K^0_S$ nonresonant	(	1.33± 0.31) $\times 10^{-5}$			2521
$K^0_S K^0_S K^0_L$	<	1.6	$\times 10^{-5}$	CL=90%	2521
$K^*(892)^0 K^+ K^-$	(	2.75± 0.26) $\times 10^{-5}$			2467
$K^*(892)^0 \phi$	(	1.00± 0.05) $\times 10^{-5}$			2460
$K^+ K^- \pi^+ \pi^-$ nonresonant	<	7.17	$\times 10^{-5}$	CL=90%	2559
$K^*(892)^0 K^- \pi^+$	(	4.5 ± 1.3) $\times 10^{-6}$			2524
$K^*(892)^0 \overline{K}^*(892)^0$	(	8.3 ± 2.4) $\times 10^{-7}$		S=1.5	2485
$K^+ K^+ \pi^- \pi^-$ nonresonant	<	6.0	$\times 10^{-6}$	CL=90%	2559
$K^*(892)^0 K^+ \pi^-$	<	2.2	$\times 10^{-6}$	CL=90%	2524
$K^*(892)^0 K^*(892)^0$	<	2	$\times 10^{-7}$	CL=90%	2485
$K^*(892)^+ K^*(892)^-$	<	2.0	$\times 10^{-6}$	CL=90%	2485
$K_1(1400)^0 \phi$	<	5.0	$\times 10^{-3}$	CL=90%	2339
$\phi(K\pi)^{*0}_0$	(	4.3 ± 0.4) $\times 10^{-6}$			–
$\phi(K\pi)^{*0}_0$ $(1.60<m_{K\pi}<2.15)$ [ttt]	<	1.7	$\times 10^{-6}$	CL=90%	–
$K^*_0(1430)^0 K^- \pi^+$	<	3.18	$\times 10^{-5}$	CL=90%	2403
$K^*_0(1430)^0 \overline{K}^*(892)^0$	<	3.3	$\times 10^{-6}$	CL=90%	2360
$K^*_0(1430)^0 \overline{K}^*_0(1430)^0$	<	8.4	$\times 10^{-6}$	CL=90%	2222
$K^*_0(1430)^0 \phi$	(	3.9 ± 0.8) $\times 10^{-6}$			2333
$K^*_0(1430)^0 K^*(892)^0$	<	1.7	$\times 10^{-6}$	CL=90%	2360
$K^*_0(1430)^0 K^*_0(1430)^0$	<	4.7	$\times 10^{-6}$	CL=90%	2222
$K^*(1680)^0 \phi$	<	3.5	$\times 10^{-6}$	CL=90%	2238
$K^*(1780)^0 \phi$	<	2.7	$\times 10^{-6}$	CL=90%	–

$K^*(2045)^0\phi$		$<$	1.53	$\times 10^{-5}$	CL=90%	–
$K_2^*(1430)^0\rho^0$		$<$	1.1	$\times 10^{-3}$	CL=90%	2381
$K_2^*(1430)^0\phi$		(	6.8 $\pm$ 0.9)	$\times 10^{-6}$	S=1.2	2332
$K^0\phi\phi$		(	3.7 $\pm$ 0.7)	$\times 10^{-6}$	S=1.3	2305
$\eta'\eta' K^0$		$<$	3.1	$\times 10^{-5}$	CL=90%	2337
$\eta K^0\gamma$		(	7.6 $\pm$ 1.8)	$\times 10^{-6}$		2587
$\eta' K^0\gamma$		$<$	6.4	$\times 10^{-6}$	CL=90%	2528
$K^0\phi\gamma$		(	2.7 $\pm$ 0.7)	$\times 10^{-6}$		2516
$K^+\pi^-\gamma$		(	4.6 $\pm$ 1.4)	$\times 10^{-6}$		2615
$K^*(892)^0\gamma$		(	4.18 $\pm$ 0.25)	$\times 10^{-5}$	S=2.1	2565
$K^*(1410)\gamma$		$<$	1.3	$\times 10^{-4}$	CL=90%	2451
$K^+\pi^-\gamma$ nonresonant		$<$	2.6	$\times 10^{-6}$	CL=90%	2615
$K^*(892)^0 X(214)$, $X \to \mu^+\mu^-$	[*uuu*]	$<$	2.26	$\times 10^{-8}$	CL=90%	–
$K^0\pi^+\pi^-\gamma$		(	1.99 $\pm$ 0.18)	$\times 10^{-5}$		2609
$K^+\pi^-\pi^0\gamma$		(	4.1 $\pm$ 0.4)	$\times 10^{-5}$		2609
$K_1(1270)^0\gamma$		$<$	5.8	$\times 10^{-5}$	CL=90%	2491
$K_1(1400)^0\gamma$		$<$	1.2	$\times 10^{-5}$	CL=90%	2454
$K_2^*(1430)^0\gamma$		(	1.24 $\pm$ 0.24)	$\times 10^{-5}$		2447
$K^*(1680)^0\gamma$		$<$	2.0	$\times 10^{-3}$	CL=90%	2360
$K_3^*(1780)^0\gamma$		$<$	8.3	$\times 10^{-5}$	CL=90%	2340
$K_4^*(2045)^0\gamma$		$<$	4.3	$\times 10^{-3}$	CL=90%	2243

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$\rho^0\gamma$		(	8.6 $\pm$ 1.5)	$\times 10^{-7}$		2583
$\rho^0 X(214)$, $X \to \mu^+\mu^-$	[*uuu*]	$<$	1.73	$\times 10^{-8}$	CL=90%	–
$\omega\gamma$		(	$4.4\ ^{+\ 1.8}_{-\ 1.6}$)	$\times 10^{-7}$		2582
$\phi\gamma$		$<$	1.0	$\times 10^{-7}$	CL=90%	2541
$\pi^+\pi^-$		(	5.12 $\pm$ 0.19)	$\times 10^{-6}$		2636
$\pi^0\pi^0$		(	1.59 $\pm$ 0.26)	$\times 10^{-6}$	S=1.4	2636
$\eta\pi^0$		(	4.1 $\pm$ 1.7)	$\times 10^{-7}$		2610
$\eta\eta$		$<$	1.0	$\times 10^{-6}$	CL=90%	2582
$\eta'\pi^0$		(	1.2 $\pm$ 0.6)	$\times 10^{-6}$	S=1.7	2551
$\eta'\eta'$		$<$	1.7	$\times 10^{-6}$	CL=90%	2460
$\eta'\eta$		$<$	1.2	$\times 10^{-6}$	CL=90%	2523
$\eta'\rho^0$		$<$	1.3	$\times 10^{-6}$	CL=90%	2492
$\eta' f_0(980)$, $f_0 \to \pi^+\pi^-$		$<$	9	$\times 10^{-7}$	CL=90%	2454
$\eta\rho^0$		$<$	1.5	$\times 10^{-6}$	CL=90%	2553
$\eta f_0(980)$, $f_0 \to \pi^+\pi^-$		$<$	4	$\times 10^{-7}$	CL=90%	2516
$\omega\eta$		(	$9.4\ ^{+\ 4.0}_{-\ 3.1}$)	$\times 10^{-7}$		2552
$\omega\eta'$		(	$1.0\ ^{+\ 0.5}_{-\ 0.4}$)	$\times 10^{-6}$		2491
$\omega\rho^0$		$<$	1.6	$\times 10^{-6}$	CL=90%	2522

$\omega f_0(980),\ f_0 \to\ \pi^+\pi^-$		<	1.5	$\times 10^{-6}$	CL=90%	2485
$\omega\omega$		(	1.2 ± 0.4)	$\times 10^{-6}$		2521
$\phi\pi^0$		<	1.5	$\times 10^{-7}$	CL=90%	2540
$\phi\eta$		<	5	$\times 10^{-7}$	CL=90%	2511
$\phi\eta'$		<	5	$\times 10^{-7}$	CL=90%	2448
$\phi\pi^+\pi^-$		(	1.8 ± 0.5)	$\times 10^{-7}$		2533
$\phi\rho^0$		<	3.3	$\times 10^{-7}$	CL=90%	2480
$\phi f_0(980),\ f_0 \to\ \pi^+\pi^-$		<	3.8	$\times 10^{-7}$	CL=90%	2441
$\phi\omega$		<	7	$\times 10^{-7}$	CL=90%	2479
$\phi\phi$		<	2.7	$\times 10^{-8}$	CL=90%	2435
$a_0(980)^\pm\pi^\mp,\ a_0^\pm \to\ \eta\pi^\pm$		<	3.1	$\times 10^{-6}$	CL=90%	–
$a_0(1450)^\pm\pi^\mp,\ a_0^\pm \to\ \eta\pi^\pm$		<	2.3	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^-\pi^0$		<	7.2	$\times 10^{-4}$	CL=90%	2631
$\rho^0\pi^0$		(	2.0 ± 0.5)	$\times 10^{-6}$		2581
$\rho^\mp\pi^\pm$	[aa]	(	2.30± 0.23)	$\times 10^{-5}$		2581
$\pi^+\pi^-\pi^+\pi^-$		<	1.12	$\times 10^{-5}$	CL=90%	2621
$\rho^0\pi^+\pi^-$		<	8.8	$\times 10^{-6}$	CL=90%	2575
$\rho^0\rho^0$		(	9.6 ± 1.5)	$\times 10^{-7}$		2523
$f_0(980)\pi^+\pi^-,\ f_0 \to\ \pi^+\pi^-$		<	3.0	$\times 10^{-6}$	CL=90%	–
$\rho^0 f_0(980),\ f_0 \to\ \pi^+\pi^-$		(	7.8 ± 2.5)	$\times 10^{-7}$		2486
$f_0(980) f_0(980),\ f_0 \to\ \pi^+\pi^-,\ f_0 \to\ \pi^+\pi^-$		<	1.9	$\times 10^{-7}$	CL=90%	2447
$f_0(980) f_0(980),\ f_0 \to\ \pi^+\pi^-,\ f_0 \to\ K^+K^-$		<	2.3	$\times 10^{-7}$	CL=90%	2447
$a_1(1260)^\mp\pi^\pm$	[aa]	(	2.6 ± 0.5)	$\times 10^{-5}$	S=1.9	2494
$a_2(1320)^\mp\pi^\pm$	[aa]	<	6.3	$\times 10^{-6}$	CL=90%	2473
$\pi^+\pi^-\pi^0\pi^0$		<	3.1	$\times 10^{-3}$	CL=90%	2622
$\rho^+\rho^-$		(	2.77± 0.19)	$\times 10^{-5}$		2523
$a_1(1260)^0\pi^0$		<	1.1	$\times 10^{-3}$	CL=90%	2495
$\omega\pi^0$		<	5	$\times 10^{-7}$	CL=90%	2580
$\pi^+\pi^+\pi^-\pi^-\pi^0$		<	9.0	$\times 10^{-3}$	CL=90%	2609
$a_1(1260)^+\rho^-$		<	6.1	$\times 10^{-5}$	CL=90%	2433
$a_1(1260)^0\rho^0$		<	2.4	$\times 10^{-3}$	CL=90%	2433
$b_1^\mp\pi^\pm,\ b_1^\mp \to\ \omega\pi^\mp$		(	1.09± 0.15)	$\times 10^{-5}$		–
$b_1^0\pi^0,\ b_1^0 \to\ \omega\pi^0$		<	1.9	$\times 10^{-6}$	CL=90%	–
$b_1^-\rho^+,\ b_1^- \to\ \omega\pi^-$		<	1.4	$\times 10^{-6}$	CL=90%	–
$b_1^0\rho^0,\ b_1^0 \to\ \omega\pi^0$		<	3.4	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$		<	3.0	$\times 10^{-3}$	CL=90%	2592
$a_1(1260)^+ a_1(1260)^-,\ a_1^+ \to\ 2\pi^+\pi^-,\ a_1^- \to\ 2\pi^-\pi^+$		(	1.18± 0.31)	$\times 10^{-5}$		2336
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$		<	1.1	%	CL=90%	2572

Baryon modes

$p\overline{p}$		(1.25± 0.32)	$\times 10^{-8}$		2467
$p\overline{p}\pi^+\pi^-$		(2.87± 0.19)	$\times 10^{-6}$		2406
$p\overline{p}K^+\pi^-$		(6.3 ± 0.5)	$\times 10^{-6}$		2306
$p\overline{p}K^0$		(2.66± 0.32)	$\times 10^{-6}$		2347
$\Theta(1540)^+\overline{p}$, $\Theta^+ \to pK^0_S$	[vvv] <	5	$\times 10^{-8}$	CL=90%	2318
$f_J(2220)K^0$, $f_J \to p\overline{p}$	<	4.5	$\times 10^{-7}$	CL=90%	2135
$p\overline{p}K^*(892)^0$		($1.24^{+\ 0.28}_{-\ 0.25}$)	$\times 10^{-6}$		2216
$f_J(2220)K^*_0$, $f_J \to p\overline{p}$	<	1.5	$\times 10^{-7}$	CL=90%	–
$p\overline{p}K^+K^-$		(1.21± 0.32)	$\times 10^{-7}$		2179
$p\overline{p}\pi^0$		(5.0 ± 1.9)	$\times 10^{-7}$		2440
$p\overline{p}p\overline{p}$	<	2.0	$\times 10^{-7}$	CL=90%	1735
$p\overline{\Lambda}\pi^-$		(3.14± 0.29)	$\times 10^{-6}$		2401
$p\overline{\Lambda}\pi^-\gamma$	<	6.5	$\times 10^{-7}$	CL=90%	2401
$p\overline{\Sigma}(1385)^-$	<	2.6	$\times 10^{-7}$	CL=90%	2363
$\Delta(1232)^+\overline{p}$ + $\Delta(1232)^-p$	<	1.6	$\times 10^{-6}$		–
$\Delta^0\overline{\Lambda}$	<	9.3	$\times 10^{-7}$	CL=90%	2364
$p\overline{\Lambda}K^-$	<	8.2	$\times 10^{-7}$	CL=90%	2308
$p\overline{\Lambda}D^-$		(2.5 ± 0.4)	$\times 10^{-5}$		1765
$p\overline{\Lambda}D^{*-}$		(3.4 ± 0.8)	$\times 10^{-5}$		1685
$p\overline{\Sigma}^0\pi^-$	<	3.8	$\times 10^{-6}$	CL=90%	2383
$\overline{\Lambda}\Lambda$	<	3.2	$\times 10^{-7}$	CL=90%	2392
$\overline{\Lambda}\Lambda K^0$		($4.8\ ^{+\ 1.0}_{-\ 0.9}$)	$\times 10^{-6}$		2250
$\overline{\Lambda}\Lambda K^{*0}$		($2.5\ ^{+\ 0.9}_{-\ 0.8}$)	$\times 10^{-6}$		2098
$\overline{\Lambda}\Lambda D^0$		($1.00^{+\ 0.30}_{-\ 0.26}$)	$\times 10^{-5}$		1662
$D^0\Sigma^0\overline{\Lambda}$+ c.c.	<	3.1	$\times 10^{-5}$	CL=90%	1611
$\Delta^0\overline{\Delta}^0$	<	1.5	$\times 10^{-3}$	CL=90%	2335
$\Delta^{++}\overline{\Delta}^{--}$	<	1.1	$\times 10^{-4}$	CL=90%	2335
$\overline{D}^0p\overline{p}$		(1.04± 0.07)	$\times 10^{-4}$		1863
$D^-_s\overline{\Lambda}p$		(2.8 ± 0.9)	$\times 10^{-5}$		1710
$\overline{D}^*(2007)^0p\overline{p}$		(9.9 ± 1.1)	$\times 10^{-5}$		1788
$D^*(2010)^-p\overline{n}$		(1.4 ± 0.4)	$\times 10^{-3}$		1785
$D^-p\overline{p}\pi^+$		(3.32± 0.31)	$\times 10^{-4}$		1786
$D^*(2010)^-p\overline{p}\pi^+$		(4.7 ± 0.5)	$\times 10^{-4}$	S=1.2	1708
$\overline{D}^0p\overline{p}\pi^+\pi^-$		(3.0 ± 0.5)	$\times 10^{-4}$		1708
$\overline{D}^{*0}p\overline{p}\pi^+\pi^-$		(1.9 ± 0.5)	$\times 10^{-4}$		1623
$\Theta_c\overline{p}\pi^+$, $\Theta_c \to D^-p$	<	9	$\times 10^{-6}$	CL=90%	–
$\Theta_c\overline{p}\pi^+$, $\Theta_c \to D^{*-}p$	<	1.4	$\times 10^{-5}$	CL=90%	–
$\overline{\Sigma}^{--}_c\Delta^{++}$	<	8	$\times 10^{-4}$	CL=90%	1839
$\overline{\Lambda}^-_cp\pi^+\pi^-$		(1.02± 0.14)	$\times 10^{-3}$	S=1.3	1934
$\overline{\Lambda}^-_cp$		(1.54± 0.18)	$\times 10^{-5}$		2021

$\overline{\Lambda}_c^- p\pi^0$		$(\ 1.55\pm\ 0.19)\times10^{-4}$			1982
$\Sigma_c(2455)^- p$		$<\ 2.4$	$\times10^{-5}$		–
$\overline{\Lambda}_c^- p\pi^+\pi^-\pi^0$		$<\ 5.07$	$\times10^{-3}$	CL=90%	1883
$\overline{\Lambda}_c^- p\pi^+\pi^-\pi^+\pi^-$		$<\ 2.74$	$\times10^{-3}$	CL=90%	1821
$\overline{\Lambda}_c^- p\pi^+\pi^-$(nonresonant)		$(\ 5.5\ \pm\ 1.0\ )\times10^{-4}$		S=1.3	1934
$\overline{\Sigma}_c(2520)^{--} p\pi^+$		$(\ 1.02\pm\ 0.18)\times10^{-4}$			1860
$\overline{\Sigma}_c(2520)^0 p\pi^-$		$<\ 3.1$	$\times10^{-5}$	CL=90%	1860
$\overline{\Sigma}_c(2455)^0 p\pi^-$		$(\ 1.08\pm\ 0.16)\times10^{-4}$			1895
$\overline{\Sigma}_c(2455)^0 N^0,\ N^0\to p\pi^-$		$(\ 6.4\ \pm\ 1.7\ )\times10^{-5}$			–
$\overline{\Sigma}_c(2455)^{--} p\pi^+$		$(\ 1.83\pm\ 0.24)\times10^{-4}$			1895
$\Lambda_c^- pK^+\pi^-$		$(\ 3.4\ \pm\ 0.7\ )\times10^{-5}$			1786
$\overline{\Sigma}_c(2455)^{--} pK^+,\ \overline{\Sigma}_c^{--}\to\overline{\Lambda}_c^-\pi^-$		$(\ 8.8\ \pm\ 2.5\ )\times10^{-6}$			1754
$\Lambda_c^- pK^*(892)^0$		$<\ 2.42$	$\times10^{-5}$	CL=90%	1647
$\Lambda_c^- pK^+K^-$		$(\ 2.0\ \pm\ 0.4\ )\times10^{-5}$			1588
$\Lambda_c^- p\phi$		$<\ 1.0$	$\times10^{-5}$	CL=90%	1567
$\Lambda_c^- p\overline{p}p$		$<\ 2.8$	$\times10^{-6}$		677
$\overline{\Lambda}_c^- \Lambda K^+$		$(\ 4.8\ \pm\ 1.1\ )\times10^{-5}$			1767
$\overline{\Lambda}_c^- \Lambda_c^+$		$<\ 1.6$	$\times10^{-5}$	CL=95%	1319
$\overline{\Lambda}_c(2593)^-\ /\ \overline{\Lambda}_c(2625)^- p$		$<\ 1.1$	$\times10^{-4}$	CL=90%	–
$\overline{\Xi}_c^- \Lambda_c^+$		$(\ 1.2\ \pm\ 0.8\ )\times10^{-3}$			1147
$\overline{\Xi}_c^- \Lambda_c^+,\ \overline{\Xi}_c^-\to\overline{\Xi}^+\pi^-\pi^-$		$(\ 2.4\ \pm\ 1.1\ )\times10^{-5}$		S=1.8	1147
$\overline{\Xi}_c^- \Lambda_c^+,\ \overline{\Xi}_c^-\to\overline{p}K^+\pi^-$		$(\ 5.3\ \pm\ 1.7\ )\times10^{-6}$			–
$\Lambda_c^+\Lambda_c^- K^0$		$(\ 4.0\ \pm\ 0.9\ )\times10^{-4}$			732
$\overline{\Xi}_c(2930)^-\Lambda_c^+,\ \overline{\Xi}_c^-\to\Lambda_c^- K^0$		$(\ 2.4\ \pm\ 0.6\ )\times10^{-4}$			–

Lepton Family number (LF) or Lepton number (L) or Baryon number (B) violating modes, or/and $\Delta B = 1$ weak neutral current ($B1$) modes

$\gamma\gamma$	$B1$		$<\ 3.2$	$\times10^{-7}$	CL=90%	2640
e^+e^-	$B1$		$<\ 2.5$	$\times10^{-9}$	CL=90%	2640
$e^+e^-\gamma$	$B1$		$<\ 1.2$	$\times10^{-7}$	CL=90%	2640
$\mu^+\mu^-$	$B1$		$(\ 7\ ^{+13}_{-11}\ )\times10^{-11}$		S=1.8	2638
$\mu^+\mu^-\gamma$	$B1$		$<\ 2.0$	$\times10^{-9}$	CL=95%	2638
$\mu^+\mu^-\mu^+\mu^-$	$B1$		$<\ 6.9$	$\times10^{-10}$	CL=95%	2629
$SP,\ S\to\mu^+\mu^-,\ P\to\mu^+\mu^-$	$B1$	[xxx]	$<\ 6.0$	$\times10^{-10}$	CL=95%	–
$\tau^+\tau^-$	$B1$		$<\ 2.1$	$\times10^{-3}$	CL=95%	1952
$\pi^0\ell^+\ell^-$	$B1$		$<\ 5.3$	$\times10^{-8}$	CL=90%	2638
$\pi^0 e^+e^-$	$B1$		$<\ 8.4$	$\times10^{-8}$	CL=90%	2638
$\pi^0\mu^+\mu^-$	$B1$		$<\ 6.9$	$\times10^{-8}$	CL=90%	2634
$\eta\ell^+\ell^-$	$B1$		$<\ 6.4$	$\times10^{-8}$	CL=90%	2611

$\eta e^+ e^-$	*B1*		<	1.08	$\times 10^{-7}$	CL=90%	2611
$\eta \mu^+ \mu^-$	*B1*		<	1.12	$\times 10^{-7}$	CL=90%	2607
$\pi^0 \nu\overline{\nu}$	*B1*		<	9	$\times 10^{-6}$	CL=90%	2638
$K^0 \ell^+ \ell^-$	*B1*	[*iii*]	(	3.3 ± 0.6)	$\times 10^{-7}$		2616
$K^0 e^+ e^-$	*B1*		(	$2.5 \,^{+\,1.1}_{-\,0.9}$)	$\times 10^{-7}$	S=1.3	2616
$K^0 \mu^+ \mu^-$	*B1*		(	3.39± 0.35)	$\times 10^{-7}$	S=1.1	2612
$K^0 \nu\overline{\nu}$	*B1*		<	2.6	$\times 10^{-5}$	CL=90%	2616
$\rho^0 \nu\overline{\nu}$	*B1*		<	4.0	$\times 10^{-5}$	CL=90%	2583
$K^*(892)^0 \ell^+ \ell^-$	*B1*	[*iii*]	(	$9.9 \,^{+\,1.2}_{-\,1.1}$)	$\times 10^{-7}$		2565
$K^*(892)^0 e^+ e^-$	*B1*		(	$1.03^{+\,0.19}_{-\,0.17}$)	$\times 10^{-6}$		2565
$K^*(892)^0 \mu^+ \mu^-$	*B1*		(	9.4 ± 0.5)	$\times 10^{-7}$		2560
$\pi^+ \pi^- \mu^+ \mu^-$	*B1*		(	2.1 ± 0.5)	$\times 10^{-8}$		2626
$K^*(892)^0 \nu\overline{\nu}$	*B1*		<	1.8	$\times 10^{-5}$	CL=90%	2565
invisible	*B1*		<	2.4	$\times 10^{-5}$	CL=90%	–
$\nu\overline{\nu}\gamma$	*B1*		<	1.6	$\times 10^{-5}$	CL=90%	2640
$\phi \nu\overline{\nu}$	*B1*		<	1.27	$\times 10^{-4}$	CL=90%	2541
$e^\pm \mu^\mp$	*LF*	[*aa*]	<	1.0	$\times 10^{-9}$	CL=90%	2639
$\pi^0 e^\pm \mu^\mp$	*LF*		<	1.4	$\times 10^{-7}$	CL=90%	2637
$K^0 e^\pm \mu^\mp$	*LF*		<	3.8	$\times 10^{-8}$	CL=90%	2615
$K^*(892)^0 e^+ \mu^-$	*LF*		<	1.6	$\times 10^{-7}$	CL=90%	2563
$K^*(892)^0 e^- \mu^+$	*LF*		<	1.2	$\times 10^{-7}$	CL=90%	2563
$K^*(892)^0 e^\pm \mu^\mp$	*LF*		<	1.8	$\times 10^{-7}$	CL=90%	2563
$e^\pm \tau^\mp$	*LF*	[*aa*]	<	1.6	$\times 10^{-5}$	CL=90%	2341
$\mu^\pm \tau^\mp$	*LF*	[*aa*]	<	1.4	$\times 10^{-5}$	CL=95%	2340
$\Lambda_c^+ \mu^-$	*L,B*		<	1.4	$\times 10^{-6}$	CL=90%	2143
$\Lambda_c^+ e^-$	*L,B*		<	4	$\times 10^{-6}$	CL=90%	2145

$B^\pm/B^0$ ADMIXTURE

CP violation

$A_{CP}(B \to\ K^*(892)\gamma) = -0.003 \pm 0.011$
$A_{CP}(B \to\ s\gamma) = 0.015 \pm 0.011$
$A_{CP}(B \to\ (s+d)\gamma) = 0.010 \pm 0.031$
$A_{CP}(B \to\ X_s \ell^+ \ell^-) = 0.04 \pm 0.11$
$A_{CP}(B \to\ X_s \ell^+ \ell^-)$ $(1.0 < q^2 < 6.0$ GeV$^2/c^4) = -0.06 \pm 0.22$
$A_{CP}(B \to\ X_s \ell^+ \ell^-)$ $(10.1 < q^2 < 12.9$ or $q^2 > 14.2$ GeV$^2/c^4)$
$= 0.19 \pm 0.18$
$A_{CP}(B \to\ K^* e^+ e^-) = -0.18 \pm 0.15$
$A_{CP}(B \to\ K^* \mu^+ \mu^-) = -0.03 \pm 0.13$
$A_{CP}(B \to\ K^* \ell^+ \ell^-) = -0.04 \pm 0.07$

$A_{CP}(B \to \ \eta\,\text{anything}) = -0.13^{+0.04}_{-0.05}$

$\Delta A_{CP}(X_s\gamma) = A_{CP}(B^{\pm} \to \ X_s\gamma) - A_{CP}(B^0 \to \ X_s\gamma) = 0.041 \pm 0.023$

$\overline{A}_{CP}(B \to \ X_s\gamma) = (A_{CP}(B^+ \to \ X_s\gamma) + A_{CP}(B^0 \to X_s\gamma))/2 = 0.009 \pm 0.012$

$\Delta A_{CP}(B \to \ K^*\gamma) = A_{CP}(B^+ \to \ K^{*+}\gamma) - A_{CP}(B^0 \to K^{*0}\gamma) = 0.024 \pm 0.028$

$\overline{A}_{CP}(B \to \ K^*\gamma) = (A_{CP}(B^+ \to \ K^{*+}\gamma) + A_{CP}(B^0 \to K^{*0}\gamma))/2 = -0.001 \pm 0.014$

The branching fraction measurements are for an admixture of B mesons at the $\Upsilon(4S)$. The values quoted assume that $\mathrm{B}(\Upsilon(4S) \to \ B\overline{B}) = 100\%$.

For inclusive branching fractions, *e.g.*, $B \to \ D^{\pm}$ *anything*, the treatment of multiple D's in the final state must be defined. One possibility would be to count the number of events with one-or-more D's and divide by the total number of B's. Another possibility would be to count the total number of D's and divide by the total number of B's, which is the definition of average multiplicity. The two definitions are identical if only one D is allowed in the final state. Even though the "one-or-more" definition seems sensible, for practical reasons inclusive branching fractions are almost always measured using the multiplicity definition. For heavy final state particles, authors call their results inclusive branching fractions while for light particles some authors call their results multiplicities. In the B sections, we list all results as inclusive branching fractions, adopting a multiplicity definition. This means that inclusive branching fractions can exceed 100% and that inclusive partial widths can exceed total widths, just as inclusive cross sections can exceed total cross section.

$\overline{B}$ modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing.

B DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Semileptonic and leptonic modes				
$\ell^+\,\nu_\ell$ anything	[*iii,yyy*]	(10.84 ± 0.16) %		–
$D^-\,\ell^+\,\nu_\ell$ anything	[*iii*]	(2.6 ± 0.5) %		–
$\overline{D}^0\,\ell^+\,\nu_\ell$ anything	[*iii*]	(7.3 ± 1.5) %		–
$\overline{D}\,\ell^+\,\nu_\ell$		(2.42 ± 0.12) %		2310
$D^{*-}\,\ell^+\,\nu_\ell$ anything	[*zzz*]	(6.7 ± 1.3) $\times 10^{-3}$		–
$\overline{D}^*\,\ell^+\,\nu_\ell$	[*aaaa*]	(4.95 ± 0.11) %		2257
$\overline{D}^{**}\,\ell^+\,\nu_\ell$	[*iii,bbaa*]	(2.7 ± 0.7) %		–
$\overline{D}_1(2420)\,\ell^+\,\nu_\ell$ anything		(3.8 ± 1.3) $\times 10^{-3}$	S=2.4	–
$\overline{D}\,\pi\,\ell^+\,\nu_\ell$ anything + $\overline{D}^*\,\pi\,\ell^+\,\nu_\ell$ anything		(2.6 ± 0.5) %	S=1.5	–
$\overline{D}\,\pi\,\ell^+\,\nu_\ell$ anything		(1.5 ± 0.6) %		–
$\overline{D}^*\,\pi\,\ell^+\,\nu_\ell$ anything		(1.9 ± 0.4) %		–
$\overline{D}_2^*(2460)\,\ell^+\,\nu_\ell$ anything		(4.4 ± 1.6) $\times 10^{-3}$		–

$D^{*-}\pi^+\ell^+\nu_\ell$ anything		(	1.00	±	0.34	) %		–
$\overline{D}\pi^+\pi^-\ell^+\nu_\ell$		(	1.62	±	0.32	) $\times 10^{-3}$		2301
$\overline{D}^*\pi^+\pi^-\ell^+\nu_\ell$		(	9.4	±	3.2	) $\times 10^{-4}$		2247
$D_s^-\ell^+\nu_\ell$ anything	[iii]	<	7			$\times 10^{-3}$	CL=90%	–
$D_s^-\ell^+\nu_\ell K^+$ anything	[iii]	<	5			$\times 10^{-3}$	CL=90%	–
$D_s^-\ell^+\nu_\ell K^0$ anything	[iii]	<	7			$\times 10^{-3}$	CL=90%	–
$X_c\ell^+\nu_\ell$		(	10.65	±	0.16	) %		–
$X_u\ell^+\nu_\ell$		(	1.91	±	0.27	) $\times 10^{-3}$		–
$X_u e^+\nu_e$		(	1.57	±	0.19	) $\times 10^{-3}$		–
$X_u\mu^+\nu_\mu$		(	1.62	±	0.21	) $\times 10^{-3}$		–
$K^+\ell^+\nu_\ell$ anything	[iii]	(	6.3	±	0.6	) %		–
$K^-\ell^+\nu_\ell$ anything	[iii]	(	10	±	4	) $\times 10^{-3}$		–
$K^0/\overline{K}^0\ell^+\nu_\ell$ anything	[iii]	(	4.6	±	0.5	) %		–
$\overline{D}\tau^+\nu_\tau$		(	8.2	±	0.8	) $\times 10^{-3}$		1911
$\overline{D}^*\tau^+\nu_\tau$		(	1.46	±	0.08	) %		1838

D, D^*, or D_s modes

$D^\pm$ anything		(	23.1	±	1.2	) %		–
$D^0/\overline{D}^0$ anything		(	61.6	±	2.9	) %	S=1.3	–
$D^*(2010)^\pm$ anything		(	22.5	±	1.5	) %		–
$\overline{D}^*(2007)^0$ anything		(	26.0	±	2.7	) %		–
$D_s^\pm$ anything	[aa]	(	8.3	±	0.8	) %		–
$D_s^{*\pm}$ anything		(	6.3	±	1.0	) %		–
$D_s^{*\pm}\overline{D}^{(*)}$		(	3.4	±	0.6	) %		–
$\overline{D}D_{s0}(2317)$			seen					1605
$\overline{D}D_{sJ}(2457)$			seen					–
$D^{(*)}\overline{D}^{(*)}K^0$ + $D^{(*)}\overline{D}^{(*)}K^\pm$	[aa,ccaa]	(	7.1	$^{+\ 2.7}_{-\ 1.7}$		) %		–
$b\to\ c\overline{c}s$		(	22	±	4	) %		–
$D_s^{(*)}\overline{D}^{(*)}$	[aa,ccaa]	(	3.9	±	0.4	) %		–
$D^*D^*(2010)^\pm$	[aa]	<	5.9			$\times 10^{-3}$	CL=90%	1711
$DD^*(2010)^\pm$ + $D^*D^\pm$	[aa]	<	5.5			$\times 10^{-3}$	CL=90%	–
$DD^\pm$	[aa]	<	3.1			$\times 10^{-3}$	CL=90%	1866
$D_s^{(*)\pm}\overline{D}^{(*)}X(n\pi^\pm)$	[aa,ccaa]	(	9	$^{+\ 5}_{-\ 4}$		) %		–
$\overline{D}^*(2010)\gamma$		<	1.1			$\times 10^{-3}$	CL=90%	2257
$D_s^+\pi^-$, $D_s^{*+}\pi^-$, $D_s^+\rho^-$, $D_s^{*+}\rho^-$, $D_s^+\pi^0$, $D_s^{*+}\pi^0$, $D_s^+\eta$, $D_s^{*+}\eta$, $D_s^+\rho^0$, $D_s^{*+}\rho^0$, $D_s^+\omega$, $D_s^{*+}\omega$	[aa]	<	4			$\times 10^{-4}$	CL=90%	–
$D_{s1}(2536)^+$ anything		<	9.5			$\times 10^{-3}$	CL=90%	–

Charmonium modes

$J/\psi(1S)$ anything		(	1.094	±	0.032)	%	S=1.1	–
$J/\psi(1S)$ (direct) anything		(	7.8	±	0.4)	$\times 10^{-3}$	S=1.1	–
$\psi(2S)$ anything		(	3.07	±	0.21)	$\times 10^{-3}$		–
$\chi_{c1}(1P)$ anything		(	3.55	±	0.27)	$\times 10^{-3}$	S=1.3	–
$\chi_{c1}(1P)$ (direct) anything		(	3.08	±	0.19)	$\times 10^{-3}$		–
$\chi_{c2}(1P)$ anything		(	10.0	±	1.7)	$\times 10^{-4}$	S=1.6	–
$\chi_{c2}(1P)$ (direct) anything		(	7.5	±	1.1)	$\times 10^{-4}$		–
$\eta_c(1S)$ anything		<	9			$\times 10^{-3}$	CL=90%	–
$K\,\chi_{c1}(3872)$		(	2.3	±	0.7)	$\times 10^{-4}$		1141
$K\,X(3940),\ X \to\ D^{*0}\,D^0$		<	6.7			$\times 10^{-5}$	CL=90%	1084
$K\,\chi_{c0}(3915),\ \chi_{c0} \to\ \omega\,J/\psi$	[ddaa]	(	7.1	±	3.4)	$\times 10^{-5}$		1103

K or K^* modes

$K^\pm$ anything	[aa]	(	78.9	±	2.5)	%		–
K^+ anything		(	66	±	5)	%		–
K^- anything		(	13	±	4)	%		–
$K^0\,/\,\overline{K}^0$ anything	[aa]	(	64	±	4)	%		–
$K^*(892)^\pm$ anything		(	18	±	6)	%		–
$K^*(892)^0\,/\,\overline{K}^*(892)^0$ anything	[aa]	(	14.6	±	2.6)	%		–
$K^*(892)\gamma$		(	4.2	±	0.6)	$\times 10^{-5}$		2565
$\eta\,K\,\gamma$		(	8.5	$^{+\ 1.8}_{-\ 1.6}$	)	$\times 10^{-6}$		2588
$K_1(1400)\gamma$		<	1.27			$\times 10^{-4}$	CL=90%	2454
$K_2^*(1430)\gamma$		(	1.7	$^{+\ 0.6}_{-\ 0.5}$	)	$\times 10^{-5}$		2447
$K_2(1770)\gamma$		<	1.2			$\times 10^{-3}$	CL=90%	2342
$K_3^*(1780)\gamma$		<	3.7			$\times 10^{-5}$	CL=90%	2340
$K_4^*(2045)\gamma$		<	1.0			$\times 10^{-3}$	CL=90%	2243
$K\,\eta'(958)$		(	8.3	±	1.1)	$\times 10^{-5}$		2528
$K^*(892)\,\eta'(958)$		(	4.1	±	1.1)	$\times 10^{-6}$		2472
$K\,\eta$		<	5.2			$\times 10^{-6}$	CL=90%	2588
$K^*(892)\,\eta$		(	1.8	±	0.5)	$\times 10^{-5}$		2534
$K\,\phi\,\phi$		(	2.3	±	0.9)	$\times 10^{-6}$		2306
$\overline{b} \to\ \overline{s}\gamma$		(	3.49	±	0.19)	$\times 10^{-4}$		–
$\overline{b} \to\ \overline{d}\gamma$		(	9.2	±	3.0)	$\times 10^{-6}$		–
$\overline{b} \to\ \overline{s}$ gluon		<	6.8			%	CL=90%	–
η anything		(	2.6	$^{+\ 0.5}_{-\ 0.8}$	)	$\times 10^{-4}$		–
η' anything		(	4.2	±	0.9)	$\times 10^{-4}$		–
K^+ gluon (charmless)		<	1.87			$\times 10^{-4}$	CL=90%	–
K^0 gluon (charmless)		(	1.9	±	0.7)	$\times 10^{-4}$		–

Light unflavored meson modes

$\rho\gamma$		(	1.39	±	0.25)	$\times 10^{-6}$	S=1.2	2583
$\rho\,/\,\omega\gamma$		(	1.30	±	0.23)	$\times 10^{-6}$	S=1.2	–

$\pi^\pm$ anything	[aa,eeaa]	(	358	± 7	) %			–
π^0 anything		(	235	±11	) %			–
η anything		(	17.6	± 1.6	) %			–
ρ^0 anything		(	21	± 5	) %			–
ω anything		<	81		%		CL=90%	–
ϕ anything		(	3.43	± 0.12	) %			–
$\phi K^*(892)$		<	2.2		$\times 10^{-5}$		CL=90%	2460
π^+ gluon (charmless)		(	3.7	± 0.8	) $\times 10^{-4}$			–

Baryon modes

Λ_c^+ / $\overline{\Lambda}_c^-$ anything		(	3.6	± 0.4	) %			–
Λ_c^+ anything		<	1.3		%		CL=90%	–
$\overline{\Lambda}_c^-$ anything		<	7		%		CL=90%	–
$\overline{\Lambda}_c^- \ell^+$ anything		<	9		$\times 10^{-4}$		CL=90%	–
$\overline{\Lambda}_c^- e^+$ anything		<	1.8		$\times 10^{-3}$		CL=90%	–
$\overline{\Lambda}_c^- \mu^+$ anything		< −	1.4		$\times 10^{-3}$		CL=90%	–
$\overline{\Lambda}_c^- p$ anything		(	2.04	± 0.33	) %			–
$\overline{\Lambda}_c^- p e^+ \nu_e$		<	8		$\times 10^{-4}$		CL=90%	2021
$\overline{\Sigma}_c^{--}$ anything		(	3.3	± 1.7	) $\times 10^{-3}$			–
$\overline{\Sigma}_c^-$ anything		<	8		$\times 10^{-3}$		CL=90%	–
$\overline{\Sigma}_c^0$ anything		(	3.7	± 1.7	) $\times 10^{-3}$			–
$\overline{\Sigma}_c^0 N(N = p$ or $n)$		<	1.2		$\times 10^{-3}$		CL=90%	1938
Ξ_c^0 anything, $\Xi_c^0 \to \Xi^- \pi^+$		(	1.93	± 0.30	) $\times 10^{-4}$		S=1.1	–
Ξ_c^+, $\Xi_c^+ \to \Xi^- \pi^+ \pi^+$		(	4.5	$^{+\ 1.3}_{-\ 1.2}$	) $\times 10^{-4}$			–
$p/\overline{p}$ anything	[aa]	(	8.0	± 0.4	) %			–
$p/\overline{p}$ (direct) anything	[aa]	(	5.5	± 0.5	) %			–
$\overline{p} e^+ \nu_e$ anything		<	5.9		$\times 10^{-4}$		CL=90%	–
$\Lambda/\overline{\Lambda}$ anything	[aa]	(	4.0	± 0.5	) %			–
Λ anything			seen					–
$\overline{\Lambda}$ anything			seen					–
$\Xi^-/\overline{\Xi}^+$ anything	[aa]	(	2.7	± 0.6	) $\times 10^{-3}$			–
baryons anything		(	6.8	± 0.6	) %			–
$p\overline{p}$ anything		(	2.47	± 0.23	) %			–
$\Lambda\overline{p}/\overline{\Lambda}p$ anything	[aa]	(	2.5	± 0.4	) %			–
$\Lambda\overline{\Lambda}$ anything		<	5		$\times 10^{-3}$		CL=90%	–

Lepton Family number (*LF*) violating modes or $\Delta B = 1$ weak neutral current (*B1*) modes

$s e^+ e^-$	*B1*		(	6.7	± 1.7	) $\times 10^{-6}$	S=2.0	–
$s \mu^+ \mu^-$	*B1*		(	4.3	± 1.0	) $\times 10^{-6}$		–
$s \ell^+ \ell^-$	*B1*	[iii]	(	5.8	± 1.3	) $\times 10^{-6}$	S=1.8	–
$\pi \ell^+ \ell^-$	*B1*		<	5.9		$\times 10^{-8}$	CL=90%	2638
$\pi e^+ e^-$	*B1*		<	1.10		$\times 10^{-7}$	CL=90%	2638

$\pi\mu^+\mu^-$	*B1*		<	5.0	$\times 10^{-8}$	CL=90%	2634
$K e^+ e^-$	*B1*		(	4.4 ± 0.6)	$\times 10^{-7}$		2617
$K^*(892) e^+ e^-$	*B1*		(	1.19 ± 0.20)	$\times 10^{-6}$	S=1.2	2565
$K\mu^+\mu^-$	*B1*		(	4.4 ± 0.4)	$\times 10^{-7}$		2612
$K^*(892)\mu^+\mu^-$	*B1*		(	1.06 ± 0.09)	$\times 10^{-6}$		2560
$K\ell^+\ell^-$	*B1*		(	4.8 ± 0.4)	$\times 10^{-7}$		2617
$K^*(892)\ell^+\ell^-$	*B1*		(	1.05 ± 0.10)	$\times 10^{-6}$		2565
$K\nu\overline{\nu}$	*B1*		<	1.6	$\times 10^{-5}$	CL=90%	2617
$K^*\nu\overline{\nu}$	*B1*		<	2.7	$\times 10^{-5}$	CL=90%	–
$\pi\nu\overline{\nu}$	*B1*		<	8	$\times 10^{-6}$	CL=90%	2638
$\rho\nu\overline{\nu}$	*B1*		<	2.8	$\times 10^{-5}$	CL=90%	2583
$s e^\pm\mu^\mp$	*LF*	[*aa*]	<	2.2	$\times 10^{-5}$	CL=90%	–
$\pi e^\pm\mu^\mp$	*LF*		<	9.2	$\times 10^{-8}$	CL=90%	2637
$\rho e^\pm\mu^\mp$	*LF*		<	3.2	$\times 10^{-6}$	CL=90%	2582
$K e^\pm\mu^\mp$	*LF*		<	3.8	$\times 10^{-8}$	CL=90%	2616
$K^*(892) e^\pm\mu^\mp$	*LF*		<	5.1	$\times 10^{-7}$	CL=90%	2563

$B^\pm/B^0/B_s^0$/*b*-baryon ADMIXTURE

These measurements are for an admixture of bottom particles at high energy (LHC, LEP, Tevatron, S$p\overline{p}$S).

Mean life $\tau = (1.5672 \pm 0.0029) \times 10^{-12}$ s

Mean life $\tau = (1.72 \pm 0.10) \times 10^{-12}$ s Charged *b*-hadron admixture

Mean life $\tau = (1.58 \pm 0.14) \times 10^{-12}$ s Neutral *b*-hadron admixture

$\tau_{\text{charged } b-\text{hadron}}/\tau_{\text{neutral } b-\text{hadron}} = 1.09 \pm 0.13$

$|\Delta\tau_b|/\tau_{b,\overline{b}} = -0.001 \pm 0.014$

The branching fraction measurements are for an admixture of *B* mesons and baryons at energies above the $\Upsilon(4S)$. Only the highest energy results (LHC, LEP, Tevatron, S$p\overline{p}$S) are used in the branching fraction averages. In the following, we assume that the production fractions are the same at the LHC, LEP, and at the Tevatron.

For inclusive branching fractions, *e.g.*, $B \to D^\pm$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

The modes below are listed for a $\overline{b}$ initial state. *b* modes are their charge conjugates. Reactions indicate the weak decay vertex and do not include mixing.

$\overline{b}$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)

PRODUCTION FRACTIONS

The production fractions for weakly decaying b-hadrons at high energy have been calculated from the best values of mean lives, mixing parameters, and branching fractions in this edition by the Heavy Flavor Averaging Group (HFLAV) as described in the note "B^0-$\overline{B}^0$ Mixing" in the B^0 Particle Listings. We no longer provide world averages of the b-hadron production fractions, where results from LEP, Tevatron and LHC are averaged together; indeed the available data (from CDF and LHCb) shows that the fractions depend on the kinematics (in particular the p_T) of the produced b hadron. Hence we would like to list the fractions in Z decays instead, which are well-defined physics observables. The production fractions in $p\overline{p}$ collisions at the Tevatron are also listed at the end of the section. Values assume

$\mathrm{B}(\overline{b} \to\ B^+) = \mathrm{B}(\overline{b} \to\ B^0)$
$\mathrm{B}(\overline{b} \to\ B^+) + \mathrm{B}(\overline{b} \to\ B^0) + \mathrm{B}(\overline{b} \to\ B^0_s) + \mathrm{B}(b \to\ b\text{-baryon}) = 100\%$.

The correlation coefficients between production fractions are also reported:
$cor(B^0_s,\ b\text{-baryon}) = 0.064$
$cor(B^0_s,\ B^\pm{=}B^0) = -0.633$
$cor(b\text{-baryon},\ B^\pm{=}B^0) = -0.813$.

The notation for production fractions varies in the literature (f_d, d_{B^0}, $f(b \to\ \overline{B}^0)$, $\mathrm{Br}(b \to\ \overline{B}^0)$). We use our own branching fraction notation here, $\mathrm{B}(\overline{b} \to\ B^0)$.

Note these production fractions are b-hadronization fractions, not the conventional branching fractions of b-quark to a B-hadron, which may have considerable dependence on the initial and final state kinematic and production environment.

B^+		(40.8 ± 0.7) %		–
B^0		(40.8 ± 0.7) %		–
B^0_s		(10.0 ± 0.8) %		–
b-baryon		(8.4 ± 1.1) %		–

DECAY MODES

Semileptonic and leptonic modes

ν anything		(23.1 ± 1.5) %		–
$\ell^+ \nu_\ell$ anything	[*iii*]	(10.69± 0.22) %		–
$e^+ \nu_e$ anything		(10.86± 0.35) %		–
$\mu^+ \nu_\mu$ anything		($10.95^{+\ 0.29}_{-\ 0.25}$) %		–
$D^- \ell^+ \nu_\ell$ anything	[*iii*]	(2.2 ± 0.4) %	S=1.9	–
$D^- \pi^+ \ell^+ \nu_\ell$ anything		(4.9 ± 1.9) $\times 10^{-3}$		–

$D^-\pi^-\ell^+\nu_\ell$ anything		(2.6 ± 1.6) × 10^{-3}	–
$\overline{D}^0\ell^+\nu_\ell$ anything	[iii]	(6.79 ± 0.34) %	–
$\overline{D}^0\pi^-\ell^+\nu_\ell$ anything		(1.07 ± 0.27) %	–
$\overline{D}^0\pi^+\ell^+\nu_\ell$ anything		(2.3 ± 1.6) × 10^{-3}	–
$D^{*-}\ell^+\nu_\ell$ anything	[iii]	(2.75 ± 0.19) %	–
$D^{*-}\pi^-\ell^+\nu_\ell$ anything		(6 ± 7) × 10^{-4}	–
$D^{*-}\pi^+\ell^+\nu_\ell$ anything		(4.8 ± 1.0) × 10^{-3}	–
$\overline{D}_j^0\ell^+\nu_\ell$ anything × B($\overline{D}_j^0 \to D^{*+}\pi^-$)	[iii,ffaa]	(2.6 ± 0.9) × 10^{-3}	–
$D_j^-\ell^+\nu_\ell$ anything × B($D_j^- \to D^0\pi^-$)	[iii,ffaa]	(7.0 ± 2.3) × 10^{-3}	–
$\overline{D}_2^*(2460)^0\ell^+\nu_\ell$ anything × B($\overline{D}_2^*(2460)^0 \to D^{*-}\pi^+$)		< 1.4 × 10^{-3} CL=90%	–
$D_2^*(2460)^-\ell^+\nu_\ell$ anything × B($D_2^*(2460)^- \to D^0\pi^-$)		(4.2 $^{+1.5}_{-1.8}$) × 10^{-3}	–
$\overline{D}_2^*(2460)^0\ell^+\nu_\ell$ anything × B($\overline{D}_2^*(2460)^0 \to D^-\pi^+$)		(1.6 ± 0.8) × 10^{-3}	–
charmless $\ell\overline{\nu}_\ell$	[iii]	(1.7 ± 0.5) × 10^{-3}	–
$\tau^+\nu_\tau$ anything		(2.41 ± 0.23) %	–
$D^{*-}\tau\nu_\tau$ anything		(9 ± 4) × 10^{-3}	–
$\overline{c} \to \ell^-\overline{\nu}_\ell$ anything	[iii]	(8.02 ± 0.19) %	–
$c \to \ell^+\nu$ anything		(1.6 $^{+0.4}_{-0.5}$) %	–

Charmed meson and baryon modes

$\overline{D}^0$ anything		(58.7 ± 2.8) %	–
$D^0D_s^\pm$ anything	[aa]	(9.1 $^{+4.0}_{-2.8}$) %	–
$D^\mp D_s^\pm$ anything	[aa]	(4.0 $^{+2.3}_{-1.8}$) %	–
$\overline{D}^0D^0$ anything	[aa]	(5.1 $^{+2.0}_{-1.8}$) %	–
$D^0D^\pm$ anything	[aa]	(2.7 $^{+1.8}_{-1.6}$) %	–
$D^\pm D^\mp$ anything	[aa]	< 9 × 10^{-3} CL=90%	–
D^- anything		(22.7 ± 1.6) %	–
$D^*(2010)^+$ anything		(17.3 ± 2.0) %	–
$D_1(2420)^0$ anything		(5.0 ± 1.5) %	–
$D^*(2010)^\mp D_s^\pm$ anything	[aa]	(3.3 $^{+1.6}_{-1.3}$) %	–
$D^0D^*(2010)^\pm$ anything	[aa]	(3.0 $^{+1.1}_{-0.9}$) %	–

$D^*(2010)^{\pm} D^{\mp}$ anything	[aa]	(2.5 $^{+\ 1.2}_{-\ 1.0}$) %		–
$D^*(2010)^{\pm} D^*(2010)^{\mp}$ anything	[aa]	(1.2 ± 0.4) %		–
$\overline{D}\,D$ anything		(10 $^{+11}_{-10}$) %		–
$D_2^*(2460)^0$ anything		(4.7 ± 2.7) %		–
D_s^- anything		(14.7 ± 2.1) %		–
D_s^+ anything		(10.1 ± 3.1) %		–
Λ_c^+ anything		(7.7 ± 1.1) %		–
$\overline{c}/c$ anything	[eeaa]	(116.2 ± 3.2) %		–

Charmonium modes

$J/\psi(1S)$ anything		(1.16± 0.10) %		–
$\psi(2S)$ anything		(3.06± 0.30) $\times 10^{-3}$		–
$\chi_{c0}(1P)$ anything		(1.5 ± 0.6) %		–
$\chi_{c1}(1P)$ anything		(1.4 ± 0.4) %		–
$\chi_{c2}(1P)$ anything		(6.2 ± 2.9) $\times 10^{-3}$		–
$\chi_c(2P)$ anything, $\chi_c \to \phi\phi$		< 2.8 $\times 10^{-7}$	CL=95%	–
$\eta_c(1S)$ anything		(5.6 ± 0.9) $\times 10^{-3}$		–
$\eta_c(2S)$ anything, $\eta_c \to \phi\phi$		(3.9 ± 1.4) $\times 10^{-7}$		–
$\chi_{c1}(3872)$ anything, $\chi_{c1} \to \phi\phi$		< 4.5 $\times 10^{-7}$	CL=95%	–
$\chi_{c0}(3915)$ anything, $\chi_{c0} \to \phi\phi$		< 3.1 $\times 10^{-7}$	CL=95%	–

K or *K** modes

$\overline{s}\gamma$		(3.1 ± 1.1) $\times 10^{-4}$		–
$\overline{s}\overline{\nu}\nu$	B1	< 6.4 $\times 10^{-4}$	CL=90%	–
$K^{\pm}$ anything		(74 ± 6) %		–
K_S^0 anything		(29.0 ± 2.9) %		–

Pion modes

$\pi^{\pm}$ anything		(397 ±21) %		–
π^0 anything	[eeaa]	(278 ±60) %		–
ϕ anything		(2.82± 0.23) %		–

Baryon modes

$p/\overline{p}$ anything		(13.1 ± 1.1) %		–
$\Lambda/\overline{\Lambda}$ anything		(5.9 ± 0.6) %		–
b-baryon anything		(10.2 ± 2.8) %		–

Other modes

charged anything	[eeaa]	(497 ± 7) %		–
hadron$^+$ hadron$^-$		(1.7 $^{+\ 1.0}_{-\ 0.7}$) $\times 10^{-5}$		–
charmless		(7 ±21) $\times 10^{-3}$		–

$\Delta B = 1$ weak neutral current ($B1$) modes

$\mu^+ \mu^-$ anything	*B1*	<	3.2	$\times 10^{-4}$ CL=90%	–

B^*

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

Quantum numbers shown are quark-model predictions.

Mass $m_{B^*} = 5324.71 \pm 0.21$ MeV
$m_{B^*} - m_B = 45.21 \pm 0.21$ MeV
$m_{B^{*+}} - m_{B^+} = 45.37 \pm 0.21$ MeV

B^* DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B\gamma$	seen	45

$B_1(5721)$

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

$B_1(5721)^+$ mass $= 5725.9^{+2.5}_{-2.7}$ MeV
$m_{B_1^+} - m_{B^{*0}} = 401.2^{+2.4}_{-2.7}$ MeV
$B_1(5721)^0$ mass $= 5726.1 \pm 1.3$ MeV (S = 1.2)
$m_{B_1^0} - m_{B^+} = 446.7 \pm 1.3$ MeV (S = 1.2)
$m_{B_1^0} - m_{B^{*+}} = 401.4 \pm 1.2$ MeV (S = 1.2)
Full width $\Gamma(B_1(5721)^+) = 31 \pm 6$ MeV (S = 1.1)
Full width $\Gamma(B_1(5721)^0) = 27.5 \pm 3.4$ MeV (S = 1.1)

$B_1(5721)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B^*\pi$	seen	365

$B_2^*(5747)$

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

$B_2^*(5747)^+$ mass $= 5737.2 \pm 0.7$ MeV
$m_{B_2^{*+}} - m_{B^0} = 457.5 \pm 0.7$ MeV
$B_2^*(5747)^0$ mass $= 5739.5 \pm 0.7$ MeV (S = 1.4)
$m_{B_2^{*0}} - m_{B_1^0} = 13.4 \pm 1.4$ MeV (S = 1.3)
$m_{B_2^{*0}} - m_{B^+} = 460.2 \pm 0.6$ MeV (S = 1.4)
Full width $\Gamma(B_2^*(5747)^+) = 20 \pm 5$ MeV (S = 2.2)
Full width $\Gamma(B_2^*(5747)^0) = 24.2 \pm 1.7$ MeV

$B_2^*(5747)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B\pi$	seen	420
$B^*\pi$	seen	376

$B_J(5970)$

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

$B_J(5970)^+$ mass $m = 5964 \pm 5$ MeV
$m_{B_J(5970)^+} - m_{B^0} = 685 \pm 5$ MeV
$B_J(5970)^0$ mass $m = 5971 \pm 5$ MeV
$m_{B_J(5970)^0} - m_{B^+} = 691 \pm 5$ MeV
$B_J(5970)^+$ full width $\Gamma = 62 \pm 20$ MeV
$B_J(5970)^0$ full width $\Gamma = 81 \pm 12$ MeV

$B_J(5970)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B\pi$	possibly seen	633
$B^*\pi$	seen	592

BOTTOM, STRANGE MESONS ($B = \pm 1, S = \mp 1$)

$B_s^0 = s\overline{b}$, $\overline{B}_s^0 = \overline{s}\,b$, similarly for B_s^*'s

B_s^0

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m_{B_s^0} = 5366.92 \pm 0.10$ MeV
$m_{B_s^0} - m_B = 87.42 \pm 0.14$ MeV
Mean life $\tau = (1.520 \pm 0.005) \times 10^{-12}$ s
$c\tau = 455.7\ \mu$m
$\Delta\Gamma_{B_s^0} = \Gamma_{B_{sL}^0} - \Gamma_{B_{sH}^0} = (0.084 \pm 0.005) \times 10^{12}$ s^{-1} (S = 1.7)

B_s^0-$\overline{B}_s^0$ mixing parameters

$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0} = (17.765 \pm 0.006) \times 10^{12}\ \hbar$ s^{-1}
$= (1.1693 \pm 0.0004) \times 10^{-8}$ MeV
$x_s = \Delta m_{B_s^0}/\Gamma_{B_s^0} = 27.01 \pm 0.10$
χ_s (B_s^0-$\overline{B}_s^0$ mixing parameter) $= 0.499318 \pm 0.000005$

CP violation parameters in B_s^0

$\mathrm{Re}(\epsilon_{B_s^0}) \,/\, (1 + |\epsilon_{B_s^0}|^2) = (-0.15 \pm 0.70) \times 10^{-3}$
$C_{KK}(B_s^0 \to\ K^+K^-) = 0.162 \pm 0.035$
$S_{KK}(B_s^0 \to\ K^+K^-) = 0.14 \pm 0.05$ (S = 1.3)
$\mathrm{r}_B(B_s^0 \to\ D_s^\mp K^\pm) = 0.37^{+0.10}_{-0.09}$
$\mathrm{r}_B(B_s^0 \to\ D_s^\mp K^\pm \pi^\pm \pi^\mp) = 0.47 \pm 0.08$
$\delta_B(B_s^0 \to\ D_s^\pm K^\mp) = (358 \pm 14)^\circ$
$\delta_B(B_s^0 \to\ D_s^\pm K^\mp \pi^\pm \pi^\mp) = (-6^{+10}_{-13})^\circ$
CP Violation phase $\beta_s = (2.5 \pm 1.0) \times 10^{-2}$ rad
$|\lambda|\ (B_s^0 \to\ J/\psi(1S)\phi) = 1.001 \pm 0.018$ (S = 1.2)
$|\lambda| = 0.999 \pm 0.017$
A, *CP* violation parameter $= -0.79 \pm 0.08$
C, *CP* violation parameter $= 0.19 \pm 0.06$
S, *CP* violation parameter $= 0.17 \pm 0.06$
$A_{CP}^L(B_s \to\ J/\psi \overline{K}^*(892)^0) = -0.05 \pm 0.06$
$A_{CP}^\parallel(B_s \to\ J/\psi \overline{K}^*(892)^0) = 0.17 \pm 0.15$
$A_{CP}^\perp(B_s \to\ J/\psi \overline{K}^*(892)^0) = -0.05 \pm 0.10$
$A_{CP}(B_s \to\ \pi^+K^-) = 0.224 \pm 0.012$
$A_{CP}(B_s^0 \to\ [K^+K^-]_D \overline{K}^*(892)^0) = -0.04 \pm 0.07$
$A_{CP}(B_s^0 \to\ [\pi^+K^-]_D K^*(892)^0) = -0.01 \pm 0.04$
$A_{CP}(B_s^0 \to\ [\pi^+\pi^-]_D K^*(892)^0) = 0.06 \pm 0.13$
$S(B_s^0 \to\ \phi\gamma) = 0.43 \pm 0.32$
$C(B_s^0 \to\ \phi\gamma) = 0.11 \pm 0.31$
$A^\Delta(B_s^0 \to\ \phi\gamma) = -0.7 \pm 0.4$
$\Delta a_\perp\ <\ 1.2 \times 10^{-12}$ GeV, CL = 95%
$\Delta a_\parallel = (-0.9 \pm 1.5) \times 10^{-14}$ GeV
$\Delta a_X = (1.0 \pm 2.2) \times 10^{-14}$ GeV
$\Delta a_Y = (-3.8 \pm 2.2) \times 10^{-14}$ GeV
$\mathrm{Re}(\xi) = -0.022 \pm 0.033$
$\mathrm{Im}(\xi) = 0.004 \pm 0.011$

These branching fractions all scale with $\mathrm{B}(\overline{b} \to\ B_s^0)$.

The branching fraction $\mathrm{B}(B_s^0 \to\ D_s^- \ell^+ \nu_\ell \text{anything})$ is not a pure measurement since the measured product branching fraction $\mathrm{B}(\overline{b} \to\ B_s^0) \times \mathrm{B}(B_s^0 \to\ D_s^- \ell^+ \nu_\ell \text{anything})$ was used to determine $\mathrm{B}(\overline{b} \to\ B_s^0)$, as described in the note on "B^0-$\overline{B}^0$ Mixing"

For inclusive branching fractions, *e.g.*, $B \to\ D^\pm$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

B_s^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
D_s^- anything		(62 ± 6) %		–
$\ell\nu_\ell X$		(9.6 ± 0.8) %		–
$e^+\nu X^-$		(9.1 ± 0.8) %		–
$\mu^+\nu X^-$		(10.2 ± 1.0) %		–
$D_s^-\ell^+\nu_\ell$ anything	[*ggaa*]	(8.1 ± 1.3) %		–
$D_s^{*-}\ell^+\nu_\ell$ anything		(5.4 ± 1.1) %		–
$D_s^-\mu^+\nu_\mu$		(2.44± 0.23) %		2321
$D_s^{*-}\mu^+\nu_\mu$		(5.3 ± 0.5) %		2266
$D_{s1}(2536)^-\mu^+\nu_\mu$, $D_{s1}^- \to D^{*-}K_S^0$		(2.7 ± 0.7) $\times 10^{-3}$		–
$D_{s1}(2536)^- X\mu^+\nu$, $D_{s1}^- \to \overline{D}^0 K^+$		(4.4 ± 1.3) $\times 10^{-3}$		–
$D_{s2}(2573)^- X\mu^+\nu$, $D_{s2}^- \to \overline{D}^0 K^+$		(2.7 ± 1.0) $\times 10^{-3}$		–
$K^-\mu^+\nu_\mu$		(1.06± 0.09) $\times 10^{-4}$		2660
$D_s^-\pi^+$		(2.98± 0.14) $\times 10^{-3}$		2320
$D_s^-\rho^+$		(6.8 ± 1.4) $\times 10^{-3}$		2249
$D_s^-\pi^+\pi^+\pi^-$		(6.1 ± 1.0) $\times 10^{-3}$		2301
$D_{s1}(2536)^-\pi^+$, $D_{s1}^- \to D_s^-\pi^+\pi^-$		(2.4 ± 0.8) $\times 10^{-5}$		–
$D_s^\mp K^\pm$		(2.25± 0.12) $\times 10^{-4}$		2293
$D_s^- K^+\pi^+\pi^-$		(3.2 ± 0.6) $\times 10^{-4}$		2249
$D_s^+ D_s^-$		(4.4 ± 0.5) $\times 10^{-3}$		1824
$D_s^- D^+$		(2.8 ± 0.5) $\times 10^{-4}$		1875
$D^+ D^-$		(2.2 ± 0.6) $\times 10^{-4}$		1925
$D^0\overline{D}^0$		(1.9 ± 0.5) $\times 10^{-4}$		1930
$D_s^{*-}\pi^+$		(1.9 $^{+\ 0.5}_{-\ 0.4}$) $\times 10^{-3}$		2265
$D_s^{*\mp}K^\pm$		(1.32$^{+\ 0.40}_{-\ 0.32}$) $\times 10^{-4}$		–
$D_s^{*-}\rho^+$		(9.5 ± 2.0) $\times 10^{-3}$		2191
$D_s^{*+}D_s^- + D_s^{*-}D_s^+$		(1.39± 0.17) %		1742
$D_s^{*+}D_s^{*-}$		(1.44± 0.21) %	S=1.1	1655
$D_s^{(*)+}D_s^{(*)-}$		(4.5 ± 1.4) %		–
$D^{*-}D_s^+$		(3.9 ± 0.8) $\times 10^{-4}$		1801
$\overline{D}^{*0}\overline{K}^0$		(2.8 ± 1.1) $\times 10^{-4}$		2278
$\overline{D}^0\overline{K}^0$		(4.3 ± 0.9) $\times 10^{-4}$		2330
$\overline{D}^0 K^-\pi^+$		(1.04± 0.13) $\times 10^{-3}$		2312

$\overline{D}^0 \overline{K}^*(892)^0$	$(\ 4.4 \pm 0.6\ ) \times 10^{-4}$		2264
$\overline{D}^0 \overline{K}^*(1410)$	$(\ 3.9 \pm 3.5\ ) \times 10^{-4}$		2117
$\overline{D}^0 \overline{K}^*_0(1430)$	$(\ 3.0 \pm 0.7\ ) \times 10^{-4}$		2113
$\overline{D}^0 \overline{K}^*_2(1430)$	$(\ 1.1 \pm 0.4\ ) \times 10^{-4}$		2112
$\overline{D}^0 \overline{K}^*(1680)$	$< 7.8 \times 10^{-5}$	CL=90%	1997
$\overline{D}^0 \overline{K}^*_0(1950)$	$< 1.1 \times 10^{-4}$	CL=90%	1890
$\overline{D}^0 \overline{K}^*_3(1780)$	$< 2.6 \times 10^{-5}$	CL=90%	1970
$\overline{D}^0 \overline{K}^*_4(2045)$	$< 3.1 \times 10^{-5}$	CL=90%	1835
$\overline{D}^0 K^- \pi^+$ (non-resonant)	$(\ 2.1 \pm 0.8\ ) \times 10^{-4}$		2312
$D^*_{s2}(2573)^- \pi^+,\ D^*_{s2} \to \overline{D}^0 K^-$	$(\ 2.6 \pm 0.4\ ) \times 10^{-4}$		–
$D^*_{s1}(2700)^- \pi^+,\ D^*_{s1} \to \overline{D}^0 K^-$	$(\ 1.6 \pm 0.8\ ) \times 10^{-5}$		–
$D^*_{s1}(2860)^- \pi^+,\ D^*_{s1} \to \overline{D}^0 K^-$	$(\ 5 \pm 4\ ) \times 10^{-5}$		–
$D^*_{s3}(2860)^- \pi^+,\ D^*_{s3} \to \overline{D}^0 K^-$	$(\ 2.2 \pm 0.6\ ) \times 10^{-5}$		–
$\overline{D}^0 K^+ K^-$	$(\ 5.6 \pm 0.9\ ) \times 10^{-5}$		2243
$\overline{D}^0 f_0(980)$	$< 3.1 \times 10^{-6}$	CL=90%	2242
$\overline{D}^0 \phi$	$(\ 3.0 \pm 0.5\ ) \times 10^{-5}$		2235
$\overline{D}^{*0} \phi$	$(\ 3.7 \pm 0.6\ ) \times 10^{-5}$		2178
$D^{*\mp} \pi^\pm$	$< 6.1 \times 10^{-6}$	CL=90%	–
$\eta_c \phi$	$(\ 5.0 \pm 0.9\ ) \times 10^{-4}$		1663
$\eta_c \pi^+ \pi^-$	$(\ 1.8 \pm 0.7\ ) \times 10^{-4}$		1840
$J/\psi(1S) \phi$	$(\ 1.04 \pm 0.04) \times 10^{-3}$		1588
$J/\psi(1S) \phi \phi$	$(\ 1.20^{+\ 0.14}_{-\ 0.16}) \times 10^{-5}$		764
$J/\psi(1S) \pi^0$	$< 1.2 \times 10^{-3}$	CL=90%	1787
$J/\psi(1S) \eta$	$(\ 4.0 \pm 0.7\ ) \times 10^{-4}$	S=1.4	1733
$J/\psi(1S) K^0_S$	$(\ 1.92 \pm 0.14) \times 10^{-5}$		1743
$J/\psi(1S) \overline{K}^*(892)^0$	$(\ 4.1 \pm 0.4\ ) \times 10^{-5}$		1637
$J/\psi(1S) \eta'$	$(\ 3.3 \pm 0.4\ ) \times 10^{-4}$		1612
$J/\psi(1S) \pi^+ \pi^-$	$(\ 2.02 \pm 0.17) \times 10^{-4}$	S=1.7	1775
$J/\psi(1S) f_0(500),\ f_0 \to \pi^+ \pi^-$	$< 4 \times 10^{-6}$	CL=90%	–
$J/\psi(1S) \rho,\ \rho \to \pi^+ \pi^-$	$< 3.4 \times 10^{-6}$	CL=90%	–
$J/\psi(1S) f_0(980),\ f_0 \to \pi^+ \pi^-$	$(\ 1.24 \pm 0.15) \times 10^{-4}$	S=2.1	–
$J/\psi(1S) f_2(1270),\ f_2 \to \pi^+ \pi^-$	$(\ 1.0 \pm 0.4\ ) \times 10^{-6}$		–
$J/\psi(1S) f_2(1270)_0,\ f_2 \to \pi^+ \pi^-$	$(\ 7.3 \pm 1.7\ ) \times 10^{-7}$		–
$J/\psi(1S) f_2(1270)_\parallel,\ f_2 \to \pi^+ \pi^-$	$(\ 1.05 \pm 0.33) \times 10^{-6}$		–

$J/\psi(1S) f_2(1270)_\perp$, $f_2 \to \pi^+\pi^-$	$(1.3 \pm 0.7) \times 10^{-6}$		–
$J/\psi(1S) f_0(1370)$, $f_0 \to \pi^+\pi^-$	$(4.4 \,^{+\,0.6}_{-\,4.0}) \times 10^{-5}$		–
$J/\psi(1S) f_0(1500)$, $f_0 \to \pi^+\pi^-$	$(2.04^{+\,0.32}_{-\,0.24}) \times 10^{-5}$		–
$J/\psi(1S) f_2'(1525)_0$, $f_2' \to \pi^+\pi^-$	$(1.03 \pm 0.22) \times 10^{-6}$		–
$J/\psi(1S) f_2'(1525)_\parallel$, $f_2' \to \pi^+\pi^-$	$(1.2 \,^{+\,2.6}_{-\,0.8}) \times 10^{-7}$		–
$J/\psi(1S) f_2'(1525)_\perp$, $f_2' \to \pi^+\pi^-$	$(5 \pm 4) \times 10^{-7}$		–
$J/\psi(1S) f_0(1790)$, $f_0 \to \pi^+\pi^-$	$(4.9 \,^{+10.0}_{-\,1.0}) \times 10^{-6}$		–
$J/\psi(1S)\pi^+\pi^-$ (nonresonant)	$(1.74^{+\,1.10}_{-\,0.34}) \times 10^{-5}$		1775
$J/\psi(1S)\overline{K}^0\pi^+\pi^-$	$< 4.4 \times 10^{-5}$	CL=90%	1675
$J/\psi(1S) K^+K^-$	$(7.9 \pm 0.7) \times 10^{-4}$		1601
$J/\psi(1S) K^0 K^-\pi^+ +$ c.c.	$(9.5 \pm 1.3) \times 10^{-4}$		1538
$J/\psi(1S)\overline{K}^0 K^+K^-$	$< 1.2 \times 10^{-5}$	CL=90%	1333
$J/\psi K^*(892)^0\overline{K}^*(892)^0$	$(1.10 \pm 0.09) \times 10^{-4}$		1083
$J/\psi(1S) f_2'(1525)$	$(2.6 \pm 0.6) \times 10^{-4}$		1310
$J/\psi(1S) p\overline{p}$	$(3.6 \pm 0.4) \times 10^{-6}$		982
$J/\psi(1S)\gamma$	$< 7.3 \times 10^{-6}$	CL=90%	1790
$J/\psi(1S)\pi^+\pi^-\pi^+\pi^-$	$(7.5 \pm 0.8) \times 10^{-5}$		1731
$J/\psi(1S) f_1(1285)$	$(7.2 \pm 1.4) \times 10^{-5}$		1460
$\psi(2S)\eta$	$(3.3 \pm 0.9) \times 10^{-4}$		1338
$\psi(2S)\eta'$	$(1.29 \pm 0.35) \times 10^{-4}$		1158
$\psi(2S)\pi^+\pi^-$	$(6.9 \pm 1.2) \times 10^{-5}$		1397
$\psi(2S)\phi$	$(5.2 \pm 0.4) \times 10^{-4}$		1120
$\psi(2S) K^-\pi^+$	$(3.1 \pm 0.4) \times 10^{-5}$		1310
$\psi(2S)\overline{K}^*(892)^0$	$(3.3 \pm 0.5) \times 10^{-5}$		1196
$\chi_{c1}\phi$	$(1.97 \pm 0.25) \times 10^{-4}$		1274
$\chi_{c1}(3872)\phi$	$(1.1 \pm 0.4) \times 10^{-4}$		936
$\chi_{c1}(3872)(K^+K^-)_{\ non-\phi}$	$(8.6 \pm 3.5) \times 10^{-5}$		961
$\pi^+\pi^-$	$(7.0 \pm 1.0) \times 10^{-7}$		2680
$\pi^0\pi^0$	$< 2.1 \times 10^{-4}$	CL=90%	2680
$\eta\pi^0$	$< 1.0 \times 10^{-3}$	CL=90%	2654
$\eta\eta$	$< 1.43 \times 10^{-4}$	CL=90%	2627
$\rho^0\rho^0$	$< 3.20 \times 10^{-4}$	CL=90%	2569
$\eta'\eta$	$< 6.5 \times 10^{-5}$	CL=90%	2568
$\eta'\eta'$	$(3.3 \pm 0.7) \times 10^{-5}$		2507
$\eta'\phi$	$< 8.2 \times 10^{-7}$	CL=90%	2495
$\phi f_0(980)$, $f_0(980) \to \pi^+\pi^-$	$(1.12 \pm 0.21) \times 10^{-6}$		–

$\phi f_2(1270),\ f_2(1270) \to \pi^+\pi^-$		$(6.1\ ^{+\ 1.8}_{-\ 1.5}) \times 10^{-7}$			–
$\phi\rho^0$		$(2.7 \pm 0.8) \times 10^{-7}$			2526
$\phi\pi^+\pi^-$		$(3.5 \pm 0.5) \times 10^{-6}$			2579
$\phi\phi$		$(1.85 \pm 0.14) \times 10^{-5}$			2482
$\phi\phi\phi$		$(2.2 \pm 0.6) \times 10^{-6}$			2165
π^+K^-		$(5.8 \pm 0.7) \times 10^{-6}$			2659
K^+K^-		$(2.66 \pm 0.22) \times 10^{-5}$			2638
$K^0\overline{K}^0$		$(1.76 \pm 0.31) \times 10^{-5}$			2637
$K^0\pi^+\pi^-$		$(9.5 \pm 2.1) \times 10^{-6}$			2653
$K^0K^\pm\pi^\mp$		$(8.4 \pm 0.9) \times 10^{-5}$			2622
$K^*(892)^-\pi^+$		$(2.9 \pm 1.1) \times 10^{-6}$			2607
$K^*(892)^\pm K^\mp$		$(1.9 \pm 0.5) \times 10^{-5}$			2585
$K_0^*(1430)^\pm K^\mp$		$(3.1 \pm 2.5) \times 10^{-5}$			–
$K_2^*(1430)^\pm K^\mp$		$(1.0 \pm 1.7) \times 10^{-5}$			–
$K^*(892)^0\overline{K}^0 +$ c.c.		$(2.0 \pm 0.6) \times 10^{-5}$			2585
$K_0^*(1430)\overline{K}^0 +$ c.c.		$(3.3 \pm 1.0) \times 10^{-5}$			2468
$K_2^*(1430)^0\overline{K}^0 +$ c.c.		$(1.7 \pm 2.2) \times 10^{-5}$			2467
$K_S^0\overline{K}^*(892)^0 +$ c.c.		$(1.6 \pm 0.4) \times 10^{-5}$			2585
$K^0K^+K^-$		$(1.3 \pm 0.6) \times 10^{-6}$			2568
$\overline{K}^*(892)^0\rho^0$		$< 7.67 \times 10^{-4}$		CL=90%	2550
$\overline{K}^*(892)^0K^*(892)^0$		$(1.11 \pm 0.27) \times 10^{-5}$			2531
$\phi K^*(892)^0$		$(1.14 \pm 0.30) \times 10^{-6}$			2507
$p\overline{p}$		$< 1.5 \times 10^{-8}$		CL=90%	2514
$p\overline{p}K^+K^-$		$(4.5 \pm 0.5) \times 10^{-6}$			2231
$p\overline{p}K^+\pi^-$		$(1.39 \pm 0.26) \times 10^{-6}$			2355
$p\overline{p}\pi^+\pi^-$		$(4.3 \pm 2.0) \times 10^{-7}$			2454
$p\overline{\Lambda}K^- +$ c.c.		$(5.5 \pm 1.0) \times 10^{-6}$			2358
$\Lambda_c^-\Lambda\pi^+$		$(3.6 \pm 1.6) \times 10^{-4}$			1979
$\Lambda_c^-\Lambda_c^+$		$< 8.0 \times 10^{-5}$		CL=95%	1405

Lepton Family number (LF) violating modes or $\Delta B = 1$ weak neutral current ($B1$) modes

$\gamma\gamma$	$B1$	$< 3.1 \times 10^{-6}$		CL=90%	2683
$\phi\gamma$	$B1$	$(3.4 \pm 0.4) \times 10^{-5}$			2587
$\mu^+\mu^-$	$B1$	$(3.01 \pm 0.35) \times 10^{-9}$			2681
e^+e^-	$B1$	$< 9.4 \times 10^{-9}$		CL=90%	2683
$\tau^+\tau^-$	$B1$	$< 6.8 \times 10^{-3}$		CL=95%	2011
$\mu^+\mu^-\mu^+\mu^-$	$B1$	$< 2.5 \times 10^{-9}$		CL=95%	2673
$SP,\ S \to \mu^+\mu^-,\ P \to \mu^+\mu^-$	$B1$	[xxx] $< 2.2 \times 10^{-9}$		CL=95%	–
$\phi(1020)\mu^+\mu^-$	$B1$	$(8.4 \pm 0.4) \times 10^{-7}$			2582

$f_2'(1525)\mu^+\mu^-$			$(\ 1.62\pm\ 0.22)\times10^{-7}$		2464
$\overline{K}^*(892)^0\mu^+\mu^-$	*B1*		$(\ 2.9\ \pm\ 1.1\ )\times10^{-8}$		2605
$\pi^+\pi^-\mu^+\mu^-$	*B1*		$(\ 8.4\ \pm\ 1.7\ )\times10^{-8}$		2670
$\phi\nu\overline{\nu}$	*B1*	$<$	5.4×10^{-3}	CL=90%	2587
$e^\pm\mu^\mp$	*LF*	[*aa*] $<$	5.4×10^{-9}	CL=90%	2682
$\mu^\pm\tau^\mp$	*LF*	$<$	4.2×10^{-5}	CL=95%	2388

B_s^*

$I(J^P) = 0(1^-)$

I, *J*, *P* need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m = 5415.4^{+1.8}_{-1.5}$ MeV (S = 2.9)

$m_{B_s^*} - m_{B_s} = 48.5^{+1.8}_{-1.5}$ MeV (S = 2.9)

B_s^* DECAY MODES	Fraction (Γ_i/Γ)	*p* (MeV/*c*)
$B_s\gamma$	seen	48

$B_{s1}(5830)^0$

$I(J^P) = 0(1^+)$

I, *J*, *P* need confirmation.

Mass $m = 5828.70 \pm 0.20$ MeV

$m_{B_{s1}^0} - m_{B^{*+}} = 503.99 \pm 0.17$ MeV

Full width $\Gamma = 0.5 \pm 0.4$ MeV

$B_{s1}(5830)^0$ DECAY MODES	Fraction (Γ_i/Γ)	*p* (MeV/*c*)
$B^{*+}K^-$	seen	97

$B_{s2}^*(5840)^0$

$I(J^P) = 0(2^+)$

I, *J*, *P* need confirmation.

Mass $m = 5839.86 \pm 0.12$ MeV

$m_{B_{s2}^{*0}} - m_{B^+} = 560.52 \pm 0.14$ MeV

Full width $\Gamma = 1.49 \pm 0.27$ MeV

Branching fractions are given relative to the one **DEFINED AS 1**.

$B_{s2}^*(5840)^0$ DECAY MODES	Fraction (Γ_i/Γ)	*p* (MeV/*c*)
B^+K^-	**DEFINED AS 1**	252
$B^{*+}K^-$	0.093 ± 0.018	141

$B^0 K_S^0$	0.43 $\pm$0.11	245
$B^{*0} K_S^0$	0.04 $\pm$0.04	–

BOTTOM, CHARMED MESONS ($B = C = \pm 1$)

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

B_c^+

$I(J^P) = 0(0^-)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

Mass $m = 6274.47 \pm 0.32$ MeV
$m_{B_c^+} - m_{B_s^0} = 907.8 \pm 0.5$ MeV
Mean life $\tau = (0.510 \pm 0.009) \times 10^{-12}$ s

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

B_c^+ DECAY MODES × B($\overline{b} \to B_c$)	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi(1S)\ell^+\nu_\ell$ anything	seen		–
$J/\psi(1S)\mu^+\nu_\mu$	seen		2372
$J/\psi(1S)\tau^+\nu_\tau$	seen		1932
$J/\psi(1S)\pi^+$	seen		2370
$J/\psi(1S)K^+$	seen		2341
$J/\psi(1S)\pi^+\pi^+\pi^-$	seen		2350
$J/\psi(1S)a_1(1260)$	not seen		2169
$J/\psi(1S)K^+K^-\pi^+$	seen		2203
$J/\psi(1S)\pi^+\pi^+\pi^+\pi^-\pi^-$	seen		2309
$\psi(2S)\pi^+$	seen		2051
$J/\psi(1S)D^0K^+$	seen		1539
$J/\psi(1S)D^*(2007)^0K^+$	seen		1411
$J/\psi(1S)D^*(2010)^+K^{*0}$	seen		919
$J/\psi(1S)D^+K^{*0}$	seen		1122
$J/\psi(1S)D_s^+$	seen		1821
$J/\psi(1S)D_s^{*+}$	seen		1727
$J/\psi(1S)p\overline{p}\pi^+$	seen		1791
$\chi_c^0\pi^+$	$(2.4^{+0.9}_{-0.8}) \times 10^{-5}$		2205
$p\overline{p}\pi^+$	not seen		2970
D^0K^+	seen		2837

$D^0\pi^+$	not seen			2858
$D^{*0}\pi^+$	not seen			2814
$D^{*0}K^+$	not seen			2792
$D_s^+\overline{D}^0$	< 7.2	$\times 10^{-4}$	90%	2483
$D_s^+ D^0$	< 3.0	$\times 10^{-4}$	90%	2483
$D^+\overline{D}^0$	< 1.9	$\times 10^{-4}$	90%	2521
$D^+ D^0$	< 1.4	$\times 10^{-4}$	90%	2521
$D_s^{*+}\overline{D}^0$	< 5.3	$\times 10^{-4}$	90%	2425
$D_s^+\overline{D}^*(2007)^0$	< 4.6	$\times 10^{-4}$	90%	2427
$D_s^{*+} D^0$	< 9	$\times 10^{-4}$	90%	2425
$D_s^+ D^*(2007)^0$	< 6.6	$\times 10^{-4}$	90%	2427
$D^*(2010)^+\overline{D}^0$	< 3.8	$\times 10^{-4}$	90%	2467
$D^*(2010)^+\overline{D}^0,\ D^{*+} \to D^+\pi^0/\gamma$	not seen			–
$D^+\overline{D}^*(2007)^0$	< 6.5	$\times 10^{-4}$	90%	2466
$D^*(2007)^+ D^0$	< 2.0	$\times 10^{-4}$	90%	–
$D^*(2010)^+ D^0,\ D^{*+} \to D^+\pi^0/\gamma$	not seen			2467
$D^+ D^*(2007)^0$	< 3.7	$\times 10^{-4}$	90%	2466
$D_s^{*+}\overline{D}^*(2007)^0$	< 1.3	$\times 10^{-3}$	90%	2366
$D_s^{*+} D^*(2007)^0$	< 1.3	$\times 10^{-3}$	90%	2366
$D^*(2010)^+\overline{D}^*(2007)^0$	< 1.0	$\times 10^{-3}$	90%	2410
$D^*(2010)^+ D^*(2007)^0$	< 7.7	$\times 10^{-4}$	90%	2410
$D^+ K^{*0}$	not seen			2783
$D^+\overline{K}^{*0}$	not seen			2783
$D_s^+ K^{*0}$	not seen			2751
$D_s^+\overline{K}^{*0}$	not seen			2751
$D_s^+\phi$	not seen			2727
$K^+ K^0$	not seen			3098
$B_s^0\pi^+$ / B($\overline{b} \to\ B_s$)	seen			–

$B_c(2S)^\pm$

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

Mass $m = 6871.2 \pm 1.0$ MeV

$B_c(2S)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B_c^+\pi^+\pi^-$	seen	504

$c\bar{c}$ MESONS (including possibly non-$q\bar{q}$ states)

$\eta_c(1S)$

$I^G(J^{PC}) = 0^+(0^{-+})$

Mass $m = 2983.9 \pm 0.4$ MeV (S = 1.2)
Full width $\Gamma = 32.0 \pm 0.7$ MeV

$\eta_c(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Decays involving hadronic resonances			
$\eta'(958)\pi\pi$	(4.1 ±1.7) %		1323
$\eta'(958)K\overline{K}$	(3.5 ±1.5) %		1131
$\rho\rho$	(1.8 ±0.5) %		1275
$K^*(892)^0 K^-\pi^+$ + c.c.	(2.0 ±0.7) %		1278
$K^*(892)\overline{K}^*(892)$	(6.9 ±1.3) $\times 10^{-3}$		1196
$K^*(892)^0\overline{K}^*(892)^0\pi^+\pi^-$	(1.1 ±0.5) %		1073
$\phi K^+ K^-$	(2.9 ±1.4) $\times 10^{-3}$		1104
$\phi\phi$	(1.74±0.19) $\times 10^{-3}$		1089
$\phi 2(\pi^+\pi^-)$	< 4 $\times 10^{-3}$	90%	1251
$a_0(980)\pi$	seen		1327
$a_2(1320)\pi$	< 2 %	90%	1196
$K^*(892)\overline{K}$ + c.c.	< 1.28 %	90%	1310
$f_2(1270)\eta$	< 1.1 %	90%	1145
$f_2(1270)\eta'$	seen		984
$\omega\omega$	(2.9 ±0.8) $\times 10^{-3}$		1270
$\omega\phi$	< 2.5 $\times 10^{-4}$	90%	1185
$f_2(1270)f_2(1270)$	(9.8 ±2.5) $\times 10^{-3}$		774
$f_2(1270)f_2'(1525)$	(9.5 ±3.2) $\times 10^{-3}$		524
$f_0(500)\eta$	seen		–
$f_0(500)\eta'$	seen		–
$f_0(980)\eta$	seen		1264
$f_0(980)\eta'$	seen		1130
$f_0(1500)\eta$	seen		1025
$f_0(1710)\eta'$	seen		653
$f_0(2100)\eta'$	seen		†
$f_0(2200)\eta$	seen		498
$a_0(1320)\pi$	seen		–
$a_0(1450)\pi$	seen		1123
$a_0(1700)\pi$	seen		–
$a_0(1950)\pi$	seen		860

$K_0^*(1430)\overline{K}$	seen				–
$K_2^*(1430)\overline{K}$	seen				–
$K_0^*(1950)\overline{K}$	seen				–

Decays into stable hadrons

$K\overline{K}\pi$	(7.3	±0.4) %			1381
$K\overline{K}\eta$	(1.36	±0.15) %			1265
$\eta\pi^+\pi^-$	(1.7	±0.6) %			1428
$\eta 2(\pi^+\pi^-)$	(4.4	±1.6) %			1386
$K^+K^-\pi^+\pi^-$	(6.6	±1.1)	$\times 10^{-3}$		1345
$K^+K^-\pi^+\pi^-\pi^0$	(3.5	±0.6) %			1304
$K^0K^-\pi^+\pi^-\pi^+$+c.c.	(5.6	±1.9) %			–
$K^+K^-2(\pi^+\pi^-)$	(7.5	±2.4)	$\times 10^{-3}$		1254
$2(K^+K^-)$	(1.43	±0.30)	$\times 10^{-3}$		1056
$\pi^+\pi^-\pi^0$	< 5		$\times 10^{-4}$	90%	1476
$\pi^+\pi^-\pi^0\pi^0$	(4.7	±1.4) %			1460
$2(\pi^+\pi^-)$	(9.1	±1.2)	$\times 10^{-3}$		1459
$2(\pi^+\pi^-\pi^0)$	(15.8	±2.3) %			1409
$3(\pi^+\pi^-)$	(1.7	±0.4) %			1407
$p\overline{p}$	(1.44	±0.14)	$\times 10^{-3}$		1160
$p\overline{p}\pi^0$	(3.6	±1.5)	$\times 10^{-3}$		1101
$\Lambda\overline{\Lambda}$	(1.06	±0.23)	$\times 10^{-3}$		991
$K^+\overline{p}\Lambda$+ c.c.	(2.5	±0.4)	$\times 10^{-3}$		772
$\overline{\Lambda}(1520)\Lambda$+ c.c.	(3.1	±1.3)	$\times 10^{-3}$		694
$\Sigma^+\overline{\Sigma}^-$	(2.1	±0.6)	$\times 10^{-3}$		901
$\Xi^-\overline{\Xi}^+$	(9.0	±2.6)	$\times 10^{-4}$		692
$\pi^+\pi^-p\overline{p}$	(5.3	±2.1)	$\times 10^{-3}$		1027

Radiative decays

$\gamma\gamma$	(1.61	±0.12)	$\times 10^{-4}$		1492

Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes

$\pi^+\pi^-$	P,CP	< 1.1	$\times 10^{-4}$	90%	1485
$\pi^0\pi^0$	P,CP	< 4	$\times 10^{-5}$	90%	1486
K^+K^-	P,CP	< 6	$\times 10^{-4}$	90%	1408
$K_S^0K_S^0$	P,CP	< 3.1	$\times 10^{-4}$	90%	1407

$J/\psi(1S)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 3096.900 \pm 0.006$ MeV
Full width $\Gamma = 92.6 \pm 1.7$ keV (S = 1.1)

$J/\psi(1S)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons		(87.7 ± 0.5) %		–
virtual $\gamma \to$ hadrons		(13.50 ± 0.30) %		–
ggg		(64.1 ± 1.0) %		–
γgg		(8.8 ± 1.1) %		–
e^+e^-		(5.971 ± 0.032) %		1548
$e^+e^-\gamma$	[*hhaa*]	(8.8 ± 1.4) $\times 10^{-3}$		1548
$\mu^+\mu^-$		(5.961 ± 0.033) %		1545
Decays involving hadronic resonances				
$\rho\pi$		(1.69 ± 0.15) %	S=2.4	1448
$\rho^0\pi^0$		(5.6 ± 0.7) $\times 10^{-3}$		1448
$a_2(1320)\rho$		(1.09 ± 0.22) %		1123
$\eta\pi^+\pi^-$		(3.8 ± 0.7) $\times 10^{-4}$		1487
$\eta\pi^+\pi^-\pi^0$		(1.17 ± 0.20) %		1470
$\eta\pi^+\pi^-3\pi^0$		(4.9 ± 1.0) $\times 10^{-3}$		1419
$\eta\rho$		(1.93 ± 0.23) $\times 10^{-4}$		1396
$\eta\phi(2170) \to \eta\phi f_0(980) \to \eta\phi\pi^+\pi^-$		(1.2 ± 0.4) $\times 10^{-4}$		628
$\eta\phi(2170) \to \eta K^*(892)^0\overline{K}^*(892)^0$		< 2.52 $\times 10^{-4}$	CL=90%	–
$\eta K^\pm K_S^0\pi^\mp$	[*aa*]	(2.2 ± 0.4) $\times 10^{-3}$		1278
$\eta K^*(892)^0\overline{K}^*(892)^0$		(1.15 ± 0.26) $\times 10^{-3}$		1003
$\rho\eta'(958)$		(8.1 ± 0.8) $\times 10^{-5}$	S=1.6	1281
$\rho^\pm\pi^\mp\pi^+\pi^-2\pi^0$		(2.8 ± 0.8) %		1364
$\rho^+\rho^-\pi^+\pi^-\pi^0$		(6 ± 4) $\times 10^{-3}$		1186
$\rho^\mp K^\pm K_S^0$		(1.9 ± 0.4) $\times 10^{-3}$		1269
$\rho(1450)\pi \to \pi^+\pi^-\pi^0$		(2.3 ± 0.7) $\times 10^{-3}$		–
$\rho(1450)^\pm\pi^\mp \to K_S^0K^\pm\pi^\mp$		(3.5 ± 0.6) $\times 10^{-4}$		–
$\rho(1450)^0\pi^0 \to K^+K^-\pi^0$		(2.7 ± 0.6) $\times 10^{-4}$		–
$\rho(1450)\eta'(958) \to \pi^+\pi^-\eta'(958)$		(3.3 ± 0.7) $\times 10^{-6}$		–
$\rho(1700)\pi \to \pi^+\pi^-\pi^0$		(1.7 ± 1.1) $\times 10^{-4}$		–
$\rho(2150)\pi \to \pi^+\pi^-\pi^0$		(8 ±40) $\times 10^{-6}$		–
$\omega\pi^0$		(4.5 ± 0.5) $\times 10^{-4}$	S=1.4	1446
$\omega\pi^0 \to \pi^+\pi^-\pi^0$		(1.7 ± 0.8) $\times 10^{-5}$		–
$\omega\pi^+\pi^-$		(7.2 ± 1.0) $\times 10^{-3}$		1435
$\omega\pi^0\pi^0$		(3.4 ± 0.8) $\times 10^{-3}$		1436
$\omega 3\pi^0$		(1.9 ± 0.6) $\times 10^{-3}$		1419
$\omega f_2(1270)$		(4.3 ± 0.6) $\times 10^{-3}$		1142
$\omega\eta$		(1.74 ± 0.20) $\times 10^{-3}$	S=1.6	1394
$\omega\pi^+\pi^-\pi^0$		(4.0 ± 0.7) $\times 10^{-3}$		1418
$\omega\pi^0\eta$		(3.4 ± 1.7) $\times 10^{-4}$		1363

$\omega\pi^+\pi^+\pi^-\pi^-$	(8.5 ± 3.4) $\times 10^{-3}$			1392
$\omega\pi^+\pi^-2\pi^0$	(3.3 ± 0.5) %			1394
$\omega\eta'\pi^+\pi^-$	(1.12 ± 0.13) $\times 10^{-3}$			1173
$\omega\eta'(958)$	(1.89 ± 0.18) $\times 10^{-4}$			1279
$\omega f_0(980)$	(1.4 ± 0.5) $\times 10^{-4}$			1267
$\omega f_0(1710) \rightarrow \omega K\overline{K}$	(4.8 ± 1.1) $\times 10^{-4}$			878
$\omega f_1(1420)$	(6.8 ± 2.4) $\times 10^{-4}$			1062
$\omega f_2'(1525)$	< 2.2	$\times 10^{-4}$	CL=90%	1007
$\omega X(1835) \rightarrow \omega p\overline{p}$	< 3.9	$\times 10^{-6}$	CL=95%	–
$\omega X(1835),\ X \rightarrow \eta'\pi^+\pi^-$	< 6.2	$\times 10^{-5}$		–
$\omega K^\pm K_S^0\pi^\mp$	[aa] (3.4 ± 0.5) $\times 10^{-3}$			1210
$\omega K\overline{K}$	(1.9 ± 0.4) $\times 10^{-3}$			1268
$\omega K^*(892)\overline{K}$ + c.c.	(6.1 ± 0.9) $\times 10^{-3}$			1097
$\eta' K^{*\pm} K^\mp$	(1.48 ± 0.13) $\times 10^{-3}$			–
$\eta' K^{*0}\overline{K}^0$ + c.c.	(1.66 ± 0.21) $\times 10^{-3}$			1000
$\eta' h_1(1415) \rightarrow \eta' K^*\overline{K}$ + c.c.	(2.16 ± 0.31) $\times 10^{-4}$			–
$\eta' h_1(1415) \rightarrow \eta' K^{*\pm} K^\mp$	(1.51 ± 0.23) $\times 10^{-4}$			–
$\overline{K}K^*(892)$+c.c. $\rightarrow$ $K_S^0 K^\pm\pi^\mp$	(5.0 ± 0.5) $\times 10^{-3}$			–
$K^+K^*(892)^-$ + c.c.	(6.0 $^{+0.8}_{-1.0}$) $\times 10^{-3}$		S=2.9	1373
$K^+K^*(892)^-$ + c.c. $\rightarrow$ $K^+K^-\pi^0$	(2.69 $^{+0.13}_{-0.20}$) $\times 10^{-3}$			–
$K^+K^*(892)^-$ + c.c. $\rightarrow$ $K^0K^\pm\pi^\mp$ + c.c.	(3.0 ± 0.4) $\times 10^{-3}$			–
$K^0\overline{K}^*(892)^0$ + c.c.	(4.2 ± 0.4) $\times 10^{-3}$			1373
$K^0\overline{K}^*(892)^0$ + c.c. $\rightarrow$ $K^0K^\pm\pi^\mp$ + c.c.	(3.2 ± 0.4) $\times 10^{-3}$			–
$\overline{K}^*(892)^0K^+\pi^-$ + c.c.	(7.7 ± 1.6) $\times 10^{-3}$			1343
$K^*(892)^\pm K^\mp\pi^0$	(4.1 ± 1.3) $\times 10^{-3}$			1344
$K^*(892)^+K_S^0\pi^-$ + c.c.	(2.0 ± 0.5) $\times 10^{-3}$			1342
$K^*(892)^+K_S^0\pi^-$ + c.c. $\rightarrow$ $K_S^0K_S^0\pi^+\pi^-$	(6.7 ± 2.2) $\times 10^{-4}$			–
$K^*(892)^0K_S^0 \rightarrow \gamma K_S^0K_S^0$	(6.3 $^{+0.6}_{-0.5}$) $\times 10^{-6}$			–
$K^*(892)^0K_S^0\pi^0$	(7 ± 4) $\times 10^{-4}$			1343
$K^*(892)^\pm K^*(700)^\mp$	(1.1 $^{+1.0}_{-0.6}$) $\times 10^{-3}$			–
$K^*(892)^0\overline{K}^*(892)^0$	(2.3 ± 0.6) $\times 10^{-4}$			1266
$K^*(892)^\pm K^*(892)^\mp$	(1.00 $^{+0.22}_{-0.40}$) $\times 10^{-3}$			1266
$K_1(1400)^\pm K^\mp$	(3.8 ± 1.4) $\times 10^{-3}$			1170
$K^*(1410)\overline{K}$+c.c $\rightarrow$ $K^\pm K^\mp\pi^0$	(7 ± 4) $\times 10^{-5}$			–

$K^*(1410)\overline{K}+$ c.c. → $K^0_S K^\pm\pi^\mp$	$(\ 8 \pm 6\ ) \times 10^{-5}$			–
$K^*_2(1430)\overline{K}+$c.c. → $K^\pm K^\mp\pi^0$	$(\ 1.0 \pm 0.5\ ) \times 10^{-4}$			–
$K^*_2(1430)\overline{K}+$ c.c. → $K^0_S K^\pm\pi^\mp$	$(\ 4.0 \pm 1.0\ ) \times 10^{-4}$			–
$\overline{K}^*_2(1430)K+$ c.c.	$< 4.0 \times 10^{-3}$		CL=90%	1158
$K^*_2(1430)^+K^-+$ c.c. → $K^+K^-\pi^0$	$(\ 2.69\ ^{+\ 0.25}_{-\ 0.19}\ ) \times 10^{-4}$			–
$K^*_2(1430)^+K^0_S\pi^-+$ c.c.	$(\ 3.6 \pm 1.8\ ) \times 10^{-3}$			1116
$\overline{K}^*_2(1430)^0K^*(892)^0+$ c.c.	$(\ 4.67 \pm 0.29\ ) \times 10^{-3}$			1011
$K^*_2(1430)^-K^*(892)^++$ c.c.	$(\ 3.4 \pm 2.9\ ) \times 10^{-3}$			1011
$K^*_2(1430)^-K^*(892)^+ +$ c.c. → $K^*(892)^+K^0_S\pi^-+$ c.c.	$(\ 4 \pm 4\ ) \times 10^{-4}$			–
$K^*_2(1430)^0\overline{K}^*_2(1430)^0$	$< 2.9 \times 10^{-3}$		CL=90%	601
$\overline{K}_2(1770)^0K^*(892)^0+$ c.c. → $K^*(892)^0K^-\pi^++$ c.c.	$(\ 6.9 \pm 0.9\ ) \times 10^{-4}$			–
$K^*_2(1980)^+K^-+$ c.c. → $K^+K^-\pi^0$	$(\ 1.10\ ^{+\ 0.60}_{-\ 0.14}\ ) \times 10^{-5}$			–
$K^*_4(2045)^+K^-+$ c.c. → $K^+K^-\pi^0$	$(\ 6.2\ ^{+\ 2.9}_{-\ 1.6}\ ) \times 10^{-6}$			–
$K_1(1270)^\pm K^\mp$	$< 3.0 \times 10^{-3}$		CL=90%	1240
$K_1(1270)K^0_S \to\ \gamma K^0_S K^0_S$	$(\ 8.5 \pm 2.5\ ) \times 10^{-7}$			–
$a_2(1320)^\pm\pi^\mp$	[aa] $< 4.3 \times 10^{-3}$		CL=90%	1263
$\phi\pi^0$	3×10^{-6} or 1×10^{-7}			1377
$\phi\pi^+\pi^-$	$(\ 9.4 \pm 1.5\ ) \times 10^{-4}$		S=1.7	1365
$\phi\pi^0\pi^0$	$(\ 5.0 \pm 1.0\ ) \times 10^{-4}$			1366
$\phi 2(\pi^+\pi^-)$	$(\ 1.60 \pm 0.32\ ) \times 10^{-3}$			1318
$\phi\eta$	$(\ 7.4 \pm 0.8\ ) \times 10^{-4}$		S=1.5	1320
$\phi\eta'(958)$	$(\ 4.6 \pm 0.5\ ) \times 10^{-4}$		S=2.2	1192
$\phi\eta\eta'$	$(\ 2.32 \pm 0.17\ ) \times 10^{-4}$			885
$\phi f_0(980)$	$(\ 3.2 \pm 0.9\ ) \times 10^{-4}$		S=1.9	1178
$\phi f_0(980) \to\ \phi\pi^+\pi^-$	$(\ 2.60 \pm 0.34\ ) \times 10^{-4}$			–
$\phi f_0(980) \to\ \phi\pi^0\pi^0$	$(\ 1.8 \pm 0.5\ ) \times 10^{-4}$			–
$\phi\pi^0 f_0(980) \to\ \phi\pi^0\pi^+\pi^-$	$(\ 4.5 \pm 1.0\ ) \times 10^{-6}$			–
$\phi\pi^0 f_0(980) \to\ \phi\pi^0 p^0\pi^0$	$(\ 1.7 \pm 0.6\ ) \times 10^{-6}$			1045
$\phi f_0(980)\eta \to\ \eta\phi\pi^+\pi^-$	$(\ 3.2 \pm 1.0\ ) \times 10^{-4}$			–
$\phi a_0(980)^0 \to\ \phi\eta\pi^0$	$(\ 4.4 \pm 1.4\ ) \times 10^{-6}$			–
$\phi f_2(1270)$	$(\ 3.2 \pm 0.6\ ) \times 10^{-4}$			1036
$\phi f_1(1285)$	$(\ 2.6 \pm 0.5\ ) \times 10^{-4}$			1032

$\phi f_1(1285) \to$ $\phi\pi^0 f_0(980) \to$ $\phi\pi^0\pi^+\pi^-$		(9.4	± 2.8	) × 10^{-7}		952
$\phi f_1(1285) \to$ $\phi\pi^0 f_0(980) \to \phi 3\pi^0$		(2.1	± 2.2	) × 10^{-7}		955
$\phi\eta(1405) \to \phi\eta\pi^+\pi^-$		(2.0	± 1.0	) × 10^{-5}		946
$\phi f_2'(1525)$		(8	± 4	) × 10^{-4}	S=2.7	877
$\phi X(1835) \to \phi p\overline{p}$		< 2.1		× 10^{-7}	CL=90%	–
$\phi X(1835) \to \phi\eta\pi^+\pi^-$		< 2.8		× 10^{-4}	CL=90%	578
$\phi X(1870) \to \phi\eta\pi^+\pi^-$		< 6.13		× 10^{-5}	CL=90%	–
$\phi K\overline{K}$		(1.77	± 0.16	) × 10^{-3}	S=1.3	1179
$\phi f_0(1710) \to \phi K\overline{K}$		(3.6	± 0.6	) × 10^{-4}		875
$\phi K^+ K^-$		(8.3	± 1.1	) × 10^{-4}		1179
$\phi K_S^0 K_S^0$		(5.9	± 1.5	) × 10^{-4}		1176
$\phi K^\pm K_S^0 \pi^\mp$	[aa]	(7.2	± 0.8	) × 10^{-4}		1114
$\phi K^*(892)\overline{K}$ + c.c.		(2.18	± 0.23	) × 10^{-3}		969
$b_1(1235)^\pm\pi^\mp$	[aa]	(3.0	± 0.5	) × 10^{-3}		1300
$b_1(1235)^0\pi^0$		(2.3	± 0.6	) × 10^{-3}		1300
$f_2'(1525)K^+K^-$		(1.06	± 0.35	) × 10^{-3}		897
$\Delta(1232)^+\overline{p}$		< 1		× 10^{-4}	CL=90%	1100
$\Delta(1232)^{++}\overline{p}\pi^-$		(1.6	± 0.5	) × 10^{-3}		1030
$\Delta(1232)^{++}\overline{\Delta}(1232)^{--}$		(1.10	± 0.29	) × 10^{-3}		938
$\overline{\Sigma}(1385)^0 pK^-$		(5.1	± 3.2	) × 10^{-4}		646
$\Sigma(1385)^0\overline{\Lambda}$ + c.c.		< 8.2		× 10^{-6}	CL=90%	911
$\Sigma(1385)^-\overline{\Sigma}^+$ (or c.c.)	[aa]	(3.1	± 0.5	) × 10^{-4}		855
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)	[aa]	(1.16	± 0.05	) × 10^{-3}		697
$\Sigma(1385)^0\overline{\Sigma}(1385)^0$		(1.07	± 0.08	) × 10^{-3}		697
$\Lambda(1520)\overline{\Lambda}$ + c.c. $\to \gamma\Lambda\overline{\Lambda}$		< 4.1		× 10^{-6}	CL=90%	–
$\overline{\Lambda}(1520)\Lambda$ + c.c.		< 1.80		× 10^{-3}	CL=90%	807
$\Xi^0\overline{\Xi}^0$		(1.17	± 0.04	) × 10^{-3}		818
$\Xi(1530)^-\overline{\Xi}^+$ + c.c.		(3.18	± 0.08	) × 10^{-4}		600
$\Xi(1530)^0\overline{\Xi}^0$		(3.2	± 1.4	) × 10^{-4}		608
$\Theta(1540)\overline{\Theta}(1540) \to$ $K_S^0 pK^-\overline{n}$ + c.c.	[iiaa]	< 1.1		× 10^{-5}	CL=90%	–
$\Theta(1540)K^-\overline{n} \to K_S^0 pK^-\overline{n}$	[iiaa]	< 2.1		× 10^{-5}	CL=90%	–
$\Theta(1540)K_S^0\overline{p} \to K_S^0\overline{p}K^+n$	[iiaa]	< 1.6		× 10^{-5}	CL=90%	–
$\overline{\Theta}(1540)K^+n \to K_S^0\overline{p}K^+n$	[iiaa]	< 5.6		× 10^{-5}	CL=90%	–
$\overline{\Theta}(1540)K_S^0 p \to K_S^0 pK^-\overline{n}$	[iiaa]	< 1.1		× 10^{-5}	CL=90%	–

Decays into stable hadrons

$2(\pi^+\pi^-)\pi^0$		(3.71	± 0.28	) %	S=1.3	1496
$3(\pi^+\pi^-)\pi^0$		(2.9	± 0.6	) %		1433
$\pi^+\pi^- 3\pi^0$		(1.9	± 0.9	) %		1497
$\pi^+\pi^- 4\pi^0$		(6.5	± 1.3	) × 10^{-3}		1470

$\rho^{\pm}\pi^{\mp}\pi^0\pi^0$	(1.41 ± 0.22) %			1421
$\rho^+\rho^-\pi^0$	(6.0 ± 1.1) $\times 10^{-3}$			1298
$\pi^+\pi^-\pi^0$	(2.10 ± 0.08) %		S=1.6	1533
$2(\pi^+\pi^-\pi^0)$	(1.61 ± 0.20) %			1468
$\pi^+\pi^-\pi^0 K^+ K^-$	(1.20 ± 0.30) %			1368
$\pi^+\pi^-$	(1.47 ± 0.14) $\times 10^{-4}$			1542
$2(\pi^+\pi^-)$	(3.57 ± 0.30) $\times 10^{-3}$			1517
$3(\pi^+\pi^-)$	(4.3 ± 0.4) $\times 10^{-3}$			1466
$2(\pi^+\pi^-)3\pi^0$	(6.2 ± 0.9) %			1435
$4(\pi^+\pi^-)\pi^0$	(9.0 ± 3.0) $\times 10^{-3}$			1345
$2(\pi^+\pi^-)\eta$	(2.29 ± 0.28) $\times 10^{-3}$			1446
$3(\pi^+\pi^-)\eta$	(7.2 ± 1.5) $\times 10^{-4}$			1379
$2(\pi^+\pi^-\pi^0)\eta$	(1.6 ± 0.5) $\times 10^{-3}$			1381
$\pi^+\pi^-\pi^0\pi^0\eta$	(2.4 ± 0.5) $\times 10^{-3}$			1448
$\rho^{\pm}\pi^{\mp}\pi^0\eta$	(1.9 ± 0.8) $\times 10^{-3}$			1326
$K^+ K^-$	(2.86 ± 0.21) $\times 10^{-4}$			1468
$K^0_S K^0_L$	(1.95 ± 0.11) $\times 10^{-4}$		S=2.4	1466
$K^0_S K^0_S$	< 1.4	$\times 10^{-8}$	CL=95%	1466
$K\overline{K}\pi$	(6.1 ± 1.0) $\times 10^{-3}$			1442
$K^+ K^-\pi^0$	(2.88 ± 0.12) $\times 10^{-3}$			1442
$K^0_S K^{\pm}\pi^{\mp}$	(5.6 ± 0.5) $\times 10^{-3}$			1440
$K^0_S K^0_L\pi^0$	(2.06 ± 0.26) $\times 10^{-3}$			1440
$K^*(892)^0\overline{K}^0$ + c.c. $\rightarrow$ $K^0_S K^0_L\pi^0$	(1.21 ± 0.18) $\times 10^{-3}$			–
$K^*_2(1430)^0\overline{K}^0$ + c.c. $\rightarrow$ $K^0_S K^0_L\pi^0$	(4.3 ± 1.3) $\times 10^{-4}$			–
$K^+ K^-\pi^+\pi^-$	(6.86 ± 0.28) $\times 10^{-3}$			1407
$K^+ K^-\pi^0\pi^0$	(2.13 ± 0.22) $\times 10^{-3}$			1410
$K^0_S K^0_L\pi^+\pi^-$	(3.8 ± 0.6) $\times 10^{-3}$			1406
$K^0_S K^0_L\pi^0\pi^0$	(1.9 ± 0.4) $\times 10^{-3}$			1408
$K^0_S K^0_L\eta$	(1.45 ± 0.33) $\times 10^{-3}$			1328
$K^0_S K^0_S\pi^+\pi^-$	(1.68 ± 0.19) $\times 10^{-3}$			1406
$K^{\mp} K^0_S\pi^{\pm}\pi^0$	(5.7 ± 0.5) $\times 10^{-3}$			1408
$K^+ K^- 2(\pi^+\pi^-)$	(3.1 ± 1.3) $\times 10^{-3}$			1320
$K^+ K^-\pi^+\pi^-\eta$	(4.7 ± 0.7) $\times 10^{-3}$			1221
$2(K^+ K^-)$	(7.2 ± 0.8) $\times 10^{-4}$			1131
$K^+ K^- K^0_S K^0_S$	(4.2 ± 0.7) $\times 10^{-4}$			1127
$p\overline{p}$	(2.120± 0.029) $\times 10^{-3}$			1232
$p\overline{p}\pi^0$	(1.19 ± 0.08) $\times 10^{-3}$		S=1.1	1176
$p\overline{p}\pi^+\pi^-$	(6.0 ± 0.5) $\times 10^{-3}$		S=1.3	1107
$p\overline{p}\pi^+\pi^-\pi^0$	[*jjaa*] (2.3 ± 0.9) $\times 10^{-3}$		S=1.9	1033
$p\overline{p}\eta$	(2.00 ± 0.12) $\times 10^{-3}$			948
$p\overline{p}\rho$	< 3.1	$\times 10^{-4}$	CL=90%	774

$p\overline{p}\omega$	(9.8 ± 1.0) $\times 10^{-4}$	S=1.3	768
$p\overline{p}\eta'(958)$	(1.29 ± 0.14) $\times 10^{-4}$	S=2.0	596
$p\overline{p}a_0(980) \rightarrow p\overline{p}\pi^0\eta$	(6.8 ± 1.8) $\times 10^{-5}$		–
$p\overline{p}\phi$	(5.19 ± 0.33) $\times 10^{-5}$		527
$p\overline{n}\pi^-$	(2.12 ± 0.09) $\times 10^{-3}$		1174
$n\overline{n}$	(2.09 ± 0.16) $\times 10^{-3}$		1231
$n\overline{n}\pi^+\pi^-$	(4 ± 4) $\times 10^{-3}$		1106
$nN(1440)$	seen		978
$nN(1520)$	seen		928
$nN(1535)$	seen		917
$\Lambda\overline{\Lambda}$	(1.89 ± 0.09) $\times 10^{-3}$	S=2.8	1074
$\Lambda\overline{\Lambda}\pi^0$	(3.8 ± 0.4) $\times 10^{-5}$		998
$\Lambda\overline{\Lambda}\pi^+\pi^-$	(4.3 ± 1.0) $\times 10^{-3}$		903
$\Lambda\overline{\Lambda}\eta$	(1.62 ± 0.17) $\times 10^{-4}$		672
$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[aa] (8.3 ± 0.7) $\times 10^{-4}$	S=1.2	950
$pK^-\overline{\Lambda}$+c.c.	(8.6 ± 1.1) $\times 10^{-4}$		876
$pK^-\overline{\Sigma}^0$	(2.9 ± 0.8) $\times 10^{-4}$		819
$\overline{\Lambda}nK^0_S$ + c.c.	(6.5 ± 1.1) $\times 10^{-4}$		872
$\Lambda\overline{\Sigma}$ + c.c.	(2.83 ± 0.23) $\times 10^{-5}$		1034
$\Sigma^+\overline{\Sigma}^-$	(1.07 ± 0.04) $\times 10^{-3}$		992
$\Sigma^0\overline{\Sigma}^0$	(1.172± 0.032) $\times 10^{-3}$	S=1.4	988
$\Xi^-\overline{\Xi}^+$	(9.7 ± 0.8) $\times 10^{-4}$	S=1.4	807

Radiative decays

$\gamma\eta_c(1S)$	(1.7 ± 0.4) %	S=1.5	111
$\gamma\eta_c(1S) \rightarrow 3\gamma$	(3.8 $^{+\ 1.3}_{-\ 1.0}$) $\times 10^{-6}$	S=1.1	–
$\gamma\eta_c(1S) \rightarrow \gamma\eta\eta\eta'$	(4.9 ± 0.8) $\times 10^{-5}$		–
3γ	(1.16 ± 0.22) $\times 10^{-5}$		1548
4γ	< 9 $\times 10^{-6}$	CL=90%	1548
5γ	< 1.5 $\times 10^{-5}$	CL=90%	1548
$\gamma\pi^0$	(3.56 ± 0.17) $\times 10^{-5}$		1546
$\gamma\pi^0\pi^0$	(1.15 ± 0.05) $\times 10^{-3}$		1543
$\gamma 2\pi^+2\pi^-$	(2.8 ± 0.5) $\times 10^{-3}$	S=1.9	1517
$\gamma f_2(1270)f_2(1270)$	(9.5 ± 1.7) $\times 10^{-4}$		878
$\gamma f_2(1270)f_2(1270)$(non resonant)	(8.2 ± 1.9) $\times 10^{-4}$		–
$\gamma\pi^+\pi^-2\pi^0$	(8.3 ± 3.1) $\times 10^{-3}$		1518
$\gamma K^0_S K^0_S$	(8.1 ± 0.4) $\times 10^{-4}$		1466
$\gamma(K\overline{K}\pi)$ $[J^{PC} = 0^{-+}]$	(7 ± 4) $\times 10^{-4}$	S=2.1	1442
$\gamma K^+K^-\pi^+\pi^-$	(2.1 ± 0.6) $\times 10^{-3}$		1407
$\gamma K^*(892)\overline{K}^*(892)$	(4.0 ± 1.3) $\times 10^{-3}$		1266
$\gamma\eta$	(1.085± 0.018) $\times 10^{-3}$		1500
$\gamma\eta\pi^0$	(2.14 ± 0.31) $\times 10^{-5}$		1497
$\gamma a_0(980)^0 \rightarrow \gamma\eta\pi^0$	< 2.5 $\times 10^{-6}$	CL=95%	–

$\gamma a_2(1320)^0 \rightarrow \gamma\eta\pi^0$	< 6.6		$\times 10^{-6}$	CL=95%	–
$\gamma\eta\pi\pi$	$(6.1 \pm 1.0) \times 10^{-3}$				1487
$\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-$	$(6.2 \pm 2.4) \times 10^{-4}$				–
$\gamma\eta'(958)$	$(5.25 \pm 0.07) \times 10^{-3}$			S=1.3	1400
$\gamma\rho\rho$	$(4.5 \pm 0.8) \times 10^{-3}$				1340
$\gamma\rho\omega$	< 5.4		$\times 10^{-4}$	CL=90%	1338
$\gamma\rho\phi$	< 8.8		$\times 10^{-5}$	CL=90%	1258
$\gamma\omega\omega$	$(1.61 \pm 0.33) \times 10^{-3}$				1336
$\gamma\phi\phi$	$(4.0 \pm 1.2) \times 10^{-4}$			S=2.1	1166
$\gamma\eta(1405/1475) \rightarrow \gamma K\overline{K}\pi$	$(2.8 \pm 0.6) \times 10^{-3}$			S=1.6	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$	$(7.8 \pm 2.0) \times 10^{-5}$			S=1.8	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$	$(3.0 \pm 0.5) \times 10^{-4}$				–
$\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$	$(1.7 \pm 0.4) \times 10^{-3}$			S=1.3	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi$	< 8.2		$\times 10^{-5}$	CL=95%	–
$\gamma\eta(1405) \rightarrow \gamma\gamma\gamma$	< 2.63		$\times 10^{-6}$	CL=90%	–
$\gamma\eta(1475) \rightarrow \gamma\gamma\gamma$	< 1.86		$\times 10^{-6}$	CL=90%	–
$\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0$	$(1.3 \pm 0.9) \times 10^{-4}$				1048
$\gamma\eta(1760) \rightarrow \gamma\omega\omega$	$(1.98 \pm 0.33) \times 10^{-3}$				–
$\gamma\eta(1760) \rightarrow \gamma\gamma\gamma$	< 4.80		$\times 10^{-6}$	CL=90%	–
$\gamma\eta(2225)$	$(3.14 \,^{+\,0.50}_{-\,0.19}) \times 10^{-4}$				752
$\gamma f_2(1270)$	$(1.64 \pm 0.12) \times 10^{-3}$			S=1.3	1286
$\gamma f_2(1270) \rightarrow \gamma K^0_S K^0_S$	$(2.58 \,^{+\,0.60}_{-\,0.22}) \times 10^{-5}$				–
$\gamma f_1(1285)$	$(6.1 \pm 0.8) \times 10^{-4}$				1283
$\gamma f_0(1370) \rightarrow \gamma K\overline{K}$	$(4.2 \pm 1.5) \times 10^{-4}$				–
$\gamma f_0(1370) \rightarrow \gamma K^0_S K^0_S$	$(1.1 \pm 0.4) \times 10^{-5}$				–
$\gamma f_1(1420) \rightarrow \gamma K\overline{K}\pi$	$(7.9 \pm 1.3) \times 10^{-4}$				1220
$\gamma f_0(1500) \rightarrow \gamma\pi\pi$	$(1.09 \pm 0.24) \times 10^{-4}$				1183
$\gamma f_0(1500) \rightarrow \gamma\eta\eta$	$(1.7 \,^{+\,0.6}_{-\,1.4}) \times 10^{-5}$				–
$\gamma f_0(1500) \rightarrow \gamma K^0_S K^0_S$	$(1.59 \,^{+\,0.24}_{-\,0.60}) \times 10^{-5}$				–
$\gamma f_1(1510) \rightarrow \gamma\eta\pi^+\pi^-$	$(4.5 \pm 1.2) \times 10^{-4}$				–
$\gamma f'_2(1525)$	$(5.7 \,^{+\,0.8}_{-\,0.5}) \times 10^{-4}$			S=1.5	1177
$\gamma f'_2(1525) \rightarrow \gamma K^0_S K^0_S$	$(8.0 \,^{+\,0.7}_{-\,0.5}) \times 10^{-5}$				–
$\gamma f'_2(1525) \rightarrow \gamma\eta\eta$	$(3.4 \pm 1.4) \times 10^{-5}$				–
$\gamma f_2(1640) \rightarrow \gamma\omega\omega$	$(2.8 \pm 1.8) \times 10^{-4}$				–
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	$(3.8 \pm 0.5) \times 10^{-4}$				–
$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$	$(9.5 \,^{+\,1.0}_{-\,0.5}) \times 10^{-4}$			S=1.5	1075
$\gamma f_0(1710) \rightarrow \gamma\omega\omega$	$(3.1 \pm 1.0) \times 10^{-4}$				–
$\gamma f_0(1710) \rightarrow \gamma\eta\eta$	$(2.4 \,^{+\,1.2}_{-\,0.7}) \times 10^{-4}$				–
$\gamma f_0(1710) \rightarrow \gamma\omega\phi$	$(2.5 \pm 0.6) \times 10^{-4}$				–

$\gamma f_0(1750) \to \gamma K^0_S K^0_S$	$(\ 1.11\ ^{+\ 0.20}_{-\ 0.33}\ ) \times 10^{-5}$				–
$\gamma f_2(1810) \to \gamma\eta\eta$	$(\ 5.4\ ^{+\ 3.5}_{-\ 2.4}\ ) \times 10^{-5}$				–
$\gamma f_2(1910) \to \gamma\omega\omega$	$(\ 2.0\ \pm\ 1.4\ ) \times 10^{-4}$				–
$\gamma f_2(1950) \to \gamma K^*(892)\overline{K}^*(892)$	$(\ 7.0\ \pm\ 2.2\ ) \times 10^{-4}$				–
$\gamma f_4(2050)$	$(\ 2.7\ \pm\ 0.7\ ) \times 10^{-3}$				891
$\gamma f_0(2100) \to \gamma\eta\eta$	$(\ 1.13\ ^{+\ 0.60}_{-\ 0.30}\ ) \times 10^{-4}$				–
$\gamma f_0(2100) \to \gamma\pi\pi$	$(\ 6.2\ \pm\ 1.0\ ) \times 10^{-4}$				–
$\gamma f_0(2200) \to \gamma K\overline{K}$	$(\ 5.9\ \pm\ 1.3\ ) \times 10^{-4}$				–
$\gamma f_0(2200) \to \gamma K^0_S K^0_S$	$(\ 2.72\ ^{+\ 0.19}_{-\ 0.50}\ ) \times 10^{-4}$				–
$\gamma f_J(2220) \to \gamma\pi\pi$	$<\ 3.9$		$\times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \to \gamma K\overline{K}$	$<\ 4.1$		$\times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \to \gamma p\overline{p}$	$(\ 1.5\ \pm\ 0.8\ ) \times 10^{-5}$				–
$\gamma f_0(2330) \to \gamma K^0_S K^0_S$	$(\ 4.9\ \pm\ 0.7\ ) \times 10^{-5}$				–
$\gamma f_2(2340) \to \gamma\eta\eta$	$(\ 5.6\ ^{+\ 2.4}_{-\ 2.2}\ ) \times 10^{-5}$				–
$\gamma f_2(2340) \to \gamma K^0_S K^0_S$	$(\ 5.5\ ^{+\ 4.0}_{-\ 1.5}\ ) \times 10^{-5}$				–
$\gamma X(1835) \to \gamma\pi^+\pi^-\eta'$	$(\ 2.7\ ^{+\ 0.6}_{-\ 0.8}\ ) \times 10^{-4}$			S=1.6	1006
$\gamma X(1835) \to \gamma p\overline{p}$	$(\ 7.7\ ^{+\ 1.5}_{-\ 0.9}\ ) \times 10^{-5}$				–
$\gamma X(1835) \to \gamma K^0_S K^0_S \eta$	$(\ 3.3\ ^{+\ 2.0}_{-\ 1.3}\ ) \times 10^{-5}$				–
$\gamma X(1835) \to \gamma\gamma\gamma$	$<\ 3.56$		$\times 10^{-6}$	CL=90%	–
$\gamma X(1835) \to \gamma 3(\pi^+\pi^-)$	$(\ 2.4\ ^{+\ 0.7}_{-\ 0.8}\ ) \times 10^{-5}$				–
$\gamma X(2370) \to \gamma K^+ K^- \eta'$	$(\ 1.8\ \pm\ 0.7\ ) \times 10^{-5}$				–
$\gamma X(2370) \to \gamma K^0_S K^0_S \eta'$	$(\ 1.2\ \pm\ 0.5\ ) \times 10^{-5}$				–
$\gamma X(2370) \to \gamma\eta\eta\eta'$	$<\ 9.2$		$\times 10^{-6}$	CL=90%	–
$\gamma p\overline{p}$	$(\ 3.8\ \pm\ 1.0\ ) \times 10^{-4}$				1232
$\gamma p\overline{p}\pi^+\pi^-$	$<\ 7.9$		$\times 10^{-4}$	CL=90%	1107
$\gamma\Lambda\overline{\Lambda}$	$<\ 1.3$		$\times 10^{-4}$	CL=90%	1074
$\gamma A \to \gamma$invisible	$[kkaa]\ <\ 1.7$		$\times 10^{-6}$	CL=90%	–
$\gamma A^0 \to \gamma\mu^+\mu^-$	$[llaa]\ <\ 5$		$\times 10^{-6}$	CL=90%	–

Dalitz decays

$\pi^0 e^+ e^-$	$(\ 7.6\ \pm\ 1.4\ ) \times 10^{-7}$				1546
$\eta e^+ e^-$	$(\ 1.42\ \pm\ 0.08\ ) \times 10^{-5}$				1500
$\eta'(958) e^+ e^-$	$(\ 6.59\ \pm\ 0.18\ ) \times 10^{-5}$				1400
$\eta U \to \eta e^+ e^-$	$[nnaa]\ <\ 9.11$		$\times 10^{-7}$	CL=90%	–
$\eta'(958) U \to \eta'(958) e^+ e^-$	$[nnaa]\ <\ 2.0$		$\times 10^{-7}$	CL=90%	–
$\phi e^+ e^-$	$<\ 1.2$		$\times 10^{-7}$	CL=90%	1381

Weak decays

$D^- e^+ \nu_e$ + c.c.	<	7.1	$\times 10^{-8}$	CL=90%	984
$\overline{D}^0 e^+ e^-$ + c.c.	<	8.5	$\times 10^{-8}$	CL=90%	987
$D_s^- e^+ \nu_e$ + c.c.	<	1.3	$\times 10^{-6}$	CL=90%	923
$D_s^{*-} e^+ \nu_e$ + c.c.	<	1.8	$\times 10^{-6}$	CL=90%	828
$D^- \pi^+$ + c.c.	<	7.5	$\times 10^{-5}$	CL=90%	977
$\overline{D}^0 \overline{K}^0$ + c.c.	<	1.7	$\times 10^{-4}$	CL=90%	898
$\overline{D}^0 \overline{K}^{*0}$ + c.c.	<	2.5	$\times 10^{-6}$	CL=90%	670
$D_s^- \pi^+$ + c.c.	<	1.3	$\times 10^{-4}$	CL=90%	915
$D_s^- \rho^+$ + c.c.	<	1.3	$\times 10^{-5}$	CL=90%	663

Charge conjugation (C), Parity (P), Lepton Family number (LF) violating modes

$\gamma\gamma$	C	<	2.7	$\times 10^{-7}$	CL=90%	1548
$\gamma\phi$	C	<	1.4	$\times 10^{-6}$	CL=90%	1381
$e^\pm \mu^\mp$	LF	<	1.6	$\times 10^{-7}$	CL=90%	1547
$e^\pm \tau^\mp$	LF	<	7.5	$\times 10^{-8}$	CL=90%	1039
$\mu^\pm \tau^\mp$	LF	<	2.0	$\times 10^{-6}$	CL=90%	1035
$\Lambda_c^+ e^-$ +c.c.		<	6.9	$\times 10^{-8}$	CL=90%	–

Other decays

invisible	<	7	$\times 10^{-4}$	CL=90%	–

$\chi_{c0}(1P)$

$I^G(J^{PC}) = 0^+(0^{++})$

Mass $m = 3414.71 \pm 0.30$ MeV
Full width $\Gamma = 10.8 \pm 0.6$ MeV

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(2.34±0.18) %		1679
$\rho^0\pi^+\pi^-$	(9.1 ±2.9) $\times 10^{-3}$		1607
$f_0(980) f_0(980)$	(6.6 ±2.1) $\times 10^{-4}$		1391
$\pi^+\pi^-\pi^0\pi^0$	(3.3 ±0.4) %		1680
$\rho^+\pi^-\pi^0$ + c.c.	(2.9 ±0.4) %		1607
$4\pi^0$	(3.3 ±0.4) $\times 10^{-3}$		1681
$\pi^+\pi^- K^+ K^-$	(1.81±0.14) %		1580
$K_0^*(1430)^0 \overline{K}_0^*(1430)^0 \to \pi^+\pi^- K^+ K^-$	(9.8 $^{+4.0}_{-2.8}$) $\times 10^{-4}$		–
$K_0^*(1430)^0 \overline{K}_2^*(1430)^0$ + c.c. $\to \pi^+\pi^- K^+ K^-$	(8.0 $^{+2.0}_{-2.4}$) $\times 10^{-4}$		–
$K_1(1270)^+ K^-$ + c.c. $\to \pi^+\pi^- K^+ K^-$	(6.3 ±1.9) $\times 10^{-3}$		–

$K_1(1400)^+ K^- +$ c.c. $\rightarrow$ $\pi^+\pi^- K^+ K^-$	< 2.7	$\times 10^{-3}$	CL=90%	–
$f_0(980) f_0(980)$	$(1.6\ ^{+1.0}_{-0.9}) \times 10^{-4}$			1391
$f_0(980) f_0(2200)$	$(7.9\ ^{+2.0}_{-2.5}) \times 10^{-4}$			586
$f_0(1370) f_0(1370)$	< 2.7	$\times 10^{-4}$	CL=90%	1019
$f_0(1370) f_0(1500)$	< 1.7	$\times 10^{-4}$	CL=90%	920
$f_0(1370) f_0(1710)$	$(6.7\ ^{+3.5}_{-2.3}) \times 10^{-4}$			740
$f_0(1500) f_0(1370)$	< 1.3	$\times 10^{-4}$	CL=90%	920
$f_0(1500) f_0(1500)$	< 5	$\times 10^{-5}$	CL=90%	804
$f_0(1500) f_0(1710)$	< 7	$\times 10^{-5}$	CL=90%	581
$K^+ K^- \pi^+ \pi^- \pi^0$	$(8.6 \pm 0.9) \times 10^{-3}$			1545
$K^0_S K^\pm \pi^\mp \pi^+ \pi^-$	$(4.2 \pm 0.4) \times 10^{-3}$			1543
$K^+ K^- \pi^0 \pi^0$	$(5.6 \pm 0.9) \times 10^{-3}$			1582
$K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	(2.49 ± 0.33) %			1581
$\rho^+ K^- K^0 +$ c.c.	(1.21 ± 0.21) %			1458
$K^*(892)^- K^+ \pi^0 \rightarrow$ $K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	$(4.6 \pm 1.2) \times 10^{-3}$			–
$K^0_S K^0_S \pi^+ \pi^-$	$(5.7 \pm 1.1) \times 10^{-3}$			1579
$K^+ K^- \eta \pi^0$	$(3.0 \pm 0.7) \times 10^{-3}$			1468
$3(\pi^+ \pi^-)$	(1.20 ± 0.18) %			1633
$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(7.5 \pm 1.6) \times 10^{-3}$			1523
$K^*(892)^0 \overline{K}^*(892)^0$	$(1.7 \pm 0.6) \times 10^{-3}$			1456
$\pi\pi$	$(8.51 \pm 0.33) \times 10^{-3}$			1702
$\pi^0 \eta$	< 1.8	$\times 10^{-4}$		1661
$\pi^0 \eta'$	< 1.1	$\times 10^{-3}$		1570
$\pi^0 \eta_c$	< 1.6	$\times 10^{-3}$	CL=90%	383
$\eta\eta$	$(3.01 \pm 0.19) \times 10^{-3}$			1617
$\eta\eta'$	$(9.1 \pm 1.1) \times 10^{-5}$			1521
$\eta'\eta'$	$(2.17 \pm 0.12) \times 10^{-3}$			1413
$\omega\omega$	$(9.7 \pm 1.1) \times 10^{-4}$			1517
$\omega\phi$	$(1.41 \pm 0.13) \times 10^{-4}$			1447
$\omega K^+ K^-$	$(1.94 \pm 0.21) \times 10^{-3}$			1457
$K^+ K^-$	$(6.05 \pm 0.31) \times 10^{-3}$			1634
$K^0_S K^0_S$	$(3.16 \pm 0.17) \times 10^{-3}$			1633
$\pi^+ \pi^- \eta$	< 2.0	$\times 10^{-4}$	CL=90%	1651
$\pi^+ \pi^- \eta'$	< 4	$\times 10^{-4}$	CL=90%	1560
$\overline{K}^0 K^+ \pi^- +$ c.c.	< 9	$\times 10^{-5}$	CL=90%	1610
$K^+ K^- \pi^0$	< 6	$\times 10^{-5}$	CL=90%	1611
$K^+ K^- \eta$	< 2.3	$\times 10^{-4}$	CL=90%	1512
$K^+ K^- K^0_S K^0_S$	$(1.4 \pm 0.5) \times 10^{-3}$			1331
$K^0_S K^0_S K^0_S K^0_S$	$(5.8 \pm 0.5) \times 10^{-4}$			1327
$K^+ K^- K^+ K^-$	$(2.82 \pm 0.29) \times 10^{-3}$			1333

$K^+ K^- \phi$	$(9.7 \pm 2.5) \times 10^{-4}$			1381
$\overline{K}^0 K^+ \pi^- \phi$ + c.c.	$(3.7 \pm 0.6) \times 10^{-3}$			1326
$K^+ K^- \pi^0 \phi$	$(1.90 \pm 0.35) \times 10^{-3}$			1329
$\phi \pi^+ \pi^- \pi^0$	$(1.18 \pm 0.15) \times 10^{-3}$			1525
$\phi\phi$	$(8.0 \pm 0.7) \times 10^{-4}$			1370
$\phi\phi\eta$	$(8.4 \pm 1.0) \times 10^{-4}$			1100
$p\overline{p}$	$(2.21 \pm 0.08) \times 10^{-4}$			1426
$p\overline{p}\pi^0$	$(7.0 \pm 0.7) \times 10^{-4}$		S=1.3	1379
$p\overline{p}\eta$	$(3.5 \pm 0.4) \times 10^{-4}$			1187
$p\overline{p}\omega$	$(5.2 \pm 0.6) \times 10^{-4}$			1043
$p\overline{p}\phi$	$(6.0 \pm 1.4) \times 10^{-5}$			876
$p\overline{p}\pi^+ \pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$		S=1.4	1320
$p\overline{p}\pi^0 \pi^0$	$(1.04 \pm 0.28) \times 10^{-3}$			1324
$p\overline{p}K^+ K^-$ (non-resonant)	$(1.22 \pm 0.26) \times 10^{-4}$			890
$p\overline{p}K^0_S K^0_S$	< 8.8	$\times 10^{-4}$	CL=90%	884
$p\overline{n}\pi^-$	$(1.27 \pm 0.11) \times 10^{-3}$			1376
$\overline{p}n\pi^+$	$(1.37 \pm 0.12) \times 10^{-3}$			1376
$p\overline{n}\pi^- \pi^0$	$(2.34 \pm 0.21) \times 10^{-3}$			1321
$\overline{p}n\pi^+ \pi^0$	$(2.21 \pm 0.18) \times 10^{-3}$			1321
$\Lambda\overline{\Lambda}$	$(3.59 \pm 0.15) \times 10^{-4}$			1292
$\Lambda\overline{\Lambda}\pi^+ \pi^-$	$(1.18 \pm 0.13) \times 10^{-3}$			1153
$\Lambda\overline{\Lambda}\pi^+ \pi^-$ (non-resonant)	< 5	$\times 10^{-4}$	CL=90%	1153
$\Sigma(1385)^+ \overline{\Lambda}\pi^-$ + c.c.	< 5	$\times 10^{-4}$	CL=90%	1083
$\Sigma(1385)^- \overline{\Lambda}\pi^+$ + c.c.	< 5	$\times 10^{-4}$	CL=90%	1083
$K^+ \overline{p}\Lambda$ + c.c.	$(1.25 \pm 0.12) \times 10^{-3}$		S=1.3	1132
$nK^0_S\overline{\Lambda}$ + c.c.	$(6.6 \pm 0.5) \times 10^{-4}$			1129
$K^*(892)^+ \overline{p}\Lambda$ + c.c.	$(4.8 \pm 0.9) \times 10^{-4}$			845
$K^+ \overline{p}\Lambda(1520)$ + c.c.	$(2.9 \pm 0.7) \times 10^{-4}$			859
$\Lambda(1520)\overline{\Lambda}(1520)$	$(3.1 \pm 1.2) \times 10^{-4}$			780
$\Sigma^0 \overline{\Sigma}^0$	$(4.68 \pm 0.32) \times 10^{-4}$			1222
$\Sigma^+ \overline{p}K^0_S$ + c.c.	$(3.52 \pm 0.27) \times 10^{-4}$			1089
$\Sigma^0 \overline{p}K^+$ + c.c.	$(3.03 \pm 0.20) \times 10^{-4}$			1090
$\Sigma^+ \overline{\Sigma}^-$	$(4.6 \pm 0.8) \times 10^{-4}$		S=2.6	1225
$\Sigma^- \overline{\Sigma}^+$	$(5.1 \pm 0.5) \times 10^{-4}$			1217
$\Sigma(1385)^+ \overline{\Sigma}(1385)^-$	$(1.6 \pm 0.6) \times 10^{-4}$			1001
$\Sigma(1385)^- \overline{\Sigma}(1385)^+$	$(2.3 \pm 0.7) \times 10^{-4}$			1001
$K^- \Lambda\overline{\Xi}^+$ + c.c.	$(1.94 \pm 0.35) \times 10^{-4}$			873
$\Xi^0 \overline{\Xi}^0$	$(3.1 \pm 0.8) \times 10^{-4}$			1089
$\Xi^- \overline{\Xi}^+$	$(4.8 \pm 0.7) \times 10^{-4}$			1081
$\eta_c \pi^+ \pi^-$	< 7	$\times 10^{-4}$	CL=90%	307

Radiative decays

$\gamma J/\psi(1S)$	(1.40 ± 0.05) %			303
$\gamma\rho^0$	< 9	$\times 10^{-6}$	CL=90%	1619

$\gamma\omega$	< 8	$\times 10^{-6}$	CL=90%	1618
$\gamma\phi$	< 6	$\times 10^{-6}$	CL=90%	1555
$\gamma\gamma$	(2.04 ± 0.09)	$\times 10^{-4}$		1707
$e^+e^-J/\psi(1S)$	(1.33 ± 0.29)	$\times 10^{-4}$		303
$\mu^+\mu^-J/\psi(1S)$	< 1.9	$\times 10^{-5}$	CL=90%	226

$\chi_{c1}(1P)$

$I^G(J^{PC}) = 0^+(1^{++})$

Mass $m = 3510.67 \pm 0.05$ MeV (S = 1.2)
Full width $\Gamma = 0.84 \pm 0.04$ MeV

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$3(\pi^+\pi^-)$	$(5.8 \pm1.4) \times 10^{-3}$	S=1.2	1683
$2(\pi^+\pi^-)$	$(7.6 \pm2.6) \times 10^{-3}$		1728
$\pi^+\pi^-\pi^0\pi^0$	(1.19 ± 0.15) %		1729
$\rho^+\pi^-\pi^0$ + c.c.	(1.45 ± 0.24) %		1658
$\rho^0\pi^+\pi^-$	$(3.9 \pm3.5) \times 10^{-3}$		1657
$4\pi^0$	$(5.4 \pm0.8) \times 10^{-4}$		1729
$\pi^+\pi^-K^+K^-$	$(4.5 \pm1.0) \times 10^{-3}$		1632
$K^+K^-\pi^0\pi^0$	$(1.12\pm0.27) \times 10^{-3}$		1634
$K^+K^-\pi^+\pi^-\pi^0$	(1.15 ± 0.13) %		1598
$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(7.5 \pm0.8) \times 10^{-3}$		1596
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(8.6 \pm1.4) \times 10^{-3}$		1632
$\rho^- K^+\overline{K}^0$ + c.c.	$(5.0 \pm1.2) \times 10^{-3}$		1514
$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(2.3 \pm0.6) \times 10^{-3}$		–
$K^+K^-\eta\pi^0$	$(1.12\pm0.34) \times 10^{-3}$		1523
$\pi^+\pi^- K^0_S K^0_S$	$(6.9 \pm2.9) \times 10^{-4}$		1630
$K^+K^-\eta$	$(3.2 \pm1.0) \times 10^{-4}$		1566
$\overline{K}^0 K^+\pi^-$ + c.c.	$(7.0 \pm0.6) \times 10^{-3}$		1661
$K^*(892)^0\overline{K}^0$ + c.c.	$(10 \pm4) \times 10^{-4}$		1602
$K^*(892)^+K^-$ + c.c.	$(1.4 \pm0.6) \times 10^{-3}$		1602
$K^*_J(1430)^0\overline{K}^0$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	< 8 $\times 10^{-4}$	CL=90%	–
$K^*_J(1430)^+K^-$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	< 2.1 $\times 10^{-3}$	CL=90%	–
$K^+K^-\pi^0$	$(1.81\pm0.24) \times 10^{-3}$		1662
$\eta\pi^+\pi^-$	$(4.62\pm0.23) \times 10^{-3}$		1701
$a_0(980)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(3.2 \pm0.4) \times 10^{-3}$	S=2.2	–
$a_2(1320)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(1.76\pm0.24) \times 10^{-4}$		–
$a_2(1700)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(4.6 \pm0.7) \times 10^{-5}$		–

$f_2(1270)\eta \to \eta\pi^+\pi^-$	$(3.5 \pm 0.6) \times 10^{-4}$		–
$f_4(2050)\eta \to \eta\pi^+\pi^-$	$(2.5 \pm 0.9) \times 10^{-5}$		–
$\pi_1(1400)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$< 5 \times 10^{-5}$	CL=90%	–
$\pi_1(1600)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$< 1.5 \times 10^{-5}$	CL=90%	–
$\pi_1(2015)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$< 8 \times 10^{-6}$	CL=90%	–
$f_2(1270)\eta$	$(6.7 \pm 1.1) \times 10^{-4}$		1467
$\pi^+\pi^-\eta'$	$(2.2 \pm 0.4) \times 10^{-3}$		1612
$K^+K^-\eta'(958)$	$(8.8 \pm 0.9) \times 10^{-4}$		1461
$K_0^*(1430)^+K^-$ + c.c.	$(6.4 \, ^{+2.2}_{-2.8}) \times 10^{-4}$		–
$f_0(980)\eta'(958)$	$(1.6 \, ^{+1.4}_{-0.7}) \times 10^{-4}$		1460
$f_0(1710)\eta'(958)$	$(7 \, ^{+7}_{-5}) \times 10^{-5}$		1118
$f_2'(1525)\eta'(958)$	$(9 \pm 6) \times 10^{-5}$		1229
$\pi^0 f_0(980) \to \pi^0\pi^+\pi^-$	$(3.5 \pm 0.9) \times 10^{-7}$		–
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$		1577
$K^*(892)^0\overline{K}^*(892)^0$	$(1.4 \pm 0.4) \times 10^{-3}$		1512
$K^+K^-K_S^0K_S^0$	$< 4 \times 10^{-4}$	CL=90%	1390
$K_S^0K_S^0K_S^0K_S^0$	$(3.5 \pm 1.0) \times 10^{-5}$		1387
$K^+K^-K^+K^-$	$(5.4 \pm 1.1) \times 10^{-4}$		1393
$K^+K^-\phi$	$(4.1 \pm 1.5) \times 10^{-4}$		1440
$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(3.3 \pm 0.5) \times 10^{-3}$		1387
$K^+K^-\pi^0\phi$	$(1.62 \pm 0.30) \times 10^{-3}$		1390
$\phi\pi^+\pi^-\pi^0$	$(7.5 \pm 1.0) \times 10^{-4}$		1578
$\omega\omega$	$(5.7 \pm 0.7) \times 10^{-4}$		1571
ωK^+K^-	$(7.8 \pm 0.9) \times 10^{-4}$		1513
$\omega\phi$	$(2.7 \pm 0.4) \times 10^{-5}$		1503
$\phi\phi$	$(4.2 \pm 0.5) \times 10^{-4}$		1429
$\phi\phi\eta$	$(3.0 \pm 0.5) \times 10^{-4}$		1172
$p\overline{p}$	$(7.60 \pm 0.34) \times 10^{-5}$		1484
$p\overline{p}\pi^0$	$(1.55 \pm 0.18) \times 10^{-4}$		1438
$p\overline{p}\eta$	$(1.45 \pm 0.25) \times 10^{-4}$		1254
$p\overline{p}\omega$	$(2.12 \pm 0.31) \times 10^{-4}$		1117
$p\overline{p}\phi$	$< 1.7 \times 10^{-5}$	CL=90%	962
$p\overline{p}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$		1381
$p\overline{p}\pi^0\pi^0$	$< 5 \times 10^{-4}$	CL=90%	1385
$p\overline{p}K^+K^-$ (non-resonant)	$(1.27 \pm 0.22) \times 10^{-4}$		974
$p\overline{p}K_S^0K_S^0$	$< 4.5 \times 10^{-4}$	CL=90%	968
$p\overline{n}\pi^-$	$(3.8 \pm 0.5) \times 10^{-4}$		1435
$\overline{p}n\pi^+$	$(3.9 \pm 0.5) \times 10^{-4}$		1435
$p\overline{n}\pi^-\pi^0$	$(1.03 \pm 0.12) \times 10^{-3}$		1383

$\overline{p}n\pi^+\pi^0$	(1.01±0.12) × 10^{-3}			1383
$\Lambda\overline{\Lambda}$	(1.27±0.08) × 10^{-4}			1355
$\Lambda\overline{\Lambda}\pi^+\pi^-$	(2.9 ±0.5) × 10^{-4}			1223
$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	(2.5 ±0.6) × 10^{-4}			1223
$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	< 1.3	× 10^{-4}	CL=90%	1157
$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	< 1.3	× 10^{-4}	CL=90%	1157
$K^+\overline{p}\Lambda$+c.c.	(4.2 ±0.4) × 10^{-4}		S=1.2	1203
$nK^0_S\overline{\Lambda}$ + c.c.	(1.66±0.17) × 10^{-4}			1200
$K^*(892)^+\overline{p}\Lambda$ + c.c.	(4.9 ±0.7) × 10^{-4}			935
$K^+\overline{p}\Lambda(1520)$ + c.c.	(1.7 ±0.4) × 10^{-4}			951
$\Lambda(1520)\overline{\Lambda}(1520)$	< 9	× 10^{-5}	CL=90%	880
$\Sigma^0\overline{\Sigma}^0$	(4.2 ±0.6) × 10^{-5}			1288
$\Sigma^+\overline{p}K^0_S$ + c.c.	(1.53±0.12) × 10^{-4}			1163
$\Sigma^0\overline{p}K^+$ + c.c.	(1.46±0.10) × 10^{-4}			1163
$\Sigma^+\overline{\Sigma}^-$	(3.6 ±0.7) × 10^{-5}			1291
$\Sigma^-\overline{\Sigma}^+$	(5.7 ±1.5) × 10^{-5}			1283
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	< 9	× 10^{-5}	CL=90%	1081
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	< 5	× 10^{-5}	CL=90%	1081
$K^-\Lambda\overline{\Xi}^+$ + c.c.	(1.35±0.24) × 10^{-4}			963
$\Xi^0\overline{\Xi}^0$	< 6	× 10^{-5}	CL=90%	1163
$\Xi^-\overline{\Xi}^+$	(8.0 ±2.1) × 10^{-5}			1155
$\pi^+\pi^- + K^+K^-$	< 2.1	× 10^{-3}		–
$K^0_SK^0_S$	< 6	× 10^{-5}	CL=90%	1683
$\eta_c\pi^+\pi^-$	< 3.2	× 10^{-3}	CL=90%	413

Radiative decays

$\gamma J/\psi(1S)$	(34.3 ±1.0) %			389
$\gamma\rho^0$	(2.16±0.17) × 10^{-4}			1670
$\gamma\omega$	(6.8 ±0.8) × 10^{-5}			1668
$\gamma\phi$	(2.4 ±0.5) × 10^{-5}			1607
$\gamma\gamma$	< 6.3	× 10^{-6}	CL=90%	1755
$e^+e^-J/\psi(1S)$	(3.46±0.22) × 10^{-3}			389
$\mu^+\mu^-J/\psi(1S)$	(2.33±0.29) × 10^{-4}			335

$h_c(1P)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Mass m = 3525.38 ± 0.11 MeV
Full width Γ = 0.7 ± 0.4 MeV

$h_c(1P)$ DECAY MODES	Fraction (Γ_i/Γ)		Confidence level	p (MeV/c)
$J/\psi(1S)\pi\pi$	not seen			312
$J/\psi(1S)\pi^+\pi^-$	< 2.3	× 10^{-3}	90%	305
$p\overline{p}$	< 1.5	× 10^{-4}	90%	1492

$p\overline{p}\pi^+\pi^-$	$(\ 2.9\pm0.6)\times10^{-3}$		1390
$p\overline{p}\pi^0\pi^0$	$<\ 5\ \times10^{-4}$	90%	1394
$\pi^+\pi^-\pi^0$	$(\ 1.6\pm0.5)\times10^{-3}$		1749
$\pi^+\pi^-\pi^0\eta$	$(\ 7.2\pm2.3)\times10^{-3}$		1695
$2\pi^+2\pi^-\pi^0$	$(\ 8.1\pm1.8)\times10^{-3}$		1716
$3\pi^+3\pi^-\pi^0$	$<\ 9\ \times10^{-3}$	90%	1661
$K^+K^-\pi^+\pi^-$	$<\ 6\ \times10^{-4}$	90%	1640
$K^+K^-\pi^+\pi^-\pi^0$	$(\ 3.2\pm0.8)\times10^{-3}$		1606
$K^+K^-\pi^+\pi^-\eta$	$<\ 2.3\ \times10^{-3}$	90%	1480
$K^+K^-\pi^0$	$<\ 6\ \times10^{-4}$	90%	1670
$K^+K^-\pi^0\eta$	$<\ 2.1\ \times10^{-3}$	90%	1532
$K^+K^-\eta$	$<\ 9\ \times10^{-4}$	90%	1574
$2K^+2K^-\pi^0$	$<\ 2.4\ \times10^{-4}$	90%	1339
$K^0_S K^\pm\pi^\mp$	$<\ 6\ \times10^{-4}$	90%	1668
$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(\ 2.8\pm1.0)\times10^{-3}$		1604

Radiative decays

$\gamma\eta$	$(\ 4.7\pm2.1)\times10^{-4}$		1720
$\gamma\eta'(958)$	$(\ 1.5\pm0.4)\times10^{-3}$		1633
$\gamma\eta_c(1S)$	(50 ±9) %		500

$\chi_{c2}(1P)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 3556.17 \pm 0.07$ MeV
Full width $\Gamma = 1.97 \pm 0.09$ MeV

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)

Hadronic decays

$2(\pi^+\pi^-)$	$(\ 1.02\pm0.09)$ %		1751
$\pi^+\pi^-\pi^0\pi^0$	$(\ 1.83\pm0.23)$ %		1752
$\rho^+\pi^-\pi^0$ + c.c.	$(\ 2.19\pm0.34)$ %		1682
$4\pi^0$	$(\ 1.11\pm0.15)\times10^{-3}$		1752
$K^+K^-\pi^0\pi^0$	$(\ 2.1\ \pm0.4\ )\times10^{-3}$		1658
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 1.38\pm0.20)$ %		1657
$\rho^-K^+\overline{K}^0$ + c.c.	$(\ 4.1\ \pm1.2\ )\times10^{-3}$		1540
$K^*(892)^0K^-\pi^+ \to K^-\pi^+K^0\pi^0$ + c.c.	$(\ 2.9\ \pm0.8\ )\times10^{-3}$		–
$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 3.8\ \pm0.9\ )\times10^{-3}$		–
$K^*(892)^-K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 3.7\ \pm0.8\ )\times10^{-3}$		–
$K^*(892)^+\overline{K}^0\pi^- \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 2.9\ \pm0.8\ )\times10^{-3}$		–

$K^+K^-\eta\pi^0$	$(\ 1.3\ \pm0.4\ )\times10^{-3}$		1549
$K^+K^-\pi^+\pi^-$	$(\ 8.4\ \pm0.9\ )\times10^{-3}$		1656
$K^+K^-\pi^+\pi^-\pi^0$	(1.17±0.13) %		1623
$K^0_SK^\pm\pi^\mp\pi^+\pi^-$	$(\ 7.3\ \pm0.8\ )\times10^{-3}$		1621
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(\ 2.1\ \pm1.1\ )\times10^{-3}$		1602
$K^*(892)^0\overline{K}^*(892)^0$	$(\ 2.3\ \pm0.4\ )\times10^{-3}$		1538
$3(\pi^+\pi^-)$	$(\ 8.6\ \pm1.8\ )\times10^{-3}$		1707
$\phi\phi$	(1.06±0.09) $\times10^{-3}$		1457
$\phi\phi\eta$	$(\ 5.3\ \pm0.6\ )\times10^{-4}$		1206
$\omega\omega$	$(\ 8.4\ \pm1.0\ )\times10^{-4}$		1597
ωK^+K^-	$(\ 7.3\ \pm0.9\ )\times10^{-4}$		1540
$\omega\phi$	$(\ 9.6\ \pm2.7\ )\times10^{-6}$		1529
$\pi\pi$	(2.23±0.09) $\times10^{-3}$		1773
$\rho^0\pi^+\pi^-$	$(\ 3.7\ \pm1.6\ )\times10^{-3}$		1682
$\pi^+\pi^-\pi^0$ (non-resonant)	$(\ 2.0\ \pm0.4\ )\times10^{-5}$		1765
$\rho(770)^\pm\pi^\mp$	$(\ 6\ \ \pm4\ \ )\times10^{-6}$		–
$\pi^+\pi^-\eta$	$(\ 4.8\ \pm1.3\ )\times10^{-4}$		1724
$\pi^+\pi^-\eta'$	$(\ 5.0\ \pm1.8\ )\times10^{-4}$		1636
$\eta\eta$	$(\ 5.4\ \pm0.4\ )\times10^{-4}$		1692
K^+K^-	(1.01±0.06) $\times10^{-3}$		1708
$K^0_SK^0_S$	$(\ 5.2\ \pm0.4\ )\times10^{-4}$		1707
$K^*(892)^\pm K^\mp$	(1.44±0.21) $\times10^{-4}$		1627
$K^*(892)^0\overline{K}^0$ + c.c.	(1.24±0.27) $\times10^{-4}$		1627
$K^*_2(1430)^\pm K^\mp$	(1.48±0.12) $\times10^{-3}$		–
$K^*_2(1430)^0\overline{K}^0$ + c.c.	(1.24±0.17) $\times10^{-3}$		1443
$K^*_3(1780)^\pm K^\mp$	$(\ 5.2\ \pm0.8\ )\times10^{-4}$		–
$K^*_3(1780)^0\overline{K}^0$ + c.c.	$(\ 5.6\ \pm2.1\ )\times10^{-4}$		1274
$a_2(1320)^0\pi^0$	(1.29±0.34) $\times10^{-3}$		–
$a_2(1320)^\pm\pi^\mp$	$(\ 1.8\ \pm0.6\ )\times10^{-3}$		1530
$\overline{K}^0K^+\pi^-$ + c.c.	(1.28±0.18) $\times10^{-3}$		1685
$K^+K^-\pi^0$	$(\ 3.0\ \pm0.8\ )\times10^{-4}$		1686
$K^+K^-\eta$	$<\ 3.2\ \times10^{-4}$	90%	1592
$K^+K^-\eta'(958)$	(1.94±0.34) $\times10^{-4}$		1488
$\eta\eta'$	$(\ 2.2\ \pm0.5\ )\times10^{-5}$		1600
$\eta'\eta'$	$(\ 4.6\ \pm0.6\ )\times10^{-5}$		1498
$\pi^+\pi^-K^0_SK^0_S$	$(\ 2.2\ \pm0.5\ )\times10^{-3}$		1655
$K^+K^-K^0_SK^0_S$	$<\ 4\ \times10^{-4}$	90%	1418
$K^0_SK^0_SK^0_SK^0_S$	(1.13±0.18) $\times10^{-4}$		1415
$K^+K^-K^+K^-$	(1.65±0.20) $\times10^{-3}$		1421
$K^+K^-\phi$	(1.42±0.29) $\times10^{-3}$		1468
$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(\ 4.8\ \pm0.7\ )\times10^{-3}$		1416
$K^+K^-\pi^0\phi$	$(\ 2.7\ \pm0.5\ )\times10^{-3}$		1419
$\phi\pi^+\pi^-\pi^0$	$(\ 9.3\ \pm1.2\ )\times10^{-4}$		1603

$p\overline{p}$	$(\ 7.33\pm0.33)\times10^{-5}$			1510
$p\overline{p}\pi^0$	$(\ 4.7\ \pm0.4\ )\times10^{-4}$			1465
$p\overline{p}\eta$	$(\ 1.74\pm0.25)\times10^{-4}$			1285
$p\overline{p}\omega$	$(\ 3.6\ \pm0.4\ )\times10^{-4}$			1152
$p\overline{p}\phi$	$(\ 2.8\ \pm0.9\ )\times10^{-5}$			1002
$p\overline{p}\pi^+\pi^-$	$(\ 1.32\pm0.34)\times10^{-3}$			1410
$p\overline{p}\pi^0\pi^0$	$(\ 7.8\ \pm2.3\ )\times10^{-4}$			1414
$p\overline{p}K^+K^-$ (non-resonant)	$(\ 1.91\pm0.32)\times10^{-4}$			1013
$p\overline{p}K^0_SK^0_S$	$<\ 7.9$	$\times10^{-4}$	90%	1007
$p\overline{n}\pi^-$	$(\ 8.5\ \pm0.9\ )\times10^{-4}$			1463
$\overline{p}n\pi^+$	$(\ 8.9\ \pm0.8\ )\times10^{-4}$			1463
$p\overline{n}\pi^-\pi^0$	$(\ 2.17\pm0.18)\times10^{-3}$			1411
$\overline{p}n\pi^+\pi^0$	$(\ 2.11\pm0.18)\times10^{-3}$			1411
$\Lambda\overline{\Lambda}$	$(\ 1.83\pm0.16)\times10^{-4}$			1384
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(\ 1.25\pm0.15)\times10^{-3}$			1255
$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(\ 6.6\ \pm1.5\ )\times10^{-4}$			1255
$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$<\ 4$	$\times10^{-4}$	90%	1192
$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$<\ 6$	$\times10^{-4}$	90%	1192
$K^+\overline{p}\Lambda$ + c.c.	$(\ 7.8\ \pm0.5\ )\times10^{-4}$			1236
$nK^0_S\overline{\Lambda}$ + c.c.	$(\ 3.58\pm0.28)\times10^{-4}$			1233
$K^*(892)^+\overline{p}\Lambda$ + c.c.	$(\ 8.2\ \pm1.1\ )\times10^{-4}$			976
$K^+\overline{p}\Lambda(1520)$ + c.c.	$(\ 2.8\ \pm0.7\ )\times10^{-4}$			992
$\Lambda(1520)\overline{\Lambda}(1520)$	$(\ 4.6\ \pm1.5\ )\times10^{-4}$			924
$\Sigma^0\overline{\Sigma}^0$	$(\ 3.7\ \pm0.6\ )\times10^{-5}$			1319
$\Sigma^+\overline{p}K^0_S$ + c.c.	$(\ 8.2\ \pm0.9\ )\times10^{-5}$			1197
$\Sigma^0\overline{p}K^+$ + c.c.	$(\ 9.1\ \pm0.8\ )\times10^{-5}$			1197
$\Sigma^+\overline{\Sigma}^-$	$(\ 3.4\ \pm0.7\ )\times10^{-5}$			1322
$\Sigma^-\overline{\Sigma}^+$	$(\ 4.4\ \pm1.8\ )\times10^{-5}$			1314
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$<\ 1.6$	$\times10^{-4}$	90%	1118
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$<\ 8$	$\times10^{-5}$	90%	1118
$K^-\Lambda\overline{\Xi}^+$ + c.c.	$(\ 1.76\pm0.32)\times10^{-4}$			1004
$\Xi^0\overline{\Xi}^0$	$<\ 1.0$	$\times10^{-4}$	90%	1197
$\Xi^-\overline{\Xi}^+$	$(\ 1.42\pm0.32)\times10^{-4}$			1189
$J/\psi(1S)\pi^+\pi^-\pi^0$	$<\ 1.5$	%	90%	185
$\pi^0\eta_c$	$<\ 3.2$	$\times10^{-3}$	90%	511
$\eta_c(1S)\pi^+\pi^-$	$<\ 5.4$	$\times10^{-3}$	90%	459

Radiative decays

$\gamma J/\psi(1S)$	$(19.0\ \pm0.5\ )$ %			430
$\gamma\rho^0$	$<\ 1.9$	$\times10^{-5}$	90%	1694
$\gamma\omega$	$<\ 6$	$\times10^{-6}$	90%	1692
$\gamma\phi$	$<\ 7$	$\times10^{-6}$	90%	1632
$\gamma\gamma$	$(\ 2.85\pm0.10)\times10^{-4}$			1778

$e^+ e^- J/\psi(1S)$	$(2.15 \pm 0.14) \times 10^{-3}$	430
$\mu^+ \mu^- J/\psi(1S)$	$(2.02 \pm 0.33) \times 10^{-4}$	381

$\eta_c(2S)$

$I^G(J^{PC}) = 0^+(0^{-+})$

Quantum numbers are quark model predictions.

Mass $m = 3637.5 \pm 1.1$ MeV (S = 1.2)
Full width $\Gamma = 11.3^{+3.2}_{-2.9}$ MeV

$\eta_c(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
hadrons	not seen		–
$K\overline{K}\pi$	(1.9 ± 1.2) %		1729
$K\overline{K}\eta$	$(5 \pm 4) \times 10^{-3}$		1637
$2\pi^+ 2\pi^-$	not seen		1792
$\rho^0\rho^0$	not seen		1645
$3\pi^+ 3\pi^-$	not seen		1749
$K^+ K^- \pi^+ \pi^-$	not seen		1700
$K^{*0}\overline{K}^{*0}$	not seen		1585
$K^+ K^- \pi^+ \pi^- \pi^0$	(1.4 ± 1.0) %		1667
$K^+ K^- 2\pi^+ 2\pi^-$	not seen		1627
$K^0_S K^- 2\pi^+ \pi^-$ + c.c.	seen		1666
$2K^+ 2K^-$	not seen		1470
$\phi\phi$	not seen		1506
$p\overline{p}$	seen		1558
$p\overline{p}\pi^+\pi^-$	seen		1461
$\gamma\gamma$	$(1.9 \pm 1.3) \times 10^{-4}$		1819
$\gamma J/\psi(1S)$	< 1.4 %	90%	500
$\pi^+\pi^-\eta$	not seen		1766
$\pi^+\pi^-\eta'$	not seen		1680
$\pi^+\pi^-\eta_c(1S)$	< 25 %	90%	537

$\psi(2S)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 3686.10 \pm 0.06$ MeV (S = 5.9)
Full width $\Gamma = 294 \pm 8$ keV

$\psi(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	(97.85 ±0.13) %		–
virtual $\gamma \rightarrow$ hadrons	(1.73 ±0.14) %	S=1.5	–
ggg	(10.6 ±1.6) %		–
γgg	(1.03 ±0.29) %		–

light hadrons	(15.4 ±1.5) %		–
K^0_S anything	(16.0 ±1.1) %		–
$e^+ e^-$	(7.93 ±0.17) × 10^{-3}		1843
$\mu^+ \mu^-$	(8.0 ±0.6) × 10^{-3}		1840
$\tau^+ \tau^-$	(3.1 ±0.4) × 10^{-3}		489

Decays into $J/\psi(1S)$ and anything

$J/\psi(1S)$ anything	(61.4 ±0.6) %		–
$J/\psi(1S)$ neutrals	(25.38 ±0.32) %		–
$J/\psi(1S)\pi^+\pi^-$	(34.68 ±0.30) %		477
$J/\psi(1S)\pi^0\pi^0$	(18.24 ±0.31) %		481
$J/\psi(1S)\eta$	(3.37 ±0.05) %		199
$J/\psi(1S)\pi^0$	(1.268±0.032) × 10^{-3}		528

Hadronic decays

$\pi^+\pi^-$	(7.8 ±2.6) × 10^{-6}		1838
$\pi^+\pi^-\pi^0$	(2.01 ±0.17) × 10^{-4}	S=1.7	1830
$\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$	(3.2 ±1.2) × 10^{-5}	S=1.8	–
$\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0$	(1.9 $^{+1.2}_{-0.4}$) × 10^{-4}		–
$2(\pi^+\pi^-)$	(2.4 ±0.6) × 10^{-4}	S=2.2	1817
$\rho^0\pi^+\pi^-$	(2.2 ±0.6) × 10^{-4}	S=1.4	1750
$2(\pi^+\pi^-)\pi^0$	(2.9 ±1.0) × 10^{-3}	S=4.7	1799
$\rho a_2(1320)$	(2.6 ±0.9) × 10^{-4}		1500
$\pi^+\pi^-\pi^0\pi^0\pi^0$	(5.3 ±0.9) × 10^{-3}		1800
$\pi^+\pi^- 4\pi^0$	(1.4 ±1.0) × 10^{-3}		1778
$\rho^\pm\pi^\mp\pi^0\pi^0$	< 2.7 × 10^{-3}	CL=90%	1737
$3(\pi^+\pi^-)$	(3.5 ±2.0) × 10^{-4}	S=2.8	1774
$2(\pi^+\pi^-\pi^0)$	(4.8 ±1.5) × 10^{-3}		1776
$3(\pi^+\pi^-)\pi^0$	(3.5 ±1.6) × 10^{-3}		1746
$2(\pi^+\pi^-)3\pi^0$	(1.42 ±0.31) %		1748
$\eta\pi^+\pi^-$	< 1.6 × 10^{-4}	CL=90%	1791
$\eta\pi^+\pi^-\pi^0$	(9.5 ±1.7) × 10^{-4}		1778
$\eta 2(\pi^+\pi^-)$	(1.2 ±0.6) × 10^{-3}		1758
$\eta\pi^+\pi^-\pi^0\pi^0$	< 4 × 10^{-4}	CL=90%	1760
$\eta\pi^+\pi^- 3\pi^0$	< 2.1 × 10^{-3}	CL=90%	1736
$\eta 2(\pi^+\pi^-\pi^0)$	< 2.1 × 10^{-3}	CL=90%	1705
$\rho\eta$	(2.2 ±0.6) × 10^{-5}	S=1.1	1717
$\eta'\pi^+\pi^-\pi^0$	(4.5 ±2.1) × 10^{-4}		1692
$\eta'\rho$	(1.9 $^{+1.7}_{-1.2}$) × 10^{-5}		1625
$\omega\pi^0$	(2.1 ±0.6) × 10^{-5}		1757
$\omega\pi^+\pi^-$	(7.3 ±1.2) × 10^{-4}	S=2.1	1748
$\omega\pi^+\pi^- 2\pi^0$	(8.7 ±2.4) × 10^{-3}		1715
$b_1^\pm\pi^\mp$	(4.0 ±0.6) × 10^{-4}	S=1.1	1635
$\omega f_2(1270)$	(2.2 ±0.4) × 10^{-4}		1515

$\omega\pi^0\pi^0$	(1.11	± 0.35)	$\times 10^{-3}$		1749
$\omega 3\pi^0$	$<$ 8		$\times 10^{-4}$	CL=90%	1736
$b_1^0\pi^0$	(2.4	± 0.6)	$\times 10^{-4}$		–
$\omega\eta$	$<$ 1.1		$\times 10^{-5}$	CL=90%	1715
$\omega\eta'$	(3.2	$^{+2.5}_{-2.1}$)	$\times 10^{-5}$		1623
$\phi\pi^0$	$<$ 4		$\times 10^{-7}$	CL=90%	1699
$\phi\pi^+\pi^-$	(1.18	± 0.26)	$\times 10^{-4}$	S=1.5	1690
$\phi f_0(980) \rightarrow \pi^+\pi^-$	(7.5	± 3.3)	$\times 10^{-5}$	S=1.6	–
$\phi\eta$	(3.10	± 0.31)	$\times 10^{-5}$		1654
$\eta\phi(2170)$, $\phi(2170) \rightarrow \phi f_0(980)$, $f_0 \rightarrow \pi^+\pi^-$	$<$ 2.2		$\times 10^{-6}$	CL=90%	–
$\phi\eta'$	(1.54	± 0.20)	$\times 10^{-5}$		1555
$\phi f_1(1285)$	(3.0	± 1.3)	$\times 10^{-5}$		1436
$\phi\eta(1405) \rightarrow \phi\pi^+\pi^-\eta$	(8.5	± 1.7)	$\times 10^{-6}$		–
$\phi f_2'(1525)$	(4.4	± 1.6)	$\times 10^{-5}$		1325
K^+K^-	(7.5	± 0.5)	$\times 10^{-5}$		1776
$K^+K^-\pi^+$	(7.3	± 0.5)	$\times 10^{-4}$		1754
$K^+K^-\pi^0$	(4.07	± 0.31)	$\times 10^{-5}$		1754
$K_S^0K_S^0$	$<$ 4.6		$\times 10^{-6}$		1775
$K_S^0K_L^0$	(5.34	± 0.33)	$\times 10^{-5}$		1775
$K_S^0K_L^0\pi^0$	$<$ 3.0		$\times 10^{-4}$	CL=90%	1753
$K^+K^-\pi^0\pi^0$	(2.6	± 1.3)	$\times 10^{-4}$		1728
$K^+K^-\pi^+\pi^-\pi^0$	(1.26	± 0.09)	$\times 10^{-3}$		1694
$\omega f_0(1710) \rightarrow \omega K^+K^-$	(5.9	± 2.2)	$\times 10^{-5}$		–
$K^*(892)^0K^-\pi^+\pi^0$ + c.c.	(8.6	± 2.2)	$\times 10^{-4}$		–
$K^*(892)^+K^-\pi^+\pi^-$ + c.c.	(9.6	± 2.8)	$\times 10^{-4}$		–
$K^*(892)^+K^-\rho^0$ + c.c.	(7.3	± 2.6)	$\times 10^{-4}$		–
$K^*(892)^0K^-\rho^+$ + c.c.	(6.1	± 1.8)	$\times 10^{-4}$		–
$K_S^0K_S^0\pi^+\pi^-$	(2.2	± 0.4)	$\times 10^{-4}$		1724
$K_S^0K_L^0\pi^0\pi^0$	(1.3	± 0.6)	$\times 10^{-3}$		1726
$K_S^0K_L^0\eta$	(1.3	± 0.5)	$\times 10^{-3}$		1661
$K^+K^-\rho^0$	(2.2	± 0.4)	$\times 10^{-4}$		1616
$K^*(892)^0\overline{K}_2^*(1430)^0$	(1.9	± 0.5)	$\times 10^{-4}$		1417
$K^+K^-\pi^+\pi^-\eta$	(1.3	± 0.7)	$\times 10^{-3}$		1574
$K^+K^-2(\pi^+\pi^-)$	(1.9	± 0.9)	$\times 10^{-3}$		1654
$K^+K^-2(\pi^+\pi^-)\pi^0$	(1.00	± 0.31)	$\times 10^{-3}$		1611
$K^+K^*(892)^-$ + c.c.	(2.9	± 0.4)	$\times 10^{-5}$	S=1.2	1698
$2(K^+K^-)$	(6.3	± 1.3)	$\times 10^{-5}$		1499
$2(K^+K^-)\pi^0$	(1.10	± 0.28)	$\times 10^{-4}$		1440
$K^+K^-\phi$	(7.0	± 1.6)	$\times 10^{-5}$		1546
$K_1(1270)^\pm K^\mp$	(1.00	± 0.28)	$\times 10^{-3}$		1588
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(6.7	± 2.5)	$\times 10^{-4}$		1674
ηK^+K^-, no $\eta\phi$	(3.49	± 0.17)	$\times 10^{-5}$		1664

$X(1750)\eta \to\ K^+K^-\eta$	$(4.8 \pm 2.8) \times 10^{-6}$				–
$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$			CL=90%	1532
$K_2^*(1430)^\pm K^\mp$	$(7.1 \,^{+1.3}_{-0.9}) \times 10^{-5}$				–
$K^*(892)^0\overline{K}^0$ + c.c.	$(1.09 \pm 0.20) \times 10^{-4}$				1697
ωK^+K^-	$(1.62 \pm 0.11) \times 10^{-4}$			S=1.1	1614
$\omega K_S^0 K_S^0$	$(7.0 \pm 0.5) \times 10^{-5}$				1612
$\omega K^*(892)^+ K^-$ + c.c.	$(2.07 \pm 0.26) \times 10^{-4}$				1482
$\omega K_2^*(1430)^+ K^-$ + c.c.	$(6.1 \pm 1.2) \times 10^{-5}$				1252
$\omega \overline{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$				1481
$\omega \overline{K}_2^*(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$				1250
$\omega X(1440) \to\ \omega K_S^0 K^-\pi^+$ + c.c.	$(1.6 \pm 0.4) \times 10^{-5}$				–
$\omega X(1440) \to\ \omega K^+K^-\pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$				–
$\omega f_1(1285) \to\ \omega K_S^0 K^-\pi^+$ + c.c.	$(3.0 \pm 1.0) \times 10^{-6}$				–
$\omega f_1(1285) \to\ \omega K^+K^-\pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$				–
$p\overline{p}$	$(2.94 \pm 0.08) \times 10^{-4}$				1586
$n\overline{n}$	$(3.06 \pm 0.15) \times 10^{-4}$				1586
$p\overline{p}\pi^0$	$(1.53 \pm 0.07) \times 10^{-4}$				1543
$N(940)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(6.4 \,^{+1.8}_{-1.3}) \times 10^{-5}$				–
$N(1440)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(7.3 \,^{+1.7}_{-1.5}) \times 10^{-5}$			S=2.5	–
$N(1520)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(6.4 \,^{+2.3}_{-1.8}) \times 10^{-6}$				–
$N(1535)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(2.5 \pm 1.0) \times 10^{-5}$				–
$N(1650)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(3.8 \,^{+1.4}_{-1.7}) \times 10^{-5}$				–
$N(1720)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(1.79 \,^{+0.26}_{-0.70}) \times 10^{-5}$				–
$N(2300)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(2.6 \,^{+1.2}_{-0.7}) \times 10^{-5}$				–
$N(2570)\overline{p}$ + c.c. $\to\ p\overline{p}\pi^0$	$(2.13 \,^{+0.40}_{-0.31}) \times 10^{-5}$				–
$p\overline{p}\pi^+\pi^-$	$(6.0 \pm 0.4) \times 10^{-4}$				1491
$p\overline{p}K^+K^-$	$(2.7 \pm 0.7) \times 10^{-5}$				1118
$p\overline{p}\eta$	$(6.0 \pm 0.4) \times 10^{-5}$				1373
$N(1535)\overline{p}$ + c.c. $\to\ p\overline{p}\eta$	$(4.5 \,^{+0.7}_{-0.6}) \times 10^{-5}$				–
$p\overline{p}\pi^+\pi^-\pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$				1435
$p\overline{p}\rho^0$	$(5.0 \pm 2.2) \times 10^{-5}$				1252
$p\overline{p}\omega$	$(6.9 \pm 2.1) \times 10^{-5}$				1247
$p\overline{p}\eta'$	$(1.10 \pm 0.13) \times 10^{-5}$				1141
$p\overline{p}\phi$	$(6.1 \pm 0.6) \times 10^{-6}$				1109
$\phi X(1835) \to\ p\overline{p}\phi$	$< 1.82 \times 10^{-7}$			CL=90%	–
$p\overline{n}\pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$				–
$p\overline{n}\pi^-\pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$				1492

$\Lambda\overline{\Lambda}$		(3.81	±0.13)	$\times 10^{-4}$	S=1.4	1467
$\Lambda\overline{\Lambda}\pi^0$		< 2.9		$\times 10^{-6}$	CL=90%	1412
$\Lambda\overline{\Lambda}\eta$		(2.5	±0.4)	$\times 10^{-5}$		1197
$\Lambda\overline{\Lambda}\pi^+\pi^-$		(2.8	±0.6)	$\times 10^{-4}$		1346
$\Lambda\overline{p}K^+$		(1.00	±0.14)	$\times 10^{-4}$		1327
$\Lambda\overline{p}K^*(892)^+$ + c.c.		(6.3	±0.7)	$\times 10^{-5}$		1087
$\Lambda\overline{p}K^+\pi^+\pi^-$		(1.8	±0.4)	$\times 10^{-4}$		1167
$\overline{\Lambda}nK^0_S$ + c.c.		(8.1	±1.8)	$\times 10^{-5}$		1324
$\Delta^{++}\overline{\Delta}^{--}$		(1.28	±0.35)	$\times 10^{-4}$		1371
$\Lambda\overline{\Sigma}^+\pi^-$ + c.c.		(1.40	±0.13)	$\times 10^{-4}$		1376
$\Lambda\overline{\Sigma}^-\pi^+$ + c.c.		(1.54	±0.14)	$\times 10^{-4}$		1379
$\Lambda\overline{\Sigma}^0$ + c.c.		(1.6	±0.7)	$\times 10^{-6}$		1437
$\Sigma^0\overline{p}K^+$ + c.c.		(1.67	±0.18)	$\times 10^{-5}$		1291
$\Sigma^+\overline{\Sigma}^-$		(2.43	±0.10)	$\times 10^{-4}$	S=1.4	1408
$\Sigma^0\overline{\Sigma}^0$		(2.35	±0.09)	$\times 10^{-4}$	S=1.1	1405
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$		(8.5	±0.7)	$\times 10^{-5}$		1218
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$		(8.5	±0.8)	$\times 10^{-5}$		1218
$\Sigma(1385)^0\overline{\Sigma}(1385)^0$		(6.9	±0.7)	$\times 10^{-5}$		1218
$\Xi^-\overline{\Xi}^+$		(2.87	±0.11)	$\times 10^{-4}$	S=1.1	1284
$\Xi^0\overline{\Xi}^0$		(2.3	±0.4)	$\times 10^{-4}$	S=4.2	1291
$\Xi(1530)^0\overline{\Xi}(1530)^0$		(6.8	±0.4)	$\times 10^{-5}$		1025
$\Lambda\overline{\Xi}^+K^-$ + c.c.		(3.9	±0.4)	$\times 10^{-5}$		1114
$\Xi(1530)^-\overline{\Xi}(1530)^+$		(1.15	±0.07)	$\times 10^{-4}$		1025
$\Xi(1530)^-\overline{\Xi}^+$		(7.0	±1.2)	$\times 10^{-6}$		1165
$\Xi(1530)^0\overline{\Xi}^0$		(5.3	±0.5)	$\times 10^{-6}$		1169
$\Xi(1690)^-\overline{\Xi}^+ \to K^-\Lambda\overline{\Xi}^+$ + c.c.		(5.2	±1.6)	$\times 10^{-6}$		–
$\Xi(1820)^-\overline{\Xi}^+ \to K^-\Lambda\overline{\Xi}^+$ + c.c.		(1.20	±0.32)	$\times 10^{-5}$		–
$\Sigma^0\overline{\Xi}^+K^-$ + c.c.		(3.7	±0.4)	$\times 10^{-5}$		1060
$\Omega^-\overline{\Omega}^+$		(5.66	±0.30)	$\times 10^{-5}$	S=1.3	774
$\eta_c\pi^+\pi^-\pi^0$		< 1.0		$\times 10^{-3}$	CL=90%	512
$h_c(1P)\pi^0$		(8.6	±1.3)	$\times 10^{-4}$		85
$\Lambda_c^+\overline{p}e^+e^-$ + c.c.		< 1.7		$\times 10^{-6}$	CL=90%	830
$\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^-\overline{n}$ + c.c.	[*iiaa*]	< 8.8		$\times 10^{-6}$	CL=90%	–
$\Theta(1540)K^-\overline{n} \to K^0_S p K^-\overline{n}$	[*iiaa*]	< 1.0		$\times 10^{-5}$	CL=90%	–
$\Theta(1540)K^0_S\overline{p} \to K^0_S\overline{p}K^+n$	[*iiaa*]	< 7.0		$\times 10^{-6}$	CL=90%	–
$\overline{\Theta}(1540)K^+n \to K^0_S\overline{p}K^+n$	[*iiaa*]	< 2.6		$\times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540)K^0_S p \to K^0_S p K^-\overline{n}$	[*iiaa*]	< 6.0		$\times 10^{-6}$	CL=90%	–

Radiative decays

$\gamma\chi_{c0}(1P)$		(9.79	±0.20)	%		261
$\gamma\chi_{c1}(1P)$		(9.75	±0.24)	%		171

$\gamma\chi_{c2}(1P)$		(9.52	± 0.20) %			128
$\gamma\eta_c(1S)$		(3.4	± 0.5) $\times 10^{-3}$		S=1.3	635
$\gamma\eta_c(2S)$		(7	± 5) $\times 10^{-4}$			48
$\gamma\pi^0$		(1.04	± 0.22) $\times 10^{-6}$		S=1.4	1841
$\gamma 2(\pi^+\pi^-)$		(4.0	± 0.6) $\times 10^{-4}$			1817
$\gamma 3(\pi^+\pi^-)$		$<$ 1.7		$\times 10^{-4}$	CL=90%	1774
$\gamma\eta'(958)$		(1.24	± 0.04) $\times 10^{-4}$			1719
$\gamma f_2(1270)$		(2.73	$^{+0.29}_{-0.25}$) $\times 10^{-4}$		S=1.8	1622
$\gamma f_0(1370) \to \gamma K\overline{K}$		(3.1	± 1.7) $\times 10^{-5}$			1588
$\gamma f_0(1500)$		(9.3	± 1.9) $\times 10^{-5}$			1535
$\gamma f_2'(1525)$		(3.3	± 0.8) $\times 10^{-5}$			1531
$\gamma f_0(1710) \to \gamma\pi\pi$		(3.5	± 0.6) $\times 10^{-5}$			–
$\gamma f_0(1710) \to \gamma K\overline{K}$		(6.6	± 0.7) $\times 10^{-5}$			–
$\gamma f_0(2100) \to \gamma\pi\pi$		(4.8	± 1.0) $\times 10^{-6}$			1244
$\gamma f_0(2200) \to \gamma K\overline{K}$		(3.2	± 1.0) $\times 10^{-6}$			1193
$\gamma f_J(2220) \to \gamma\pi\pi$		$<$ 5.8		$\times 10^{-6}$	CL=90%	1168
$\gamma f_J(2220) \to \gamma K\overline{K}$		$<$ 9.5		$\times 10^{-6}$	CL=90%	1168
$\gamma\eta$		(9.2	± 1.8) $\times 10^{-7}$			1802
$\gamma\eta\pi^+\pi^-$		(8.7	± 2.1) $\times 10^{-4}$			1791
$\gamma\eta(1405) \to \gamma K\overline{K}\pi$		$<$ 9		$\times 10^{-5}$	CL=90%	1569
$\gamma\eta(1405) \to \gamma\eta\pi^+\pi^-$		(3.6	± 2.5) $\times 10^{-5}$			–
$\gamma\eta(1405) \to \gamma f_0(980)\pi^0 \to \gamma\pi^+\pi^-\pi^0$		$<$ 5.0		$\times 10^{-7}$	CL=90%	–
$\gamma\eta(1475) \to \gamma K\overline{K}\pi$		$<$ 1.4		$\times 10^{-4}$	CL=90%	–
$\gamma\eta(1475) \to \gamma\eta\pi^+\pi^-$		$<$ 8.8		$\times 10^{-5}$	CL=90%	–
$\gamma K^{*0}K^+\pi^-$ + c.c.		(3.7	± 0.9) $\times 10^{-4}$			1674
$\gamma K^{*0}\overline{K}^{*0}$		(2.4	± 0.7) $\times 10^{-4}$			1613
$\gamma K_S^0 K^+\pi^-$ + c.c.		(2.6	± 0.5) $\times 10^{-4}$			1753
$\gamma K^+K^-\pi^+\pi^-$		(1.9	± 0.5) $\times 10^{-4}$			1726
$\gamma K^+K^-2(\pi^+\pi^-)$		$<$ 2.2		$\times 10^{-4}$	CL=90%	1654
$\gamma 2(K^+K^-)$		$<$ 4		$\times 10^{-5}$	CL=90%	1499
$\gamma p\overline{p}$		(3.9	± 0.5) $\times 10^{-5}$		S=2.0	1586
$\gamma f_2(1950) \to \gamma p\overline{p}$		(1.20	± 0.22) $\times 10^{-5}$			–
$\gamma f_2(2150) \to \gamma p\overline{p}$		(7.2	± 1.8) $\times 10^{-6}$			–
$\gamma X(1835) \to \gamma p\overline{p}$		(4.6	$^{+1.8}_{-4.0}$) $\times 10^{-6}$			–
$\gamma X \to \gamma p\overline{p}$	[*ooaa*]	$<$ 2		$\times 10^{-6}$	CL=90%	–
$\gamma p\overline{p}\pi^+\pi^-$		(2.8	± 1.4) $\times 10^{-5}$			1491
$\gamma\gamma$		$<$ 1.5		$\times 10^{-4}$	CL=90%	1843
$\gamma\gamma J/\psi$		(3.1	$^{+1.0}_{-1.2}$) $\times 10^{-4}$			542
$e^+e^-\eta'$		(1.90	± 0.26) $\times 10^{-6}$			1719

$e^+ e^- \chi_{c0}(1P)$	(1.06 ±0.24) × 10^{-3}		261
$e^+ e^- \chi_{c1}(1P)$	(8.5 ±0.6) × 10^{-4}		171
$e^+ e^- \chi_{c2}(1P)$	(7.0 ±0.8) × 10^{-4}		128
Weak decays			
$D^0 e^+ e^-$ + c.c.	< 1.4 × 10^{-7}	CL=90%	1371
Other decays			
invisible	< 1.6 %	CL=90%	–

$\psi(3770)$ $I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 3773.7 \pm 0.4$ MeV (S = 1.4)
Full width $\Gamma = 27.2 \pm 1.0$ MeV

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D\overline{D}$	(93 $^{+8}_{-9}$) %	S=2.0	287
$D^0\overline{D}^0$	(52 $^{+4}_{-5}$) %	S=2.0	287
D^+D^-	(41 ±4) %	S=2.0	254
$J/\psi X$	(5.0 ±2.2) × 10^{-3}		–
$J/\psi\pi^+\pi^-$	(1.93±0.28) × 10^{-3}		561
$J/\psi\pi^0\pi^0$	(8.0 ±3.0) × 10^{-4}		565
$J/\psi\eta$	(9 ±4) × 10^{-4}		361
$J/\psi\pi^0$	< 2.8 × 10^{-4}	CL=90%	604
e^+e^-	(9.6 ±0.7) × 10^{-6}	S=1.3	1887
Decays to light hadrons			
$b_1(1235)\pi$	< 1.4 × 10^{-5}	CL=90%	1684
$\phi\eta'$	< 7 × 10^{-4}	CL=90%	1607
$\omega\eta'$	< 4 × 10^{-4}	CL=90%	1672
$\rho^0\eta'$	< 6 × 10^{-4}	CL=90%	1674
$\phi\eta$	(3.1 ±0.7) × 10^{-4}		1703
$\omega\eta$	< 1.4 × 10^{-5}	CL=90%	1762
$\rho^0\eta$	< 5 × 10^{-4}	CL=90%	1764
$\phi\pi^0$	< 3 × 10^{-5}	CL=90%	1746
$\omega\pi^0$	< 6 × 10^{-4}	CL=90%	1803
$\pi^+\pi^-\pi^0$	< 5 × 10^{-6}	CL=90%	1874
$\rho\pi$	< 5 × 10^{-6}	CL=90%	1805
$K^*(892)^+K^-$ + c.c.	< 1.4 × 10^{-5}	CL=90%	1745
$K^*(892)^0\overline{K}^0$ + c.c.	< 1.2 × 10^{-3}	CL=90%	1745
$K^0_S K^0_L$	< 1.2 × 10^{-5}	CL=90%	1820
$2(\pi^+\pi^-)$	< 1.12 × 10^{-3}	CL=90%	1861
$2(\pi^+\pi^-)\pi^0$	< 1.06 × 10^{-3}	CL=90%	1844

$2(\pi^+\pi^-\pi^0)$	$<$	5.85	%	CL=90%	1821
$\omega\pi^+\pi^-$	$<$	6.0	$\times 10^{-4}$	CL=90%	1794
$3(\pi^+\pi^-)$	$<$	9.1	$\times 10^{-3}$	CL=90%	1820
$3(\pi^+\pi^-)\pi^0$	$<$	1.37	%	CL=90%	1792
$3(\pi^+\pi^-)2\pi^0$	$<$	11.74	%	CL=90%	1760
$\eta\pi^+\pi^-$	$<$	1.24	$\times 10^{-3}$	CL=90%	1836
$\pi^+\pi^-2\pi^0$	$<$	8.9	$\times 10^{-3}$	CL=90%	1862
$\rho^0\pi^+\pi^-$	$<$	6.9	$\times 10^{-3}$	CL=90%	1796
$\eta 3\pi$	$<$	1.34	$\times 10^{-3}$	CL=90%	1824
$\eta 2(\pi^+\pi^-)$	$<$	2.43	%	CL=90%	1804
$\eta\rho^0\pi^+\pi^-$	$<$	1.45	%	CL=90%	1708
$\eta' 3\pi$	$<$	2.44	$\times 10^{-3}$	CL=90%	1741
$K^+K^-\pi^+\pi^-$	$<$	9.0	$\times 10^{-4}$	CL=90%	1773
$\phi\pi^+\pi^-$	$<$	4.1	$\times 10^{-4}$	CL=90%	1737
$K^+K^-2\pi^0$	$<$	4.2	$\times 10^{-3}$	CL=90%	1774
$4(\pi^+\pi^-)$	$<$	1.67	%	CL=90%	1757
$4(\pi^+\pi^-)\pi^0$	$<$	3.06	%	CL=90%	1720
$\phi f_0(980)$	$<$	4.5	$\times 10^{-4}$	CL=90%	1597
$K^+K^-\pi^+\pi^-\pi^0$	$<$	2.36	$\times 10^{-3}$	CL=90%	1741
$K^+K^-\rho^0\pi^0$	$<$	8	$\times 10^{-4}$	CL=90%	1624
$K^+K^-\rho^+\pi^-$	$<$	1.46	%	CL=90%	1623
ωK^+K^-	$<$	3.4	$\times 10^{-4}$	CL=90%	1664
$\phi\pi^+\pi^-\pi^0$	$<$	3.8	$\times 10^{-3}$	CL=90%	1723
$K^{*0}K^-\pi^+\pi^0 +$ c.c.	$<$	1.62	%	CL=90%	1694
$K^{*+}K^-\pi^+\pi^- +$ c.c.	$<$	3.23	%	CL=90%	1693
$K^+K^-\pi^+\pi^-2\pi^0$	$<$	2.67	%	CL=90%	1705
$K^+K^-2(\pi^+\pi^-)$	$<$	1.03	%	CL=90%	1702
$K^+K^-2(\pi^+\pi^-)\pi^0$	$<$	3.60	%	CL=90%	1661
ηK^+K^-	$<$	4.1	$\times 10^{-4}$	CL=90%	1712
$\eta K^+K^-\pi^+\pi^-$	$<$	1.24	%	CL=90%	1624
$\rho^0 K^+K^-$	$<$	5.0	$\times 10^{-3}$	CL=90%	1666
$2(K^+K^-)$	$<$	6.0	$\times 10^{-4}$	CL=90%	1552
ϕK^+K^-	$<$	7.5	$\times 10^{-4}$	CL=90%	1598
$2(K^+K^-)\pi^0$	$<$	2.9	$\times 10^{-4}$	CL=90%	1494
$2(K^+K^-)\pi^+\pi^-$	$<$	3.2	$\times 10^{-3}$	CL=90%	1426
$K^0_S K^-\pi^+$	$<$	3.2	$\times 10^{-3}$	CL=90%	1799
$K^0_S K^-\pi^+\pi^0$	$<$	1.33	%	CL=90%	1773
$K^0_S K^-\rho^+$	$<$	6.6	$\times 10^{-3}$	CL=90%	1665
$K^0_S K^-2\pi^+\pi^-$	$<$	8.7	$\times 10^{-3}$	CL=90%	1740
$K^0_S K^-\pi^+\rho^0$	$<$	1.6	%	CL=90%	1621
$K^0_S K^-\pi^+\eta$	$<$	1.3	%	CL=90%	1670
$K^0_S K^-2\pi^+\pi^-\pi^0$	$<$	4.18	%	CL=90%	1703
$K^0_S K^-2\pi^+\pi^-\eta$	$<$	4.8	%	CL=90%	1570

$K^0_S K^- \pi^+ 2(\pi^+\pi^-)$	$<$	1.22	%	CL=90%	1658
$K^0_S K^- \pi^+ 2\pi^0$	$<$	2.65	%	CL=90%	1742
$K^0_S K^- K^+ K^- \pi^+$	$<$	4.9	$\times 10^{-3}$	CL=90%	1491
$K^0_S K^- K^+ K^- \pi^+ \pi^0$	$<$	3.0	%	CL=90%	1427
$K^0_S K^- K^+ K^- \pi^+ \eta$	$<$	2.2	%	CL=90%	1214
$K^{*0} K^- \pi^+ +$ c.c.	$<$	9.7	$\times 10^{-3}$	CL=90%	1722
$p\overline{p}\pi^0$	$<$	4	$\times 10^{-5}$	CL=90%	1595
$p\overline{p}\pi^+\pi^-$	$<$	5.8	$\times 10^{-4}$	CL=90%	1544
$\Lambda\overline{\Lambda}$	$<$	1.2	$\times 10^{-4}$	CL=90%	1522
$p\overline{p}\pi^+\pi^-\pi^0$	$<$	1.85	$\times 10^{-3}$	CL=90%	1490
$\omega p\overline{p}$	$<$	2.9	$\times 10^{-4}$	CL=90%	1310
$\Lambda\overline{\Lambda}\pi^0$	$<$	7	$\times 10^{-5}$	CL=90%	1469
$p\overline{p}2(\pi^+\pi^-)$	$<$	2.6	$\times 10^{-3}$	CL=90%	1426
$\eta p\overline{p}$	$<$	5.4	$\times 10^{-4}$	CL=90%	1431
$\eta p\overline{p}\pi^+\pi^-$	$<$	3.3	$\times 10^{-3}$	CL=90%	1284
$\rho^0 p\overline{p}$	$<$	1.7	$\times 10^{-3}$	CL=90%	1314
$p\overline{p}K^+K^-$	$<$	3.2	$\times 10^{-4}$	CL=90%	1186
$\eta p\overline{p}K^+K^-$	$<$	6.9	$\times 10^{-3}$	CL=90%	737
$\pi^0 p\overline{p}K^+K^-$	$<$	1.2	$\times 10^{-3}$	CL=90%	1094
$\phi p\overline{p}$	$<$	1.3	$\times 10^{-4}$	CL=90%	1178
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$<$	2.5	$\times 10^{-4}$	CL=90%	1405
$\Lambda\overline{p}K^+$	$<$	2.8	$\times 10^{-4}$	CL=90%	1387
$\Lambda\overline{p}K^+\pi^+\pi^-$	$<$	6.3	$\times 10^{-4}$	CL=90%	1234
$\Lambda\overline{\Lambda}\eta$	$<$	1.9	$\times 10^{-4}$	CL=90%	1263
$\Sigma^+\overline{\Sigma}^-$	$<$	1.0	$\times 10^{-4}$	CL=90%	1465
$\Sigma^0\overline{\Sigma}^0$	$<$	4	$\times 10^{-5}$	CL=90%	1462
$\Xi^+\overline{\Xi}^-$	$<$	1.5	$\times 10^{-4}$	CL=90%	1347
$\Xi^0\overline{\Xi}^0$	$<$	1.4	$\times 10^{-4}$	CL=90%	1353

Radiative decays

$\gamma\chi_{c2}$	$<$	6.4	$\times 10^{-4}$	CL=90%	211
$\gamma\chi_{c1}$	(	2.49±0.23)	$\times 10^{-3}$		254
$\gamma\chi_{c0}$	(	6.9 ±0.6)	$\times 10^{-3}$		342
$\gamma\eta_c$	$<$	7	$\times 10^{-4}$	CL=90%	707
$\gamma\eta_c(2S)$	$<$	9	$\times 10^{-4}$	CL=90%	134
$\gamma\eta'$	$<$	1.8	$\times 10^{-4}$	CL=90%	1765
$\gamma\eta$	$<$	1.5	$\times 10^{-4}$	CL=90%	1847
$\gamma\pi^0$	$<$	2	$\times 10^{-4}$	CL=90%	1884

$\psi_2(3823)$

$I^G(J^{PC}) = 0^-(2^{--})$
I, J, P need confirmation.

was $\psi(3823)$, $X(3823)$

Mass $m = 3823.7 \pm 0.5$ MeV (S = 1.1)
Full width $\Gamma < 5.2$ MeV, CL = 90%

Branching fractions are given relative to the one **DEFINED AS 1**.

$\psi_2(3823)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi(1S)\pi^+\pi^-$	<0.06	90%	607
$J/\psi(1S)\pi^0\pi^0$	<0.11	90%	610
$J/\psi(1S)\pi^0$	<0.030	90%	646
$J/\psi(1S)\eta$	<0.14	90%	431
$\chi_{c0}\gamma$	<0.24	90%	387
$\chi_{c1}\gamma$	**DEFINED AS 1**		300
$\chi_{c2}\gamma$	$0.28\ ^{+0.14}_{-0.11}$		258

$\psi_3(3842)$

$I^G(J^{PC}) = 0^-(3^{--})$
J, P need confirmation.

Seen by a single experiment only.

Mass $m = 3842.71 \pm 0.20$ MeV
Full width $\Gamma = 2.8 \pm 0.6$ MeV

$\psi_3(3842)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
D^+D^-	seen	443
$D^0\overline{D}^0$	seen	463

$\chi_{c1}(3872)$

$I^G(J^{PC}) = 0^+(1^{++})$

also known as $X(3872)$

Mass $m = 3871.65 \pm 0.06$ MeV
$m_{\chi_{c1}(3872)} - m_{J/\psi} = 775 \pm 4$ MeV
Full width $\Gamma = 1.19 \pm 0.21$ MeV (S = 1.1)

$\chi_{c1}(3872)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
e^+e^-	$< 2.8 \times 10^{-6}$	90%	1936
$\pi^+\pi^- J/\psi(1S)$	(3.8± 1.2) %		650
$\pi^+\pi^-\pi^0 J/\psi(1S)$	not seen		588
$\omega\eta_c(1S)$	< 33 %	90%	368
$\omega J/\psi(1S)$	(4.3± 2.1) %		†
$\phi\phi$	not seen		1646
$D^0\overline{D}^0\pi^0$	$(49\ ^{+18}_{-20})$ %		116
$\overline{D}^{*0}D^0$	(37 ± 9) %		†

$\gamma\gamma$	< 11	%	90%	1936
$D^0\overline{D}^0$	< 29	%	90%	519
D^+D^-	< 19	%	90%	502
$\pi^0\chi_{c2}$	< 4	%	90%	273
$\pi^0\chi_{c1}$	(3.4 ± 1.6)	%		319
$\pi^0\chi_{c0}$	< 70	%	90%	–
$\pi^+\pi^-\eta_c(1S)$	< 14	%	90%	745
$\pi^+\pi^-\chi_{c1}$	< 7	$\times 10^{-3}$	90%	218
$p\overline{p}$	< 2.4	$\times 10^{-5}$	95%	1693
Radiative decays				
γD^+D^-	< 4	%	90%	502
$\gamma\overline{D}^0D^0$	< 6	%	90%	519
$\gamma J/\psi$	(8 ± 4)	$\times 10^{-3}$		697
$\gamma\chi_{c1}$	< 9	$\times 10^{-3}$	90%	344
$\gamma\chi_{c2}$	< 3.2	%	90%	303
$\gamma\psi(2S)$	(4.5 ± 2.0)	%		181
***C*-violating decays**				
$\eta J/\psi$	< 1.8	%	90%	491

$Z_c(3900)$

$I^G(J^{PC}) = 1^+(1^{+-})$

was $X(3900)$

Mass $m = 3887.1 \pm 2.6$ MeV (S = 1.7)
Full width $\Gamma = 28.4 \pm 2.6$ MeV

$Z_c(3900)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\pi$	seen	699
$h_c\pi^\pm$	not seen	318
$\eta_c\pi^+\pi^-$	not seen	759
$(D\overline{D}^*)^\pm$	seen	–
D^0D^{*-} + c.c.	seen	152
D^-D^{*0} + c.c.	seen	143
$\omega\pi^\pm$	not seen	1862
$J/\psi\eta$	not seen	510
D^+D^{*-} + c.c	seen	–
$D^0\overline{D}^{*0}$ + c.c	seen	–

$\chi_{c0}(3915)$

$I^G(J^{PC}) = 0^+(0^{++})$

was $X(3915)$

Mass $m = 3921.7 \pm 1.8$ MeV (S = 1.5)
Full width $\Gamma = 18.8 \pm 3.5$ MeV

$\chi_{c0}(3915)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega J/\psi$	seen	231
$\overline{D}^{*0} D^0$	not seen	312
$D^+ D^-$	seen	591
$\pi^+ \pi^- \eta_c(1S)$	not seen	788
$\eta_c \eta$	not seen	668
$\eta_c \pi^0$	not seen	817
$K \overline{K}$	not seen	1898
$\gamma\gamma$	seen	1961
$\pi^0 \chi_{c1}$	not seen	368

$\chi_{c2}(3930)$

$I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 3922.5 \pm 1.0$ MeV (S = 1.7)
Full width $\Gamma = 35.2 \pm 2.2$ MeV (S = 1.2)

$\chi_{c2}(3930)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma$	seen	1961
$D \overline{D}$	seen	607
$D^+ D^-$	seen	592
$D^0 \overline{D}^0$	seen	607
$\pi^+ \pi^- \eta_c(1S)$	not seen	788
$K \overline{K}$	not seen	1898

$X(4020)^{\pm}$

$I^G(J^{PC}) = 1^+(?^{?-})$

Mass $m = 4024.1 \pm 1.9$ MeV
Full width $\Gamma = 13 \pm 5$ MeV (S = 1.7)

$X(4020)^{\pm}$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$h_c(1P)\pi$	seen	450
$D^* \overline{D}^*$	seen	85
$D \overline{D}^*$ + c.c.	not seen	542
$\eta_c \pi^+ \pi^-$	not seen	872
$J/\psi(1S)\pi^{\pm}$	not seen	811

$\psi(4040)$ [ppaa]

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 4039 \pm 1$ MeV
Full width $\Gamma = 80 \pm 10$ MeV

Due to the complexity of the $c\overline{c}$ threshold region, in this listing, "seen" ("not seen") means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle's central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

$\psi(4040)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
e^+e^-	$(1.07\pm0.16)\times10^{-5}$		2019
$D\overline{D}$	seen		775
$D^0\overline{D}^0$	seen		775
D^+D^-	seen		763
$D^*\overline{D}$ + c.c.	seen		569
$D^*(2007)^0\overline{D}^0$ + c.c.	seen		575
$D^*(2010)^+D^-$ + c.c.	seen		561
$D^*\overline{D}^*$	seen		193
$D^*(2007)^0\overline{D}^*(2007)^0$	seen		226
$D^*(2010)^+D^*(2010)^-$	seen		193
$D^0D^-\pi^+$ +c.c. (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen		–
$D\overline{D}^*\pi$ (excl. $D^*\overline{D}^*$)	not seen		–
$D^0\overline{D}^{*-}\pi^+$ +c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	seen		–
$D_s^+D_s^-$	seen		452
$J/\psi\pi^+\pi^-$	$< 4 \times10^{-3}$	90%	794
$J/\psi\pi^0\pi^0$	$< 2 \times10^{-3}$	90%	797
$J/\psi\eta$	$(5.2\ \pm0.7\ )\times10^{-3}$		675
$J/\psi\pi^0$	$< 2.8 \times10^{-4}$	90%	823
$J/\psi\pi^+\pi^-\pi^0$	$< 2 \times10^{-3}$	90%	746
$\chi_{c1}\gamma$	$< 3.4 \times10^{-3}$	90%	494
$\chi_{c2}\gamma$	$< 5 \times10^{-3}$	90%	454
$\chi_{c1}\pi^+\pi^-\pi^0$	< 1.1 %	90%	306
$\chi_{c2}\pi^+\pi^-\pi^0$	< 3.2 %	90%	233
$h_c(1P)\pi^+\pi^-$	$< 3 \times10^{-3}$	90%	403
$\phi\pi^+\pi^-$	$< 3 \times10^{-3}$	90%	1880
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 2.9 \times10^{-4}$	90%	1578
$\Lambda\overline{\Lambda}\pi^0$	$< 9 \times10^{-5}$	90%	1636

$\Lambda\overline{\Lambda}\eta$	< 3.0	$\times 10^{-4}$	90%	1452
$\Lambda\overline{\Lambda}$	< 6	$\times 10^{-6}$	90%	1683
$\Sigma^+\overline{\Sigma}^-$	< 1.3	$\times 10^{-4}$	90%	1632
$\Sigma^0\overline{\Sigma}^0$	< 7	$\times 10^{-5}$	90%	1630
$\Xi^+\overline{\Xi}^-$	< 1.6	$\times 10^{-4}$	90%	1527
$\Xi^0\overline{\Xi}^0$	< 1.8	$\times 10^{-4}$	90%	1533
$\mu^+\mu^-$	(9 ± 6)	$\times 10^{-6}$		2017

$\chi_{c1}(4140)$

$I^G(J^{PC}) = 0^+(1^{++})$

was $X(4140)$

Mass $m = 4146.5 \pm 3.0$ MeV (S = 1.3)
Full width $\Gamma = 19^{+7}_{-5}$ MeV

$\chi_{c1}(4140)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\phi$	seen	216
$\gamma\gamma$	not seen	2073

$\psi(4160)$ [ppaa]

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 4191 \pm 5$ MeV
Full width $\Gamma = 70 \pm 10$ MeV

Due to the complexity of the $c\overline{c}$ threshold region, in this listing, "seen" ("not seen") means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle's central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

$\psi(4160)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
e^+e^-	$(6.9 \pm 3.3) \times 10^{-6}$		2096
$\mu^+\mu^-$	seen		2093
$D\overline{D}$	seen		956
$D^0\overline{D}^0$	seen		956
D^+D^-	seen		947
$D^*\overline{D}$ + c.c.	seen		798
$D^*(2007)^0\overline{D}^0$ + c.c.	seen		802
$D^*(2010)^+D^-$ + c.c.	seen		792
$D^*\overline{D}^*$	seen		592
$D^*(2007)^0\overline{D}^*(2007)^0$	seen		604
$D^*(2010)^+D^*(2010)^-$	seen		592

$D^0 D^- \pi^+$ +c.c. (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen			–
$D \overline{D}^* \pi$ +c.c. (excl. $D^* \overline{D}^*$)	seen			–
$D^0 D^{*-} \pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	not seen			–
$D_s^+ D_s^-$	not seen			719
$D_s^{*+} D_s^-$ +c.c.	seen			385
$J/\psi \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	919
$J/\psi \pi^0 \pi^0$	< 3	$\times 10^{-3}$	90%	922
$J/\psi K^+ K^-$	< 2	$\times 10^{-3}$	90%	407
$J/\psi \eta$	< 8	$\times 10^{-3}$	90%	822
$J/\psi \pi^0$	< 1	$\times 10^{-3}$	90%	944
$J/\psi \eta'$	< 5	$\times 10^{-3}$	90%	457
$J/\psi \pi^+ \pi^- \pi^0$	< 1	$\times 10^{-3}$	90%	879
$\psi(2S) \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	396
$\chi_{c1} \gamma$	< 5	$\times 10^{-3}$	90%	625
$\chi_{c2} \gamma$	< 1.3	%	90%	587
$\chi_{c1} \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	496
$\chi_{c2} \pi^+ \pi^- \pi^0$	< 8	$\times 10^{-3}$	90%	445
$h_c(1P) \pi^+ \pi^-$	< 5	$\times 10^{-3}$	90%	556
$h_c(1P) \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	560
$h_c(1P) \eta$	< 2	$\times 10^{-3}$	90%	348
$h_c(1P) \pi^0$	< 4	$\times 10^{-4}$	90%	600
$\phi \pi^+ \pi^-$	< 2	$\times 10^{-3}$	90%	1961
$\gamma \chi_{c1}(3872)$	< 1.8	$\times 10^{-3}$	90%	308
$\gamma \chi_{c0}(3915) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.36	$\times 10^{-4}$	90%	–
$\gamma X(3930) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.18	$\times 10^{-4}$	90%	–
$\gamma X(3940) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.47	$\times 10^{-4}$	90%	–
$\gamma \chi_{c0}(3915) \rightarrow \gamma \gamma J/\psi$	< 1.26	$\times 10^{-4}$	90%	–
$\gamma X(3930) \rightarrow \gamma \gamma J/\psi$	< 8.8	$\times 10^{-5}$	90%	–
$\gamma X(3940) \rightarrow \gamma \gamma J/\psi$	< 1.79	$\times 10^{-4}$	90%	–
$p \overline{p} p \overline{p}$	not seen			834
$\Lambda \overline{\Lambda}$	< 1.5	$\times 10^{-6}$	90%	1774

$\psi(4230)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4230)$; was $\psi(4260)$

Mass $m = 4222.7 \pm 2.6$ MeV (S = 1.7)
Full width $\Gamma = 49 \pm 8$ MeV (S = 3.5)

$\psi(4230)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\mu^+ \mu^-$	$(3.1 \pm 2.8) \times 10^{-5}$	2107

$\eta_c(1S)\pi^+\pi^-$	not seen	1027
$\eta_c(1S)\pi^+\pi^-\pi^0$	seen	992
$J/\psi\pi^+\pi^-$	seen	942
$J/\psi f_0(980),\ f_0(980) \to\ \pi^+\pi^-$	seen	–
$Z_c(3900)^\pm\pi^\mp,\ Z_c^\pm \to\ J/\psi\pi^\pm$	seen	–
$J/\psi\pi^0\pi^0$	seen	944
$J/\psi K^+K^-$	seen	460
$J/\psi K_S^0 K_S^0$	not seen	447
$J/\psi\eta$	seen	848
$J/\psi\pi^0$	not seen	966
$J/\psi\eta'$	seen	504
$J/\psi\pi^+\pi^-\pi^0$	not seen	904
$J/\psi\eta\pi^0$	not seen	770
$J/\psi\eta\eta$	not seen	211
$\psi(2S)\pi^+\pi^-$	seen	426
$\psi(2S)\eta$	not seen	†
$\chi_{c0}\omega$	seen	171
$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	527
$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	477
$h_c(1P)\pi^+\pi^-$	seen	583
$\phi\pi^+\pi^-$	not seen	1976
$\phi f_0(980) \to\ \phi\pi^+\pi^-$	not seen	–
$D\overline{D}$	not seen	987
$D^0\overline{D}^0$	not seen	987
D^+D^-	not seen	978
$D^*\overline{D}$ +c.c.	not seen	887
$D^*(2007)^0\overline{D}^0$ +c.c.	not seen	–
$D^*(2010)^+D^-$ +c.c.	not seen	–
$D^*(2007)^0\overline{D}^*(2007)^0$	not seen	652
$D^*(2010)^+D^*(2010)^-$	not seen	641
$D^0D^-\pi^+$ +c.c. (excl. $D^*(2007)^0\overline{D}^{*0}$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen	–
$D\overline{D}^*\pi$ +c.c. (excl. $D^*\overline{D}^*$)	not seen	723
$D^0D^{*-}\pi^+$ +c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	not seen	–
$D^0D^*(2010)^-\pi^+$ +c.c.	seen	716
$D_1(2420)\overline{D}$ + c.c.	not seen	†
$D^*\overline{D}^*\pi$	not seen	367
$D_s^+D_s^-$	not seen	760
$D_s^{*+}D_s^-$ +c.c.	not seen	615
$D_s^{*+}D_s^{*-}$	not seen	†
$p\overline{p}$	not seen	1890

$p\overline{p}\pi^0$	not seen	1854
$p\overline{p}\eta$	not seen	1712
$p\overline{p}\omega$	not seen	1610
$\Xi^-\overline{\Xi}^+$	not seen	1645
$\pi^+\pi^+\pi^-\pi^-$	not seen	2087
$\pi^+\pi^+\pi^-\pi^-\pi^0$	not seen	2071
$K^0_S K^\pm\pi^\mp$	not seen	2032
$K^0_S K^\pm\pi^\mp\pi^0$	not seen	2009
$K^0_S K^\pm\pi^\mp\eta$	not seen	1917
$K^+K^-\pi^0$	not seen	2033
$K^+K^-\pi^+\pi^-$	not seen	2008
$K^+K^-\pi^+\pi^-\pi^0$	not seen	1981
$K^+K^+K^-K^-$	not seen	1813
$K^+K^+K^-K^-\pi^0$	not seen	1762
$p\overline{p}\pi^+\pi^-$	not seen	1810
$p\overline{p}\pi^+\pi^-\pi^0$	not seen	1764
$p\overline{p}p\overline{p}$	not seen	864
$\Lambda\overline{\Lambda}$	not seen	1791

Radiative decays

$\eta_c(1S)\gamma$	possibly seen	1055
$\eta_c(1S)\pi^0\gamma$	not seen	1049
$\chi_{c1}\gamma$	not seen	650
$\chi_{c2}\gamma$	not seen	612
$\chi_{c1}(3872)\gamma$	seen	334

$\chi_{c1}(4274)$

$I^G(J^{PC}) = 0^+(1^{++})$

was $X(4274)$

Mass $m = 4286^{+8}_{-9}$ MeV (S = 1.7)
Full width $\Gamma = 51 \pm 7$ MeV

$\chi_{c1}(4274)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\phi$	seen	522

$\psi(4360)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4360)$; was $X(4360)$

$\psi(4360)$ MASS $= 4372 \pm 9$ MeV (S = 2.9)
$\psi(4360)$ WIDTH $= 115 \pm 13$ MeV (S = 2.2)

ψ(4360) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$h_c\pi^+\pi^-$	seen	721
$\psi(2S)\pi^+\pi^-$	seen	577
$\psi(3770)\pi^+\pi^-$	possibly seen	493
$\psi_2(3823)\pi^+\pi^-$	possibly seen	442
$J/\psi\eta$	seen	981
$D_1(2420)\overline{D}+$ c.c.	possibly seen	426
$p\overline{p}\eta$	not seen	1805
$p\overline{p}\omega$	not seen	1707

ψ(4415) [ppaa]

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 4421 \pm 4$ MeV
Full width $\Gamma = 62 \pm 20$ MeV

Due to the complexity of the $c\overline{c}$ threshold region, in this listing, "seen" ("not seen") means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle's central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

ψ(4415) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D\overline{D}$	seen		1187
$D^0\overline{D}^0$	seen		1187
D^+D^-	seen		1179
$D^*\overline{D}+$ c.c.	seen		1063
$D^*(2007)^0\overline{D}^0+$ c.c.	seen		1067
$D^*(2010)^+D^-+$ c.c.	seen		1059
$D^*\overline{D}^*$	seen		919
$D^*(2007)^0\overline{D}^*(2007)^0+$ c.c.	seen		927
$D^*(2010)^+D^*(2010)^-+$ c.c.	seen		919
$D^0D^-\pi^+$ (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.	< 2.3 %	90%	–
$D\overline{D}_2^*(2460) \to D^0D^-\pi^+$+c.c.	(10 $\pm$4) %		–
$D^0D^{*-}\pi^+$+c.c.	< 11 %	90%	926
$D_1(2420)\overline{D}+$ c.c.	possibly seen		537
$D_s^+D_s^-$	not seen		1006
$\omega\chi_{c2}$	possibly seen		330
$D_s^{*+}D_s^-$+c.c.	seen		–
$D_s^{*+}D_s^{*-}$	not seen		652
$\psi_2(3823)\pi^+\pi^-$	possibly seen		492

$\psi(3770)\pi^+\pi^-$	possibly seen			541
$J/\psi\eta$	$<$ 6	$\times 10^{-3}$	90%	1022
$\chi_{c1}\gamma$	$<$ 8	$\times 10^{-4}$	90%	817
$\chi_{c2}\gamma$	$<$ 4	$\times 10^{-3}$	90%	780
$\Lambda\overline{\Lambda}$	$<$ 3.1	$\times 10^{-6}$	90%	1908
e^+e^-	(9.4±3.2)	$\times 10^{-6}$		2210
$\mu^+\mu^-$	(2.0±1.0)	$\times 10^{-5}$		2208

$Z_c(4430)$

$I^G(J^{PC}) = 1^+(1^{+-})$
G, C need confirmation.

was $X(4430)^{\pm}$

Quantum numbers not established.

Mass $m = 4478^{+15}_{-18}$ MeV
Full width $\Gamma = 181 \pm 31$ MeV

$Z_c(4430)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\psi(2S)$	seen	711
$\pi^+ J/\psi$	seen	1162

$\psi(4660)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4660)$; was $X(4660)$

$\psi(4660)$ MASS = 4630 ± 6 MeV (S = 1.4)
$\psi(4660)$ WIDTH = 72^{+14}_{-12} MeV (S = 1.7)

$\psi(4660)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	not seen	2315
$\psi(2S)\pi^+\pi^-$	seen	809
$J/\psi\eta$	not seen	1192
$D^0D^{*-}\pi^+$	not seen	1153
$\chi_{c1}\gamma$	not seen	984
$\chi_{c2}\gamma$	not seen	949
$\Lambda_c^+\Lambda_c^-$	seen	363
$D_s^+ D_{s1}(2536)^-$	seen	534

$b\bar{b}$ MESONS (including possibly non-$q\bar{q}$ states)

$\eta_b(1S)$

$I^G(J^{PC}) = 0^+(0^{-+})$

Mass $m = 9398.7 \pm 2.0$ MeV (S = 1.5)
Full width $\Gamma = 10^{+5}_{-4}$ MeV

$\eta_b(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
hadrons	seen		–
$3h^+3h^-$	not seen		4672
$2h^+2h^-$	not seen		4689
$4h^+4h^-$	not seen		4648
$\gamma\gamma$	not seen		4699
$\mu^+\mu^-$	$<9\times10^{-3}$	90%	4698
$\tau^+\tau^-$	<8 %	90%	4350

$\Upsilon(1S)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 9460.30 \pm 0.26$ MeV (S = 3.3)
Full width $\Gamma = 54.02 \pm 1.25$ keV

$\Upsilon(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\tau^+\tau^-$	(2.60 ±0.10) %		4384
e^+e^-	(2.38 ±0.11) %		4730
$\mu^+\mu^-$	(2.48 ±0.05) %		4729
Hadronic decays			
ggg	(81.7 ±0.7) %		–
γgg	(2.2 ±0.6) %		–
$\eta'(958)$ anything	(2.94 ±0.24) %		–
$J/\psi(1S)$ anything	(5.4 ±0.4) $\times10^{-4}$	S=1.4	4223
$J/\psi(1S)\eta_c$	< 2.2 $\times10^{-6}$	CL=90%	3623
$J/\psi(1S)\chi_{c0}$	< 3.4 $\times10^{-6}$	CL=90%	3429
$J/\psi(1S)\chi_{c1}$	(3.9 ±1.2) $\times10^{-6}$		3382
$J/\psi(1S)\chi_{c2}$	< 1.4 $\times10^{-6}$	CL=90%	3359
$J/\psi(1S)\eta_c(2S)$	< 2.2 $\times10^{-6}$	CL=90%	3317
$J/\psi(1S)X(3940)$	< 5.4 $\times10^{-6}$	CL=90%	3148
$J/\psi(1S)X(4160)$	< 5.4 $\times10^{-6}$	CL=90%	3020

$X(4350)$ anything, $X \to J/\psi(1S)\phi$	$<$	8.1		$\times 10^{-6}$	CL=90%	–
$Z_c(3900)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	$<$	1.3		$\times 10^{-5}$	CL=90%	–
$Z_c(4200)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	$<$	6.0		$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	$<$	4.9		$\times 10^{-5}$	CL=90%	–
$X_{cs}^{\pm}$ anything, $X \to J/\psi K^{\pm}$	$<$	5.7		$\times 10^{-6}$	CL=90%	–
$\psi(4230)$ anything, $\psi \to J/\psi(1S)\pi^+\pi^-$	$<$	3.8		$\times 10^{-5}$	CL=90%	–
$\psi(4230)$ anything, $\psi \to J/\psi(1S)K^+K^-$	$<$	7.5		$\times 10^{-6}$	CL=90%	–
$\chi_{c1}(4140)$ anything, $\chi_{c1} \to J/\psi(1S)\phi$	$<$	5.2		$\times 10^{-6}$	CL=90%	–
χ_{c0} anything	$<$	4		$\times 10^{-3}$	CL=90%	–
χ_{c1} anything	(	1.90	± 0.35)	$\times 10^{-4}$		–
$\chi_{c1}(1P)X_{tetra}$	$<$	3.78		$\times 10^{-5}$	CL=90%	–
χ_{c2} anything	(	2.8	± 0.8)	$\times 10^{-4}$		–
$\psi(2S)$ anything	(	1.23	± 0.20)	$\times 10^{-4}$		–
$\psi(2S)\eta_c$	$<$	3.6		$\times 10^{-6}$	CL=90%	3345
$\psi(2S)\chi_{c0}$	$<$	6.5		$\times 10^{-6}$	CL=90%	3124
$\psi(2S)\chi_{c1}$	$<$	4.5		$\times 10^{-6}$	CL=90%	3070
$\psi(2S)\chi_{c2}$	$<$	2.1		$\times 10^{-6}$	CL=90%	3043
$\psi(2S)\eta_c(2S)$	$<$	3.2		$\times 10^{-6}$	CL=90%	2994
$\psi(2S)X(3940)$	$<$	2.9		$\times 10^{-6}$	CL=90%	2797
$\psi(2S)X(4160)$	$<$	2.9		$\times 10^{-6}$	CL=90%	2645
$\psi(4230)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	$<$	7.9		$\times 10^{-5}$	CL=90%	–
$\psi(4360)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	$<$	5.2		$\times 10^{-5}$	CL=90%	–
$\psi(4660)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	$<$	2.2		$\times 10^{-5}$	CL=90%	–
$X(4050)^{\pm}$ anything, $X \to \psi(2S)\pi^{\pm}$	$<$	8.8		$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^{\pm}$ anything, $Z_c \to \psi(2S)\pi^{\pm}$	$<$	6.7		$\times 10^{-5}$	CL=90%	–
$\chi_{c1}(3872)$ anything	$<$	2.5		$\times 10^{-4}$	CL=90%	–
$Z_c(4200)^+ Z_c(4200)^-$	$<$	2.23		$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^{\pm} Z_c(4200)^{\mp}$	$<$	8.1		$\times 10^{-6}$	CL=90%	–
$Z_c(3900)^+ Z_c(3900)^-$	$<$	1.8		$\times 10^{-6}$	CL=90%	–
$X(4050)^+ X(4050)^-$	$<$	1.58		$\times 10^{-5}$	CL=90%	–
$X(4250)^+ X(4250)^-$	$<$	2.66		$\times 10^{-5}$	CL=90%	–

$X(4050)^{\pm} X(4250)^{\mp}$	$<$	4.42	$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^{+} Z_c(4430)^{-}$	$<$	2.03	$\times 10^{-5}$	CL=90%	–
$X(4055)^{\pm} X(4055)^{\mp}$	$<$	2.33	$\times 10^{-5}$	CL=90%	–
$X(4055)^{\pm} Z_c(4430)^{\mp}$	$<$	4.55	$\times 10^{-5}$	CL=90%	–
$\rho\pi$	$<$	3.68	$\times 10^{-6}$	CL=90%	4697
$\omega\pi^0$	$<$	3.90	$\times 10^{-6}$	CL=90%	4697
$\pi^+\pi^-$	$<$	5	$\times 10^{-4}$	CL=90%	4728
K^+K^-	$<$	5	$\times 10^{-4}$	CL=90%	4704
$p\overline{p}$	$<$	5	$\times 10^{-4}$	CL=90%	4636
$\pi^+\pi^-\pi^0$	(	2.1 ±0.8)	$\times 10^{-6}$		4725
ϕK^+K^-	(	2.4 ±0.5)	$\times 10^{-6}$		4622
$\omega\pi^+\pi^-$	(	4.5 ±1.0)	$\times 10^{-6}$		4694
$K^*(892)^0 K^-\pi^+ +$ c.c.	(	4.4 ±0.8)	$\times 10^{-6}$		4667
$\phi f_2'(1525)$	$<$	1.63	$\times 10^{-6}$	CL=90%	4551
$\omega f_2(1270)$	$<$	1.79	$\times 10^{-6}$	CL=90%	4611
$\rho(770) a_2(1320)$	$<$	2.24	$\times 10^{-6}$	CL=90%	4605
$K^*(892)^0 \overline{K}_2^*(1430)^0 +$ c.c.	(	3.0 ±0.8)	$\times 10^{-6}$		4578
$K_1(1270)^{\pm} K^{\mp}$	$<$	2.41	$\times 10^{-6}$	CL=90%	4634
$K_1(1400)^{\pm} K^{\mp}$	(	1.0 ±0.4)	$\times 10^{-6}$		4613
$b_1(1235)^{\pm}\pi^{\mp}$	$<$	1.25	$\times 10^{-6}$	CL=90%	4649
$\pi^+\pi^-\pi^0\pi^0$	(	1.28 ±0.30)	$\times 10^{-5}$		4720
$K_S^0 K^+\pi^- +$ c.c.	(	1.6 ±0.4)	$\times 10^{-6}$		4696
$K^*(892)^0 \overline{K}^0 +$ c.c.	(	2.9 ±0.9)	$\times 10^{-6}$		4675
$K^*(892)^- K^+ +$ c.c.	$<$	1.11	$\times 10^{-6}$	CL=90%	4675
$f_1(1285)$ anything	(	4.6 ±3.1)	$\times 10^{-3}$		–
$D^*(2010)^{\pm}$ anything	(	2.52 ±0.20)	%		–
$f_1(1285) X_{tetra}$	$<$	6.24	$\times 10^{-5}$	CL=90%	–
^2H anything	(	2.85 ±0.25)	$\times 10^{-5}$		–
Sum of 100 exclusive modes	(	1.200±0.017)	%		–

Radiative decays

$\gamma\pi^+\pi^-$		(6.3 ±1.8)	$\times 10^{-5}$		4728
$\gamma\pi^0\pi^0$		(1.7 ±0.7)	$\times 10^{-5}$		4728
$\gamma\pi\pi$(S-wave)		(4.6 ±0.7)	$\times 10^{-5}$		4728
$\gamma\pi^0\eta$	$<$	2.4	$\times 10^{-6}$	CL=90%	4713
γK^+K^-	[*qqaa*]	(1.14 ±0.13)	$\times 10^{-5}$		4704
$\gamma p\overline{p}$	[*rraa*] $<$	6	$\times 10^{-6}$	CL=90%	4636
$\gamma 2h^+2h^-$		(7.0 ±1.5)	$\times 10^{-4}$		4720
$\gamma 3h^+3h^-$		(5.4 ±2.0)	$\times 10^{-4}$		4703
$\gamma 4h^+4h^-$		(7.4 ±3.5)	$\times 10^{-4}$		4679
$\gamma\pi^+\pi^- K^+K^-$		(2.9 ±0.9)	$\times 10^{-4}$		4686
$\gamma 2\pi^+2\pi^-$		(2.5 ±0.9)	$\times 10^{-4}$		4720
$\gamma 3\pi^+3\pi^-$		(2.5 ±1.2)	$\times 10^{-4}$		4703
$\gamma 2\pi^+2\pi^- K^+K^-$		(2.4 ±1.2)	$\times 10^{-4}$		4658

$\gamma\pi^+\pi^- p\overline{p}$			(1.5	$\pm$0.6	) $\times 10^{-4}$		4604
$\gamma 2\pi^+ 2\pi^- p\overline{p}$			(4	$\pm$6	) $\times 10^{-5}$		4563
$\gamma 2K^+ 2K^-$			(2.0	$\pm$2.0	) $\times 10^{-5}$		4601
$\gamma\eta'(958)$		<	1.9		$\times 10^{-6}$	CL=90%	4682
$\gamma\eta$		<	1.0		$\times 10^{-6}$	CL=90%	4714
$\gamma f_0(980)$		<	3		$\times 10^{-5}$	CL=90%	4678
$\gamma f_2'(1525)$			(2.9	$\pm$0.6	) $\times 10^{-5}$		4608
$\gamma f_2(1270)$			(1.01	$\pm$0.06	) $\times 10^{-4}$		4644
$\gamma\eta(1405)$		<	8.2		$\times 10^{-5}$	CL=90%	4625
$\gamma f_0(1500)$		<	1.5		$\times 10^{-5}$	CL=90%	4610
$\gamma f_0(1500) \to \gamma K^+ K^-$			(1.0	$\pm$0.4	) $\times 10^{-5}$		–
$\gamma f_0(1710)$		<	2.6		$\times 10^{-4}$	CL=90%	4577
$\gamma f_0(1710) \to \gamma K^+ K^-$			(1.01	$\pm$0.32	) $\times 10^{-5}$		–
$\gamma f_0(1710) \to \gamma\pi^+\pi^-$			(5.3	$\pm$2.0	) $\times 10^{-6}$		–
$\gamma f_0(1710) \to \gamma\pi^0\pi^0$		<	1.4		$\times 10^{-6}$	CL=90%	–
$\gamma f_0(1710) \to \gamma\eta\eta$		<	1.8		$\times 10^{-6}$	CL=90%	–
$\gamma f_4(2050)$		<	5.3		$\times 10^{-5}$	CL=90%	4515
$\gamma f_0(2200) \to \gamma K^+ K^-$		<	2		$\times 10^{-4}$	CL=90%	4475
$\gamma f_J(2220) \to \gamma K^+ K^-$		<	8		$\times 10^{-7}$	CL=90%	4469
$\gamma f_J(2220) \to \gamma\pi^+\pi^-$		<	6		$\times 10^{-7}$	CL=90%	–
$\gamma f_J(2220) \to \gamma p\overline{p}$		<	1.1		$\times 10^{-6}$	CL=90%	–
$\gamma\eta(2225) \to \gamma\phi\phi$		<	3		$\times 10^{-3}$	CL=90%	4469
$\gamma\eta_c(1S)$		<	2.9		$\times 10^{-5}$	CL=90%	4260
$\gamma\eta_c(2S)$		<	4		$\times 10^{-4}$	CL=90%	4031
$\gamma\chi_{c0}$		<	6.6		$\times 10^{-5}$	CL=90%	4114
$\gamma\chi_{c1}$			(4.7	$^{+2.4}_{-1.9}$	) $\times 10^{-5}$		4079
$\gamma\chi_{c2}$		<	7.6		$\times 10^{-6}$	CL=90%	4062
$\gamma\chi_{c1}(3872)$		<	4		$\times 10^{-5}$	CL=90%	3938
$\gamma\chi_{c1}(3872)$, $\chi_{c1} \to \pi^+\pi^-\pi^0 J/\psi$		<	2.8		$\times 10^{-6}$	CL=90%	–
$\gamma\chi_{c0}(3915) \to \omega J/\psi$		<	3.0		$\times 10^{-6}$	CL=90%	–
$\gamma\chi_{c1}(4140) \to \phi J/\psi$		<	2.2		$\times 10^{-6}$	CL=90%	–
γX	[*ssaa*]	<	4.5		$\times 10^{-6}$	CL=90%	–
$\gamma X\overline{X}(m_X < 3.1$ GeV)	[*ttaa*]	<	1		$\times 10^{-3}$	CL=90%	–
$\gamma X\overline{X}(m_X < 4.5$ GeV)	[*uuaa*]	<	2.4		$\times 10^{-4}$	CL=90%	–
$\gamma X \to \gamma +\geq 4$ prongs	[*vvaa*]	<	1.78		$\times 10^{-4}$	CL=95%	–
$\gamma a_1^0 \to \gamma\mu^+\mu^-$	[*xxaa*]	<	9		$\times 10^{-6}$	CL=90%	–
$\gamma a_1^0 \to \gamma\tau^+\tau^-$	[*qqaa*]	<	1.30		$\times 10^{-4}$	CL=90%	–
$\gamma a_1^0 \to \gamma g g$	[*yyaa*]	<	1		%	CL=90%	–
$\gamma a_1^0 \to \gamma s\overline{s}$	[*yyaa*]	<	1		$\times 10^{-3}$	CL=90%	–

Lepton Family number (*LF*) violating modes

$\mu^\pm\tau^\mp$	*LF*	<	6.0		$\times 10^{-6}$	CL=95%	4563

Other decays

invisible	$< 3.0 \times 10^{-4}$	CL=90%	–
hadrons	(97 ±5) %		–

$\chi_{b0}(1P)$ [zzaa]

$I^G(J^{PC}) = 0^+(0^{++})$
J needs confirmation.

Mass $m = 9859.44 \pm 0.42 \pm 0.31$ MeV

$\chi_{b0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\,\Upsilon(1S)$	(1.94±0.27) %		391
$D^0 X$	< 10.4 %	90%	–
$\pi^+\pi^- K^+ K^- \pi^0$	$< 1.6 \times 10^{-4}$	90%	4875
$2\pi^+\pi^- K^- K^0_S$	$< 5 \times 10^{-5}$	90%	4875
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$< 5 \times 10^{-4}$	90%	4846
$2\pi^+ 2\pi^- 2\pi^0$	$< 2.1 \times 10^{-4}$	90%	4905
$2\pi^+ 2\pi^- K^+ K^-$	(1.1 ±0.6) $\times 10^{-4}$		4861
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$< 2.7 \times 10^{-4}$	90%	4846
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$< 5 \times 10^{-4}$	90%	4828
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$< 1.6 \times 10^{-4}$	90%	4827
$3\pi^+ 3\pi^-$	$< 8 \times 10^{-5}$	90%	4904
$3\pi^+ 3\pi^- 2\pi^0$	$< 6 \times 10^{-4}$	90%	4881
$3\pi^+ 3\pi^- K^+ K^-$	(2.4 ±1.2) $\times 10^{-4}$		4827
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$< 1.0 \times 10^{-3}$	90%	4808
$4\pi^+ 4\pi^-$	$< 8 \times 10^{-5}$	90%	4880
$4\pi^+ 4\pi^- 2\pi^0$	$< 2.1 \times 10^{-3}$	90%	4850
$J/\psi\, J/\psi$	$< 7 \times 10^{-5}$	90%	3836
$J/\psi\,\psi(2S)$	$< 1.2 \times 10^{-4}$	90%	3571
$\psi(2S)\psi(2S)$	$< 3.1 \times 10^{-5}$	90%	3273
$J/\psi(1S)$ anything	$< 2.3 \times 10^{-3}$	90%	–

$\chi_{b1}(1P)$ [zzaa]

$I^G(J^{PC}) = 0^+(1^{++})$
J needs confirmation.

Mass $m = 9892.78 \pm 0.26 \pm 0.31$ MeV

$\chi_{b1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\,\Upsilon(1S)$	(35.2 ±2.0) %		423
$D^0 X$	(12.6 ±2.2) %		–
$\pi^+\pi^- K^+ K^- \pi^0$	(2.0 ±0.6) $\times 10^{-4}$		4892
$2\pi^+\pi^- K^- K^0_S$	(1.3 ±0.5) $\times 10^{-4}$		4892
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$< 6 \times 10^{-4}$	90%	4863
$2\pi^+ 2\pi^- 2\pi^0$	(8.0 ±2.5) $\times 10^{-4}$		4921

$2\pi^+2\pi^-K^+K^-$	(1.5 ±0.5)	$\times 10^{-4}$		4878
$2\pi^+2\pi^-K^+K^-\pi^0$	(3.5 ±1.2)	$\times 10^{-4}$		4863
$2\pi^+2\pi^-K^+K^-2\pi^0$	(8.6 ±3.2)	$\times 10^{-4}$		4845
$3\pi^+2\pi^-K^-K^0_S\pi^0$	(9.3 ±3.3)	$\times 10^{-4}$		4844
$3\pi^+3\pi^-$	(1.9 ±0.6)	$\times 10^{-4}$		4921
$3\pi^+3\pi^-2\pi^0$	(1.7 ±0.5)	$\times 10^{-3}$		4898
$3\pi^+3\pi^-K^+K^-$	(2.6 ±0.8)	$\times 10^{-4}$		4844
$3\pi^+3\pi^-K^+K^-\pi^0$	(7.5 ±2.6)	$\times 10^{-4}$		4825
$4\pi^+4\pi^-$	(2.6 ±0.9)	$\times 10^{-4}$		4897
$4\pi^+4\pi^-2\pi^0$	(1.4 ±0.6)	$\times 10^{-3}$		4867
ω anything	(4.9 ±1.4)	%		–
ωX_{tetra}	< 4.44	$\times 10^{-4}$	90%	–
$J/\psi J/\psi$	< 2.7	$\times 10^{-5}$	90%	3857
$J/\psi\psi(2S)$	< 1.7	$\times 10^{-5}$	90%	3594
$\psi(2S)\psi(2S)$	< 6	$\times 10^{-5}$	90%	3298
$J/\psi(1S)$ anything	< 1.1	$\times 10^{-3}$	90%	–
$J/\psi(1S)X_{tetra}$	< 2.27	$\times 10^{-4}$	90%	–

$h_b(1P)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Mass $m = 9899.3 \pm 0.8$ MeV

$h_b(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta_b(1S)\gamma$	(52^{+6}_{-5}) %	488

$\chi_{b2}(1P)$ [zzaa]

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

Mass $m = 9912.21 \pm 0.26 \pm 0.31$ MeV

$\chi_{b2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\,\Upsilon(1S)$	(18.0±1.0) %		442
D^0X	< 7.9 %	90%	–
$\pi^+\pi^-K^+K^-\pi^0$	(8 ±5) $\times 10^{-5}$		4902
$2\pi^+\pi^-K^-K^0_S$	< 1.0 $\times 10^{-4}$	90%	4901
$2\pi^+\pi^-K^-K^0_S2\pi^0$	(5.3±2.4) $\times 10^{-4}$		4873
$2\pi^+2\pi^-2\pi^0$	(3.5±1.4) $\times 10^{-4}$		4931
$2\pi^+2\pi^-K^+K^-$	(1.1±0.4) $\times 10^{-4}$		4888
$2\pi^+2\pi^-K^+K^-\pi^0$	(2.1±0.9) $\times 10^{-4}$		4872
$2\pi^+2\pi^-K^+K^-2\pi^0$	(3.9±1.8) $\times 10^{-4}$		4855
$3\pi^+2\pi^-K^-K^0_S\pi^0$	< 5 $\times 10^{-4}$	90%	4854

$3\pi^+3\pi^-$	$(\ 7.0\pm3.1)\times10^{-5}$		4931
$3\pi^+3\pi^-2\pi^0$	$(\ 1.0\pm0.4)\times10^{-3}$		4908
$3\pi^+3\pi^-K^+K^-$	$<\ 8\ \times10^{-5}$	90%	4854
$3\pi^+3\pi^-K^+K^-\pi^0$	$(\ 3.6\pm1.5)\times10^{-4}$		4835
$4\pi^+4\pi^-$	$(\ 8\ \pm4\ )\times10^{-5}$		4907
$4\pi^+4\pi^-2\pi^0$	$(\ 1.8\pm0.7)\times10^{-3}$		4877
$J/\psi\,J/\psi$	$<\ 4\ \times10^{-5}$	90%	3869
$J/\psi\,\psi(2S)$	$<\ 5\ \times10^{-5}$	90%	3608
$\psi(2S)\,\psi(2S)$	$<\ 1.6\ \times10^{-5}$	90%	3313
$J/\psi(1S)$ anything	$(\ 1.5\pm0.4)\times10^{-3}$		–

$\Upsilon(2S)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 10023.26 \pm 0.31$ MeV
$m_{\Upsilon(3S)} - m_{\Upsilon(2S)} = 331.50 \pm 0.13$ MeV
Full width $\Gamma = 31.98 \pm 2.63$ keV

$\Upsilon(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\Upsilon(1S)\pi^+\pi^-$	(17.85± 0.26) %		475
$\Upsilon(1S)\pi^0\pi^0$	(8.6 ± 0.4) %		480
$\tau^+\tau^-$	(2.00± 0.21) %		4686
$\mu^+\mu^-$	(1.93± 0.17) %	S=2.2	5011
e^+e^-	(1.91± 0.16) %		5012
$\Upsilon(1S)\pi^0$	$<\ 4\ \times10^{-5}$	CL=90%	531
$\Upsilon(1S)\eta$	$(\ 2.9\ \pm\ 0.4\ )\times10^{-4}$	S=2.0	126
$J/\psi(1S)$ anything	$<\ 6\ \times10^{-3}$	CL=90%	4533
$J/\psi(1S)\eta_c$	$<\ 5.4\ \times10^{-6}$	CL=90%	3984
$J/\psi(1S)\chi_{c0}$	$<\ 3.4\ \times10^{-6}$	CL=90%	3808
$J/\psi(1S)\chi_{c1}$	$<\ 1.2\ \times10^{-6}$	CL=90%	3765
$J/\psi(1S)\chi_{c2}$	$<\ 2.0\ \times10^{-6}$	CL=90%	3744
$J/\psi(1S)\eta_c(2S)$	$<\ 2.5\ \times10^{-6}$	CL=90%	3707
$J/\psi(1S)X(3940)$	$<\ 2.0\ \times10^{-6}$	CL=90%	3555
$J/\psi(1S)X(4160)$	$<\ 2.0\ \times10^{-6}$	CL=90%	3442
χ_{c1} anything	$(\ 2.2\ \pm\ 0.5\ )\times10^{-4}$		–
$\chi_{c1}(1P)^0X_{tetra}$	$<\ 3.67\ \times10^{-5}$	CL=90%	–
χ_{c2} anything	$(\ 2.3\ \pm\ 0.8\ )\times10^{-4}$		–
$\psi(2S)\eta_c$	$<\ 5.1\ \times10^{-6}$	CL=90%	3732
$\psi(2S)\chi_{c0}$	$<\ 4.7\ \times10^{-6}$	CL=90%	3536
$\psi(2S)\chi_{c1}$	$<\ 2.5\ \times10^{-6}$	CL=90%	3488
$\psi(2S)\chi_{c2}$	$<\ 1.9\ \times10^{-6}$	CL=90%	3464
$\psi(2S)\eta_c(2S)$	$<\ 3.3\ \times10^{-6}$	CL=90%	3422
$\psi(2S)X(3940)$	$<\ 3.9\ \times10^{-6}$	CL=90%	3250
$\psi(2S)X(4160)$	$<\ 3.9\ \times10^{-6}$	CL=90%	3120

$Z_c(3900)^+ Z_c(3900)^-$	< 1.0	$\times 10^{-6}$	CL=90%	–
$Z_c(4200)^+ Z_c(4200)^-$	< 1.67	$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^\pm Z_c(4200)^\mp$	< 7.3	$\times 10^{-6}$	CL=90%	–
$X(4050)^+ X(4050)^-$	< 1.35	$\times 10^{-5}$	CL=90%	–
$X(4250)^+ X(4250)^-$	< 2.67	$\times 10^{-5}$	CL=90%	–
$X(4050)^\pm X(4250)^\mp$	< 2.72	$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^+ Z_c(4430)^-$	< 2.03	$\times 10^{-5}$	CL=90%	–
$X(4055)^\pm X(4055)^\mp$	< 1.11	$\times 10^{-5}$	CL=90%	–
$X(4055)^\pm Z_c(4430)^\mp$	< 2.11	$\times 10^{-5}$	CL=90%	–
$\overline{^2H}$ anything	$(2.78^{+\ 0.30}_{-\ 0.26}) \times 10^{-5}$		S=1.2	–
hadrons	(94 $\pm$11) %			–
$g\,g\,g$	(58.8 $\pm$ 1.2) %			–
$\gamma\,g\,g$	(1.87$\pm$ 0.28) %			–
$\phi K^+ K^-$	(1.6 $\pm$ 0.4) $\times 10^{-6}$			4910
$\omega\pi^+\pi^-$	< 2.58	$\times 10^{-6}$	CL=90%	4977
$K^*(892)^0 K^-\pi^+ +$ c.c.	(2.3 $\pm$ 0.7) $\times 10^{-6}$			4952
$\phi f_2'(1525)$	< 1.33	$\times 10^{-6}$	CL=90%	4842
$\omega f_2(1270)$	< 5.7	$\times 10^{-7}$	CL=90%	4899
$\rho(770)\,a_2(1320)$	< 8.8	$\times 10^{-7}$	CL=90%	4894
$K^*(892)^0 \overline{K}_2^*(1430)^0 +$ c.c.	(1.5 $\pm$ 0.6) $\times 10^{-6}$			4869
$K_1(1270)^\pm K^\mp$	< 3.22	$\times 10^{-6}$	CL=90%	4921
$K_1(1400)^\pm K^\mp$	< 8.3	$\times 10^{-7}$	CL=90%	4901
$b_1(1235)^\pm \pi^\mp$	< 4.0	$\times 10^{-7}$	CL=90%	4935
$\rho\pi$	< 1.16	$\times 10^{-6}$	CL=90%	4981
$\pi^+\pi^-\pi^0$	< 8.0	$\times 10^{-7}$	CL=90%	5007
$\omega\pi^0$	< 1.63	$\times 10^{-6}$	CL=90%	4980
$\pi^+\pi^-\pi^0\pi^0$	(1.30$\pm$ 0.28) $\times 10^{-5}$			5002
$K_S^0 K^+\pi^- +$ c.c.	(1.14$\pm$ 0.33) $\times 10^{-6}$			4979
$K^*(892)^0 \overline{K}^0 +$ c.c.	< 4.22	$\times 10^{-6}$	CL=90%	4959
$K^*(892)^- K^+ +$ c.c.	< 1.45	$\times 10^{-6}$	CL=90%	4960
$f_1(1285)$ anything	(2.2 $\pm$ 1.6) $\times 10^{-3}$			–
$f_1(1285)\,X_{tetra}$	< 6.47	$\times 10^{-5}$	CL=90%	–
Sum of 100 exclusive modes	(2.90$\pm$ 0.30) $\times 10^{-3}$			–

Radiative decays

$\gamma\chi_{b1}(1P)$	(6.9 $\pm$ 0.4) %			130
$\gamma\chi_{b2}(1P)$	(7.15$\pm$ 0.35) %			110
$\gamma\chi_{b0}(1P)$	(3.8 $\pm$ 0.4) %			162
$\gamma f_0(1710)$	< 5.9	$\times 10^{-4}$	CL=90%	4867
$\gamma f_2'(1525)$	< 5.3	$\times 10^{-4}$	CL=90%	4897
$\gamma f_2(1270)$	< 2.41	$\times 10^{-4}$	CL=90%	4930
$\gamma\eta_c(1S)$	< 2.7	$\times 10^{-5}$	CL=90%	4567
$\gamma\chi_{c0}$	< 1.0	$\times 10^{-4}$	CL=90%	4430
$\gamma\chi_{c1}$	< 3.6	$\times 10^{-6}$	CL=90%	4397

$\gamma\chi_{c2}$		$<$ 1.5	$\times 10^{-5}$	CL=90%	4381
$\gamma\chi_{c1}(3872)$		$<$ 2.1	$\times 10^{-5}$	CL=90%	4264
$\gamma\chi_{c1}(3872)$, $\chi_{c1} \to \pi^+\pi^-\pi^0 J/\psi$		$<$ 2.4	$\times 10^{-6}$	CL=90%	–
$\gamma\chi_{c0}(3915) \to \omega J/\psi$		$<$ 2.8	$\times 10^{-6}$	CL=90%	–
$\gamma\chi_{c1}(4140) \to \phi J/\psi$		$<$ 1.2	$\times 10^{-6}$	CL=90%	–
$\gamma X(4350) \to \phi J/\psi$		$<$ 1.3	$\times 10^{-6}$	CL=90%	–
$\gamma\eta_b(1S)$		$(\ 5.5\ ^{+\ 1.1}_{-\ 0.9}\ )$	$\times 10^{-4}$	S=1.2	605
$\gamma\eta_b(1S) \to \gamma$Sum of 26 exclusive modes		$<$ 3.7	$\times 10^{-6}$	CL=90%	–
$\gamma X_{b\overline{b}} \to \gamma$Sum of 26 exclusive modes		$<$ 4.9	$\times 10^{-6}$	CL=90%	–
$\gamma X \to \gamma +\geq 4$ prongs	[*aabb*]	$<$ 1.95	$\times 10^{-4}$	CL=95%	–
$\gamma A^0 \to \gamma$hadrons		$<$ 8	$\times 10^{-5}$	CL=90%	–
$\gamma a_1^0 \to \gamma\mu^+\mu^-$		$<$ 8.3	$\times 10^{-6}$	CL=90%	–

Lepton Family number (*LF*) violating modes

$e^\pm\tau^\mp$	*LF*	$<$ 3.2	$\times 10^{-6}$	CL=90%	4854
$\mu^\pm\tau^\mp$	*LF*	$<$ 3.3	$\times 10^{-6}$	CL=90%	4854

$\Upsilon_2(1D)$

$I^G(J^{PC}) = 0^-(2^{--})$

was $\Upsilon(1D)$

Mass $m = 10163.7 \pm 1.4$ MeV (S = 1.7)

$\Upsilon_2(1D)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma\,\Upsilon(1S)$	seen	679
$\gamma\chi_{bJ}(1P)$	seen	300
$\eta\,\Upsilon(1S)$	not seen	426
$\pi^+\pi^-\,\Upsilon(1S)$	$(6.6\pm1.6)\times10^{-3}$	623

$\chi_{b0}(2P)$ [*zzaa*]

$I^G(J^{PC}) = 0^+(0^{++})$

J needs confirmation.

Mass $m = 10232.5 \pm 0.4 \pm 0.5$ MeV

$\chi_{b0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\,\Upsilon(2S)$	(1.38 ± 0.30) %		207
$\gamma\,\Upsilon(1S)$	$(3.8\ \pm1.7\ )\times10^{-3}$		743
D^0X	$<$ 8.2 %	90%	–
$\pi^+\pi^-K^+K^-\pi^0$	$<$ 3.4 $\times 10^{-5}$	90%	5064
$2\pi^+\pi^-K^-K^0_S$	$<$ 5 $\times 10^{-5}$	90%	5063

$2\pi^+\pi^-K^-K^0_S2\pi^0$	< 2.2	$\times 10^{-4}$	90%	5036
$2\pi^+2\pi^-2\pi^0$	< 2.4	$\times 10^{-4}$	90%	5092
$2\pi^+2\pi^-K^+K^-$	< 1.5	$\times 10^{-4}$	90%	5050
$2\pi^+2\pi^-K^+K^-\pi^0$	< 2.2	$\times 10^{-4}$	90%	5035
$2\pi^+2\pi^-K^+K^-2\pi^0$	< 1.1	$\times 10^{-3}$	90%	5019
$3\pi^+2\pi^-K^-K^0_S\pi^0$	< 7	$\times 10^{-4}$	90%	5018
$3\pi^+3\pi^-$	< 7	$\times 10^{-5}$	90%	5091
$3\pi^+3\pi^-2\pi^0$	< 1.2	$\times 10^{-3}$	90%	5070
$3\pi^+3\pi^-K^+K^-$	< 1.5	$\times 10^{-4}$	90%	5017
$3\pi^+3\pi^-K^+K^-\pi^0$	< 7	$\times 10^{-4}$	90%	4999
$4\pi^+4\pi^-$	< 1.7	$\times 10^{-4}$	90%	5069
$4\pi^+4\pi^-2\pi^0$	< 6	$\times 10^{-4}$	90%	5039

$\chi_{b1}(2P)$ [zzaa]

$I^G(J^{PC}) = 0^+(1^{++})$
J needs confirmation.

Mass $m = 10255.46 \pm 0.22 \pm 0.50$ MeV
$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)} = 23.5 \pm 1.0$ MeV

$\chi_{b1}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega\,\Upsilon(1S)$	$(1.63^{+0.40}_{-0.34})$ %	135
$\gamma\,\Upsilon(2S)$	(18.1 ±1.9) %	230
$\gamma\,\Upsilon(1S)$	(9.9 ±1.0) %	764
$\pi\pi\,\chi_{b1}(1P)$	(9.1 ±1.3) $\times 10^{-3}$	238
D^0X	(8.8 ±1.7) %	–
$\pi^+\pi^-K^+K^-\pi^0$	(3.1 ±1.0) $\times 10^{-4}$	5075
$2\pi^+\pi^-K^-K^0_S$	(1.1 ±0.5) $\times 10^{-4}$	5075
$2\pi^+\pi^-K^-K^0_S2\pi^0$	(7.7 ±3.2) $\times 10^{-4}$	5047
$2\pi^+2\pi^-2\pi^0$	(5.9 ±2.0) $\times 10^{-4}$	5104
$2\pi^+2\pi^-K^+K^-$	(10 ±4) $\times 10^{-5}$	5062
$2\pi^+2\pi^-K^+K^-\pi^0$	(5.5 ±1.8) $\times 10^{-4}$	5047
$2\pi^+2\pi^-K^+K^-2\pi^0$	(10 ±4) $\times 10^{-4}$	5030
$3\pi^+2\pi^-K^-K^0_S\pi^0$	(6.7 ±2.6) $\times 10^{-4}$	5029
$3\pi^+3\pi^-$	(1.2 ±0.4) $\times 10^{-4}$	5103
$3\pi^+3\pi^-2\pi^0$	(1.2 ±0.4) $\times 10^{-3}$	5081
$3\pi^+3\pi^-K^+K^-$	(2.0 ±0.8) $\times 10^{-4}$	5029
$3\pi^+3\pi^-K^+K^-\pi^0$	(6.1 ±2.2) $\times 10^{-4}$	5011
$4\pi^+4\pi^-$	(1.7 ±0.6) $\times 10^{-4}$	5080
$4\pi^+4\pi^-2\pi^0$	(1.9 ±0.7) $\times 10^{-3}$	5051

$h_b(2P)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Mass $m = 10259.8 \pm 1.2$ MeV

$h_b(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
hadrons	not seen	–
$\eta_b(1S)\gamma$	(22± 5) %	825
$\eta_b(2S)\gamma$	(48±13) %	257

$\chi_{b2}(2P)$ [zzaa]

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

Mass $m = 10268.65 \pm 0.22 \pm 0.50$ MeV
$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)} = 13.10 \pm 0.24$ MeV

$\chi_{b2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\omega\,\Upsilon(1S)$	$(1.10^{+0.34}_{-0.30})$ %		194
$\gamma\,\Upsilon(2S)$	(8.9 ±1.2) %		242
$\gamma\,\Upsilon(1S)$	(6.6 ±0.8) %		777
$\pi\pi\chi_{b2}(1P)$	(5.1 ±0.9) $\times 10^{-3}$		229
$D^0 X$	< 2.4 %	90%	–
$\pi^+\pi^- K^+ K^- \pi^0$	< 1.1 $\times 10^{-4}$	90%	5082
$2\pi^+\pi^- K^- K^0_S$	< 9 $\times 10^{-5}$	90%	5082
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	< 7 $\times 10^{-4}$	90%	5054
$2\pi^+ 2\pi^- 2\pi^0$	(3.9 ±1.6) $\times 10^{-4}$		5110
$2\pi^+ 2\pi^- K^+ K^-$	(9 ±4) $\times 10^{-5}$		5068
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	(2.4 ±1.1) $\times 10^{-4}$		5054
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	(4.7 ±2.3) $\times 10^{-4}$		5037
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	< 4 $\times 10^{-4}$	90%	5036
$3\pi^+ 3\pi^-$	(9 ±4) $\times 10^{-5}$		5110
$3\pi^+ 3\pi^- 2\pi^0$	(1.2 ±0.4) $\times 10^{-3}$		5088
$3\pi^+ 3\pi^- K^+ K^-$	(1.4 ±0.7) $\times 10^{-4}$		5036
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	(4.2 ±1.7) $\times 10^{-4}$		5017
$4\pi^+ 4\pi^-$	(9 ±5) $\times 10^{-5}$		5087
$4\pi^+ 4\pi^- 2\pi^0$	(1.3 ±0.5) $\times 10^{-3}$		5058

$\Upsilon(3S)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 10355.2 \pm 0.5$ MeV
$m_{\Upsilon(3S)} - m_{\Upsilon(2S)} = 331.50 \pm 0.13$ MeV
Full width $\Gamma = 20.32 \pm 1.85$ keV

$\Upsilon(3S)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\Upsilon(2S)$ anything		(10.6 ± 0.8) %		296
$\Upsilon(2S)\pi^+\pi^-$		(2.82± 0.18) %	S=1.6	177
$\Upsilon(2S)\pi^0\pi^0$		(1.85± 0.14) %		190
$\Upsilon(2S)\gamma\gamma$		(5.0 ± 0.7) %		327
$\Upsilon(2S)\pi^0$		$< 5.1 \times 10^{-4}$	CL=90%	298
$\Upsilon(1S)\pi^+\pi^-$		(4.37± 0.08) %		813
$\Upsilon(1S)\pi^0\pi^0$		(2.20± 0.13) %		816
$\Upsilon(1S)\eta$		$< 1 \times 10^{-4}$	CL=90%	677
$\Upsilon(1S)\pi^0$		$< 7 \times 10^{-5}$	CL=90%	846
$h_b(1P)\pi^0$		$< 1.2 \times 10^{-3}$	CL=90%	426
$h_b(1P)\pi^0 \to \gamma\eta_b(1S)\pi^0$		(4.3 ± 1.4) $\times 10^{-4}$		–
$h_b(1P)\pi^+\pi^-$		$< 1.2 \times 10^{-4}$	CL=90%	353
$\tau^+\tau^-$		(2.29± 0.30) %		4863
$\mu^+\mu^-$		(2.18± 0.21) %	S=2.1	5177
e^+e^-		(2.18± 0.20) %		5178
hadrons		(93 ±12) %		–
ggg		(35.7 ± 2.6) %		–
$\underline{\gamma g}g$		(9.7 ± 1.8) $\times 10^{-3}$		–
^2H anything		(2.33± 0.33) $\times 10^{-5}$		–
Radiative decays				
$\gamma\chi_{b2}(2P)$		(13.1 ± 1.6) %	S=3.4	86
$\gamma\chi_{b1}(2P)$		(12.6 ± 1.2) %	S=2.4	99
$\gamma\chi_{b0}(2P)$		(5.9 ± 0.6) %	S=1.4	122
$\gamma\chi_{b2}(1P)$		(10.0 ± 1.0) $\times 10^{-3}$	S=1.7	434
$\gamma\chi_{b1}(1P)$		(9 ± 5) $\times 10^{-4}$	S=1.8	452
$\gamma\chi_{b0}(1P)$		(2.7 ± 0.4) $\times 10^{-3}$		484
$\gamma\eta_b(2S)$		$< 6.2 \times 10^{-4}$	CL=90%	350
$\gamma\eta_b(1S)$		(5.1 ± 0.7) $\times 10^{-4}$		912
$\gamma A^0 \to \gamma$ hadrons		$< 8 \times 10^{-5}$	CL=90%	–
$\gamma X \to \gamma + \geq 4$ prongs	[*bbbb*]	$< 2.2 \times 10^{-4}$	CL=95%	–
$\gamma a_1^0 \to \gamma\mu^+\mu^-$		$< 5.5 \times 10^{-6}$	CL=90%	–
$\gamma a_1^0 \to \gamma\tau^+\tau^-$	[*ccbb*]	$< 1.6 \times 10^{-4}$	CL=90%	–
Lepton Family number (*LF*) violating modes				
$e^\pm\tau^\mp$	*LF*	$< 4.2 \times 10^{-6}$	CL=90%	5025
$\mu^\pm\tau^\mp$	*LF*	$< 3.1 \times 10^{-6}$	CL=90%	5025

$\chi_{b1}(3P)$ [*zzaa*]

$I^G(J^{PC}) = 0^+(1^{++})$

J needs confirmation.

Mass $m = 10513.4 \pm 0.7$ MeV

$\chi_{b1}(3P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\gamma$	seen	1000
$\Upsilon(2S)\gamma$	seen	479
$\Upsilon(3S)\gamma$	seen	157

$\chi_{b2}(3P)$ [zzaa]

$I^G(J^{PC}) = 0^+(2^{++})$

J needs confirmation.

Mass $m = 10524.0 \pm 0.8$ MeV

$\chi_{b2}(3P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(3S)\gamma$	seen	167

$\Upsilon(4S)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $\Upsilon(10580)$

Mass $m = 10579.4 \pm 1.2$ MeV

Full width $\Gamma = 20.5 \pm 2.5$ MeV

$\Upsilon(4S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\overline{B}$	> 96 %	95%	326
B^+B^-	(51.4 $\pm$0.6) %		331
D_s^+ anything + c.c.	(17.8 $\pm$2.6) %		–
$B^0\overline{B}^0$	(48.6 $\pm$0.6) %		326
$J/\psi K_S^0 + (J/\psi,\ \eta_c)K_S^0$	$< 4 \times 10^{-7}$	90%	–
non-$B\overline{B}$	< 4 %	95%	–
e^+e^-	(1.57$\pm$0.08) $\times 10^{-5}$		5290
$\rho^+\rho^-$	$< 5.7 \times 10^{-6}$	90%	5233
$K^*(892)^0\overline{K}^0$	$< 2.0 \times 10^{-6}$	90%	5240
$J/\psi(1S)$ anything	$< 1.9 \times 10^{-4}$	95%	–
D^{*+} anything + c.c.	< 7.4 %	90%	5099
ϕ anything	(7.1 $\pm$0.6) %		5240
$\phi\eta$	$< 1.8 \times 10^{-6}$	90%	5226
$\phi\eta'$	$< 4.3 \times 10^{-6}$	90%	5196
$\rho\eta$	$< 1.3 \times 10^{-6}$	90%	5247
$\rho\eta'$	$< 2.5 \times 10^{-6}$	90%	5217
$\Upsilon(1S)$ anything	$< 4 \times 10^{-3}$	90%	1053
$\Upsilon(1S)\pi^+\pi^-$	(8.2 $\pm$0.4) $\times 10^{-5}$		1026

$\Upsilon(1S)\eta$	$(\ 1.81\pm0.18)\times10^{-4}$			924
$\Upsilon(1S)\eta'$	$(\ 3.4\ \pm0.9\ )\times10^{-5}$			–
$\Upsilon(2S)\pi^+\pi^-$	$(\ 8.2\ \pm0.8\ )\times10^{-5}$			468
$h_b(1P)\pi^+\pi^-$	not seen			600
$h_b(1P)\eta$	$(\ 2.18\pm0.21)\times10^{-3}$			390
$\eta_b(1S)\omega$	$<\ 1.8$	$\times10^{-4}$	90%	–
^2H anything	$<\ 1.3$	$\times10^{-5}$	90%	–

Double Radiative Decays

$\gamma\gamma\,\Upsilon(\mathrm{D}) \rightarrow\ \gamma\gamma\eta\,\Upsilon(1S)$	$<\ 2.3$	$\times10^{-5}$	90%	–

$Z_b(10610)$

$I^G(J^{PC}) = 1^+(1^{+-})$

was $X(10610)$

Mass $m = 10607.2 \pm 2.0$ MeV
Full width $\Gamma = 18.4 \pm 2.4$ MeV

$Z_b(10610)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\pi^+$	$(\ 5.4^{+1.9}_{-1.5})\times10^{-3}$	1077
$\Upsilon(1S)\pi^0$	not seen	1077
$\Upsilon(2S)\pi^+$	$(\ 3.6^{+1.1}_{-0.8})$ %	551
$\Upsilon(2S)\pi^0$	seen	552
$\Upsilon(3S)\pi^+$	$(\ 2.1^{+0.8}_{-0.6})$ %	207
$\Upsilon(3S)\pi^0$	seen	210
$h_b(1P)\pi^+$	$(\ 3.5^{+1.2}_{-0.9})$ %	671
$h_b(2P)\pi^+$	$(\ 4.7^{+1.7}_{-1.3})$ %	313
$B^+\overline{B}^0$	not seen	505
$B^+\overline{B}^{*0}\ +\ B^{*+}\overline{B}^0$	$(85.6^{+2.1}_{-2.9})$ %	–

$Z_b(10650)$

$I^G(J^{PC}) = 1^+(1^{+-})$
I, G, C need confirmation.

was $X(10650)^\pm$

Mass $m = 10652.2 \pm 1.5$ MeV
Full width $\Gamma = 11.5 \pm 2.2$ MeV

$Z_b(10650)^-$ decay modes are charge conjugates of the modes below.

$Z_b(10650)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\pi^+$	$(\ 1.7^{+0.8}_{-0.6}) \times 10^{-3}$	1117
$\Upsilon(2S)\pi^+$	$(\ 1.4^{+0.6}_{-0.4})$ %	595
$\Upsilon(3S)\pi^+$	$(\ 1.6^{+0.7}_{-0.5})$ %	259
$h_b(1P)\pi^+$	$(\ 8.4^{+2.9}_{-2.4})$ %	714
$h_b(2P)\pi^+$	(15 ± 4) %	360
$B^+\overline{B}^0$	not seen	703
$B^+\overline{B}^{*0}$ + $B^{*+}\overline{B}^0$	not seen	–
$B^{*+}\overline{B}^{*0}$	$(74\ ^{+4}_{-6}\ )$ %	122

$\Upsilon(10860)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 10885.2^{+2.6}_{-1.6}$ MeV
Full width $\Gamma = 37 \pm 4$ MeV

$\Upsilon(10860)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\overline{B}X$	$(\ 76.2\ ^{+2.7}_{-4.0}\ )$ %		–
$B\overline{B}$	(5.5 ± 1.0) %		1322
$B\overline{B}^*$ + c.c.	(13.7 ± 1.6) %		–
$B^*\overline{B}^*$	(38.1 ± 3.4) %		1127
$B\overline{B}^{(*)}\pi$	$<$ 19.7 %	90%	1015
$B\overline{B}\pi$	(0.0 ± 1.2) %		1015
$B^*\overline{B}\pi$ + $B\overline{B}^*\pi$	(7.3 ± 2.3) %		–
$B^*\overline{B}^*\pi$	(1.0 ± 1.4) %		739
$B\overline{B}\pi\pi$	$<$ 8.9 %	90%	551
$B_s^{(*)}\overline{B}_s^{(*)}$	(20.1 ± 3.1) %		905
$B_s\overline{B}_s$	(5 ± 5) $\times 10^{-3}$		905
$B_s\overline{B}_s^*$ + c.c.	(1.35$\pm$0.32) %		–
$B_s^*\overline{B}_s^*$	(17.6 ± 2.7) %		543
no open-bottom	$(\ 3.8\ ^{+5.0}_{-0.5}\ )$ %		–
e^+e^-	(8.3 ± 2.1) $\times 10^{-6}$		5443
$K^*(892)^0\overline{K}^0$	$<$ 1.0 $\times 10^{-5}$	90%	5395
$\Upsilon(1S)\pi^+\pi^-$	(5.3 ± 0.6) $\times 10^{-3}$		1306
$\Upsilon(1S)\eta$	(8.5 ± 1.7) $\times 10^{-4}$		1229
$\Upsilon(1S)\eta'$	$<$ 6.9 $\times 10^{-5}$	90%	985

$\Upsilon(2S)\pi^+\pi^-$	(7.8 $\pm$1.3) $\times 10^{-3}$			783
$\Upsilon(2S)\eta$	(4.1 $\pm$0.6) $\times 10^{-3}$			639
$\Upsilon(3S)\pi^+\pi^-$	(4.8 $^{+1.9}_{-1.7}$) $\times 10^{-3}$			440
$\Upsilon(1S)K^+K^-$	(6.1 $\pm$1.8) $\times 10^{-4}$			959
$\eta\,\Upsilon_J(1D)$	(4.8 $\pm$1.1) $\times 10^{-3}$			–
$h_b(1P)\pi^+\pi^-$	(3.5 $^{+1.0}_{-1.3}$) $\times 10^{-3}$			903
$h_b(2P)\pi^+\pi^-$	(5.7 $^{+1.7}_{-2.1}$) $\times 10^{-3}$			544
$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	(2.5 $\pm$2.3) $\times 10^{-3}$			894
$\chi_{b0}(1P)\pi^+\pi^-\pi^0$	$<$ 6.3	$\times 10^{-3}$	90%	894
$\chi_{b0}(1P)\omega$	$<$ 3.9	$\times 10^{-3}$	90%	631
$\chi_{b0}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$<$ 4.8	$\times 10^{-3}$	90%	–
$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	(1.85$\pm$0.33) $\times 10^{-3}$			861
$\chi_{b1}(1P)\omega$	(1.57$\pm$0.30) $\times 10^{-3}$			582
$\chi_{b1}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	(5.2 $\pm$1.9) $\times 10^{-4}$			–
$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	(1.17$\pm$0.30) $\times 10^{-3}$			841
$\chi_{b2}(1P)\omega$	(6.0 $\pm$2.7) $\times 10^{-4}$			552
$\chi_{b2}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	(6 $\pm$4) $\times 10^{-4}$			–
$\gamma X_b \rightarrow\ \gamma\,\Upsilon(1S)\omega$	$<$ 3.8	$\times 10^{-5}$	90%	–
$\eta_b(1S)\omega$	$<$ 1.3	$\times 10^{-3}$	90%	1177
$\eta_b(2S)\omega$	$<$ 5.6	$\times 10^{-3}$	90%	399

Inclusive Decays.

These decay modes are submodes of one or more of the decay modes above.

ϕ anything	(13.8 $^{+2.4}_{-1.7}$) %	–
D^0 anything + c.c.	(108 $\pm$8) %	–
D_s anything + c.c.	(46 $\pm$6) %	–
J/ψ anything	(2.06$\pm$0.21) %	–
B^0 anything + c.c.	(77 $\pm$8) %	–
B^+ anything + c.c.	(72 $\pm$6) %	–

$\Upsilon(11020)$

$I^G(J^{PC}) = 0^-(1^{--})$

Mass $m = 11000 \pm 4$ MeV
Full width $\Gamma = 24^{+8}_{-6}$ MeV

$\Upsilon(11020)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	$(5.4^{+1.9}_{-2.1}) \times 10^{-6}$	5500
$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	(9 $^{+9}_{-8}$) $\times 10^{-3}$	1007

$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	seen	975
$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	seen	956

NOTES

[a] See the review on "Form Factors for Radiative Pion and Kaon Decays" for definitions and details.

[b] Measurements of $\Gamma(e^+\nu_e)/\Gamma(\mu^+\nu_\mu)$ always include decays with γ's, and measurements of $\Gamma(e^+\nu_e\gamma)$ and $\Gamma(\mu^+\nu_\mu\gamma)$ never include low-energy γ's. Therefore, since no clean separation is possible, we consider the modes with γ's to be subreactions of the modes without them, and let $[\Gamma(e^+\nu_e) + \Gamma(\mu^+\nu_\mu)]/\Gamma_{\text{total}} = 100\%$.

[c] See the $\pi^\pm$ Particle Listings for the energy limits used in this measurement; low-energy γ's are not included.

[d] Derived from an analysis of neutrino-oscillation experiments.

[e] Astrophysical and cosmological arguments give limits of order 10^{-13}, but they are model dependent and for the summary value we use the best laboratory limit, which includes any final state of invisible particles.

[f] Forbidden by angular momentum conservation.

[g] C parity forbids this to occur as a single-photon process.

[h] The $\omega\rho$ interference is then due to $\omega\rho$ mixing only, and is expected to be small. If $e\mu$ universality holds, $\Gamma(\rho^0 \to \mu^+\mu^-) = \Gamma(\rho^0 \to e^+e^-) \times 0.99785$.

[i] Our estimate. See the Particle Listings for details.

[j] See the "Note on $a_1(1260)$" in the $a_1(1260)$ Particle Listings in PDG 06, Journal of Physics **G33** 1 (2006).

[k] See also the $\omega(1650)$.

[l] See also the $\omega(1420)$.

[n] See the note in the $K^\pm$ Particle Listings.

[o] Neglecting photon channels. See, *e.g.*, A. Pais and S.B. Treiman, Phys. Rev. **D12**, 2744 (1975).

[p] The definition of the slope parameters of the $K \to 3\pi$ Dalitz plot is as follows (see also "Note on Dalitz Plot Parameters for $K \to 3\pi$ Decays" in the $K^\pm$ Particle Listings):

$$|M|^2 = 1 + g(s_3 - s_0)/m^2_{\pi^+} + \cdots .$$

[q] For more details and definitions of parameters see the Particle Listings.

[r] See the $K^\pm$ Particle Listings for the energy limits used in this measurement.

[*s*] Most of this radiative mode, the low-momentum γ part, is also included in the parent mode listed without γ's.

[*t*] Structure-dependent part.

[*u*] Direct-emission branching fraction.

[*v*] Violates angular-momentum conservation.

[*x*] Derived from measured values of ϕ_{+-}, ϕ_{00}, $|\eta|$, $|m_{K^0_L} - m_{K^0_S}|$, and $\tau_{K^0_S}$, as described in the introduction to "Tests of Conservation Laws."

[*y*] The *CP*-violation parameters are defined as follows (see also "Note on *CP* Violation in $K_S \to 3\pi$" and "Note on *CP* Violation in K^0_L Decay" in the Particle Listings):

$$\eta_{+-} = |\eta_{+-}|e^{i\phi_{+-}} = \frac{A(K^0_L \to \pi^+\pi^-)}{A(K^0_S \to \pi^+\pi^-)} = \epsilon + \epsilon'$$

$$\eta_{00} = |\eta_{00}|e^{i\phi_{00}} = \frac{A(K^0_L \to \pi^0\pi^0)}{A(K^0_S \to \pi^0\pi^0)} = \epsilon - 2\epsilon'$$

$$\delta = \frac{\Gamma(K^0_L \to \pi^-\ell^+\nu) - \Gamma(K^0_L \to \pi^+\ell^-\nu)}{\Gamma(K^0_L \to \pi^-\ell^+\nu) + \Gamma(K^0_L \to \pi^+\ell^-\nu)} ,$$

$$\mathrm{Im}(\eta_{+-0})^2 = \frac{\Gamma(K^0_S \to \pi^+\pi^-\pi^0)^{CP \text{ viol.}}}{\Gamma(K^0_L \to \pi^+\pi^-\pi^0)} ,$$

$$\mathrm{Im}(\eta_{000})^2 = \frac{\Gamma(K^0_S \to \pi^0\pi^0\pi^0)}{\Gamma(K^0_L \to \pi^0\pi^0\pi^0)} .$$

where for the last two relations *CPT* is assumed valid, *i.e.*, $\mathrm{Re}(\eta_{+-0}) \simeq 0$ and $\mathrm{Re}(\eta_{000}) \simeq 0$.

[*z*] See the K^0_S Particle Listings for the energy limits used in this measurement.

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

[*bb*] $\mathrm{Re}(\epsilon'/\epsilon) = \epsilon'/\epsilon$ to a very good approximation provided the phases satisfy *CPT* invariance.

[*cc*] This mode includes gammas from inner bremsstrahlung but not the direct emission mode $K^0_L \to \pi^+\pi^-\gamma$(DE).

[*dd*] See the K^0_L Particle Listings for the energy limits used in this measurement.

[*ee*] Allowed by higher-order electroweak interactions.

[*ff*] Violates *CP* in leading order. Test of direct *CP* violation since the indirect *CP*-violating and *CP*-conserving contributions are expected to be suppressed.

[*gg*] See our minireview under the $K_2(1770)$ in the 2004 edition of this *Review*.

[*hh*] 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.

[*ii*] See the Particle Listings for the (complicated) definition of this quantity.

[*jj*] 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.

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

[*ll*] 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.

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

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

[*pp*] This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

[*qq*] In the 2010 *Review*, the values for these quantities were given using a measure of the asymmetry that was inconsistent with the usual definition.

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

[*ss*] 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.

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

[*uu*] 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 $\pm$ 0.17 %.

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

[*xx*] 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.

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

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

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

[*bbb*] This is the purely e^+ semileptonic branching fraction: the e^+ fraction from τ^+ decays has been subtracted off. The sum of our (non-τ) e^+ exclusive fractions — an $e^+\nu_e$ with an η, η', ϕ, K^0, or K^{*0} — is 5.99 ± 0.31 %.

[*ccc*] This fraction includes η from η' decays.

[*ddd*] The sum of our exclusive η' fractions — $\eta' e^+\nu_e$, $\eta'\mu^+\nu_\mu$, $\eta'\pi^+$, $\eta'\rho^+$, and $\eta' K^+$ — is 11.8 ± 1.6%.

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

[*fff*] A test for $u\overline{u}$ or $d\overline{d}$ content in the D_s^+. Neither Cabibbo-favored nor Cabibbo-suppressed decays can contribute, and $\omega-\phi$ mixing is an unlikely explanation for any fraction above about 2×10^{-4}.

[*ggg*] We decouple the $D_s^+\to\ \phi\pi^+$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+\to\ \phi\pi^+$, $\phi\to\ K^+K^-$ branching fraction obtained from the Dalitz-plot analysis of $D_s^+\to\ K^+K^-\pi^+$. That is, the ratio of these two branching fractions is not exactly the $\phi\to\ K^+K^-$ branching fraction 0.491.

[*hhh*] This is the average of a model-independent and a *K*-matrix parametrization of the $\pi^+\pi^-$ *S*-wave and is a sum over several f_0 mesons.

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

[*jjj*] An *CP*(±1) indicates the *CP*=+1 and *CP*=−1 eigenstates of the D^0-$\overline{D}^0$ system.

[*kkk*] *D* denotes D^0 or $\overline{D}^0$.

[*lll*] D^{*0}_{CP+} decays into $D^0\pi^0$ with the D^0 reconstructed in *CP*-even eigenstates K^+K^- and $\pi^+\pi^-$.

[*nnn*] $\overline{D}^{**}$ represents an excited state with mass $2.2 < \mathrm{M} < 2.8$ GeV/c^2.

[*ooo*] $\chi_{c1}(3872)^+$ is a hypothetical charged partner of the $\chi_{c1}(3872)$.

[*ppp*] $\Theta(1710)^{++}$ is a possible narrow pentaquark state and $G(2220)$ is a possible glueball resonance.

[*qqq*] $(\overline{\Lambda}_c^-\, p)_s$ denotes a low-mass enhancement near 3.35 GeV/c^2.

[*rrr*] Stands for the possible candidates of $K^*(1410)$, $K_0^*(1430)$ and $K_2^*(1430)$.

[*sss*] B^0 and B_s^0 contributions not separated. Limit is on weighted average of the two decay rates.

[*ttt*] This decay refers to the coherent sum of resonant and nonresonant $J^P = 0^+$ $K\pi$ components with $1.60 < m_{K\pi} < 2.15$ GeV/c^2.

[*uuu*] $X(214)$ is a hypothetical particle of mass 214 MeV/c^2 reported by the HyperCP experiment, Physical Review Letters **94** 021801 (2005)

[*vvv*] $\Theta(1540)^+$ denotes a possible narrow pentaquark state.

[*xxx*] Here S and P are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/c^2 and 214.3 MeV/c^2, respectively.

[*yyy*] These values are model dependent.

[*zzz*] Here "anything" means at least one particle observed.

[*aaaa*] This is a B($B^0 \to \ D^{*-}\ell^+\nu_\ell$) value.

[*bbaa*] D^{**} stands for the sum of the $D(1\,^1P_1)$, $D(1\,^3P_0)$, $D(1\,^3P_1)$, $D(1\,^3P_2)$, $D(2\,^1S_0)$, and $D(2\,^1S_1)$ resonances.

[*ccaa*] $D^{(*)}\overline{D}^{(*)}$ stands for the sum of $D^*\overline{D}^*$, $D^*\overline{D}$, $D\overline{D}^*$, and $D\overline{D}$.

[*ddaa*] $X(3915)$ denotes a near-threshold enhancement in the $\omega J/\psi$ mass spectrum.

[*eeaa*] Inclusive branching fractions have a multiplicity definition and can be greater than 100%.

[*ffaa*] D_j represents an unresolved mixture of pseudoscalar and tensor D^{**} (P-wave) states.

[*ggaa*] Not a pure measurement. See note at head of B_s^0 Decay Modes.

[*hhaa*] For $E_\gamma\ > 100$ MeV.

[*iiaa*] $\Theta(1540)$ is a hypothetical pentaquark state of 1.54 GeV/c^2 mass and a width of less than 25 MeV/c^2.

[*jjaa*] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$.

[*kkaa*] For a narrow state A with mass less than 960 MeV.

[*llaa*] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV.

[*nnaa*] For a dark photon U with mass between 100 and 2100 MeV.

[*ooaa*] For a narrow resonance in the range $2.2 < \ M(X) < 2.8$ GeV.

[*ppaa*] J^{PC} known by production in e^+e^- via single photon annihilation. I^G is not known; interpretation of this state as a single resonance is unclear because of the expectation of substantial threshold effects in this energy region.

[*qqaa*] $2m_\tau < \mathrm{M}(\tau^+\tau^-) < 9.2$ GeV

[*rraa*] 2 GeV $< m_{K^+K^-} <$ 3 GeV

[*ssaa*] X = scalar with $m < 8.0$ GeV

[*ttaa*] $X\overline{X}$ = vectors with $m < 3.1$ GeV

[*uuaa*] X and $\overline{X}$ = zero spin with $m < 4.5$ GeV

[*vvaa*] 1.5 GeV $< m_X <$ 5.0 GeV

[*xxaa*] 201 MeV $< \mathrm{M}(\mu^+\mu^-) <$ 3565 MeV

[*yyaa*] 0.5 GeV $< m_X <$ 9.0 GeV, where m_X is the invariant mass of the hadronic final state.

[*zzaa*] Spectroscopic labeling for these states is theoretical, pending experimental information.

[*aabb*] 1.5 GeV $< m_X <$ 5.0 GeV

[*bbbb*] 1.5 GeV $< m_X <$ 5.0 GeV

[*ccbb*] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV.