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 $m = 139.57018 \pm 0.00035$ MeV (S = 1.2)
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
$e^+\nu_e\nu\overline{\nu}$		< 5 $\times 10^{-6}$	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 $m = 134.9766 \pm 0.0006$ MeV (S = 1.1)
$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
Mean life $\tau = (8.52 \pm 0.18) \times 10^{-17}$ s (S = 1.2)
$c\tau = 25.5$ 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) × 10^{-9}		67
$e^+e^+e^-e^-$		(3.34 ±0.16) × 10^{-5}		67
e^+e^-		(6.46 ±0.33) × 10^{-8}		67
4γ		< 2	× 10^{-8} CL=90%	67
$\nu\overline{\nu}$	[e]	< 2.7	× 10^{-7} CL=90%	67
$\nu_e\overline{\nu}_e$		< 1.7	× 10^{-6} CL=90%	67
$\nu_\mu\overline{\nu}_\mu$		< 1.6	× 10^{-6} CL=90%	67
$\nu_\tau\overline{\nu}_\tau$		< 2.1	× 10^{-6} CL=90%	67
$\gamma\nu\overline{\nu}$		< 6	× 10^{-4} CL=90%	67
Charge conjugation (C) or Lepton Family number (LF) violating modes				
3γ	C	< 3.1	× 10^{-8} CL=90%	67
μ^+e^-	LF	< 3.8	× 10^{-10} CL=90%	26
μ^-e^+	LF	< 3.4	× 10^{-9} CL=90%	26
$\mu^+e^- + \mu^-e^+$	LF	< 3.6	× 10^{-10} CL=90%	26

η

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

Mass $m = 547.862 \pm 0.018$ 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 $A_\phi = (-0.6 \pm 3.1) \times 10^{-2}$

Dalitz plot parameter

$\pi^0\pi^0\pi^0$ $\alpha = -0.0315 \pm 0.0015$

η DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Neutral modes				
neutral modes		(72.12±0.34) %	S=1.2	–
2γ		(39.41±0.20) %	S=1.1	274
$3\pi^0$		(32.68±0.23) %	S=1.1	179
$\pi^0 2\gamma$		(2.7 ±0.5) $\times 10^{-4}$	S=1.1	257
$2\pi^0 2\gamma$		$< 1.2 \times 10^{-3}$	CL=90%	238
4γ		$< 2.8 \times 10^{-4}$	CL=90%	274
invisible		$< 1.0 \times 10^{-4}$	CL=90%	–
Charged modes				
charged modes		(28.10±0.34) %	S=1.2	–
$\pi^+\pi^-\pi^0$		(22.92±0.28) %	S=1.2	174
$\pi^+\pi^-\gamma$		(4.22±0.08) %	S=1.1	236
$e^+e^-\gamma$		(6.9 ±0.4) $\times 10^{-3}$	S=1.3	274
$\mu^+\mu^-\gamma$		(3.1 ±0.4) $\times 10^{-4}$		253
e^+e^-		$< 5.6 \times 10^{-6}$	CL=90%	274
$\mu^+\mu^-$		(5.8 ±0.8) $\times 10^{-6}$		253
$2e^+2e^-$		(2.40±0.22) $\times 10^{-5}$		274
$\pi^+\pi^- e^+ e^- (\gamma)$		(2.68±0.11) $\times 10^{-4}$		235
$e^+e^-\mu^+\mu^-$		$< 1.6 \times 10^{-4}$	CL=90%	253
$2\mu^+2\mu^-$		$< 3.6 \times 10^{-4}$	CL=90%	161
$\mu^+\mu^-\pi^+\pi^-$		$< 3.6 \times 10^{-4}$	CL=90%	113
$\pi^+ e^- \overline{\nu}_e +$ c.c.		$< 1.7 \times 10^{-4}$	CL=90%	256
$\pi^+\pi^- 2\gamma$		$< 2.1 \times 10^{-3}$		236
$\pi^+\pi^-\pi^0\gamma$		$< 5 \times 10^{-4}$	CL=90%	174
$\pi^0\mu^+\mu^-\gamma$		$< 3 \times 10^{-6}$	CL=90%	210
Charge conjugation (C), Parity (P), Charge conjugation × Parity (CP), or Lepton Family number (LF) violating modes				
$\pi^0\gamma$	C	$< 9 \times 10^{-5}$	CL=90%	257
$\pi^+\pi^-$	P,CP	$< 1.3 \times 10^{-5}$	CL=90%	236
$2\pi^0$	P,CP	$< 3.5 \times 10^{-4}$	CL=90%	238
$2\pi^0\gamma$	C	$< 5 \times 10^{-4}$	CL=90%	238
$3\pi^0\gamma$	C	$< 6 \times 10^{-5}$	CL=90%	179
3γ	C	$< 1.6 \times 10^{-5}$	CL=90%	274
$4\pi^0$	P,CP	$< 6.9 \times 10^{-7}$	CL=90%	40
$\pi^0 e^+ e^-$	C	[f] $< 4 \times 10^{-5}$	CL=90%	257
$\pi^0\mu^+\mu^-$	C	[f] $< 5 \times 10^{-6}$	CL=90%	210
$\mu^+ e^- + \mu^- e^+$	LF	$< 6 \times 10^{-6}$	CL=90%	264

$f_0(500)$ or σ [g] was $f_0(600)$

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

Mass m = (400–550) MeV
Full width Γ = (400–700) MeV

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

$\rho(770)$ [h]

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

Mass $m = 775.26 \pm 0.25$ MeV
Full width $\Gamma = 149.1 \pm 0.8$ MeV
$\Gamma_{ee} = 7.04 \pm 0.06$ keV

$\rho(770)$ 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 ±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 ±1.6)	$\times 10^{-3}$		362
$\pi^0\gamma$		(6.0 ±0.8)	$\times 10^{-4}$		376
$\eta\gamma$		(3.00±0.20)	$\times 10^{-4}$		194
$\pi^0\pi^0\gamma$		(4.5 ±0.8)	$\times 10^{-5}$		363
$\mu^+\mu^-$	[i]	(4.55±0.28)	$\times 10^{-5}$		373
e^+e^-	[i]	(4.72±0.05)	$\times 10^{-5}$		388
$\pi^+\pi^-\pi^0$		($1.01^{+0.54}_{-0.36}$±0.34)	$\times 10^{-4}$		323
$\pi^+\pi^-\pi^+\pi^-$		(1.8 ±0.9)	$\times 10^{-5}$		251
$\pi^+\pi^-\pi^0\pi^0$		(1.6 ±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 $m = 782.65 \pm 0.12$ MeV (S = 1.9)
Full width $\Gamma = 8.49 \pm 0.08$ MeV
$\Gamma_{ee} = 0.60 \pm 0.02$ keV

$\omega(782)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi^+\pi^-\pi^0$	(89.2 $\pm$0.7) %		327
$\pi^0\gamma$	(8.28$\pm$0.28) %	S=2.1	380
$\pi^+\pi^-$	($1.53^{+0.11}_{-0.13}$) %	S=1.2	366
neutrals (excluding $\pi^0\gamma$)	(8^{+8}_{-5}) $\times 10^{-3}$	S=1.1	–
$\eta\gamma$	(4.6 $\pm$0.4) $\times 10^{-4}$	S=1.1	200
$\pi^0 e^+ e^-$	(7.7 $\pm$0.6) $\times 10^{-4}$		380
$\pi^0\mu^+\mu^-$	(1.3 $\pm$0.4) $\times 10^{-4}$	S=2.1	349
$e^+ e^-$	(7.28$\pm$0.14) $\times 10^{-5}$	S=1.3	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
$\pi^0\pi^0\gamma$	(6.6 $\pm$1.1) $\times 10^{-5}$		367
$\eta\pi^0\gamma$	$<$ 3.3 $\times 10^{-5}$	CL=90%	162
$\mu^+\mu^-$	(9.0 $\pm$3.1) $\times 10^{-5}$		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 $<$ 2.1 $\times 10^{-4}$	CL=90%	367
$3\pi^0$	C $<$ 2.3 $\times 10^{-4}$	CL=90%	330

$\eta'(958)$

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

Mass $m = 957.78 \pm 0.06$ MeV
Full width $\Gamma = 0.198 \pm 0.009$ MeV

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\pi^+\pi^-\eta$	(42.9 ±0.7) %		232
$\rho^0\gamma$(including non-resonant $\pi^+\pi^-\gamma$)	(29.1 ±0.5) %		165
$\pi^0\pi^0\eta$	(22.2 ±0.8) %		239
$\omega\gamma$	(2.75±0.23) %		159
$\gamma\gamma$	(2.20±0.08) %		479
$3\pi^0$	(2.14±0.20) $\times 10^{-3}$		430
$\mu^+\mu^-\gamma$	(1.08±0.27) $\times 10^{-4}$		467
$\pi^+\pi^-\mu^+\mu^-$	$<$ 2.2 $\times 10^{-4}$	90%	401
$\pi^+\pi^-\pi^0$	(3.8 ±0.4) $\times 10^{-3}$		428
$\pi^0\rho^0$	$<$ 4 %	90%	111
$2(\pi^+\pi^-)$	$<$ 2.4 $\times 10^{-4}$	90%	372
$\pi^+\pi^-2\pi^0$	$<$ 2.5 $\times 10^{-3}$	90%	376
$2(\pi^+\pi^-)$ neutrals	$<$ 1 %	95%	–
$2(\pi^+\pi^-)\pi^0$	$<$ 1.9 $\times 10^{-3}$	90%	298
$2(\pi^+\pi^-)2\pi^0$	$<$ 1 %	95%	197
$3(\pi^+\pi^-)$	$<$ 5 $\times 10^{-4}$	90%	189
$\pi^+\pi^-e^+e^-$	(2.4 $^{+1.3}_{-1.0}$) $\times 10^{-3}$		458
$\pi^+e^-\nu_e$ + c.c.	$<$ 2.1 $\times 10^{-4}$	90%	469
γe^+e^-	$<$ 9 $\times 10^{-4}$	90%	479
$\pi^0\gamma\gamma$	$<$ 8 $\times 10^{-4}$	90%	469
$4\pi^0$	$<$ 5 $\times 10^{-4}$	90%	380
e^+e^-	$<$ 2.1 $\times 10^{-7}$	90%	479
invisible	$<$ 5 $\times 10^{-4}$	90%	–

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

$\pi^+\pi^-$	P,CP	$<$ 6	$\times 10^{-5}$	90%	458
$\pi^0\pi^0$	P,CP	$<$ 4	$\times 10^{-4}$	90%	459
$\pi^0e^+e^-$	C	[f] $<$ 1.4	$\times 10^{-3}$	90%	469
ηe^+e^-	C	[f] $<$ 2.4	$\times 10^{-3}$	90%	322
3γ	C	$<$ 1.0	$\times 10^{-4}$	90%	479
$\mu^+\mu^-\pi^0$	C	[f] $<$ 6.0	$\times 10^{-5}$	90%	445
$\mu^+\mu^-\eta$	C	[f] $<$ 1.5	$\times 10^{-5}$	90%	273
$e\mu$	LF	$<$ 4.7	$\times 10^{-4}$	90%	473

$f_0(980)$ [j]

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

Mass $m = 990 \pm 20$ MeV
Full width $\Gamma = 40$ to 100 MeV

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

$a_0(980)$ [j]

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

Mass $m = 980 \pm 20$ MeV
Full width $\Gamma = 50$ to 100 MeV

$a_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	dominant	319
$K\overline{K}$	seen	†
$\gamma\gamma$	seen	490

$\phi(1020)$

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

Mass $m = 1019.455 \pm 0.020$ MeV (S = 1.1)
Full width $\Gamma = 4.26 \pm 0.04$ MeV (S = 1.4)

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
K^+K^-	(48.9 ±0.5) %	S=1.1	127
$K^0_L K^0_S$	(34.2 ±0.4) %	S=1.1	110
$\rho\pi + \pi^+\pi^-\pi^0$	(15.32 ±0.32) %	S=1.1	–
$\eta\gamma$	(1.309±0.024) %	S=1.2	363
$\pi^0\gamma$	(1.27 ±0.06) $\times 10^{-3}$		501
$\ell^+\ell^-$	—		510
e^+e^-	(2.954±0.030) $\times 10^{-4}$	S=1.1	510
$\mu^+\mu^-$	(2.87 ±0.19) $\times 10^{-4}$		499
ηe^+e^-	(1.15 ±0.10) $\times 10^{-4}$		363
$\pi^+\pi^-$	(7.4 ±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
$\pi^0\pi^0\gamma$	(1.13 ±0.06) $\times 10^{-4}$		492
$\pi^+\pi^-\pi^+\pi^-$	(4.0 $^{+2.8}_{-2.2}$) $\times 10^{-6}$		410
$\pi^+\pi^+\pi^-\pi^-\pi^0$	< 4.6 $\times 10^{-6}$	CL=90%	342
$\pi^0 e^+e^-$	(1.12 ±0.28) $\times 10^{-5}$		501
$\pi^0\eta\gamma$	(7.27 ±0.30) $\times 10^{-5}$	S=1.5	346
$a_0(980)\gamma$	(7.6 ±0.6) $\times 10^{-5}$		39
$K^0\overline{K}^0\gamma$	< 1.9 $\times 10^{-8}$	CL=90%	110
$\eta'(958)\gamma$	(6.25 ±0.21) $\times 10^{-5}$		60
$\eta\pi^0\pi^0\gamma$	< 2 $\times 10^{-5}$	CL=90%	293
$\mu^+\mu^-\gamma$	(1.4 ±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
Lepton Faminly 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 $m = 1170 \pm 20$ MeV
Full width $\Gamma = 360 \pm 40$ MeV

$h_1(1170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	308

$b_1(1235)$ $I^G(J^{PC}) = 1^+(1^{+-})$

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)
$\omega\pi$	dominant		348
[D/S amplitude ratio $= 0.277 \pm 0.027$]			
$\pi^\pm\gamma$	$(1.6\pm0.4)\times10^{-3}$		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

$a_1(1260)$ [k] $I^G(J^{PC}) = 1^-(1^{++})$

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

$a_1(1260)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$(\rho\pi)_{S-\text{wave}}$	seen	353
$(\rho\pi)_{D-\text{wave}}$	seen	353
$(\rho(1450)\pi)_{S-\text{wave}}$	seen	†
$(\rho(1450)\pi)_{D-\text{wave}}$	seen	†
$\sigma\pi$	seen	–
$f_0(980)\pi$	not seen	179
$f_0(1370)\pi$	seen	†
$f_2(1270)\pi$	seen	†
$K\overline{K}^*(892)+$ c.c.	seen	†
$\pi\gamma$	seen	608

$f_2(1270)$ $I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1275.1 \pm 1.2$ MeV (S = 1.1)
Full width $\Gamma = 185.1^{+2.9}_{-2.4}$ MeV (S = 1.5)

$f_2(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$	$(84.8\ ^{+2.4}_{-1.2})$ %	S=1.2	623
$\pi^+\pi^- 2\pi^0$	$(7.1\ ^{+1.4}_{-2.7})$ %	S=1.3	562
$K\overline{K}$	$(4.6\ \pm0.4)$ %	S=2.8	403
$2\pi^+ 2\pi^-$	$(2.8\ \pm0.4)$ %	S=1.2	559
$\eta\eta$	$(4.0\ \pm0.8)\times10^{-3}$	S=2.1	326
$4\pi^0$	$(3.0\ \pm1.0)\times10^{-3}$		564
$\gamma\gamma$	$(1.64\pm0.19)\times10^{-5}$	S=1.9	638
$\eta\pi\pi$	$< 8 \times10^{-3}$	CL=95%	477
$K^0 K^-\pi^+$ + c.c.	$< 3.4 \times10^{-3}$	CL=95%	293
$e^+ e^-$	$< 6 \times10^{-10}$	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 $\Gamma = 24.2 \pm 1.1$ MeV (S = 1.3)

$f_1(1285)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
4π	$(33.1^{+\ 2.1}_{-\ 1.8})$ %	S=1.3	568
$\pi^0\pi^0\pi^+\pi^-$	$(22.0^{+\ 1.4}_{-\ 1.2})$ %	S=1.3	566
$2\pi^+ 2\pi^-$	$(11.0^{+\ 0.7}_{-\ 0.6})$ %	S=1.3	563
$\rho^0\pi^+\pi^-$	$(11.0^{+\ 0.7}_{-\ 0.6})$ %	S=1.3	336
$\rho^0\rho^0$	seen		†
$4\pi^0$	$< 7 \times10^{-4}$	CL=90%	568
$\eta\pi^+\pi^-$	$(35\ \pm15\ )$ %		479
$\eta\pi\pi$	$(52.4^{+\ 1.9}_{-\ 2.2})$ %	S=1.2	482
$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	$(36\ \pm\ 7\ )$ %		238
$\eta\pi\pi$ [excluding $a_0(980)\pi$]	$(16\ \pm\ 7\ )$ %		482
$K\overline{K}\pi$	$(9.0\pm\ 0.4)$ %	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
$\gamma\rho^0$	(5.5± 1.3) %	S=2.8	407
$\phi\gamma$	(7.4± 2.6) $\times 10^{-4}$		236

$\eta(1295)$

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

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

$\pi(1300)$ 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 $m = 1318.3^{+0.5}_{-0.6}$ 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
$\eta'(958)\pi$	(5.3 ±0.9) $\times 10^{-3}$		288
$\pi^\pm\gamma$	(2.68±0.31) $\times 10^{-3}$		652
$\gamma\gamma$	(9.4 ±0.7) $\times 10^{-6}$		659
e^+e^-	< 5 $\times 10^{-9}$	CL=90%	659

$f_0(1370)$ [j]

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

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
$\rho\rho$	dominant	†
$2(\pi\pi)_{S\text{-wave}}$	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

$\pi_1(1400)$ [n]

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

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

$\eta(1405)$ [o]

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

Mass $m = 1408.8 \pm 1.8$ MeV [l] (S = 2.1)
Full width $\Gamma = 51.0 \pm 2.9$ MeV [l] (S = 1.8)

$\eta(1405)$ 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
$\eta(\pi\pi)_{S\text{-wave}}$	seen		–
$f_0(980)\eta$	seen		†
4π	seen		639
$\rho\rho$	<58 %	99.85%	†
$\rho^0\gamma$	seen		491
$K^*(892)K$	seen		123

$f_1(1420)$ [p]

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

Mass $m = 1426.4 \pm 0.9$ MeV (S = 1.1)
Full width $\Gamma = 54.9 \pm 2.6$ MeV

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

$\omega(1420)$ [q]

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

Mass m (1400–1450) MeV
Full width Γ (180–250) MeV

$\omega(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	dominant	486
$\omega\pi\pi$	seen	444
$b_1(1235)\pi$	seen	125
e^+e^-	seen	710

$a_0(1450)$ [j]

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

Mass $m = 1474 \pm 19$ MeV
Full width $\Gamma = 265 \pm 13$ MeV

$a_0(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\eta$	seen	627
$\pi\eta'(958)$	seen	410
$K\overline{K}$	seen	547
$\omega\pi\pi$	seen	484
$a_0(980)\pi\pi$	seen	342
$\gamma\gamma$	seen	737

$\rho(1450)$ [r]

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

Mass $m = 1465 \pm 25$ MeV [l]
Full width $\Gamma = 400 \pm 60$ MeV [l]

$\rho(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	720
4π	seen	669
e^+e^-	seen	732
$\eta\rho$	possibly seen	311
$a_2(1320)\pi$	not seen	54
$K\overline{K}$	not seen	541
$K\overline{K}^*(892)+$ c.c.	possibly seen	229
$\eta\gamma$	possibly 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	178

$\eta(1475)$ [o]

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

Mass $m = 1476 \pm 4$ MeV (S = 1.3)
Full width $\Gamma = 85 \pm 9$ MeV (S = 1.5)

$\eta(1475)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}\pi$	dominant	477
$K\overline{K}^*(892)+$ c.c.	seen	245
$a_0(980)\pi$	seen	396
$\gamma\gamma$	seen	738

$f_0(1500)$ [n]

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

Mass $m = 1505 \pm 6$ MeV (S = 1.3)
Full width $\Gamma = 109 \pm 7$ MeV

$f_0(1500)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\pi\pi$	(34.9±2.3) %	1.2	741
$\pi^+\pi^-$	seen		740
$2\pi^0$	seen		741
4π	(49.5±3.3) %	1.2	691
$4\pi^0$	seen		691
$2\pi^+2\pi^-$	seen		687
$2(\pi\pi)_{S\text{-wave}}$	seen		–
$\rho\rho$	seen		†
$\pi(1300)\pi$	seen		144
$a_1(1260)\pi$	seen		218
$\eta\eta$	(5.1±0.9) %	1.4	516
$\eta\eta'(958)$	(1.9±0.8) %	1.7	†
$K\overline{K}$	(8.6±1.0) %	1.1	568
$\gamma\gamma$	not seen		753

$f_2'(1525)$

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

Mass $m = 1525 \pm 5$ MeV [l]
Full width $\Gamma = 73^{+6}_{-5}$ MeV [l]

$f_2'(1525)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	(88.7 ±2.2) %	581
$\eta\eta$	(10.4 ±2.2) %	530
$\pi\pi$	(8.2 ±1.5) $\times 10^{-3}$	750
$\gamma\gamma$	(1.11±0.14) $\times 10^{-6}$	763

$\pi_1(1600)$ [n]

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

Mass $m = 1662^{+8}_{-9}$ MeV
Full width $\Gamma = 241 \pm 40$ MeV (S = 1.4)

$\pi_1(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	not seen	803
$\rho^0\pi^-$	not 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

$\eta_2(1645)$

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

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	†

$\omega(1650)$ [s]

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

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

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	647
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835

$\omega_3(1670)$

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

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

$\omega_3(1670)$ 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 $m = 1672.2 \pm 3.0$ MeV [l] (S = 1.4)
Full width $\Gamma = 260 \pm 9$ MeV [l] (S = 1.2)

$\pi_2(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
3π	(95.8±1.4) %		809
$f_2(1270)\pi$	(56.3±3.2) %		329
$\rho\pi$	(31 ±4) %		648
$\sigma\pi$	(10.9±3.4) %		–
$(\pi\pi)_{S\text{-wave}}$	(8.7±3.4) %		–
$K\overline{K}^*(892)+$ c.c.	(4.2±1.4) %		455
$\omega\rho$	(2.7±1.1) %		304
$\gamma\gamma$	$< 2.8 \times 10^{-7}$	90%	836
$\rho(1450)\pi$	$< 3.6 \times 10^{-3}$	97.7%	147
$b_1(1235)\pi$	$< 1.9 \times 10^{-3}$	97.7%	365
$f_1(1285)\pi$	possibly seen		323
$a_2(1320)\pi$	not seen		292

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

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.	dominant	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

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

Mass $m = 1688.8 \pm 2.1$ MeV [I]
Full width $\Gamma = 161 \pm 10$ MeV [I] (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
$\pi\pi\rho$ Excluding 2ρ and $a_2(1320)\pi$.	seen		633
$a_2(1320)\pi$	seen		307
$\rho\rho$	seen		335

$\rho(1700)$ [r]

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

Mass $m = 1720 \pm 20$ MeV [l] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)
Full width $\Gamma = 250 \pm 100$ MeV [l] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)

$\rho(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$2(\pi^+\pi^-)$	large	803
$\rho\pi\pi$	dominant	653
$\rho^0\pi^+\pi^-$	large	651
$\rho^\pm\pi^\mp\pi^0$	large	652
$a_1(1260)\pi$	seen	404
$h_1(1170)\pi$	seen	447
$\pi(1300)\pi$	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

$f_0(1710)$ [t]

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

Mass $m = 1720 \pm 6$ MeV (S = 1.6)
Full width $\Gamma = 135 \pm 8$ MeV (S = 1.1)

$f_0(1710)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	704
$\eta\eta$	seen	663
$\pi\pi$	seen	849
$\omega\omega$	seen	357

$\pi(1800)$ $I^G(J^{PC}) = 1^-(0^{-+})$

Mass $m = 1812 \pm 12$ MeV (S = 2.3)
Full width $\Gamma = 208 \pm 12$ MeV

$\pi(1800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^-\pi^-$	seen	879
$f_0(500)\pi^-$	seen	–
$f_0(980)\pi^-$	seen	625
$f_0(1370)\pi^-$	seen	368
$f_0(1500)\pi^-$	not seen	250
$\rho\pi^-$	not seen	732
$\eta\eta\pi^-$	seen	661
$a_0(980)\eta$	seen	473
$a_2(1320)\eta$	not seen	†
$f_2(1270)\pi$	not seen	442
$f_0(1370)\pi^-$	not seen	368
$f_0(1500)\pi^-$	seen	250
$\eta\eta'(958)\pi^-$	seen	375
$K_0^*(1430)K^-$	seen	†
$K^*(892)K^-$	not seen	570

$\phi_3(1850)$ $I^G(J^{PC}) = 0^-(3^{--})$

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

$\pi_2(1880)$ $I^G(J^{PC}) = 1^-(2^{-+})$

Mass $m = 1895 \pm 16$ MeV
Full width $\Gamma = 235 \pm 34$ MeV

$f_2(1950)$ $I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1944 \pm 12$ MeV (S = 1.5)
Full width $\Gamma = 472 \pm 18$ MeV

$f_2(1950)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\overline{K}^*(892)$	seen	387
$\pi^+\pi^-$	seen	962
$\pi^0\pi^0$	seen	963
4π	seen	925
$\eta\eta$	seen	803
$K\overline{K}$	seen	837
$\gamma\gamma$	seen	972
$p\overline{p}$	seen	254

$f_2(2010)$ $I^G(J^{PC}) = 0^+(2^{++})$

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

$a_4(2040)$ $I^G(J^{PC}) = 1^-(4^{++})$

Mass $m = 1996^{+10}_{-9}$ MeV (S = 1.1)
Full width $\Gamma = 255^{+28}_{-24}$ MeV (S = 1.3)

$a_4(2040)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	868
$\pi^+\pi^-\pi^0$	seen	974
$\rho\pi$	seen	841
$f_2(1270)\pi$	seen	580
$\omega\pi^-\pi^0$	seen	819
$\omega\rho$	seen	624
$\eta\pi^0$	seen	918
$\eta'(958)\pi$	seen	761

$f_4(2050)$

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

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
$a_2(1320)\pi$	seen	567

$\phi(2170)$

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

Mass $m = 2175 \pm 15$ MeV (S = 1.6)
Full width $\Gamma = 61 \pm 18$ MeV

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	seen	1087
$\phi f_0(980)$	seen	416
$K^+K^- f_0(980) \to K^+K^-\pi^+\pi^-$	seen	–
$K^+K^- f_0(980) \to K^+K^-\pi^0\pi^0$	seen	–
$K^{*0}K^\pm\pi^\mp$	not seen	770
$K^*(892)^0\overline{K}^*(892)^0$	not seen	622

$f_2(2300)$

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

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

$f_2(2340)$

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

Mass $m = 2339 \pm 60$ MeV
Full width $\Gamma = 319^{+80}_{-70}$ MeV

$f_2(2340)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	573
$\eta\eta$	seen	1033

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 [u] (S = 2.8)
Mean life $\tau = (1.2380 \pm 0.0021) \times 10^{-8}$ s (S = 1.9)
$c\tau = 3.712$ m

Slope parameter g [v]

(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,x]

Assuming μ-e universality

$\lambda_+(K^+_{\mu 3}) = \lambda_+(K^+_{e3}) = (2.97 \pm 0.05) \times 10^{-2}$
$\lambda_0(K^+_{\mu 3}) = (1.95 \pm 0.12) \times 10^{-2}$

Not assuming μ-e universality

$\lambda_+(K^+_{e3}) = (2.98 \pm 0.05) \times 10^{-2}$
$\lambda_+(K^+_{\mu 3}) = (2.96 \pm 0.17) \times 10^{-2}$
$\lambda_0(K^+_{\mu 3}) = (1.96 \pm 0.13) \times 10^{-2}$

K_{e3} form factor quadratic fit

λ'_+ ($K^\pm_{e3}$) linear coeff. $= (2.49 \pm 0.17) \times 10^{-2}$

λ''_+($K^\pm_{e3}$) quadratic coeff. $= (0.19 \pm 0.09) \times 10^{-2}$

K^+_{e3} $\left|f_S/f_+\right| = (-0.3^{+0.8}_{-0.7}) \times 10^{-2}$

K^+_{e3} $\left|f_T/f_+\right| = (-1.2 \pm 2.3) \times 10^{-2}$

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

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

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

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

$K^+ \to e^+ \nu_e \gamma$ $\left|F_A - F_V\right| < 0.49$

$K^+ \to \mu^+ \nu_\mu \gamma$ $\left|F_A - F_V\right| = -0.24$ to 0.04, CL = 90%

Charge Radius

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

***CP* violation parameters**

$\Delta(K^\pm_{\pi e e}) = (-2.2 \pm 1.6) \times 10^{-2}$

$\Delta(K^\pm_{\pi \mu \mu}) = 0.010 \pm 0.023$

$\Delta(K^\pm_{\pi \pi \gamma}) = (0.0 \pm 1.2) \times 10^{-3}$

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

***T* violation parameters**

$K^+ \to \pi^0 \mu^+ \nu_\mu$ $P_T = (-1.7 \pm 2.5) \times 10^{-3}$

$K^+ \to \mu^+ \nu_\mu \gamma$ $P_T = (-0.6 \pm 1.9) \times 10^{-2}$

$K^+ \to \pi^0 \mu^+ \nu_\mu$ $\mathrm{Im}(\xi) = -0.006 \pm 0.008$

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				
$e^+\nu_e$		$(1.581\pm0.008)\times10^{-5}$		247
$\mu^+\nu_\mu$		(63.55 ± 0.11) %	S=1.2	236
$\pi^0 e^+\nu_e$		(5.07 ± 0.04) %	S=2.1	228
Called K^+_{e3}.				
$\pi^0\mu^+\nu_\mu$		(3.353 ± 0.034) %	S=1.8	215
Called $K^+_{\mu3}$.				
$\pi^0\pi^0 e^+\nu_e$		$(2.2\pm0.4)\times10^{-5}$		206
$\pi^+\pi^- e^+\nu_e$		$(4.254\pm0.032)\times10^{-5}$		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				
$\pi^+\pi^0$		(20.66 ± 0.08) %	S=1.2	205
$\pi^+\pi^0\pi^0$		(1.761 ± 0.022) %	S=1.1	133
$\pi^+\pi^+\pi^-$		(5.59 ± 0.04) %	S=1.3	125
Leptonic and semileptonic modes with photons				
$\mu^+\nu_\mu\gamma$	[y,z]	$(6.2\pm0.8)\times10^{-3}$		236
$\mu^+\nu_\mu\gamma(\mathrm{SD}^+)$	[a,aa]	$(1.33\pm0.22)\times10^{-5}$		–
$\mu^+\nu_\mu\gamma(\mathrm{SD}^+\mathrm{INT})$	[a,aa]	$< 2.7\times10^{-5}$	CL=90%	–
$\mu^+\nu_\mu\gamma(\mathrm{SD}^- + \mathrm{SD}^-\mathrm{INT})$	[a,aa]	$< 2.6\times10^{-4}$	CL=90%	–
$e^+\nu_e\gamma$		$(9.4\pm0.4)\times10^{-6}$		247
$\pi^0 e^+\nu_e\gamma$	[y,z]	$(2.56\pm0.16)\times10^{-4}$		228
$\pi^0 e^+\nu_e\gamma(\mathrm{SD})$	[a,aa]	$< 5.3\times10^{-5}$	CL=90%	228
$\pi^0\mu^+\nu_\mu\gamma$	[y,z]	$(1.25\pm0.25)\times10^{-5}$		215
$\pi^0\pi^0 e^+\nu_e\gamma$		$< 5\times10^{-6}$	CL=90%	206
Hadronic modes with photons or $\ell\overline{\ell}$ pairs				
$\pi^+\pi^0\gamma(\mathrm{INT})$		$(-4.2\pm0.9)\times10^{-6}$		–
$\pi^+\pi^0\gamma(\mathrm{DE})$	[y,bb]	$(6.0\pm0.4)\times10^{-6}$		205
$\pi^+\pi^0\pi^0\gamma$	[y,z]	$(7.6\,^{+6.0}_{-3.0})\times10^{-6}$		133
$\pi^+\pi^+\pi^-\gamma$	[y,z]	$(1.04\pm0.31)\times10^{-4}$		125
$\pi^+\gamma\gamma$	[y]	$(1.10\pm0.32)\times10^{-6}$		227
$\pi^+ 3\gamma$	[y]	$< 1.0\times10^{-4}$	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
$\mu^+\nu_\mu\nu\overline{\nu}$		$<$	6.0	$\times 10^{-6}$	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
$\pi^+\nu\overline{\nu}$	$S1$		(	1.7 $\pm$1.1)	$\times 10^{-10}$		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		$<$	5.2	$\times 10^{-10}$	CL=90%	214
$\pi^-\mu^+ e^+$	L		$<$	5.0	$\times 10^{-10}$	CL=90%	214
$\pi^- e^+ e^+$	L		$<$	6.4	$\times 10^{-10}$	CL=90%	227
$\pi^-\mu^+\mu^+$	L	[d]	$<$	1.1	$\times 10^{-9}$	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
$\pi^+\gamma$		[cc]	$<$	2.3	$\times 10^{-9}$	CL=90%	227

K^0

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

50% K_S, 50% K_L

Mass $m = 497.614 \pm 0.024$ MeV (S = 1.6)

$m_{K^0} - m_{K^\pm} = 3.937 \pm 0.028$ MeV (S = 1.8)

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 [x]

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

CPT-violation parameters [x]

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% [dd]
$(\Gamma_{K^0} - \Gamma_{\overline{K}^0})/m_{\text{average}} = (8 \pm 8) \times 10^{-18}$

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 [ee]

Im(η_{+-0}) $= -0.002 \pm 0.009$
Im(η_{000}) $= (-0.1 \pm 1.6) \times 10^{-2}$
$|\eta_{000}| = |A(K_S^0 \to 3\pi^0)/A(K_L^0 \to 3\pi^0)| < 0.018$, 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 $^{+1.1}_{-0.9}$) × 10^{-7}		133
Modes with photons or $\ell\bar{\ell}$ pairs				
$\pi^+\pi^-\gamma$	[z,ff]	(1.79±0.05) × 10^{-3}		206
$\pi^+\pi^- e^+ e^-$		(4.79±0.15) × 10^{-5}		206
$\pi^0\gamma\gamma$	[ff]	(4.9 ±1.8) × 10^{-8}		231
$\gamma\gamma$		(2.63±0.17) × 10^{-6}	S=3.0	249
Semileptonic modes				
$\pi^\pm e^\mp \nu_e$	[gg]	(7.04±0.08) × 10^{-4}		229
***CP* violating (*CP*) and $\Delta S = 1$ weak neutral current (*S1*) modes**				
$3\pi^0$	*CP*	< 1.2 × 10^{-7}	CL=90%	139
$\mu^+\mu^-$	*S1*	< 9 × 10^{-9}	CL=90%	225
$e^+ e^-$	*S1*	< 9 × 10^{-9}	CL=90%	249
$\pi^0 e^+ e^-$	*S1*	[ff] (3.0 $^{+1.5}_{-1.2}$) × 10^{-9}		230
$\pi^0\mu^+\mu^-$	*S1*	(2.9 $^{+1.5}_{-1.2}$) × 10^{-9}		177

K_L^0

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

$m_{K_L} - m_{K_S}$
$= (0.5293 \pm 0.0009) \times 10^{10}\ \hbar\ \text{s}^{-1}$ (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 parameter g [v]

(See Particle Listings for quadratic coefficients)
$K_L^0 \to \pi^+\pi^-\pi^0$: $g = 0.678 \pm 0.008$ (S = 1.5)

K_L decay form factors [x]

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

$M^{\mu}_V\ (K^0_{\mu 3}) = M^{e}_V\ (K^0_{e3}) = 878 \pm 6$ MeV (S = 1.1)

$M^{\mu}_S\ (K^0_{\mu 3}) = 1252 \pm 90$ MeV (S = 2.6)

Dispersive parametrization assuming μ-e universality

$\Lambda_+ = (0.251 \pm 0.006) \times 10^{-1}$ (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 [ee]

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

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

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

$\mathrm{Re}(\epsilon'/\epsilon) = (1.66 \pm 0.23) \times 10^{-3}$ [hh] (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 $K_L^0 \to \pi^+\pi^- e^+ e^- = (13.7 \pm 1.5)\%$

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

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

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

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

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

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

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

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

T-violation parameters

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

CPT invariance tests

$\phi_{00} - \phi_{+-} = (0.34 \pm 0.32)^\circ$

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

Re $x = -0.002 \pm 0.006$

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					
$\pi^\pm e^\mp \nu_e$ Called K^0_{e3}.		[gg]	(40.55 ±0.11) %	S=1.7	229
$\pi^\pm \mu^\mp \nu_\mu$ Called $K^0_{\mu 3}$.		[gg]	(27.04 ±0.07) %	S=1.1	216
$(\pi\mu\text{atom})\nu$			(1.05 ±0.11) × 10^{-7}		188
$\pi^0\pi^\pm e^\mp \nu$		[gg]	(5.20 ±0.11) × 10^{-5}		207
$\pi^\pm e^\mp \nu e^+ e^-$		[gg]	(1.26 ±0.04) × 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*	[ii]	(1.967±0.010) × 10^{-3}	S=1.5	206
$\pi^0\pi^0$	*CPV*		(8.64 ±0.06) × 10^{-4}	S=1.8	209
Semileptonic modes with photons					
$\pi^\pm e^\mp \nu_e \gamma$		[z,gg,jj]	(3.79 ±0.06) × 10^{-3}		229
$\pi^\pm \mu^\mp \nu_\mu \gamma$			(5.65 ±0.23) × 10^{-4}		216
Hadronic modes with photons or $\ell\bar{\ell}$ pairs					
$\pi^0\pi^0\gamma$			< 2.43 × 10^{-7}	CL=90%	209
$\pi^+\pi^-\gamma$		[z,jj]	(4.15 ±0.15) × 10^{-5}	S=2.8	206
$\pi^+\pi^-\gamma$(DE)			(2.84 ±0.11) × 10^{-5}	S=2.0	206
$\pi^0 2\gamma$		[jj]	(1.273±0.033) × 10^{-6}		231
$\pi^0\gamma e^+ e^-$			(1.62 ±0.17) × 10^{-8}		230
Other modes with photons or $\ell\bar{\ell}$ pairs					
2γ			(5.47 ±0.04) × 10^{-4}	S=1.1	249
3γ			< 7.4 × 10^{-8}	CL=90%	249
$e^+ e^-\gamma$			(9.4 ±0.4) × 10^{-6}	S=2.0	249
$\mu^+\mu^-\gamma$			(3.59 ±0.11) × 10^{-7}	S=1.3	225
$e^+ e^-\gamma\gamma$		[jj]	(5.95 ±0.33) × 10^{-7}		249
$\mu^+\mu^-\gamma\gamma$		[jj]	(1.0 $^{+0.8}_{-0.6}$) × 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 ±0.11) × 10^{-9}		225
$e^+ e^-$	*S1*		(9 $^{+6}_{-4}$) × 10^{-12}		249
$\pi^+\pi^- e^+ e^-$	*S1*	[jj]	(3.11 ±0.19) × 10^{-7}		206
$\pi^0\pi^0 e^+ e^-$	*S1*		< 6.6 × 10^{-9}	CL=90%	209
$\pi^0\pi^0\mu^+\mu^-$	*S1*		< 9.2 × 10^{-11}	CL=90%	57
$\mu^+\mu^- e^+ e^-$	*S1*		(2.69 ±0.27) × 10^{-9}		225

$e^+ e^- e^+ e^-$	*S1*		$(\ 3.56\ \pm 0.21\ ) \times 10^{-8}$			249
$\pi^0 \mu^+ \mu^-$	*CP,S1*	[*kk*]	$< 3.8 \times 10^{-10}$		CL=90%	177
$\pi^0 e^+ e^-$	*CP,S1*	[*kk*]	$< 2.8 \times 10^{-10}$		CL=90%	230
$\pi^0 \nu \overline{\nu}$	*CP,S1*	[*ll*]	$< 2.6 \times 10^{-8}$		CL=90%	231
$\pi^0 \pi^0 \nu \overline{\nu}$	*S1*		$< 8.1 \times 10^{-7}$		CL=90%	209
$e^\pm \mu^\mp$	*LF*	[*gg*]	$< 4.7 \times 10^{-12}$		CL=90%	238
$e^\pm e^\pm \mu^\mp \mu^\mp$	*LF*	[*gg*]	$< 4.12 \times 10^{-11}$		CL=90%	225
$\pi^0 \mu^\pm e^\mp$	*LF*	[*gg*]	$< 7.6 \times 10^{-11}$		CL=90%	217
$\pi^0 \pi^0 \mu^\pm e^\mp$	*LF*		$< 1.7 \times 10^{-10}$		CL=90%	159

$K^*(892)$

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

$K^*(892)^\pm$ hadroproduced mass $m = 891.66 \pm 0.26$ MeV
$K^*(892)^\pm$ in τ decays mass $m = 895.5 \pm 0.8$ MeV
$K^*(892)^0$ mass $m = 895.81 \pm 0.19$ MeV (S = 1.4)
$K^*(892)^\pm$ hadroproduced full width $\Gamma = 50.8 \pm 0.9$ MeV
$K^*(892)^\pm$ in τ decays full width $\Gamma = 46.2 \pm 1.3$ MeV
$K^*(892)^0$ full width $\Gamma = 47.4 \pm 0.6$ MeV (S = 2.2)

$K^*(892)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\pi$	~ 100 %		289
$K^0\gamma$	$(\ 2.46\pm0.21) \times 10^{-3}$		307
$K^\pm\gamma$	$(\ 9.9\ \pm0.9\ ) \times 10^{-4}$		309
$K\pi\pi$	$< 7 \times 10^{-4}$	95%	223

$K_1(1270)$

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

Mass $m = 1272 \pm 7$ MeV [*l*]
Full width $\Gamma = 90 \pm 20$ MeV [*l*]

$K_1(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\rho$	(42 ±6) %	46
$K_0^*(1430)\pi$	(28 ±4) %	†
$K^*(892)\pi$	(16 ±5) %	302
$K\omega$	(11.0±2.0) %	†
$K f_0(1370)$	(3.0±2.0) %	†
γK^0	seen	539

$K_1(1400)$ $I(J^P) = \frac{1}{2}(1^+)$

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
$K f_0(1370)$	(2.0±2.0) %	†
$K\omega$	(1.0±1.0) %	284
$K_0^*(1430)\pi$	not seen	†
γK^0	seen	613

$K^*(1410)$ $I(J^P) = \frac{1}{2}(1^-)$

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	seen		619

$K_0^*(1430)$ [nn] $I(J^P) = \frac{1}{2}(0^+)$

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

$K_0^*(1430)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(93±10) %	619

$K_2^*(1430)$ $I(J^P) = \frac{1}{2}(2^+)$

$K_2^*(1430)^\pm$ mass $m = 1425.6 \pm 1.5$ MeV (S = 1.1)
$K_2^*(1430)^0$ mass $m = 1432.4 \pm 1.3$ MeV
$K_2^*(1430)^\pm$ full width $\Gamma = 98.5 \pm 2.7$ MeV (S = 1.1)
$K_2^*(1430)^0$ 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) %		619
$K^*(892)\pi$	(24.7±1.5) %		419
$K^*(892)\pi\pi$	(13.4±2.2) %		372
$K\rho$	(8.7±0.8) %	S=1.2	318
$K\omega$	(2.9±0.8) %		311
$K^+\gamma$	(2.4±0.5) $\times 10^{-3}$	S=1.1	627
$K\eta$	($1.5^{+3.4}_{-1.0}$) $\times 10^{-3}$	S=1.3	486
$K\omega\pi$	$<$ 7.2 $\times 10^{-4}$	CL=95%	100
$K^0\gamma$	$<$ 9 $\times 10^{-4}$	CL=90%	626

$K^*(1680)$

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

Mass $m = 1717 \pm 27$ MeV (S = 1.4)
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) %	781
$K\rho$	($31.4^{+5.0}_{-2.1}$) %	571
$K^*(892)\pi$	($29.9^{+2.2}_{-5.0}$) %	618

$K_2(1770)$ [oo]

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

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
$K_2^*(1430)\pi$	dominant	288
$K^*(892)\pi$	seen	654
$Kf_2(1270)$	seen	55
$K\phi$	seen	441
$K\omega$	seen	607

$K_3^*(1780)$ $I(J^P) = \frac{1}{2}(3^-)$

Mass $m = 1776 \pm 7$ MeV (S = 1.1)
Full width $\Gamma = 159 \pm 21$ MeV (S = 1.3)

$K_3^*(1780)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\rho$	(31 ± 9) %		613
$K^*(892)\pi$	(20 ± 5) %		656
$K\pi$	(18.8± 1.0) %		813
$K\eta$	(30 ±13) %		719
$K_2^*(1430)\pi$	< 16 %	95%	291

$K_2(1820)$ [pp] $I(J^P) = \frac{1}{2}(2^-)$

Mass $m = 1816 \pm 13$ MeV
Full width $\Gamma = 276 \pm 35$ MeV

$K_2(1820)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K_2^*(1430)\pi$	seen	327
$K^*(892)\pi$	seen	681
$Kf_2(1270)$	seen	186
$K\omega$	seen	638

$K_4^*(2045)$ $I(J^P) = \frac{1}{2}(4^+)$

Mass $m = 2045 \pm 9$ MeV (S = 1.1)
Full width $\Gamma = 198 \pm 30$ MeV

$K_4^*(2045)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(9.9±1.2) %	958
$K^*(892)\pi\pi$	(9 ±5) %	802
$K^*(892)\pi\pi\pi$	(7 ±5) %	768
$\rho K\pi$	(5.7±3.2) %	741
$\omega K\pi$	(5.0±3.0) %	738
$\phi K\pi$	(2.8±1.4) %	594
$\phi K^*(892)$	(1.4±0.7) %	363

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 $m = 1869.62 \pm 0.15$ MeV (S = 1.1)
Mean life $\tau = (1040 \pm 7) \times 10^{-15}$ s
$c\tau = 311.8$ μm

c-quark decays

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

CP-violation decay-rate asymmetries

$A_{CP}(\mu^\pm \nu) = (8 \pm 8)\%$
$A_{CP}(K^0_S \pi^\pm) = (-0.41 \pm 0.09)\%$
$A_{CP}(K^\mp 2\pi^\pm) = (-0.1 \pm 1.0)\%$
$A_{CP}(K^\mp \pi^\pm \pi^\pm \pi^0) = (1.0 \pm 1.3)\%$
$A_{CP}(K^0_S \pi^\pm \pi^0) = (0.3 \pm 0.9)\%$
$A_{CP}(K^0_S \pi^\pm \pi^+ \pi^-) = (0.1 \pm 1.3)\%$
$A_{CP}(\pi^\pm \pi^0) = (2.9 \pm 2.9)\%$
$A_{CP}(\pi^\pm \eta) = (1.0 \pm 1.5)\%$ (S = 1.4)
$A_{CP}(\pi^\pm \eta'(958)) = (-0.5 \pm 1.2)\%$ (S = 1.1)
$A_{CP}(K^0_S K^\pm) = (-0.23 \pm 0.31)\%$
$A_{CP}(K^+ K^- \pi^\pm) = (0.3 \pm 0.6)\%$
$A_{CP}(K^\pm K^{*0}) = (0.1 \pm 1.3)\%$
$A_{CP}(\phi\pi^\pm) = (0.42 \pm 0.28)\%$
$A_{CP}(K^\pm K^*_0(1430)^0) = (8^{+7}_{-6})\%$
$A_{CP}(K^\pm K^*_2(1430)^0) = (43^{+20}_{-26})\%$
$A_{CP}(K^\pm K^*_0(800)) = (-12^{+18}_{-13})\%$
$A_{CP}(a_0(1450)^0 \pi^\pm) = (-19^{+14}_{-16})\%$
$A_{CP}(\phi(1680)\pi^\pm) = (-9 \pm 26)\%$
$A_{CP}(\pi^+ \pi^- \pi^\pm) = (-2 \pm 4)\%$
$A_{CP}(K^0_S K^\pm \pi^+ \pi^-) = (-4 \pm 7)\%$
$A_{CP}(K^\pm \pi^0) = (-4 \pm 11)\%$

T-violation decay-rate asymmetry

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

D^+ form factors

$f_+(0)|V_{cs}|$ in $\overline{K}^0 \ell^+ \nu_\ell = 0.707 \pm 0.013$
$r_1 \equiv a_1/a_0$ in $\overline{K}^0 \ell^+ \nu_\ell = -1.7 \pm 0.5$
$r_2 \equiv a_2/a_0$ in $\overline{K}^0 \ell^+ \nu_\ell = -14 \pm 11$
$f_+(0)|V_{cd}|$ in $\pi^0 \ell^+ \nu_\ell = 0.146 \pm 0.007$
$r_1 \equiv a_1/a_0$ in $\pi^0 \ell^+ \nu_\ell = -1.4 \pm 0.9$
$r_2 \equiv a_2/a_0$ in $\pi^0 \ell^+ \nu_\ell = -4 \pm 5$
$f_+(0)|V_{cd}|$ in $D^+ \to \eta e^+ \nu_e = 0.086 \pm 0.006$
$r_1 \equiv a_1/a_0$ in $D^+ \to \eta e^+ \nu_e = -1.8 \pm 2.2$
$r_v \equiv V(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 1.51 \pm 0.07$ (S = 2.2)
$r_2 \equiv A_2(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 0.807 \pm 0.025$
$r_3 \equiv A_3(0)/A_1(0)$ in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 0.0 \pm 0.4$
Γ_L/Γ_T in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 1.13 \pm 0.08$
Γ_+/Γ_- in $\overline{K}^*(892)^0 \ell^+ \nu_\ell = 0.22 \pm 0.06$ (S = 1.6)

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

D^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Inclusive modes			
e^+ semileptonic	(16.07±0.30) %		–
μ^+ anything	(17.6 ±3.2) %		–
K^- anything	(25.7 ±1.4) %		–
$\overline{K}^0$ anything + K^0 anything	(61 ±5) %		–
K^+ anything	(5.9 ±0.8) %		–
$K^*(892)^-$ anything	(6 ±5) %		–
$\overline{K}^*(892)^0$ anything	(23 ±5) %		–
$K^*(892)^0$ anything	< 6.6 %	CL=90%	–
η anything	(6.3 ±0.7) %		–
η' anything	(1.04±0.18) %		–
ϕ anything	(1.03±0.12) %		–
Leptonic and semileptonic modes			
$e^+ \nu_e$	< 8.8 $\times 10^{-6}$	CL=90%	935
$\mu^+ \nu_\mu$	(3.82±0.33) $\times 10^{-4}$		932
$\tau^+ \nu_\tau$	< 1.2 $\times 10^{-3}$	CL=90%	91
$\overline{K}^0 e^+ \nu_e$	(8.83±0.22) %		869
$\overline{K}^0 \mu^+ \nu_\mu$	(9.2 ±0.6) %		865
$K^- \pi^+ e^+ \nu_e$	(4.00±0.10) %		864

$\overline{K}^*(892)^0 e^+ \nu_e$, $\overline{K}^*(892)^0 \to K^- \pi^+$		(3.68±0.10) %		722
$(K^- \pi^+)_{S-wave} e^+ \nu_e$		(2.32±0.10) × 10^{-3}		–
$\overline{K}^*(1410)^0 e^+ \nu_e$, $\overline{K}^*(1410)^0 \to K^- \pi^+$		< 6 × 10^{-3}	CL=90%	–
$\overline{K}_2^*(1430)^0 e^+ \nu_e$, $\overline{K}_2^*(1430)^0 \to K^- \pi^+$		< 5 × 10^{-4}	CL=90%	–
$K^- \pi^+ e^+ \nu_e$ nonresonant		< 7 × 10^{-3}	CL=90%	864
$K^- \pi^+ \mu^+ \nu_\mu$		(3.8 ±0.4) %		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		(2.0 ±0.5) × 10^{-3}		851
$K^- \pi^+ \pi^0 \mu^+ \nu_\mu$		< 1.6 × 10^{-3}	CL=90%	825
$\pi^0 e^+ \nu_e$		(4.05±0.18) × 10^{-3}		930
$\eta e^+ \nu_e$		(1.14±0.10) × 10^{-3}		855
$\rho^0 e^+ \nu_e$		(2.2 ±0.4) × 10^{-3}		774
$\rho^0 \mu^+ \nu_\mu$		(2.4 ±0.4) × 10^{-3}		770
$\omega e^+ \nu_e$		(1.6 $^{+0.7}_{-0.6}$) × 10^{-3}		771
$\eta'(958) e^+ \nu_e$		(2.2 ±0.5) × 10^{-4}		689
$\phi e^+ \nu_e$		< 9 × 10^{-5}	CL=90%	657

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

$\overline{K}^*(892)^0 e^+ \nu_e$		(5.52±0.15) %		722
$\overline{K}^*(892)^0 \mu^+ \nu_\mu$		(5.28±0.15) %		717
$\overline{K}_0^*(1430)^0 \mu^+ \nu_\mu$		< 2.4 × 10^{-4}		380
$\overline{K}^*(1680)^0 \mu^+ \nu_\mu$		< 1.5 × 10^{-3}		105

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

$K_S^0 \pi^+$		(1.47±0.07) %	S=2.0	863
$K_L^0 \pi^+$		(1.46±0.05) %		863
$K^- 2\pi^+$	[ss]	(9.13±0.19) %		846
$(K^- \pi^+)_{S-\text{wave}} \pi^+$		(7.32±0.19) %		846
$\overline{K}_0^*(1430)^0 \pi^+$, $\overline{K}_0^*(1430)^0 \to K^- \pi^+$	[tt]	(1.21±0.06) %		382
$\overline{K}^*(892)^0 \pi^+$, $\overline{K}^*(892)^0 \to K^- \pi^+$		(1.01±0.11) %		714
$\overline{K}^*(1410)^0 \pi^+$, $\overline{K}^{*0} \to K^- \pi^+$		not seen		381
$\overline{K}_2^*(1430)^0 \pi^+$, $\overline{K}_2^*(1430)^0 \to K^- \pi^+$	[tt]	(2.2 ±0.7) × 10^{-4}		371
$\overline{K}^*(1680)^0 \pi^+$, $\overline{K}^*(1680)^0 \to K^- \pi^+$	[tt]	(2.1 ±1.1) × 10^{-4}		58

$K^-(2\pi^+)_{I=2}$		(1.41±0.26) %		–
$K^0_S\pi^+\pi^0$	[ss]	(6.99±0.27) %		845
$K^0_S\rho^+$		(4.8 ±1.0) %		677
$\overline{K}^*(892)^0\pi^+$,		(1.3 ±0.6) %		714
$\overline{K}^*(892)^0 \to K^0_S\pi^0$				
$K^0_S\pi^+\pi^0$ nonresonant		(9 ±7) × 10^{-3}		845
$K^-2\pi^+\pi^0$	[uu]	(5.99±0.18) %		816
$K^0_S2\pi^+\pi^-$	[uu]	(3.12±0.11) %		814
$K^-3\pi^+\pi^-$	[ss]	(5.6 ±0.5) × 10^{-3}	S=1.1	772
$\overline{K}^*(892)^0 2\pi^+\pi^-$,		(1.2 ±0.4) × 10^{-3}		645
$\overline{K}^*(892)^0 \to K^-\pi^+$				
$\overline{K}^*(892)^0\rho^0\pi^+$,		(2.2 ±0.4) × 10^{-3}		239
$\overline{K}^*(892)^0 \to K^-\pi^+$				
$\overline{K}^*(892)^0 a_1(1260)^+$	[vv]	(9.0 ±1.8) × 10^{-3}		†
$K^-\rho^0 2\pi^+$		(1.68±0.27) × 10^{-3}		524
$K^-3\pi^+\pi^-$ nonresonant		(3.9 ±2.9) × 10^{-4}		772
$K^+2K^0_S$		(4.5 ±2.0) × 10^{-3}		545
$K^+K^-K^0_S\pi^+$		(2.4 ±0.6) × 10^{-4}		436

Pionic modes

$\pi^+\pi^0$		(1.19±0.06) × 10^{-3}		925
$2\pi^+\pi^-$		(3.18±0.18) × 10^{-3}		909
$\rho^0\pi^+$		(8.1 ±1.5) × 10^{-4}		767
$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$		(1.78±0.16) × 10^{-3}		909
$\sigma\pi^+$, $\sigma \to \pi^+\pi^-$		(1.34±0.12) × 10^{-3}		–
$f_0(980)\pi^+$,		(1.52±0.33) × 10^{-4}		669
$f_0(980) \to \pi^+\pi^-$				
$f_0(1370)\pi^+$,		(8 ±4) × 10^{-5}		–
$f_0(1370) \to \pi^+\pi^-$				
$f_2(1270)\pi^+$,		(4.9 ±0.9) × 10^{-4}		485
$f_2(1270) \to \pi^+\pi^-$				
$\rho(1450)^0\pi^+$,		< 8 × 10^{-5}	CL=95%	338
$\rho(1450)^0 \to \pi^+\pi^-$				
$f_0(1500)\pi^+$,		(1.1 ±0.4) × 10^{-4}		–
$f_0(1500) \to \pi^+\pi^-$				
$f_0(1710)\pi^+$,		< 5 × 10^{-5}	CL=95%	–
$f_0(1710) \to \pi^+\pi^-$				
$f_0(1790)\pi^+$,		< 6 × 10^{-5}	CL=95%	–
$f_0(1790) \to \pi^+\pi^-$				
$(\pi^+\pi^+)_{S-\text{wave}}\pi^-$		< 1.2 × 10^{-4}	CL=95%	909
$2\pi^+\pi^-$ nonresonant		< 1.1 × 10^{-4}	CL=95%	909
$\pi^+2\pi^0$		(4.6 ±0.4) × 10^{-3}		910
$2\pi^+\pi^-\pi^0$		(1.13±0.08) %		883

$\eta\pi^+$, $\eta \to \pi^+\pi^-\pi^0$		$(\ 8.0\ \pm 0.5\ ) \times 10^{-4}$		848
$\omega\pi^+$, $\omega \to \pi^+\pi^-\pi^0$		$< 3 \times 10^{-4}$	CL=90%	763
$3\pi^+ 2\pi^-$		$(\ 1.61 \pm 0.16) \times 10^{-3}$		845

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

$\eta\pi^+$		$(\ 3.53 \pm 0.21) \times 10^{-3}$		848
$\eta\pi^+\pi^0$		$(\ 1.38 \pm 0.35) \times 10^{-3}$		830
$\omega\pi^+$		$< 3.4 \times 10^{-4}$	CL=90%	764
$\eta'(958)\pi^+$		$(\ 4.67 \pm 0.29) \times 10^{-3}$		681
$\eta'(958)\pi^+\pi^0$		$(\ 1.6\ \pm 0.5\ ) \times 10^{-3}$		654

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

$K^+ K^0_S$		$(\ 2.83 \pm 0.16) \times 10^{-3}$	S=2.2	793
$K^+ K^-\pi^+$	[ss]	$(\ 9.54 \pm 0.26) \times 10^{-3}$	S=1.1	744
$\phi\pi^+$, $\phi \to K^+ K^-$		$(\ 2.65^{+0.08}_{-0.09}) \times 10^{-3}$		647
$K^+\overline{K}^*(892)^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(\ 2.45^{+0.09}_{-0.14}) \times 10^{-3}$		613
$K^+\overline{K}^*_0(1430)^0$, $\overline{K}^*_0(1430)^0 \to K^-\pi^+$		$(\ 1.79 \pm 0.34) \times 10^{-3}$		–
$K^+\overline{K}^*_2(1430)^0$, $\overline{K}^*_2 \to K^-\pi^+$		$(\ 1.6\ ^{+1.2}_{-0.8}\ ) \times 10^{-4}$		–
$K^+\overline{K}^*_0(800)$, $\overline{K}^*_0 \to K^-\pi^+$		$(\ 6.7\ ^{+3.4}_{-2.1}\ ) \times 10^{-4}$		–
$a_0(1450)^0\pi^+$, $a^0_0 \to K^+ K^-$		$(\ 4.4\ ^{+7.0}_{-1.8}\ ) \times 10^{-4}$		–
$\phi(1680)\pi^+$, $\phi \to K^+ K^-$		$(\ 4.9\ ^{+4.0}_{-1.9}\ ) \times 10^{-5}$		–
$K^+ K^-\pi^+$ nonresonant		not seen		744
$K^+ K^0_S \pi^+\pi^-$		$(\ 1.75 \pm 0.18) \times 10^{-3}$		678
$K^0_S K^- 2\pi^+$		$(\ 2.40 \pm 0.18) \times 10^{-3}$		678
$K^+ K^- 2\pi^+\pi^-$		$(\ 2.2\ \pm 1.2\ ) \times 10^{-4}$		600

A few poorly measured branching fractions:

$\phi\pi^+\pi^0$		$(\ 2.3\ \pm 1.0\ )\ \%$		619
$\phi\rho^+$		$< 1.5\ \%$	CL=90%	260
$K^+ K^-\pi^+\pi^0$ non-ϕ		$(\ 1.5\ ^{+0.7}_{-0.6}\ )\ \%$		682
$K^*(892)^+ K^0_S$		$(\ 1.6\ \pm 0.7\ )\ \%$		612

Doubly Cabibbo-suppressed modes

$K^+\pi^0$		$(\ 1.83\pm0.26)\times10^{-4}$	S=1.4	864
$K^+\eta$		$(\ 1.08\pm0.17)\times10^{-4}$		776
$K^+\eta'(958)$		$(\ 1.76\pm0.22)\times10^{-4}$		571
$K^+\pi^+\pi^-$		$(\ 5.27\pm0.23)\times10^{-4}$		846
$K^+\rho^0$		$(\ 2.0\ \pm0.5\ )\times10^{-4}$		679
$K^*(892)^0\pi^+$, $K^*(892)^0\to K^+\pi^-$		$(\ 2.5\ \pm0.4\ )\times10^{-4}$		714
$K^+ f_0(980)$, $f_0(980)\to\pi^+\pi^-$		$(\ 4.7\ \pm2.8\ )\times10^{-5}$		–
$K_2^*(1430)^0\pi^+$, $K_2^*(1430)^0\to K^+\pi^-$		$(\ 4.2\ \pm2.9\ )\times10^{-5}$		–
$K^+\pi^+\pi^-$ nonresonant		not seen		846
$2K^+K^-$		$(\ 8.7\ \pm2.0\ )\times10^{-5}$		550

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

$\pi^+e^+e^-$	*C1*	$<\ 1.1$	$\times10^{-6}$	CL=90%	930
$\pi^+\phi$, $\phi\to\ e^+e^-$		[xx] $(\ 1.7\ ^{+1.4}_{-0.9}\ )\times10^{-6}$			–
$\pi^+\mu^+\mu^-$	*C1*	$<\ 3.9$	$\times10^{-6}$	CL=90%	918
$\pi^+\phi,\ \phi\to\ \mu^+\mu^-$		[xx] $(\ 1.8\ \pm0.8\ )\times10^{-6}$			–
$\rho^+\mu^+\mu^-$	*C1*	$<\ 5.6$	$\times10^{-4}$	CL=90%	757
$K^+e^+e^-$		[yy] $<\ 1.0$	$\times10^{-6}$	CL=90%	870
$K^+\mu^+\mu^-$		[yy] $<\ 4.3$	$\times10^{-6}$	CL=90%	856
$\pi^+e^+\mu^-$	*LF*	$<\ 2.9$	$\times10^{-6}$	CL=90%	927
$\pi^+e^-\mu^+$	*LF*	$<\ 3.6$	$\times10^{-6}$	CL=90%	927
$K^+e^+\mu^-$	*LF*	$<\ 1.2$	$\times10^{-6}$	CL=90%	866
$K^+e^-\mu^+$	*LF*	$<\ 2.8$	$\times10^{-6}$	CL=90%	866
π^-2e^+	*L*	$<\ 1.1$	$\times10^{-6}$	CL=90%	930
$\pi^-2\mu^+$	*L*	$<\ 2.0$	$\times10^{-6}$	CL=90%	918
$\pi^-e^+\mu^+$	*L*	$<\ 2.0$	$\times10^{-6}$	CL=90%	927
$\rho^-2\mu^+$	*L*	$<\ 5.6$	$\times10^{-4}$	CL=90%	757
K^-2e^+	*L*	$<\ 9$	$\times10^{-7}$	CL=90%	870
$K^-2\mu^+$	*L*	$<\ 1.0$	$\times10^{-5}$	CL=90%	856
$K^-e^+\mu^+$	*L*	$<\ 1.9$	$\times10^{-6}$	CL=90%	866
$K^*(892)^-2\mu^+$	*L*	$<\ 8.5$	$\times10^{-4}$	CL=90%	703

D^0

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

Mass $m = 1864.86 \pm 0.13$ MeV
$m_{D^\pm} - m_{D^0} = 4.76 \pm 0.10$ MeV (S = 1.1)
Mean life $\tau = (410.1 \pm 1.5) \times 10^{-15}$ s
$c\tau = 122.9$ μm
$|m_{D_1^0} - m_{D_2^0}| = (1.18^{+0.43}_{-0.47}) \times 10^{10}$ $\hbar$ s^{-1}
$(\Gamma_{D_1^0} - \Gamma_{D_2^0})/\Gamma = 2y = (1.43 \pm 0.19) \times 10^{-2}$
$|q/p| = 0.67^{+0.18}_{-0.14}$
$A_\Gamma = (-0.22 \pm 1.61) \times 10^{-3}$
$K^+\pi^-$ relative strong phase: $\cos\delta = 0.81^{+0.23}_{-0.19}$
$K^-\pi^+\pi^0$ coherence factor $R_{K\pi\pi^0} = 0.78^{+0.11}_{-0.25}$
$K^-\pi^+\pi^0$ average relative strong phase $\delta^{K\pi\pi^0} = (239^{+32}_{-28})^\circ$
$K^-\pi^-2\pi^+$ coherence factor $R_{K3\pi} = 0.36^{+0.24}_{-0.30}$
$K^-\pi^-2\pi^+$ average relative strong phase $\delta^{K3\pi} = (118^{+60}_{-50})^\circ$
$K^0_S K^+\pi^-$ coherence factor $R_{K^0_S K\pi} = 0.73 \pm 0.08$
$K^0_S K^+\pi^-$ average relative strong phase $\delta^{K^0_S K\pi} = (8 \pm 15)^\circ$
K^*K coherence factor $R_{K^*K} = 1.00 \pm 0.16$
K^*K average relative strong phase $\delta^{K^*K} = (26 \pm 16)^\circ$

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

$A_{CP}(K^+K^-) = (-0.21 \pm 0.17)\%$
$A_{CP}(2K^0_S) = (-23 \pm 19)\%$
$A_{CP}(\pi^+\pi^-) = (0.22 \pm 0.21)\%$
$A_{CP}(2\pi^0) = (0 \pm 5)\%$
$A_{CP}(\pi^+\pi^-\pi^0) = (0.3 \pm 0.4)\%$
$A_{CP}(\rho(770)^+\pi^- \to \pi^+\pi^-\pi^0) = (1.2 \pm 0.9)\%$ [zz]
$A_{CP}(\rho(770)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-3.1 \pm 3.0)\%$ [zz]
$A_{CP}(\rho(770)^-\pi^+ \to \pi^+\pi^-\pi^0) = (-1.0 \pm 1.7)\%$ [zz]
$A_{CP}(\rho(1450)^+\pi^- \to \pi^+\pi^-\pi^0) = (0 \pm 70)\%$ [zz]
$A_{CP}(\rho(1450)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-20 \pm 40)\%$ [zz]
$A_{CP}(\rho(1450)^-\pi^+ \to \pi^+\pi^-\pi^0) = (6 \pm 9)\%$ [zz]
$A_{CP}(\rho(1700)^+\pi^- \to \pi^+\pi^-\pi^0) = (-5 \pm 14)\%$ [zz]
$A_{CP}(\rho(1700)^0\pi^0 \to \pi^+\pi^-\pi^0) = (13 \pm 9)\%$ [zz]
$A_{CP}(\rho(1700)^-\pi^+ \to \pi^+\pi^-\pi^0) = (8 \pm 11)\%$ [zz]
$A_{CP}(f_0(980)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 35)\%$ [zz]
$A_{CP}(f_0(1370)\pi^0 \to \pi^+\pi^-\pi^0) = (25 \pm 18)\%$ [zz]
$A_{CP}(f_0(1500)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 18)\%$ [zz]
$A_{CP}(f_0(1710)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 24)\%$ [zz]
$A_{CP}(f_2(1270)\pi^0 \to \pi^+\pi^-\pi^0) = (-4 \pm 6)\%$ [zz]

$A_{CP}(\sigma(400)\pi^0 \to \pi^+\pi^-\pi^0) = (6 \pm 8)\%$ [zz]
$A_{CP}(\text{nonresonant } \pi^+\pi^-\pi^0) = (-13 \pm 23)\%$ [zz]
$A_{CP}(K^+K^-\pi^0) = (-1.0 \pm 1.7)\%$
$A_{CP}(K^*(892)^+K^- \to K^+K^-\pi^0) = (-0.9 \pm 1.3)\%$ [zz]
$A_{CP}(K^*(1410)^+K^- \to K^+K^-\pi^0) = (-21 \pm 24)\%$ [zz]
$A_{CP}((K^+\pi^0)_{S-wave}K^- \to K^+K^-\pi^0) = (7 \pm 15)\%$ [zz]
$A_{CP}(\phi(1020)\pi^0 \to K^+K^-\pi^0) = (1.1 \pm 2.2)\%$ [zz]
$A_{CP}(f_0(980)\pi^0 \to K^+K^-\pi^0) = (-3 \pm 19)\%$ [zz]
$A_{CP}(a_0(980)^0\pi^0 \to K^+K^-\pi^0) = (-5 \pm 16)\%$ [zz]
$A_{CP}(f_2'(1525)\pi^0 \to K^+K^-\pi^0) = (0 \pm 160)\%$ [zz]
$A_{CP}(K^*(892)^-K^+ \to K^+K^-\pi^0) = (-5 \pm 4)\%$ [zz]
$A_{CP}(K^*(1410)^-K^+ \to K^+K^-\pi^0) = (-17 \pm 29)\%$ [zz]
$A_{CP}((K^-\pi^0)_{S-wave}K^+ \to K^+K^-\pi^0) = (-10 \pm 40)\%$ [zz]
$A_{CP}(K^0_S\pi^0) = (-0.27 \pm 0.21)\%$
$A_{CP}(K^0_S\eta) = (0.5 \pm 0.5)\%$
$A_{CP}(K^0_S\eta') = (1.0 \pm 0.7)\%$
$A_{CP}(K^0_S\phi) = (-3 \pm 9)\%$
$A_{CP}(K^-\pi^+) = (0.1 \pm 0.7)\%$
$A_{CP}(K^+\pi^-) = (2.2 \pm 3.2)\%$
$A_{CP}(K^-\pi^+\pi^0) = (0.2 \pm 0.9)\%$
$A_{CP}(K^+\pi^-\pi^0) = (0 \pm 5)\%$
$A_{CP}(K^0_S\pi^+\pi^-) = (-0.1 \pm 0.8)\%$
$A_{CP}(K^*(892)^-\pi^+ \to K^0_S\pi^+\pi^-) = (0.4 \pm 0.5)\%$
$A_{CP}(K^*(892)^+\pi^- \to K^0_S\pi^+\pi^-) = (1 \pm 6)\%$
$A_{CP}(\overline{K}^0\rho^0 \to K^0_S\pi^+\pi^-) = (-0.1 \pm 0.5)\%$
$A_{CP}(\overline{K}^0\omega \to K^0_S\pi^+\pi^-) = (-13 \pm 7)\%$
$A_{CP}(\overline{K}^0 f_0(980) \to K^0_S\pi^+\pi^-) = (-0.4 \pm 2.7)\%$
$A_{CP}(\overline{K}^0 f_2(1270) \to K^0_S\pi^+\pi^-) = (-4 \pm 5)\%$
$A_{CP}(\overline{K}^0 f_0(1370) \to K^0_S\pi^+\pi^-) = (-1 \pm 9)\%$
$A_{CP}(\overline{K}^0\rho^0(1450) \to K^0_S\pi^+\pi^-) = (-4 \pm 10)\%$
$A_{CP}(\overline{K}^0 f_0(600) \to K^0_S\pi^+\pi^-) = (-3 \pm 5)\%$
$A_{CP}(\overline{K}^0 f_2(1270) \to K^0_S\pi^+\pi^-) = (-7 \pm 8)\%$
$A_{CP}(K^*(1410)^-\pi^+ \to K^0_S\pi^+\pi^-) = (-2 \pm 9)\%$
$A_{CP}(K^*_0(1430)^-\pi^+ \to K^0_S\pi^+\pi^-) = (4 \pm 4)\%$
$A_{CP}(K^*_0(1430)^+\pi^- \to K^0_S\pi^+\pi^-) = (12 \pm 15)\%$
$A_{CP}(K^*_2(1430)^-\pi^+ \to K^0_S\pi^+\pi^-) = (3 \pm 6)\%$
$A_{CP}(K^*_2(1430)^+\pi^- \to K^0_S\pi^+\pi^-) = (-10 \pm 32)\%$
$A_{CP}(K^*(1680)^-\pi^+ \to K^0_S\pi^+\pi^-)$
$A_{CP}(K^-\pi^+\pi^+\pi^-) = (0.7 \pm 1.0)\%$
$A_{CP}(K^+\pi^-\pi^+\pi^-) = (-2 \pm 4)\%$
$A_{CP}(K^+K^-\pi^+\pi^-) = (-8 \pm 7)\%$
$A_{CP}(K^*_1(1270)^+K^- \to K^{*0}\pi^+K^-) = (-1 \pm 10)\%$

$A_{CP}(K_1^*(1270)^- K^+ \to \overline{K}^{*0}\pi^- K^+) = (-10 \pm 32)\%$
$A_{CP}(K_1^*(1270)^+ K^- \to \rho^0 K^+ K^-) = (-7 \pm 17)\%$
$A_{CP}(K_1^*(1270)^- K^+ \to \rho^0 K^- K^+) = (10 \pm 13)\%$
$A_{CP}(K^*(1410)^+ K^- \to K^{*0}\pi^+ K^-) = (-20 \pm 17)\%$
$A_{CP}(K^*(1410)^- K^+ \to \overline{K}^{*0}\pi^- K^+) = (-1 \pm 14)\%$
$A_{CP}(K^{*0}\overline{K}^{*0}\ S\text{-wave}) = (10 \pm 14)\%$
$A_{CP}(\phi\rho^0\ S\text{-wave}) = (-3 \pm 5)\%$
$A_{CP}(\phi\rho^0\ D\text{-wave}) = (-37 \pm 19)\%$
$A_{CP}(\phi(\pi^+\pi^-)_{S-wave}) = (-9 \pm 10)\%$
$A_{CP}((K^-\pi^+)_{P-wave}\ (K^+\pi^-)_{S-wave}) = (3 \pm 11)\%$

CP-violation asymmetry difference

$\Delta A_{CP} = A_{CP}(K^+K^-) - A_{CP}(\pi^+\pi^-) = (-0.68 \pm 0.16)\%$

T-violation decay-rate asymmetry

$A_T(K^+K^-\pi^+\pi^-) = (1 \pm 7) \times 10^{-3}$ [rr]

CPT-violation decay-rate asymmetry

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

Form factors

$r_V \equiv V(0)/A_1(0)$ in $D^0 \to K^*(892)^-\ell^+\nu_\ell = 1.7 \pm 0.8$
$r_2 \equiv A_2(0)/A_1(0)$ in $D^0 \to K^*(892)^-\ell^+\nu_\ell = 0.9 \pm 0.4$
$f_+(0)$ in $D^0 \to K^-\ell^+\nu_\ell = 0.727 \pm 0.011$
$f_+(0)|V_{cs}|$ in $D^0 \to K^-\ell^+\nu_\ell = 0.726 \pm 0.009$
$r_1 \equiv a_1/a_0$ in $D^0 \to K^-\ell^+\nu_\ell = -2.65 \pm 0.35$
$r_2 \equiv a_1/a_0$ in $D^0 \to K^-\ell^+\nu_\ell = 13 \pm 9$
$f_+(0)|V_{cd}|$ in $D^0 \to \pi^-\ell^+\nu_\ell = 0.152 \pm 0.005$
$r_1 \equiv a_1/a_0$ in $D^0 \to \pi^-\ell^+\nu_\ell = -2.8 \pm 0.5$
$r_2 \equiv a_1/a_0$ in $D^0 \to \pi^-\ell^+\nu_\ell = 6 \pm 3.0$

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

D^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Topological modes				
0-prongs	[*aaa*]	(15 ± 6) %		–
2-prongs		(70 ± 6) %		–
4-prongs	[*bbb*]	(14.5 ± 0.5) %		–
6-prongs	[*ccc*]	(6.4 ± 1.3) $\times 10^{-4}$		–
Inclusive modes				
e^+ anything	[*ddd*]	(6.49 ± 0.11) %		–
μ^+ anything		(6.7 ± 0.6) %		–
K^- anything		(54.7 ± 2.8) %	S=1.3	–
$\overline{K}^0$ anything + K^0 anything		(47 ± 4) %		–
K^+ anything		(3.4 ± 0.4) %		–
$K^*(892)^-$ anything		(15 ± 9) %		–
$\overline{K}^*(892)^0$ anything		(9 ± 4) %		–
$K^*(892)^+$ anything		< 3.6 %	CL=90%	–
$K^*(892)^0$ anything		(2.8 ± 1.3) %		–
η anything		(9.5 ± 0.9) %		–
η' anything		(2.48 ± 0.27) %		–
ϕ anything		(1.05 ± 0.11) %		–
Semileptonic modes				
$K^- e^+ \nu_e$		(3.55 ± 0.05) %	S=1.2	867
$K^- \mu^+ \nu_\mu$		(3.31 ± 0.13) %		864
$K^*(892)^- e^+ \nu_e$		(2.16 ± 0.16) %		719
$K^*(892)^- \mu^+ \nu_\mu$		(1.91 ± 0.24) %		714
$K^- \pi^0 e^+ \nu_e$		(1.6 $^{+\ 1.3}_{-\ 0.5}$) %		861
$\overline{K}^0 \pi^- e^+ \nu_e$		(2.7 $^{+\ 0.9}_{-\ 0.7}$) %		860
$K^- \pi^+ \pi^- e^+ \nu_e$		(2.8 $^{+\ 1.4}_{-\ 1.1}$) $\times 10^{-4}$		843
$K_1(1270)^- e^+ \nu_e$		(7.6 $^{+\ 4.0}_{-\ 3.1}$) $\times 10^{-4}$		498
$K^- \pi^+ \pi^- \mu^+ \nu_\mu$		< 1.2 $\times 10^{-3}$	CL=90%	821
$(\overline{K}^*(892)\pi)^- \mu^+ \nu_\mu$		< 1.4 $\times 10^{-3}$	CL=90%	692
$\pi^- e^+ \nu_e$		(2.89 ± 0.08) $\times 10^{-3}$	S=1.1	927
$\pi^- \mu^+ \nu_\mu$		(2.37 ± 0.24) $\times 10^{-3}$		924
$\rho^- e^+ \nu_e$		(1.9 ± 0.4) $\times 10^{-3}$		771

Hadronic modes with one $\overline{K}$

$K^-\pi^+$		$(\ 3.88 \pm 0.05\ )\ \%$	S=1.1	861
$K^+\pi^-$		$(\ 1.37 \pm 0.06\ )\times 10^{-4}$		861
$K^0_S\pi^0$		$(\ 1.19 \pm 0.04\ )\ \%$		860
$K^0_L\pi^0$		$(10.0 \pm 0.7\ )\times 10^{-3}$		860
$K^0_S\pi^+\pi^-$	[ss]	$(\ 2.83 \pm 0.20\ )\ \%$	S=1.1	842
$K^0_S\rho^0$		$(\ 6.3\ ^{+\ 0.7}_{-\ 0.8}\ )\times 10^{-3}$		674
$K^0_S\omega,\ \omega\to\ \pi^+\pi^-$		$(\ 2.1 \pm 0.6\ )\times 10^{-4}$		670
$K^0_S(\pi^+\pi^-)_{S-\text{wave}}$		$(\ 3.4 \pm 0.8\ )\times 10^{-3}$		842
$K^0_S f_0(980),\ f_0(980)\to\ \pi^+\pi^-$		$(\ 1.22\ ^{+\ 0.40}_{-\ 0.24}\ )\times 10^{-3}$		549
$K^0_S f_0(1370),\ f_0(1370)\to\ \pi^+\pi^-$		$(\ 2.8\ ^{+\ 0.9}_{-\ 1.3}\ )\times 10^{-3}$		†
$K^0_S f_2(1270),\ f_2(1270)\to\ \pi^+\pi^-$		$(\ 9\ ^{+10}_{-\ 6}\ )\times 10^{-5}$		262
$K^*(892)^-\pi^+,\ K^*(892)^-\to\ K^0_S\pi^-$		$(\ 1.66\ ^{+\ 0.15}_{-\ 0.17}\ )\ \%$		711
$K^*_0(1430)^-\pi^+,\ K^*_0(1430)^-\to\ K^0_S\pi^-$		$(\ 2.70\ ^{+\ 0.40}_{-\ 0.34}\ )\times 10^{-3}$		378
$K^*_2(1430)^-\pi^+,\ K^*_2(1430)^-\to\ K^0_S\pi^-$		$(\ 3.4\ ^{+\ 1.9}_{-\ 1.0}\ )\times 10^{-4}$		367
$K^*(1680)^-\pi^+,\ K^*(1680)^-\to\ K^0_S\pi^-$		$(\ 4 \pm 4\ )\times 10^{-4}$		46
$K^*(892)^+\pi^-,\ K^*(892)^+\to\ K^0_S\pi^+$	[eee]	$(\ 1.14\ ^{+\ 0.60}_{-\ 0.34}\ )\times 10^{-4}$		711
$K^*_0(1430)^+\pi^-,\ K^*_0(1430)^+\to\ K^0_S\pi^+$	[eee]	$<\ 1.4\times 10^{-5}$	CL=95%	–
$K^*_2(1430)^+\pi^-,\ K^*_2(1430)^+\to\ K^0_S\pi^+$	[eee]	$<\ 3.4\times 10^{-5}$	CL=95%	–
$K^0_S\pi^+\pi^-$ nonresonant		$(\ 2.5\ ^{+\ 6.0}_{-\ 1.6}\ )\times 10^{-4}$		842
$K^-\pi^+\pi^0$	[ss]	$(13.9 \pm 0.5\ )\ \%$	S=1.7	844
$K^-\rho^+$		$(10.8 \pm 0.7\ )\ \%$		675
$K^-\rho(1700)^+,\ \rho(1700)^+\to\ \pi^+\pi^0$		$(\ 7.9 \pm 1.7\ )\times 10^{-3}$		†
$K^*(892)^-\pi^+,\ K^*(892)^-\to\ K^-\pi^0$		$(\ 2.22\ ^{+\ 0.40}_{-\ 0.19}\ )\ \%$		711
$\overline{K}^*(892)^0\pi^0,\ \overline{K}^*(892)^0\to\ K^-\pi^+$		$(\ 1.88 \pm 0.23\ )\ \%$		711

$K_0^*(1430)^-\pi^+$, $K_0^*(1430)^- \to K^-\pi^0$		(4.6 ± 2.1) $\times 10^{-3}$		378
$\overline{K}_0^*(1430)^0\pi^0$, $\overline{K}_0^*(1430)^0 \to K^-\pi^+$		(5.7 $^{+\ 5.0}_{-\ 1.5}$) $\times 10^{-3}$		379
$K^*(1680)^-\pi^+$, $K^*(1680)^- \to K^-\pi^0$		(1.8 ± 0.7) $\times 10^{-3}$		46
$K^-\pi^+\pi^0$ nonresonant		(1.11 $^{+\ 0.50}_{-\ 0.19}$) %		844
$K_S^0 2\pi^0$		(9.1 ± 1.1) $\times 10^{-3}$	S=2.2	843
$K_S^0(2\pi^0)$-*S*-wave		(2.6 ± 0.7) $\times 10^{-3}$		–
$\overline{K}^*(892)^0\pi^0$, $\overline{K}^*(892)^0 \to K_S^0\pi^0$		(7.8 ± 0.7) $\times 10^{-3}$		711
$\overline{K}^*(1430)^0\pi^0$, $\overline{K}^{*0} \to K_S^0\pi^0$		(4 ±23) $\times 10^{-5}$		–
$\overline{K}^*(1680)^0\pi^0$, $\overline{K}^{*0} \to K_S^0\pi^0$		(1.0 ± 0.4) $\times 10^{-3}$		–
$K_S^0 f_2(1270)$, $f_2 \to 2\pi^0$		(2.3 ± 1.1) $\times 10^{-4}$		–
$2K_S^0$, one $K_S^0 \to 2\pi^0$		(3.2 ± 1.1) $\times 10^{-4}$		–
$K^-2\pi^+\pi^-$	[*ss*]	(8.08 $^{+\ 0.21}_{-\ 0.19}$) %	S=1.3	813
$K^-\pi^+\rho^0$ total		(6.75 ± 0.33) %		609
$K^-\pi^+\rho^0$ 3-body		(5.1 ± 2.3) $\times 10^{-3}$		609
$\overline{K}^*(892)^0\rho^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		(1.05 ± 0.23) %		416
$K^- a_1(1260)^+$, $a_1(1260)^+ \to 2\pi^+\pi^-$		(3.6 ± 0.6) %		327
$\overline{K}^*(892)^0\pi^+\pi^-$ total, $\overline{K}^*(892)^0 \to K^-\pi^+$		(1.6 ± 0.4) %		685
$\overline{K}^*(892)^0\pi^+\pi^-$ 3-body, $\overline{K}^*(892)^0 \to K^-\pi^+$		(9.9 ± 2.3) $\times 10^{-3}$		685
$K_1(1270)^-\pi^+$, $K_1(1270)^- \to K^-\pi^+\pi^-$	[*fff*]	(2.9 ± 0.3) $\times 10^{-3}$		484
$K^-2\pi^+\pi^-$ nonresonant		(1.88 ± 0.26) %		813
$K_S^0\pi^+\pi^-\pi^0$	[*ggg*]	(5.2 ± 0.6) %		813
$K_S^0\eta$, $\eta \to \pi^+\pi^-\pi^0$		(1.02 ± 0.09) $\times 10^{-3}$		772
$K_S^0\omega$, $\omega \to \pi^+\pi^-\pi^0$		(9.9 ± 0.5) $\times 10^{-3}$		670
$K^-2\pi^+\pi^-\pi^0$		(4.2 ± 0.4) %		771
$\overline{K}^*(892)^0\pi^+\pi^-\pi^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		(1.3 ± 0.6) %		643
$K^-\pi^+\omega$, $\omega \to \pi^+\pi^-\pi^0$		(2.7 ± 0.5) %		605
$\overline{K}^*(892)^0\omega$, $\overline{K}^*(892)^0 \to K^-\pi^+$, $\omega \to \pi^+\pi^-\pi^0$		(6.5 ± 3.0) $\times 10^{-3}$		410
$K_S^0\eta\pi^0$		(5.5 ± 1.1) $\times 10^{-3}$		721

$K^0_S\, a_0(980)$, $a_0(980) \to \eta\pi^0$		(6.5 ± 2.0) $\times 10^{-3}$			–
$\overline{K}^*(892)^0\eta$, $\overline{K}^*(892)^0 \to K^0_S\pi$		(1.6 ± 0.5) $\times 10^{-3}$			–
$K^0_S 2\pi^+2\pi^-$		(2.69 ± 0.31) $\times 10^{-3}$			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 ± 8) $\times 10^{-4}$			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 many of the following modes with resonances have already appeared above as submodes of particular charged-particle modes. (Modes for which there are only upper limits and $\overline{K}^*(892)\rho$ submodes only appear below.)

$K^0_S\eta$		(4.79 ± 0.30) $\times 10^{-3}$			772
$K^0_S\omega$		(1.11 ± 0.06) %			670
$K^0_S\eta'(958)$		(9.4 ± 0.5) $\times 10^{-3}$			565
$K^- a_1(1260)^+$		(7.8 ± 1.1) %			327
$K^- a_2(1320)^+$		< 2	$\times 10^{-3}$	CL=90%	198
$\overline{K}^*(892)^0\pi^+\pi^-$ total		(2.4 ± 0.5) %			685
$\overline{K}^*(892)^0\pi^+\pi^-$ 3-body		(1.48 ± 0.34) %			685
$\overline{K}^*(892)^0\rho^0$		(1.58 ± 0.34) %			417
$\overline{K}^*(892)^0\rho^0$ transverse		(1.7 ± 0.6) %			417
$\overline{K}^*(892)^0\rho^0$ S-wave		(3.0 ± 0.6) %			417
$\overline{K}^*(892)^0\rho^0$ S-wave long.		< 3	$\times 10^{-3}$	CL=90%	417
$\overline{K}^*(892)^0\rho^0$ P-wave		< 3	$\times 10^{-3}$	CL=90%	417
$\overline{K}^*(892)^0\rho^0$ D-wave		(2.1 ± 0.6) %			417
$K_1(1270)^-\pi^+$	[fff]	(1.6 ± 0.8) %			484
$K_1(1400)^-\pi^+$		< 1.2	%	CL=90%	386
$\overline{K}^*(892)^0\pi^+\pi^-\pi^0$		(1.9 ± 0.9) %			644
$K^-\pi^+\omega$		(3.0 ± 0.6) %			605
$\overline{K}^*(892)^0\omega$		(1.1 ± 0.5) %			410
$K^-\pi^+\eta'(958)$		(7.5 ± 1.9) $\times 10^{-3}$			479
$\overline{K}^*(892)^0\eta'(958)$		< 1.1	$\times 10^{-3}$	CL=90%	120

Hadronic modes with three K's

$K^0_S K^+K^-$		(4.47 ± 0.34) $\times 10^{-3}$			544
$K^0_S\, a_0(980)^0$, $a_0^0 \to K^+K^-$		(3.0 ± 0.4) $\times 10^{-3}$			–
$K^- a_0(980)^+$, $a_0^+ \to K^+K^0_S$		(6.0 ± 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%	–

$K^0_S\phi$, $\phi \to K^+K^-$	(2.05 ± 0.16) × 10^{-3}		520
$K^0_S f_0(1370)$, $f_0 \to K^+K^-$	(1.7 ± 1.1) × 10^{-4}		–
$3K^0_S$	(9.1 ± 1.3) × 10^{-4}		539
$K^+2K^-\pi^+$	(2.21 ± 0.31) × 10^{-4}		434
$K^+K^-\overline{K}^*(892)^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(4.4 ± 1.7) × 10^{-5}		†
$K^-\pi^+\phi$, $\phi \to K^+K^-$	(4.0 ± 1.7) × 10^{-5}		422
$\phi\overline{K}^*(892)^0$, $\phi \to K^+K^-$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(1.06 ± 0.20) × 10^{-4}		†
$K^+2K^-\pi^+$ nonresonant	(3.3 ± 1.5) × 10^{-5}		434
$2K^0_S K^\pm\pi^\mp$	(6.0 ± 1.3) × 10^{-4}		427

Pionic modes

$\pi^+\pi^-$	(1.402± 0.026) × 10^{-3}	S=1.1	922
$2\pi^0$	(8.20 ± 0.35) × 10^{-4}		923
$\pi^+\pi^-\pi^0$	(1.43 ± 0.06) %	S=1.9	907
$\rho^+\pi^-$	(9.8 ± 0.4) × 10^{-3}		764
$\rho^0\pi^0$	(3.72 ± 0.22) × 10^{-3}		764
$\rho^-\pi^+$	(4.96 ± 0.24) × 10^{-3}		764
$\rho(1450)^+\pi^-$, $\rho(1450)^+ \to \pi^+\pi^0$	(1.6 ± 2.0) × 10^{-5}		–
$\rho(1450)^0\pi^0$, $\rho(1450)^0 \to \pi^+\pi^-$	(4.3 ± 1.9) × 10^{-5}		–
$\rho(1450)^-\pi^+$, $\rho(1450)^- \to \pi^-\pi^0$	(2.6 ± 0.4) × 10^{-4}		–
$\rho(1700)^+\pi^-$, $\rho(1700)^+ \to \pi^+\pi^0$	(5.9 ± 1.4) × 10^{-4}		–
$\rho(1700)^0\pi^0$, $\rho(1700)^0 \to \pi^+\pi^-$	(7.2 ± 1.7) × 10^{-4}		–
$\rho(1700)^-\pi^+$, $\rho(1700)^- \to \pi^-\pi^0$	(4.6 ± 1.1) × 10^{-4}		–
$f_0(980)\pi^0$, $f_0(980) \to \pi^+\pi^-$	(3.6 ± 0.8) × 10^{-5}		–
$f_0(500)\pi^0$, $f_0(500) \to \pi^+\pi^-$	(1.18 ± 0.21) × 10^{-4}		–
$f_0(1370)\pi^0$, $f_0(1370) \to \pi^+\pi^-$	(5.3 ± 2.1) × 10^{-5}		–
$f_0(1500)\pi^0$, $f_0(1500) \to \pi^+\pi^-$	(5.6 ± 1.5) × 10^{-5}		–
$f_0(1710)\pi^0$, $f_0(1710) \to \pi^+\pi^-$	(4.4 ± 1.5) × 10^{-5}		–
$f_2(1270)\pi^0$, $f_2(1270) \to \pi^+\pi^-$	(1.89 ± 0.20) × 10^{-4}		–
$\pi^+\pi^-\pi^0$ nonresonant	(1.20 ± 0.35) × 10^{-4}		907
$3\pi^0$	< 3.5 × 10^{-4}	CL=90%	908
$2\pi^+2\pi^-$	(7.42 ± 0.21) × 10^{-3}	S=1.1	880

$a_1(1260)^+\pi^-$, $a_1^+ \to 2\pi^+\pi^-$ total		(4.45 ± 0.31) × 10^{-3}			–
$a_1(1260)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ S-wave		(3.21 ± 0.25) × 10^{-3}			–
$a_1(1260)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ D-wave		(1.9 ± 0.5) × 10^{-4}			–
$a_1(1260)^+\pi^-$, $a_1^+ \to \sigma\pi^+$		(6.2 ± 0.7) × 10^{-4}			–
$2\rho^0$ total		(1.82 ± 0.13) × 10^{-3}			518
$2\rho^0$, parallel helicities		(8.2 ± 3.2) × 10^{-5}			–
$2\rho^0$, perpendicular helicities		(4.8 ± 0.6) × 10^{-4}			–
$2\rho^0$, longitudinal helicities		(1.25 ± 0.10) × 10^{-3}			–
Resonant $(\pi^+\pi^-)\pi^+\pi^-$ 3-body total		(1.48 ± 0.12) × 10^{-3}			–
$\sigma\pi^+\pi^-$		(6.1 ± 0.9) × 10^{-4}			–
$f_0(980)\pi^+\pi^-$, $f_0 \to \pi^+\pi^-$		(1.8 ± 0.5) × 10^{-4}			–
$f_2(1270)\pi^+\pi^-$, $f_2 \to \pi^+\pi^-$		(3.6 ± 0.6) × 10^{-4}			–
$\pi^+\pi^-2\pi^0$		(1.00 ± 0.09) %			882
$\eta\pi^0$	[hhh]	(6.8 ± 0.7) × 10^{-4}			846
$\omega\pi^0$	[hhh]	< 2.6 × 10^{-4}		CL=90%	761
$2\pi^+2\pi^-\pi^0$		(4.1 ± 0.5) × 10^{-3}			844
$\eta\pi^+\pi^-$	[hhh]	(1.09 ± 0.16) × 10^{-3}			827
$\omega\pi^+\pi^-$	[hhh]	(1.6 ± 0.5) × 10^{-3}			738
$3\pi^+3\pi^-$		(4.2 ± 1.2) × 10^{-4}			795
$\eta'(958)\pi^0$		(9.0 ± 1.4) × 10^{-4}			678
$\eta'(958)\pi^+\pi^-$		(4.5 ± 1.7) × 10^{-4}			650
2η		(1.67 ± 0.20) × 10^{-3}			755
$\eta\eta'(958)$		(1.05 ± 0.26) × 10^{-3}			537

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

K^+K^-		(3.96 ± 0.08) × 10^{-3}		S=1.4	791
$2K_S^0$		(1.7 ± 0.4) × 10^{-4}		S=2.5	789
$K_S^0K^-\pi^+$		(3.5 ± 0.5) × 10^{-3}		S=1.2	739
$\overline{K}^*(892)^0K_S^0$, $\overline{K}^{*0} \to K^-\pi^+$		< 5 × 10^{-4}		CL=90%	608
$K_S^0K^+\pi^-$		(2.1 ± 0.4) × 10^{-3}		S=1.3	739
$K^*(892)^0K_S^0$, $K^{*0} \to K^+\pi^-$		< 1.8 × 10^{-4}		CL=90%	608
$K^+K^-\pi^0$		(3.29 ± 0.14) × 10^{-3}			743
$K^*(892)^+K^-$, $K^*(892)^+ \to K^+\pi^0$		(1.46 ± 0.07) × 10^{-3}			–
$K^*(892)^-K^+$, $K^*(892)^- \to K^-\pi^0$		(5.2 ± 0.4) × 10^{-4}			–

$(K^+\pi^0)_{S-wave}K^-$	$(\ 2.34 \pm 0.17\ )\times10^{-3}$		743
$(K^-\pi^0)_{S-wave}K^+$	$(\ 1.3 \pm 0.4\ )\times10^{-4}$		743
$f_0(980)\pi^0,\ f_0\to\ K^+K^-$	$(\ 3.5 \pm 0.6\ )\times10^{-4}$		–
$\phi\pi^0,\ \phi\to\ K^+K^-$	$(\ 6.4 \pm 0.4\ )\times10^{-4}$		–
$2K^0_S\pi^0$	$< 5.9 \times10^{-4}$		740
$K^+K^-\pi^+\pi^-$	$(\ 2.43 \pm 0.12\ )\times10^{-3}$		677
$\phi(\pi^+\pi^-)_{S-wave},\ \phi\to$ K^+K^-	$(\ 2.50 \pm 0.33\ )\times10^{-4}$		614
$(\phi\rho^0)_{S-wave},\ \phi\to\ K^+K^-$	$(\ 9.3 \pm 1.2\ )\times10^{-4}$		250
$(\phi\rho^0)_{D-wave},\ \phi\to\ K^+K^-$	$(\ 8.3 \pm 2.3\ )\times10^{-5}$		–
$(K^{*0}\overline{K}^{*0})_{S-wave},\ K^{*0}\to$ $K^\pm\pi^\mp$	$(\ 1.48 \pm 0.30\ )\times10^{-4}$		–
$(K^-\pi^+)_{P-wave},$ $(K^+\pi^-)_{S-wave},$	$(\ 2.6 \pm 0.5\ )\times10^{-4}$		–
$K_1(1270)^+K^-,$ $K_1(1270)^+\to\ K^{*0}\pi^+$	$(\ 1.8 \pm 0.5\ )\times10^{-4}$		–
$K_1(1270)^+K^-,$ $K_1(1270)^+\to\ \rho^0K^+$	$(\ 1.14 \pm 0.26\ )\times10^{-4}$		–
$K_1(1270)^-K^+,$ $K_1(1270)^-\to\ \overline{K}^{*0}\pi^-$	$(\ 2.2 \pm 1.2\ )\times10^{-5}$		–
$K_1(1270)^-K^+,$ $K_1(1270)^-\to\ \rho^0K^-$	$(\ 1.46 \pm 0.25\ )\times10^{-4}$		–
$K^*(1410)^+K^-,$ $K^*(1410)^+\to\ K^{*0}\pi^+$	$(\ 1.02 \pm 0.26\ )\times10^{-4}$		–
$K^*(1410)^-K^+,$ $K^*(1410)^-\to\ \overline{K}^{*0}\pi^-$	$(\ 1.14 \pm 0.25\ )\times10^{-4}$		–
$2K^0_S\pi^+\pi^-$	$(\ 1.23 \pm 0.24\ )\times10^{-3}$		673
$K^0_SK^-2\pi^+\pi^-$	$< 1.5 \times10^{-4}$	CL=90%	595
$K^+K^-\pi^+\pi^-\pi^0$	$(\ 3.1 \pm 2.0\ )\times10^{-3}$		600

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

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

Radiative modes

$\rho^0\gamma$	$< 2.4 \times10^{-4}$	CL=90%	771
$\omega\gamma$	$< 2.4 \times10^{-4}$	CL=90%	768
$\phi\gamma$	$(\ 2.70 \pm 0.35\ )\times10^{-5}$		654
$\overline{K}^*(892)^0\gamma$	$(\ 3.27 \pm 0.34\ )\times10^{-4}$		719

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

$K^+ \ell^- \overline{\nu}_\ell$ via $\overline{D}^0$		< 2.2	$\times 10^{-5}$	CL=90%	–
K^+ or $K^*(892)^+ e^- \overline{\nu}_e$ via $\overline{D}^0$		< 6	$\times 10^{-5}$	CL=90%	–
$K^+ \pi^-$	*DC*	$(1.47 \pm 0.07) \times 10^{-4}$		S=2.8	861
$K^+ \pi^-$ via DCS		$(1.31 \pm 0.08) \times 10^{-4}$			–
$K^+ \pi^-$ via $\overline{D}^0$		< 1.6	$\times 10^{-5}$	CL=95%	861
$K^0_S \pi^+ \pi^-$ in $D^0 \to \overline{D}^0$		< 1.8	$\times 10^{-4}$	CL=95%	–
$K^*(892)^+ \pi^-$, $K^*(892)^+ \to K^0_S \pi^+$	*DC*	$(1.14 \, {}^{+\,0.60}_{-\,0.34}) \times 10^{-4}$			711
$K^*_0(1430)^+ \pi^-$, $K^*_0(1430)^+ \to K^0_S \pi^+$	*DC*	< 1.4	$\times 10^{-5}$		–
$K^*_2(1430)^+ \pi^-$, $K^*_2(1430)^+ \to K^0_S \pi^+$	*DC*	< 3.4	$\times 10^{-5}$		–
$K^+ \pi^- \pi^0$	*DC*	$(3.04 \pm 0.17) \times 10^{-4}$			844
$K^+ \pi^- \pi^0$ via $\overline{D}^0$		$(7.3 \pm 0.5) \times 10^{-4}$			–
$K^+ \pi^+ 2\pi^-$	*DC*	$(2.62 \, {}^{+\,0.21}_{-\,0.19}) \times 10^{-4}$			813
$K^+ \pi^+ 2\pi^-$ via $\overline{D}^0$		< 4	$\times 10^{-4}$	CL=90%	812
μ^- anything via $\overline{D}^0$		< 4	$\times 10^{-4}$	CL=90%	–

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

$\gamma\gamma$	*C1*	< 2.2	$\times 10^{-6}$	CL=90%	932
$e^+ e^-$	*C1*	< 7.9	$\times 10^{-8}$	CL=90%	932
$\mu^+ \mu^-$	*C1*	< 1.4	$\times 10^{-7}$	CL=90%	926
$\pi^0 e^+ e^-$	*C1*	< 4.5	$\times 10^{-5}$	CL=90%	928
$\pi^0 \mu^+ \mu^-$	*C1*	< 1.8	$\times 10^{-4}$	CL=90%	915
$\eta e^+ e^-$	*C1*	< 1.1	$\times 10^{-4}$	CL=90%	852
$\eta \mu^+ \mu^-$	*C1*	< 5.3	$\times 10^{-4}$	CL=90%	838
$\pi^+ \pi^- e^+ e^-$	*C1*	< 3.73	$\times 10^{-4}$	CL=90%	922
$\rho^0 e^+ e^-$	*C1*	< 1.0	$\times 10^{-4}$	CL=90%	771
$\pi^+ \pi^- \mu^+ \mu^-$	*C1*	< 3.0	$\times 10^{-5}$	CL=90%	894
$\rho^0 \mu^+ \mu^-$	*C1*	< 2.2	$\times 10^{-5}$	CL=90%	754
$\omega e^+ e^-$	*C1*	< 1.8	$\times 10^{-4}$	CL=90%	768
$\omega \mu^+ \mu^-$	*C1*	< 8.3	$\times 10^{-4}$	CL=90%	751
$K^- K^+ e^+ e^-$	*C1*	< 3.15	$\times 10^{-4}$	CL=90%	791
$\phi e^+ e^-$	*C1*	< 5.2	$\times 10^{-5}$	CL=90%	654
$K^- K^+ \mu^+ \mu^-$	*C1*	< 3.3	$\times 10^{-5}$	CL=90%	710
$\phi \mu^+ \mu^-$	*C1*	< 3.1	$\times 10^{-5}$	CL=90%	631
$\overline{K}^0 e^+ e^-$	[*yy*]	< 1.1	$\times 10^{-4}$	CL=90%	866
$\overline{K}^0 \mu^+ \mu^-$	[*yy*]	< 2.6	$\times 10^{-4}$	CL=90%	852

$K^-\pi^+e^+e^-$	C1		< 3.85	$\times 10^{-4}$	CL=90%	861
$\overline{K}^*(892)^0e^+e^-$		[yy]	< 4.7	$\times 10^{-5}$	CL=90%	719
$K^-\pi^+\mu^+\mu^-$	C1		< 3.59	$\times 10^{-4}$	CL=90%	829
$\overline{K}^*(892)^0\mu^+\mu^-$		[yy]	< 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	[gg]	< 2.6	$\times 10^{-7}$	CL=90%	929
$\pi^0e^\pm\mu^\mp$	LF	[gg]	< 8.6	$\times 10^{-5}$	CL=90%	924
$\eta e^\pm\mu^\mp$	LF	[gg]	< 1.0	$\times 10^{-4}$	CL=90%	848
$\pi^+\pi^-e^\pm\mu^\mp$	LF	[gg]	< 1.5	$\times 10^{-5}$	CL=90%	911
$\rho^0e^\pm\mu^\mp$	LF	[gg]	< 4.9	$\times 10^{-5}$	CL=90%	767
$\omega e^\pm\mu^\mp$	LF	[gg]	< 1.2	$\times 10^{-4}$	CL=90%	764
$K^-K^+e^\pm\mu^\mp$	LF	[gg]	< 1.8	$\times 10^{-4}$	CL=90%	754
$\phi e^\pm\mu^\mp$	LF	[gg]	< 3.4	$\times 10^{-5}$	CL=90%	648
$\overline{K}^0e^\pm\mu^\mp$	LF	[gg]	< 1.0	$\times 10^{-4}$	CL=90%	863
$K^-\pi^+e^\pm\mu^\mp$	LF	[gg]	< 5.53	$\times 10^{-4}$	CL=90%	848
$\overline{K}^*(892)^0e^\pm\mu^\mp$	LF	[gg]	< 8.3	$\times 10^{-5}$	CL=90%	714
$2\pi^-2e^+$ + c.c.	L		< 1.12	$\times 10^{-4}$	CL=90%	922
$2\pi^-2\mu^+$ + c.c.	L		< 2.9	$\times 10^{-5}$	CL=90%	894
$K^-\pi^-2e^+$ + c.c.	L		< 2.06	$\times 10^{-4}$	CL=90%	861
$K^-\pi^-2\mu^+$ + c.c.	L		< 3.9	$\times 10^{-4}$	CL=90%	829
$2K^-2e^+$ + c.c.	L		< 1.52	$\times 10^{-4}$	CL=90%	791
$2K^-2\mu^+$ + c.c.	L		< 9.4	$\times 10^{-5}$	CL=90%	710
$\pi^-\pi^-e^+\mu^+$ + c.c.	L		< 7.9	$\times 10^{-5}$	CL=90%	911
$K^-\pi^-e^+\mu^+$ + c.c.	L		< 2.18	$\times 10^{-4}$	CL=90%	848
$2K^-e^+\mu^+$ + c.c.	L		< 5.7	$\times 10^{-5}$	CL=90%	754
pe^-	L,B	[iii]	< 1.0	$\times 10^{-5}$	CL=90%	696
$\overline{p}e^+$	L,B	[jjj]	< 1.1	$\times 10^{-5}$	CL=90%	696

$D^*(2007)^0$

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

Mass $m = 2006.99 \pm 0.15$ MeV
$m_{D^{*0}} - m_{D^0} = 142.12 \pm 0.07$ MeV
Full width $\Gamma < 2.1$ MeV, CL = 90%

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

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

$D^*(2010)^{\pm}$

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

Mass $m = 2010.29 \pm 0.13$ MeV
$m_{D^*(2010)^+} - m_{D^+} = 140.66 \pm 0.10$ MeV (S = 1.1)
$m_{D^*(2010)^+} - m_{D^0} = 145.421 \pm 0.010$ MeV (S = 1.1)
Full width $\Gamma = 96 \pm 22$ keV

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

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

$D_0^*(2400)^0$

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

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

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

$D_1(2420)^0$

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

Mass $m = 2421.4 \pm 0.6$ MeV (S = 1.2)
$m_{D_1^0} - m_{D^{*+}} = 411.1 \pm 0.6$ (S = 1.2)
Full width $\Gamma = 27.4 \pm 2.5$ MeV (S = 2.3)

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

$D_1(2420)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+\pi^-$	seen	354
$D^0\pi^+\pi^-$	seen	425
$D^+\pi^-$	not seen	473
$D^{*0}\pi^+\pi^-$	not seen	280

$D_2^*(2460)^0$ $I(J^P) = \frac{1}{2}(2^+)$

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

Mass $m = 2462.6 \pm 0.6$ MeV (S = 1.2)
$m_{D_2^{*0}} - m_{D^+} = 593.0 \pm 0.6$ MeV (S = 1.3)
$m_{D_2^{*0}} - m_{D^{*+}} = 452.3 \pm 0.6$ MeV (S = 1.3)
Full width $\Gamma = 49.0 \pm 1.3$ MeV (S = 1.5)

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

$D_2^*(2460)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^+\pi^-$	seen	507
$D^*(2010)^+\pi^-$	seen	391
$D^0\pi^+\pi^-$	not seen	463
$D^{*0}\pi^+\pi^-$	not seen	326

$D_2^*(2460)^\pm$ $I(J^P) = \frac{1}{2}(2^+)$

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

Mass $m = 2464.3 \pm 1.6$ MeV (S = 1.7)
$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV
Full width $\Gamma = 37 \pm 6$ MeV (S = 1.4)

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

$D_2^*(2460)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^+$	seen	512
$D^{*0}\pi^+$	seen	395
$D^+\pi^+\pi^-$	not seen	461
$D^{*+}\pi^+\pi^-$	not seen	324

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

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

$D_s^\pm$

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

Mass $m = 1968.50 \pm 0.32$ MeV (S = 1.3)
$m_{D_s^\pm} - m_{D^\pm} = 98.87 \pm 0.29$ MeV (S = 1.4)
Mean life $\tau = (500 \pm 7) \times 10^{-15}$ s (S = 1.3)
$c\tau = 149.9$ μm

CP-violating decay-rate asymmetries

$A_{CP}(\mu^\pm\nu) = (5 \pm 6)\%$
$A_{CP}(K^\pm K_S^0) = (0.3 \pm 0.4)\%$
$A_{CP}(K^+K^-\pi^\pm) = (0.3 \pm 1.4)\%$
$A_{CP}(K^+K^-\pi^\pm\pi^0) = (-6 \pm 4)\%$
$A_{CP}(K_S^0 K^\mp 2\pi^\pm) = (-1 \pm 4)\%$
$A_{CP}(\pi^+\pi^-\pi^\pm) = (2 \pm 5)\%$
$A_{CP}(\pi^\pm\eta) = (-4.6 \pm 2.9)\%$
$A_{CP}(\pi^\pm\eta') = (-6.1 \pm 3.0)\%$
$A_{CP}(K^\pm\pi^0) = (-27 \pm 24)\%$
$A_{CP}(K_S^0\pi^\pm) = (6.6 \pm 3.3)\%$ (S = 1.4)
$A_{CP}(K^\pm\pi^+\pi^-) = (11 \pm 7)\%$
$A_{CP}(K^\pm\eta) = (9 \pm 15)\%$
$A_{CP}(K^\pm\eta'(958)) = (6 \pm 19)\%$

T-violating decay-rate asymmetry

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

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

$r_2 = 0.84 \pm 0.11$ (S = 2.4)
$r_v = 1.80 \pm 0.08$
$\Gamma_L/\Gamma_T = 0.72 \pm 0.18$

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	[*kkk*]	(6.5 ±0.4) %		–
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_S^0 anything		(19.0 ±1.1) %		–
η anything	[*lll*]	(29.9 ±2.8) %		–
ω anything		(6.1 ±1.4) %		–
η' anything	[*nnn*]	(11.7 ±1.8) %		–
$f_0(980)$ anything, $f_0 \to \pi^+\pi^-$		< 1.3 %	CL=90%	–
ϕ anything		(15.7 ±1.0) %		–
K^+K^- anything		(15.8 ±0.7) %		–
$K_S^0 K^+$ anything		(5.8 ±0.5) %		–
$K_S^0 K^-$ anything		(1.9 ±0.4) %		–
$2K_S^0$ 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				
$e^+\nu_e$		< 1.2 $\times 10^{-4}$	CL=90%	984
$\mu^+\nu_\mu$		(5.90±0.33) $\times 10^{-3}$		981
$\tau^+\nu_\tau$		(5.43±0.31) %		182
$K^+K^-e^+\nu_e$		—		851
$\phi e^+\nu_e$	[*ooo*]	(2.49±0.14) %		720
$\eta e^+\nu_e$ + $\eta'(958)e^+\nu_e$	[*ooo*]	(3.66±0.37) %		–
$\eta e^+\nu_e$	[*ooo*]	(2.67±0.29) %	S=1.1	908
$\eta'(958)e^+\nu_e$	[*ooo*]	(9.9 ±2.3) $\times 10^{-3}$		751
$\omega e^+\nu_e$	[*ppp*]	< 2.0 $\times 10^{-3}$	CL=90%	829
$K^0 e^+\nu_e$		(3.7 ±1.0) $\times 10^{-3}$		921
$K^*(892)^0 e^+\nu_e$	[*ooo*]	(1.8 ±0.7) $\times 10^{-3}$		782
$f_0(980)e^+\nu_e$, $f_0 \to \pi^+\pi^-$		(2.00±0.32) $\times 10^{-3}$		–

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

$K^+ K^0_S$		(1.48±0.08) %			850
$K^+ K^- \pi^+$	[*ss*]	(5.49±0.27) %			805
$\phi\pi^+$	[*ooo,qqq*]	(4.5 ±0.4) %			712
$\phi\pi^+$, $\phi \to K^+K^-$	[*qqq*]	(2.28±0.12) %			712
$K^+\overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^-\pi^+$		(2.63±0.13) %			416
$f_0(980)\pi^+$, $f_0 \to K^+K^-$		(1.16±0.32) %			732
$f_0(1370)\pi^+$, $f_0 \to K^+K^-$		(7 ±5) × 10^{-4}			–
$f_0(1710)\pi^+$, $f_0 \to K^+K^-$		(6.7 ±2.9) × 10^{-4}			198
$K^+\overline{K}^*_0(1430)^0$, $\overline{K}^*_0 \to K^-\pi^+$		(1.9 ±0.4) × 10^{-3}			218
$K^0\overline{K}^0\pi^+$		—			802
$K^*(892)^+\overline{K}^0$	[*ooo*]	(5.4 ±1.2) %			683
$K^+K^-\pi^+\pi^0$		(5.6 ±0.5) %			748
$\phi\rho^+$	[*ooo*]	(8.4 $^{+1.9}_{-2.3}$) %			401
$K^0_S K^- 2\pi^+$		(1.64±0.12) %			744
$K^*(892)^+\overline{K}^*(892)^0$	[*ooo*]	(7.2 ±2.6) %			417
$K^+K^0_S\pi^+\pi^-$		(9.6 ±1.3) × 10^{-3}			744
$K^+K^-2\pi^+\pi^-$		(8.8 ±1.6) × 10^{-3}			673
$\phi 2\pi^+\pi^-$	[*ooo*]	(1.21±0.16) %			640
$K^+K^-\rho^0\pi^+$ non-ϕ		< 2.6 × 10^{-4}	CL=90%		249
$\phi\rho^0\pi^+$, $\phi \to K^+K^-$		(6.6 ±1.3) × 10^{-3}			181
$\phi a_1(1260)^+$, $\phi \to K^+K^-$, $a_1^+ \to \rho^0\pi^+$		(7.5 ±1.3) × 10^{-3}			†
$K^+K^-2\pi^+\pi^-$ nonresonant		(9 ±7) × 10^{-4}			673
$2K^0_S 2\pi^+\pi^-$		(8.3 ±3.5) × 10^{-4}			669

Hadronic modes without K's

$\pi^+\pi^0$		< 3.4 × 10^{-4}	CL=90%		975
$2\pi^+\pi^-$		(1.10±0.06) %			959
$\rho^0\pi^+$		(2.0 ±1.2) × 10^{-4}			825
$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$	[*rrr*]	(9.2 ±0.6) × 10^{-3}			959
$f_2(1270)\pi^+$, $f_2 \to \pi^+\pi^-$		(1.11±0.20) × 10^{-3}			559
$\rho(1450)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$		(3.0 ±2.0) × 10^{-4}			421
$\pi^+ 2\pi^0$		(6.5 ±1.3) × 10^{-3}			961
$2\pi^+\pi^-\pi^0$		—			935
$\eta\pi^+$	[*ooo*]	(1.83±0.15) %			902
$\omega\pi^+$	[*ooo*]	(2.5 ±0.7) × 10^{-3}			822
$3\pi^+ 2\pi^-$		(8.0 ±0.9) × 10^{-3}			899
$2\pi^+\pi^- 2\pi^0$		—			902
$\eta\rho^+$	[*ooo*]	(8.9 ±0.8) %			724
$\eta\pi^+\pi^0$ 3-body	[*ooo*]	< 5 %	CL=90%		886

$\omega\pi^+\pi^0$	[ooo]	(2.8 ±0.7) %			802
$3\pi^+2\pi^-\pi^0$		(4.9 ±3.2) %			856
$\omega 2\pi^+\pi^-$	[ooo]	(1.6 ±0.5) %			766
$\eta'(958)\pi^+$	[nnn,ooo]	(3.94±0.33) %			743
$3\pi^+2\pi^-2\pi^0$		—			803
$\omega\eta\pi^+$	[ooo]	< 2.13	%	CL=90%	654
$\eta'(958)\rho^+$	[nnn,ooo]	(12.5 ±2.2) %			465
$\eta'(958)\pi^+\pi^0$ 3-body	[ooo]	< 1.8	%	CL=90%	720

Modes with one or three K's

$K^+\pi^0$		(6.2 ±2.1) $\times 10^{-4}$			917
$K^0_S\pi^+$		(1.21±0.08) $\times 10^{-3}$			916
$K^+\eta$	[ooo]	(1.75±0.35) $\times 10^{-3}$			835
$K^+\omega$	[ooo]	< 2.4	$\times 10^{-3}$	CL=90%	741
$K^+\eta'(958)$	[ooo]	(1.8 ±0.6) $\times 10^{-3}$			646
$K^+\pi^+\pi^-$		(6.9 ±0.5) $\times 10^{-3}$			900
$K^+\rho^0$		(2.7 ±0.5) $\times 10^{-3}$			745
$K^+\rho(1450)^0$, $\rho^0\to\pi^+\pi^-$		(7.3 ±2.6) $\times 10^{-4}$			–
$K^*(892)^0\pi^+$, $K^{*0}\to K^+\pi^-$		(1.50±0.26) $\times 10^{-3}$			775
$K^*(1410)^0\pi^+$, $K^{*0}\to K^+\pi^-$		(1.30±0.31) $\times 10^{-3}$			–
$K^*(1430)^0\pi^+$, $K^{*0}\to K^+\pi^-$		(5 ±4) $\times 10^{-4}$			–
$K^+\pi^+\pi^-$ nonresonant		(1.1 ±0.4) $\times 10^{-3}$			900
$K^0\pi^+\pi^0$		(1.00±0.18) %			900
$K^0_S 2\pi^+\pi^-$		(2.9 ±1.1) $\times 10^{-3}$			870
$K^+\omega\pi^0$	[ooo]	< 8.2	$\times 10^{-3}$	CL=90%	684
$K^+\omega\pi^+\pi^-$	[ooo]	< 5.4	$\times 10^{-3}$	CL=90%	603
$K^+\omega\eta$	[ooo]	< 7.9	$\times 10^{-3}$	CL=90%	367
$2K^+K^-$		(2.20±0.23) $\times 10^{-4}$			628
ϕK^+, $\phi\to K^+K^-$		(9.0 ±2.1) $\times 10^{-5}$			–

Doubly Cabibbo-suppressed modes

$2K^+\pi^-$		(1.28±0.14) $\times 10^{-4}$			805
$K^+K^*(892)^0$, $K^{*0}\to K^+\pi^-$		(6.0 ±3.5) $\times 10^{-5}$			–

Baryon-antibaryon mode

$p\overline{n}$		(1.3 ±0.4) $\times 10^{-3}$			295

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

$\pi^+e^+e^-$	[yy]	< 1.3	$\times 10^{-5}$	CL=90%	979
$\pi^+\phi$, $\phi\to e^+e^-$	[xx]	(6 $^{+8}_{-4}$) $\times 10^{-6}$			–

$\pi^+\mu^+\mu^-$		[yy] <	2.6	$\times 10^{-5}$	CL=90%	968
$K^+e^+e^-$	C1	<	3.7	$\times 10^{-6}$	CL=90%	922
$K^+\mu^+\mu^-$	C1	<	2.1	$\times 10^{-5}$	CL=90%	909
$K^*(892)^+\mu^+\mu^-$	C1	<	1.4	$\times 10^{-3}$	CL=90%	765
$\pi^+e^+\mu^-$	LF	<	1.2	$\times 10^{-5}$	CL=90%	976
$\pi^+e^-\mu^+$	LF	<	2.0	$\times 10^{-5}$	CL=90%	976
$K^+e^+\mu^-$	LF	<	1.4	$\times 10^{-5}$	CL=90%	919
$K^+e^-\mu^+$	LF	<	9.7	$\times 10^{-6}$	CL=90%	919
π^-2e^+	L	<	4.1	$\times 10^{-6}$	CL=90%	979
$\pi^-2\mu^+$	L	<	1.4	$\times 10^{-5}$	CL=90%	968
$\pi^-e^+\mu^+$	L	<	8.4	$\times 10^{-6}$	CL=90%	976
K^-2e^+	L	<	5.2	$\times 10^{-6}$	CL=90%	922
$K^-2\mu^+$	L	<	1.3	$\times 10^{-5}$	CL=90%	909
$K^-e^+\mu^+$	L	<	6.1	$\times 10^{-6}$	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 $m = 2112.3 \pm 0.5$ MeV (S = 1.1)
$m_{D_s^{*\pm}} - m_{D_s^{\pm}} = 143.8 \pm 0.4$ 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)
$D_s^+\gamma$	(94.2±0.7) %	139
$D_s^+\pi^0$	(5.8±0.7) %	48

$D^*_{s0}(2317)^\pm$

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

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

Mass $m = 2317.8 \pm 0.6$ MeV (S = 1.1)
$m_{D^*_{s0}(2317)^\pm} - m_{D_s^\pm} = 349.3 \pm 0.6$ MeV (S = 1.1)
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)	p (MeV/c)
$D_s^+\pi^0$	seen	298
$D_s^+\pi^0\pi^0$	not seen	205

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

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

Mass $m = 2459.6 \pm 0.6$ MeV (S = 1.1)
$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}} = 347.2 \pm 0.7$ MeV (S = 1.2)
$m_{D_{s1}(2460)^\pm} - m_{D_s^\pm} = 491.1 \pm 0.7$ 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 $m = 2535.12 \pm 0.13$ MeV
Full width $\Gamma = 0.92 \pm 0.05$ MeV

$D_{s1}(2536)^-$ modes are charge conjugates of the modes below.

$D_{s1}(2536)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+ K^0$	seen	149
$D^*(2007)^0 K^+$	seen	167
$D^+ K^0$	not seen	381
$D^0 K^+$	not seen	391
$D_s^{*+}\gamma$	possibly seen	388
$D_s^+ \pi^+ \pi^-$	seen	437

$D_{s2}^*(2573)$

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

J^P is natural, width and decay modes consistent with 2^+.

Mass $m = 2571.9 \pm 0.8$ MeV
Full width $\Gamma = 17 \pm 4$ MeV (S = 1.3)

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

$D_{s2}^*(2573)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	434
$D^*(2007)^0 K^+$	not seen	243

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

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

Mass $m = 2709 \pm 4$ MeV
Full width $\Gamma = 117 \pm 13$ MeV

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 "$B^\pm/B^0/B_s^0/b$-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_s^0-$\overline{B}_s^0$ mixing data and B-$\overline{B}$ mixing data for a B^0/B_s^0 admixture are found in the B_s^0 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
- $B^\pm/B^0/B_s^0/b$-baryon Admixtures

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

  mass
- $B_1(5721)^0$

  mass
- $B_2^*(5747)^0$

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

- Σ_b

  mass

- Σ_b^*

  mass

- Ξ_b^0, Ξ_b^-

  mass, mean life, branching fractions

- 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 $m_{B^\pm} = 5279.26 \pm 0.17$ MeV
Mean life $\tau_{B^\pm} = (1.641 \pm 0.008) \times 10^{-12}$ s
$c\tau = 492.0\ \mu$m

CP violation

$A_{CP}(B^+ \to J/\psi(1S)K^+) = (1 \pm 7) \times 10^{-3}$ (S = 1.8)
$A_{CP}(B^+ \to J/\psi(1S)\pi^+) = 0.007 \pm 0.033$ (S = 1.3)
$A_{CP}(B^+ \to J/\psi\rho^+) = -0.11 \pm 0.14$
$A_{CP}(B^+ \to J/\psi K^*(892)^+) = -0.048 \pm 0.033$
$A_{CP}(B^+ \to \eta_c K^+) = -0.16 \pm 0.08$
$A_{CP}(B^+ \to \psi(2S)\pi^+) = 0.03 \pm 0.06$
$A_{CP}(B^+ \to \psi(2S)K^+) = 0.008 \pm 0.021$ (S = 1.6)
$A_{CP}(B^+ \to \psi(2S)K^*(892)^+) = 0.08 \pm 0.21$
$A_{CP}(B^+ \to \chi_{c1}(1P)\pi^+) = 0.07 \pm 0.18$
$A_{CP}(B^+ \to \chi_{c0}K^+) = -0.20 \pm 0.18$ (S = 1.5)
$A_{CP}(B^+ \to \chi_{c1}K^+) = -0.009 \pm 0.033$
$A_{CP}(B^+ \to \chi_{c1}K^*(892)^+) = 0.5 \pm 0.5$
$A_{CP}(B^+ \to \overline{D}^0\pi^+) = -0.008 \pm 0.008$
$A_{CP}(B^+ \to D_{CP(+1)}\pi^+) = 0.035 \pm 0.024$
$A_{CP}(B^+ \to D_{CP(-1)}\pi^+) = 0.017 \pm 0.026$
$A_{CP}(B^+ \to \overline{D}^0K^+) = 0.07 \pm 0.04$
$r_B(B^+ \to D^0K^+) = 0.096 \pm 0.014$ (S = 1.2)
$\delta_B(B^+ \to D^0K^+) = (115 \pm 13)^\circ$
$r_B(B^+ \to \overline{D}^0K^{*+}) = 0.17 \pm 0.11$ (S = 2.3)
$\delta_B(B^+ \to D^0K^{*+}) = (155 \pm 70)^\circ$ (S = 2.0)
$A_{CP}(B^+ \to [K^-\pi^+]_D K^+) = -0.58 \pm 0.21$
$A_{CP}(B^+ \to [K^-\pi^+]_{\overline{D}}K^*(892)^+) = -0.3 \pm 0.5$
$A_{CP}(B^+ \to [K^-\pi^+]_D\pi^+) = 0.00 \pm 0.09$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\pi)}\pi^+) = -0.09 \pm 0.27$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\gamma)}\pi^+) = -0.7 \pm 0.6$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\pi)}K^+) = 0.8 \pm 0.4$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\gamma)}K^+) = 0.4 \pm 1.0$
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D K^+) = -0.02 \pm 0.15$
$A_{CP}(B^+ \to D_{CP(+1)}K^+) = 0.170 \pm 0.033$ (S = 1.2)
$A_{ADS}(B^+ \to DK^+) = -0.52 \pm 0.15$
$A_{ADS}(B^+ \to D\pi^+) = 0.14 \pm 0.06$
$A_{CP}(B^+ \to D_{CP(-1)}K^+) = -0.10 \pm 0.07$
$A_{CP}(B^+ \to \overline{D}^{*0}\pi^+) = -0.014 \pm 0.015$
$A_{CP}(B^+ \to (D^*_{CP(+1)})^0\pi^+) = -0.02 \pm 0.05$
$A_{CP}(B^+ \to (D^*_{CP(-1)})^0\pi^+) = -0.09 \pm 0.05$
$A_{CP}(B^+ \to D^{*0}K^+) = -0.07 \pm 0.04$
$r^*_B(B^+ \to D^{*0}K^+) = 0.114^{+0.023}_{-0.040}$ (S = 1.2)
$\delta^*_B(B^+ \to D^{*0}K^+) = (310^{+22}_{-28})^\circ$ (S = 1.3)

$A_{CP}(B^+ \to D^{*0}_{CP(+1)} K^+) = -0.12 \pm 0.08$
$A_{CP}(B^+ \to D^{*}_{CP(-1)} K^+) = 0.07 \pm 0.10$
$A_{CP}(B^+ \to D_{CP(+1)} K^*(892)^+) = 0.09 \pm 0.14$
$A_{CP}(B^+ \to D_{CP(-1)} K^*(892)^+) = -0.23 \pm 0.22$
$A_{CP}(B^+ \to D_s^+ \phi) = 0.0 \pm 0.4$
$A_{CP}(B^+ \to D^{*+} \overline{D}^{*0}) = -0.15 \pm 0.11$
$A_{CP}(B^+ \to D^{*+} \overline{D}^{0}) = -0.06 \pm 0.13$
$A_{CP}(B^+ \to D^{+} \overline{D}^{*0}) = 0.13 \pm 0.18$
$A_{CP}(B^+ \to D^{+} \overline{D}^{0}) = -0.03 \pm 0.07$
$A_{CP}(B^+ \to K^0_S \pi^+) = -0.014 \pm 0.019$
$A_{CP}(B^+ \to K^+ \pi^0) = 0.037 \pm 0.021$
$A_{CP}(B^+ \to \eta' K^+) = 0.013 \pm 0.017$
$A_{CP}(B^+ \to \eta' K^*(892)^+) = -0.26 \pm 0.27$
$A_{CP}(B^+ \to \eta' K^*_0(1430)^+) = 0.06 \pm 0.20$
$A_{CP}(B^+ \to \eta' K^*_2(1430)^+) = 0.15 \pm 0.13$
$\boldsymbol{A_{CP}(B^+ \to \eta K^+) = -0.37 \pm 0.08}$
$A_{CP}(B^+ \to \eta K^*(892)^+) = 0.02 \pm 0.06$
$A_{CP}(B^+ \to \eta K^*_0(1430)^+) = 0.05 \pm 0.13$
$A_{CP}(B^+ \to \eta K^*_2(1430)^+) = -0.45 \pm 0.30$
$A_{CP}(B^+ \to \omega K^+) = 0.02 \pm 0.05$
$A_{CP}(B^+ \to \omega K^{*+}) = 0.29 \pm 0.35$
$A_{CP}(B^+ \to \omega (K\pi)^{*+}_0) = -0.10 \pm 0.09$
$A_{CP}(B^+ \to \omega K^*_2(1430)^+) = 0.14 \pm 0.15$
$A_{CP}(B^+ \to K^{*0} \pi^+) = -0.04 \pm 0.09 \quad (S = 2.1)$
$A_{CP}(B^+ \to K^*(892)^+ \pi^0) = -0.06 \pm 0.24$
$A_{CP}(B^+ \to K^+ \pi^- \pi^+) = 0.038 \pm 0.022$
$A_{CP}(B^+ \to K^+ K^- K^+ \text{ nonresonant}) = 0.06 \pm 0.05$
$A_{CP}(B^+ \to f(980)^0 K^+) = -0.08 \pm 0.09$
$\boldsymbol{A_{CP}(B^+ \to f_2(1270) K^+) = -0.68^{+0.19}_{-0.17}}$
$A_{CP}(B^+ \to f_0(1500) K^+) = 0.28 \pm 0.30$
$A_{CP}(B^+ \to f'_2(1525)^0 K^+) = -0.08^{+0.05}_{-0.04}$
$\boldsymbol{A_{CP}(B^+ \to \rho^0 K^+) = 0.37 \pm 0.10}$
$A_{CP}(B^+ \to K^*_0(1430)^0 \pi^+) = 0.055 \pm 0.033$
$A_{CP}(B^+ \to K^*_2(1430)^0 \pi^+) = 0.05^{+0.29}_{-0.24}$
$A_{CP}(B^+ \to K^+ \pi^0 \pi^0) = -0.06 \pm 0.07$
$A_{CP}(B^+ \to K^0 \rho^+) = -0.12 \pm 0.17$
$A_{CP}(B^+ \to K^{*+} \pi^+ \pi^-) = 0.07 \pm 0.08$
$A_{CP}(B^+ \to \rho^0 K^*(892)^+) = 0.31 \pm 0.13$
$A_{CP}(B^+ \to K^*(892)^+ f_0(980)) = -0.15 \pm 0.12$
$A_{CP}(B^+ \to a_1^+ K^0) = 0.12 \pm 0.11$

$A_{CP}(B^+ \to\ b_1^+ K^0) = -0.03 \pm 0.15$
$A_{CP}(B^+ \to\ K^*(892)^0 \rho^+) = -0.01 \pm 0.16$
$A_{CP}(B^+ \to\ b_1^0 K^+) = -0.46 \pm 0.20$
$A_{CP}(B^+ \to\ K^0 K^+) = 0.04 \pm 0.14$
$A_{CP}(B^+ \to\ K^+ K_S^0 K_S^0) = 0.04^{+0.04}_{-0.05}$
$A_{CP}(B^+ \to\ K^+ K^- \pi^+) = 0.00 \pm 0.10$
$A_{CP}(B^+ \to\ K^+ K^- K^+) = -0.017^{+0.024}_{-0.020}$
$A_{CP}(B^+ \to\ \phi K^+) = 0.10 \pm 0.04$
$A_{CP}(B^+ \to\ X_0(1550) K^+) = -0.04 \pm 0.07$
$A_{CP}(B^+ \to\ K^{*+} K^+ K^-) = 0.11 \pm 0.09$
$A_{CP}(B^+ \to\ \phi K^*(892)^+) = -0.01 \pm 0.08$
$A_{CP}(B^+ \to\ \phi (K\pi)_0^{*+}) = 0.04 \pm 0.16$
$A_{CP}(B^+ \to\ \phi K_1(1270)^+) = 0.15 \pm 0.20$
$A_{CP}(B^+ \to\ \phi K_2^*(1430)^+) = -0.23 \pm 0.20$
$A_{CP}(B^+ \to\ K^+ \phi\phi) = -0.10 \pm 0.08$
$A_{CP}(B^+ \to\ K^+ [\phi\phi]_{\eta_c}) = 0.09 \pm 0.10$
$A_{CP}(B^+ \to\ K^*(892)^+ \gamma) = 0.018 \pm 0.029$
$A_{CP}(B^+ \to\ \eta K^+ \gamma) = -0.12 \pm 0.07$
$A_{CP}(B^+ \to\ \phi K^+ \gamma) = -0.13 \pm 0.11$ (S = 1.1)
$A_{CP}(B^+ \to\ \rho^+ \gamma) = -0.11 \pm 0.33$
$A_{CP}(B^+ \to\ \pi^+ \pi^0) = 0.03 \pm 0.04$
$A_{CP}(B^+ \to\ \pi^+ \pi^- \pi^+) = 0.03 \pm 0.06$
$A_{CP}(B^+ \to\ \rho^0 \pi^+) = 0.18^{+0.09}_{-0.17}$
$A_{CP}(B^+ \to\ f_2(1270) \pi^+) = 0.41 \pm 0.30$
$A_{CP}(B^+ \to\ \rho^0(1450) \pi^+) = -0.1^{+0.4}_{-0.5}$
$A_{CP}(B^+ \to\ f_0(1370)\pi^+) = 0.72 \pm 0.22$
$A_{CP}(B^+ \to\ \pi^+ \pi^- \pi^+ \text{ nonresonant}) = -0.14^{+0.23}_{-0.16}$
$A_{CP}(B^+ \to\ \rho^+ \pi^0) = 0.02 \pm 0.11$
$A_{CP}(B^+ \to\ \rho^+ \rho^0) = -0.05 \pm 0.05$
$A_{CP}(B^+ \to\ \omega \pi^+) = -0.04 \pm 0.06$
$A_{CP}(B^+ \to\ \omega \rho^+) = -0.20 \pm 0.09$
$A_{CP}(B^+ \to\ \eta \pi^+) = -0.14 \pm 0.07$ (S = 1.4)
$A_{CP}(B^+ \to\ \eta \rho^+) = 0.11 \pm 0.11$
$A_{CP}(B^+ \to\ \eta' \pi^+) = 0.06 \pm 0.16$
$A_{CP}(B^+ \to\ \eta' \rho^+) = 0.26 \pm 0.17$
$A_{CP}(B^+ \to\ b_1^0 \pi^+) = 0.05 \pm 0.16$
$A_{CP}(B^+ \to\ p \overline{p} \pi^+) = 0.00 \pm 0.04$
$A_{CP}(B^+ \to\ p \overline{p} K^+) = -0.16 \pm 0.07$
$A_{CP}(B^+ \to\ p \overline{p} K^*(892)^+) = 0.21 \pm 0.16$ (S = 1.4)
$A_{CP}(B^+ \to\ p \overline{\Lambda} \gamma) = 0.17 \pm 0.17$
$A_{CP}(B^+ \to\ p \overline{\Lambda} \pi^0) = 0.01 \pm 0.17$

$A_{CP}(B^+ \to K^+ \ell^+ \ell^-) = -0.02 \pm 0.08$
$A_{CP}(B^+ \to K^+ e^+ e^-) = 0.14 \pm 0.14$
$A_{CP}(B^+ \to K^+ \mu^+ \mu^-) = -0.05 \pm 0.13$
$A_{CP}(B^+ \to K^{*+} \ell^+ \ell^-) = -0.09 \pm 0.14$
$A_{CP}(B^+ \to K^* e^+ e^-) = -0.14 \pm 0.23$
$A_{CP}(B^+ \to K^* \mu^+ \mu^-) = -0.12 \pm 0.24$
$\gamma(B^+ \to D^{(*)0} K^{(*)+}) = (72 \pm 11)^\circ$

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.*, $B \to D^\pm$ anything, 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				
$\ell^+ \nu_\ell$ anything	[*sss*]	(10.99 ±0.28) %		–
$e^+ \nu_e X_c$		(10.8 ±0.4) %		–
$D \ell^+ \nu_\ell$ anything		(9.8 ±0.7) %		–
$\overline{D}^0 \ell^+ \nu_\ell$	[*sss*]	(2.23 ±0.12) %		2310
$\overline{D}^0 \tau^+ \nu_\tau$		(7.7 ±2.5) $\times 10^{-3}$		1911
$\overline{D}^*(2007)^0 \ell^+ \nu_\ell$	[*sss*]	(5.70 ±0.19) %		2258
$\overline{D}^*(2007)^0 \tau^+ \nu_\tau$		(1.88 ±0.20) %		1839
$D^- \pi^+ \ell^+ \nu_\ell$		(4.2 ±0.5) $\times 10^{-3}$		2306
$\overline{D}_0^*(2420)^0 \ell^+ \nu_\ell \times$ B($\overline{D}_0^{*0} \to D^- \pi^+$)		(2.5 ±0.5) $\times 10^{-3}$		–
$\overline{D}_2^*(2460)^0 \ell^+ \nu_\ell \times$ B($\overline{D}_2^{*0} \to D^- \pi^+$)		(1.53 ±0.16) $\times 10^{-3}$		2065
$D^{(*)}$ n $\pi \ell^+ \nu_\ell$ (n $\geq$ 1)		(1.87 ±0.26) %		–
$D^{*-} \pi^+ \ell^+ \nu_\ell$		(6.1 ±0.6) $\times 10^{-3}$		2254
$\overline{D}_1(2420)^0 \ell^+ \nu_\ell \times$ B($\overline{D}_1^0 \to D^{*-} \pi^+$)		(3.03 ±0.20) $\times 10^{-3}$		2084

$\overline{D}_1'(2430)^0\,\ell^+\nu_\ell\times$ B($\overline{D}_1'^0\to D^{*-}\pi^+$)		(2.7	±0.6)	$\times10^{-3}$		–
$\overline{D}_2^*(2460)^0\,\ell^+\nu_\ell\times$ B($\overline{D}_2^{*0}\to D^{*-}\pi^+$)		(1.01	±0.24)	$\times10^{-3}$	S=2.0	2065
$D_s^{(*)-}\,K^+\ell^+\nu_\ell$		(6.1	±1.0)	$\times10^{-4}$		–
$D_s^-\,K^+\ell^+\nu_\ell$		(3.0	$^{+1.4}_{-1.2}$)	$\times10^{-4}$		2242
$D_s^{*-}\,K^+\ell^+\nu_\ell$		(2.9	±1.9)	$\times10^{-4}$		2185
$\pi^0\,\ell^+\nu_\ell$		(7.79	±0.26)	$\times10^{-5}$		2638
$\eta\,\ell^+\nu_\ell$		(3.8	±0.6)	$\times10^{-5}$		2611
$\eta'\,\ell^+\nu_\ell$		(2.3	±0.8)	$\times10^{-5}$		2553
$\omega\,\ell^+\nu_\ell$	[sss]	(1.21	±0.12)	$\times10^{-4}$		2582
$\rho^0\,\ell^+\nu_\ell$	[sss]	(1.07	±0.13)	$\times10^{-4}$		2583
$p\overline{p}\,e^+\nu_e$		$<$ 5.2		$\times10^{-3}$	CL=90%	2467
$e^+\nu_e$		$<$ 9.8		$\times10^{-7}$	CL=90%	2640
$\mu^+\nu_\mu$		$<$ 1.0		$\times10^{-6}$	CL=90%	2639
$\tau^+\nu_\tau$		(1.05	±0.25)	$\times10^{-4}$	S=1.1	2341
$\ell^+\nu_\ell\gamma$		$<$ 1.56		$\times10^{-5}$	CL=90%	2640
$e^+\nu_e\gamma$		$<$ 1.7		$\times10^{-5}$	CL=90%	2640
$\mu^+\nu_\mu\gamma$		$<$ 2.4		$\times10^{-5}$	CL=90%	2639

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	$^{+2.2}_{-1.8}$)	%		–
$\overline{c}\,c\,X$		(120	±6)	%		–

D, D^*, or D_s modes

$\overline{D}^0\,\pi^+$		(4.81	±0.15)	$\times10^{-3}$		2308
$D_{CP(+1)}\,\pi^+$	[ttt]	(2.20	±0.26)	$\times10^{-3}$		–
$D_{CP(-1)}\,\pi^+$	[ttt]	(2.1	±0.4)	$\times10^{-3}$		–
$\overline{D}^0\,\rho^+$		(1.34	±0.18)	%		2237
$\overline{D}^0\,K^+$		(3.70	±0.21)	$\times10^{-4}$		2281
$D_{CP(+1)}\,K^+$	[ttt]	(1.91	±0.15)	$\times10^{-4}$		–

$D_{CP(-1)}\,K^+$	[*ttt*]	(	2.00	±0.20)	$\times 10^{-4}$		–
$[K^-\pi^+]_D\,K^+$	[*uuu*]	<	2.8		$\times 10^{-7}$	CL=90%	–
$[K^+\pi^-]_D\,K^+$	[*uuu*]	<	1.8		$\times 10^{-5}$	CL=90%	–
$[K^-\pi^+]_D\,\pi^+$	[*uuu*]	(	6.3	±1.1)	$\times 10^{-7}$		–
$[K^+\pi^-]_D\,\pi^+$		(	1.68	±0.31)	$\times 10^{-4}$		–
$[\pi^+\pi^-\pi^0]_D\,K^-$		(	4.6	±0.9)	$\times 10^{-6}$		–
$\overline{D}^0\,K^*(892)^+$		(	5.3	±0.4)	$\times 10^{-4}$		2213
$D_{CP(-1)}\,K^*(892)^+$	[*ttt*]	(	2.7	±0.8)	$\times 10^{-4}$		–
$D_{CP(+1)}\,K^*(892)^+$	[*ttt*]	(	5.8	±1.1)	$\times 10^{-4}$		–
$\overline{D}^0\,K^+\pi^+\pi^-$		(	5.4	±2.2)	$\times 10^{-4}$		2237
$\overline{D}^0\,K^+\overline{K}^0$		(	5.5	±1.6)	$\times 10^{-4}$		2189
$\overline{D}^0\,K^+\overline{K}^*(892)^0$		(	7.5	±1.7)	$\times 10^{-4}$		2071
$\overline{D}^0\,\pi^+\pi^+\pi^-$		(	5.7	±2.2)	$\times 10^{-3}$	S=3.6	2289
$\overline{D}^0\,\pi^+\pi^+\pi^-$ nonresonant		(	5	±4)	$\times 10^{-3}$		2289
$\overline{D}^0\,\pi^+\rho^0$		(	4.2	±3.0)	$\times 10^{-3}$		2207
$\overline{D}^0\,a_1(1260)^+$		(	4	±4)	$\times 10^{-3}$		2123
$\overline{D}^0\,\omega\,\pi^+$		(	4.1	±0.9)	$\times 10^{-3}$		2206
$D^*(2010)^-\,\pi^+\pi^+$		(	1.35	±0.22)	$\times 10^{-3}$		2247
$\overline{D}_1(2420)^0\,\pi^+,\ \overline{D}_1^0 \to D^*(2010)^-\,\pi^+$		(	5.3	±2.3)	$\times 10^{-4}$		2081
$D^-\,\pi^+\pi^+$		(	1.07	±0.05)	$\times 10^{-3}$		2299
$D^+\,K^0$		<	2.9		$\times 10^{-6}$	CL=90%	2278
$D^+\,K^{*0}$		<	1.8		$\times 10^{-6}$	CL=90%	2211
$D^+\,\overline{K}^{*0}$		<	1.4		$\times 10^{-6}$	CL=90%	2211
$\overline{D}^*(2007)^0\,\pi^+$		(	5.18	±0.26)	$\times 10^{-3}$		2256
$\overline{D}^{*0}_{CP(+1)}\,\pi^+$	[*vvv*]	(	2.9	±0.7)	$\times 10^{-3}$		–
$D^{*0}_{CP(-1)}\,\pi^+$	[*vvv*]	(	2.6	±1.0)	$\times 10^{-3}$		–
$\overline{D}^*(2007)^0\,\omega\,\pi^+$		(	4.5	±1.2)	$\times 10^{-3}$		2149
$\overline{D}^*(2007)^0\,\rho^+$		(	9.8	±1.7)	$\times 10^{-3}$		2181
$\overline{D}^*(2007)^0\,K^+$		(	4.20	±0.34)	$\times 10^{-4}$		2227
$\overline{D}^{*0}_{CP(+1)}\,K^+$	[*vvv*]	(	2.8	±0.4)	$\times 10^{-4}$		–
$\overline{D}^{*0}_{CP(-1)}\,K^+$	[*vvv*]	(	2.31	±0.33)	$\times 10^{-4}$		–
$\overline{D}^*(2007)^0\,K^*(892)^+$		(	8.1	±1.4)	$\times 10^{-4}$		2156
$\overline{D}^*(2007)^0\,K^+\overline{K}^0$		<	1.06		$\times 10^{-3}$	CL=90%	2132
$\overline{D}^*(2007)^0\,K^+K^*(892)^0$		(	1.5	±0.4)	$\times 10^{-3}$		2008
$\overline{D}^*(2007)^0\,\pi^+\pi^+\pi^-$		(	1.03	±0.12)	%		2236
$\overline{D}^*(2007)^0\,a_1(1260)^+$		(	1.9	±0.5)	%		2063
$\overline{D}^*(2007)^0\,\pi^-\pi^+\pi^+\pi^0$		(	1.8	±0.4)	%		2219
$\overline{D}^{*0}\,3\pi^+2\pi^-$		(	5.7	±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	±0.7)	%		2235

$D^*(2010)^-\pi^+\pi^+\pi^+\pi^-$		(	2.6	± 0.4	) $\times 10^{-3}$		2217
$\overline{D}^{**0}\pi^+$	[xxx]	(	5.9	± 1.3	) $\times 10^{-3}$		–
$\overline{D}_1^*(2420)^0\pi^+$		(	1.5	± 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	$^{+1.7}_{-1.4}$	) $\times 10^{-4}$	S=4.0	2081
$\overline{D}_1(2420)^0\pi^+\times$ B($\overline{D}_1^0 \to \overline{D}^0\pi^+\pi^-$ (nonresonant))		(	2.3	± 1.0	) $\times 10^{-4}$		2081
$\overline{D}_2^*(2462)^0\pi^+ \times$ B($\overline{D}_2^*(2462)^0 \to D^-\pi^+$)		(	3.5	± 0.4	) $\times 10^{-4}$		–
$\overline{D}_2^*(2462)^0\pi^+\times$B($\overline{D}_2^{*0} \to \overline{D}^0\pi^-\pi^+$)		(	2.3	± 1.1	) $\times 10^{-4}$		–
$\overline{D}_2^*(2462)^0\pi^+\times$B($\overline{D}_2^{*0} \to \overline{D}^0\pi^-\pi^+$ (nonresonant))		<	1.7		$\times 10^{-4}$	CL=90%	–
$\overline{D}_2^*(2462)^0\pi^+\times$B($\overline{D}_2^{*0} \to D^*(2010)^-\pi^+$)		(	2.2	± 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	) $\times 10^{-4}$		2128
$\overline{D}_1(2421)^0\pi^+ \times$ B($\overline{D}_1(2421)^0 \to D^{*-}\pi^+$)		(	6.8	± 1.5	) $\times 10^{-4}$		–
$\overline{D}_2^*(2462)^0\pi^+ \times$ B($\overline{D}_2^*(2462)^0 \to D^{*-}\pi^+$)		(	1.8	± 0.5	) $\times 10^{-4}$		–
$\overline{D}_1'(2427)^0\pi^+ \times$ B($\overline{D}_1'(2427)^0 \to D^{*-}\pi^+$)		(	5.0	± 1.2	) $\times 10^{-4}$		–
$\overline{D}_1(2420)^0\pi^+\times$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%	2062
$\overline{D}_2^*(2460)^0\pi^+\times$B($\overline{D}_2^{*0} \to \overline{D}^{*0}\pi^+\pi^-$)		<	2.2		$\times 10^{-5}$	CL=90%	2062
$\overline{D}_2^*(2460)^0\rho^+$		<	4.7		$\times 10^{-3}$	CL=90%	1976
$\overline{D}^0 D_s^+$		(	10.0	± 1.7	) $\times 10^{-3}$		1815
$D_{s0}(2317)^+\overline{D}^0\times$ B($D_{s0}(2317)^+ \to D_s^+\pi^0$)		(	7.3	$^{+2.2}_{-1.7}$	) $\times 10^{-4}$		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		$\times10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+\overline{D}^0\times$ B($D_{sJ}(2457)^+\to D_s^+\pi^0$)	$<$	2.7		$\times10^{-4}$	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	±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	±1.0)	$\times10^{-4}$		1447
$\overline{D}^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+\to D^*(2007)^0K^+$)	(	2.2	±0.7)	$\times10^{-4}$		1447
$\overline{D}^*(2007)^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+\to D^*(2007)^0K^+$)	(	5.5	±1.6)	$\times10^{-4}$		1339
$\overline{D}^0 D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+\to D^{*+}K^0$)	(	2.3	±1.1)	$\times10^{-4}$		1447
$\overline{D}^0 D_{sJ}(2700)^+\times$ B($D_{sJ}(2700)^+\to D^0K^+$)	(	1.13	$^{+0.26}_{-0.40}$)	$\times10^{-3}$		–
$\overline{D}^{*0} D_{s1}(2536)^+\times$ B($D_{s1}(2536)^+\to D^{*+}K^0$)	(	3.9	±2.6)	$\times10^{-4}$		1339
$\overline{D}^{*0} D_{sJ}(2573)^+\times$ B($D_{sJ}(2573)^+\to D^0K^+$)	$<$	2		$\times10^{-4}$	CL=90%	1306
$\overline{D}^*(2007)^0 D_{sJ}(2573)^+\times$ B($D_{sJ}(2573)^+\to D^0K^+$)	$<$	5		$\times10^{-4}$	CL=90%	1306
$\overline{D}^0 D_s^{*+}$	(	7.6	±1.6)	$\times10^{-3}$		1734
$\overline{D}^*(2007)^0 D_s^+$	(	8.2	±1.7)	$\times10^{-3}$		1737
$\overline{D}^*(2007)^0 D_s^{*+}$	(	1.71	±0.24)	%		1651
$D_s^{(*)+}\overline{D}^{**0}$	(	2.7	±1.2)	%		–
$\overline{D}^*(2007)^0 D^*(2010)^+$	(	8.1	±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	±0.5)	$\times10^{-4}$		1792
$\overline{D}^0 D^+$	(	3.8	±0.4)	$\times10^{-4}$		1866
$\overline{D}^0 D^+ K^0$	(	1.55	±0.21)	$\times10^{-3}$		1571
$D^+\overline{D}^*(2007)^0$	(	6.3	±1.7)	$\times10^{-4}$		1791
$\overline{D}^*(2007)^0 D^+ K^0$	(	2.1	±0.5)	$\times10^{-3}$		1474

$\overline{D}^0 \overline{D}^*(2010)^+ K^0$	(	3.8	± 0.4	) $\times 10^{-3}$		1476
$\overline{D}^*(2007)^0 D^*(2010)^+ K^0$	(	9.2	± 1.2	) $\times 10^{-3}$		1362
$\overline{D}^0 D^0 K^+$	(	1.45	± 0.33	) $\times 10^{-3}$	S=2.6	1577
$\overline{D}^*(2007)^0 D^0 K^+$	(	2.26	± 0.23	) $\times 10^{-3}$		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	) $\times 10^{-4}$		1570
$D^- D^*(2010)^+ K^+$	(	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
$D_s^+ \phi$	(	1.9	$^{+1.3}_{-0.8}$	) $\times 10^{-6}$		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
$D_s^- K^+ K^+$	(	1.1	± 0.4	) $\times 10^{-5}$		2149
$D_s^{*-} K^+ K^+$	$<$	1.5		$\times 10^{-5}$	CL=90%	2088

Charmonium modes

$\eta_c K^+$	(	9.6	± 1.1	) $\times 10^{-4}$		1751
$\eta_c K^+$, $\eta_c \to K_S^0 K^\mp \pi^\pm$	(	2.7	± 0.6	) $\times 10^{-5}$		–
$\eta_c K^*(892)^+$	(	1.0	$^{+0.5}_{-0.4}$	) $\times 10^{-3}$		1646
$\eta_c(2S) K^+$	(	3.4	± 1.8	) $\times 10^{-4}$		1319

$\eta_c(2S)K^+$, $\eta_c(2S) \to K^0_S K^\mp \pi^\pm$	(	3.4	$^{+2.3}_{-1.6}$) $\times 10^{-6}$			–
$h_c(1P)K^+ \times$ B($h_c(1P) \to J/\psi\pi^+\pi^-$)	$<$	3.4		$\times 10^{-6}$	CL=90%	1401
$X(3872)K^+$	$<$	3.2		$\times 10^{-4}$	CL=90%	1141
$X(3872)K^+ \times$ B($X \to J/\psi\pi^+\pi^-$)	(	8.6	± 0.8) $\times 10^{-6}$			1141
$X(3872)K^+ \times$ B($X \to J/\psi\gamma$)	(	2.1	± 0.4) $\times 10^{-6}$		S=1.1	1141
$X(3872)K^*(892)^+ \times$ B($X \to J/\psi\gamma$)	$<$	4.8		$\times 10^{-6}$	CL=90%	939
$X(3872)K^+ \times$ B($X \to \psi(2S)\gamma$)	(	4	± 4) $\times 10^{-6}$		S=2.5	1141
$X(3872)K^*(892)^+ \times$ B($X \to \psi(2S)\gamma$)	$<$	2.8		$\times 10^{-5}$	CL=90%	939
$X(3872)K^+ \times$ B($X \to D^0\overline{D}^0$)	$<$	6.0		$\times 10^{-5}$	CL=90%	1141
$X(3872)K^+ \times$ B($X \to D^+D^-$)	$<$	4.0		$\times 10^{-5}$	CL=90%	1141
$X(3872)K^+ \times$ B($X \to D^0\overline{D}^0\pi^0$)	(	1.0	± 0.4) $\times 10^{-4}$			1141
$X(3872)K^+ \times$ B($X \to \overline{D}^{*0}D^0$)	(	8.5	± 2.6) $\times 10^{-5}$		S=1.4	1141
$X(3872)K^+ \times$ B($X(3872) \to J/\psi(1S)\eta$)	$<$	7.7		$\times 10^{-6}$	CL=90%	1141
$X(3872)^+K^0 \times$ B($X(3872)^+ \to J/\psi(1S)\pi^+\pi^0$) [yyy]	$<$	6.1		$\times 10^{-6}$	CL=90%	–
$X(4430)^+K^0 \times$ B($X^+ \to J/\psi\pi^+$)	$<$	1.5		$\times 10^{-5}$	CL=95%	–
$X(4430)^+K^0 \times$ B($X^+ \to \psi(2S)\pi^+$)	$<$	4.7		$\times 10^{-5}$	CL=95%	–
$X(4260)^0K^+ \times$ B($X^0 \to J/\psi\pi^+\pi^-$)	$<$	2.9		$\times 10^{-5}$	CL=95%	–
$X(3915)^0K^+ \times$ B($X^0 \to J/\psi\gamma$)	$<$	1.4		$\times 10^{-5}$	CL=90%	–
$Z(3930)^0K^+ \times$ B($Z^0 \to J/\psi\gamma$)	$<$	2.5		$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)K^+$	(	1.028	± 0.031) $\times 10^{-3}$			1683
$J/\psi(1S)K^+\pi^+\pi^-$	(	8.1	± 1.3) $\times 10^{-4}$		S=2.5	1612
$J/\psi(1S)K^*(892)^+$	(	1.44	± 0.08) $\times 10^{-3}$			1571
$J/\psi(1S)K(1270)^+$	(	1.8	± 0.5) $\times 10^{-3}$			1390
$J/\psi(1S)K(1400)^+$	$<$	5		$\times 10^{-4}$	CL=90%	1308
$J/\psi(1S)\eta K^+$	(	1.08	± 0.33) $\times 10^{-4}$			1510
$J/\psi(1S)\eta' K^+$	$<$	8.8		$\times 10^{-5}$	CL=90%	1273
$J/\psi(1S)\phi K^+$	(	5.2	± 1.7) $\times 10^{-5}$		S=1.2	1227

$X(4140)K^+,\ X \to J/\psi(1S)\phi$	$<$	4		$\times 10^{-6}$	CL=90%	–
$X(4274)K^+,\ X \to J/\psi(1S)\phi$	$<$	4		$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)\omega K^+$	(	3.20	$^{+0.60}_{-0.32}$)	$\times 10^{-4}$		1388
$X(3872)K^+ \times$ B($X \to J/\psi\omega$)	(	6.0	± 2.2)	$\times 10^{-6}$		1141
$X(3915)K^+ \times$ B($X \to J/\psi\omega$)	(	3.0	$^{+0.9}_{-0.7}$)	$\times 10^{-5}$		1103
$J/\psi(1S)\pi^+$	(	4.1	± 0.4)	$\times 10^{-5}$	S=2.6	1727
$J/\psi(1S)\rho^+$	(	5.0	± 0.8)	$\times 10^{-5}$		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
$J/\psi(1S)p\overline{\Lambda}$	(	1.18	± 0.31)	$\times 10^{-5}$		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%	870
$J/\psi(1S)\overline{D}^0\pi^+$	$<$	2.5		$\times 10^{-5}$	CL=90%	665
$\psi(2S)\pi^+$	(	2.44	± 0.30)	$\times 10^{-5}$		1347
$\psi(2S)K^+$	(	6.27	± 0.24)	$\times 10^{-4}$		1284
$\psi(2S)K^*(892)^+$	(	6.7	± 1.4)	$\times 10^{-4}$	S=1.3	1115
$\psi(2S)K^+\pi^+\pi^-$	(	4.3	± 0.5)	$\times 10^{-4}$		1179
$\psi(3770)K^+$	(	4.9	± 1.3)	$\times 10^{-4}$		1218
$\psi(3770)K^+ \times$ B($\psi \to D^0\overline{D}^0$)	(	1.6	± 0.4)	$\times 10^{-4}$	S=1.1	1218
$\psi(3770)K^+ \times$ B($\psi \to D^+D^-$)	(	9.4	± 3.5)	$\times 10^{-5}$		1218
$\chi_{c0}\pi^+ \times$B($\chi_{c0} \to \pi^+\pi^-$)	$<$	1		$\times 10^{-7}$	CL=90%	1531
$\chi_{c0}(1P)K^+$	(	1.49	$^{+0.15}_{-0.13}$)	$\times 10^{-4}$		1478
$\chi_{c0}K^*(892)^+$	$<$	2.1		$\times 10^{-4}$	CL=90%	1341
$\chi_{c2}\pi^+ \times$B($\chi_{c2} \to \pi^+\pi^-$)	$<$	1		$\times 10^{-7}$	CL=90%	1437
$\chi_{c2}K^+$	(	1.1	± 0.4)	$\times 10^{-5}$		1379
$\chi_{c2}K^*(892)^+$	$<$	1.2		$\times 10^{-4}$	CL=90%	1227
$\chi_{c1}(1P)\pi^+$	(	2.2	± 0.5)	$\times 10^{-5}$		1468
$\chi_{c1}(1P)K^+$	(	4.79	± 0.23)	$\times 10^{-4}$		1412
$\chi_{c1}(1P)K^*(892)^+$	(	3.0	± 0.6)	$\times 10^{-4}$	S=1.1	1265
$h_c(1P)K^+$	$<$	3.8		$\times 10^{-5}$		1401

K or K^* modes

$K^0\pi^+$	(	2.38	± 0.07)	$\times 10^{-5}$		2614
$K^+\pi^0$	(	1.29	± 0.05)	$\times 10^{-5}$		2615
$\eta' K^+$	(	7.06	± 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	$^{+0.21}_{-0.18}$	) $\times 10^{-5}$		2406
$f_1(1285) K^+$	$<$	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^+	(	6.7	± 0.8	) $\times 10^{-6}$	S=1.8	2557
$\omega K^*(892)^+$	$<$	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	) $\times 10^{-5}$		2380
$a_0(980)^+ K^0 \times$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	± 0.09	) $\times 10^{-5}$		2562
$K^*(892)^+ \pi^0$	(	8.2	± 1.9	) $\times 10^{-6}$		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	) $\times 10^{-6}$		2557
$K^+ f_0(980) \times$ 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%	2392
$K^+\rho^0$	(	3.7	±0.5	)$\times10^{-6}$		2559
$K_0^*(1430)^0\pi^+$	(	4.5	$^{+0.9}_{-0.7}$	)$\times10^{-5}$	S=1.5	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	±0.19	)$\times10^{-5}$		2610
$f_0(980)K^+\times$ B($f_0\to\pi^0\pi^0$)	(	2.8	±0.8	)$\times10^{-6}$		2522
$K^-\pi^+\pi^+$	$<$	9.5		$\times10^{-7}$	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%	2484
$K_1(1400)^0\pi^+$	$<$	3.9		$\times10^{-5}$	CL=90%	2451
$K^0\pi^+\pi^0$	$<$	6.6		$\times10^{-5}$	CL=90%	2609
$K^0\rho^+$	(	8.0	±1.5	)$\times10^{-6}$		2558
$K^*(892)^+\pi^+\pi^-$	(	7.5	±1.0	)$\times10^{-5}$		2557
$K^*(892)^+\rho^0$	(	4.6	±1.1	)$\times10^{-6}$		2504
$K^*(892)^+f_0(980)$	(	4.2	±0.7	)$\times10^{-6}$		2466
$a_1^+K^0$	(	3.5	±0.7	)$\times10^{-5}$		–
$b_1^+K^0\times$ B($b_1^+\to\omega\pi^+$)	(	9.6	±1.9	)$\times10^{-6}$		–
$K^*(892)^0\rho^+$	(	9.2	±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	±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%	–
$K^+\overline{K}^0$	(	1.19	±0.18	)$\times10^{-6}$		2593
$\overline{K}^0K^+\pi^0$	$<$	2.4		$\times10^{-5}$	CL=90%	2578
$K^+K_S^0K_S^0$	(	1.08	±0.06	)$\times10^{-5}$		2521
$f_0(980)K^+$, $f_0\to K_S^0K_S^0$	(	1.47	±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	±0.4	)$\times10^{-5}$		2521
$K_S^0K_S^0\pi^+$	$<$	5.1		$\times10^{-7}$	CL=90%	2577
$K^+K^-\pi^+$	(	5.0	±0.7	)$\times10^{-6}$		2578
$K^+K^-\pi^+$ nonresonant	$<$	7.5		$\times10^{-5}$	CL=90%	2578
$K^+\overline{K}^*(892)^0$	$<$	1.1		$\times10^{-6}$	CL=90%	2540
$K^+\overline{K}_0^*(1430)^0$	$<$	2.2		$\times10^{-6}$	CL=90%	2421
$K^+K^+\pi^-$	$<$	1.6		$\times10^{-7}$	CL=90%	2578
$K^+K^+\pi^-$ nonresonant	$<$	8.79		$\times10^{-5}$	CL=90%	2578
$f_2'(1525)K^+$	(	1.8	±0.5	)$\times10^{-6}$	S=1.1	2392
$K^{*+}\pi^+K^-$	$<$	1.18		$\times10^{-5}$	CL=90%	2524

$K^*(892)^+ K^*(892)^0$	(	1.2	± 0.5	) $\times 10^{-6}$		2484
$K^{*+} K^+ \pi^-$	$<$	6.1		$\times 10^{-6}$	CL=90%	2524
$K^+ K^- K^+$	(	3.40	± 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	± 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	± 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	± 0.6	) $\times 10^{-6}$		2331
$K^+ K^- K^+$ nonresonant	(	2.38	$^{+0.28}_{-0.50}$	) $\times 10^{-5}$		2523
$K^*(892)^+ K^+ K^-$	(	3.6	± 0.5	) $\times 10^{-5}$		2466
$K^*(892)^+ \phi$	(	10.0	± 2.0	) $\times 10^{-6}$	S=1.7	2460
$\phi(K\pi)_0^{*+}$	(	8.3	± 1.6	) $\times 10^{-6}$		–
$\phi K_1(1270)^+$	(	6.1	± 1.9	) $\times 10^{-6}$		2375
$\phi K_1(1400)^+$	$<$	3.2		$\times 10^{-6}$	CL=90%	2339
$\phi K^*(1410)^+$	$<$	4.3		$\times 10^{-6}$	CL=90%	–
$\phi K_0^*(1430)^+$	(	7.0	± 1.6	) $\times 10^{-6}$		–
$\phi K_2^*(1430)^+$	(	8.4	± 2.1	) $\times 10^{-6}$		2333
$\phi K_2^*(1770)^+$	$<$	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%	–
$K^+ \phi \phi$	(	5.0	± 1.2	) $\times 10^{-6}$	S=2.3	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%	–
$K^*(892)^+ \gamma$	(	4.21	± 0.18	) $\times 10^{-5}$		2564
$K_1(1270)^+ \gamma$	(	4.3	± 1.3	) $\times 10^{-5}$		2486
$\eta K^+ \gamma$	(	7.9	± 0.9	) $\times 10^{-6}$		2588
$\eta' K^+ \gamma$	(	2.9	$^{+1.0}_{-0.9}$	) $\times 10^{-6}$		2528
$\phi K^+ \gamma$	(	2.7	± 0.4	) $\times 10^{-6}$	S=1.2	2516
$K^+ \pi^- \pi^+ \gamma$	(	2.76	± 0.22	) $\times 10^{-5}$	S=1.2	2609
$K^*(892)^0 \pi^+ \gamma$	(	2.0	$^{+0.7}_{-0.6}$	) $\times 10^{-5}$		2562
$K^+ \rho^0 \gamma$	$<$	2.0		$\times 10^{-5}$	CL=90%	2559
$K^+ \pi^- \pi^+ \gamma$ nonresonant	$<$	9.2		$\times 10^{-6}$	CL=90%	2609
$K^0 \pi^+ \pi^0 \gamma$	(	4.6	± 0.5	) $\times 10^{-5}$		2609
$K_1(1400)^+ \gamma$	$<$	1.5		$\times 10^{-5}$	CL=90%	2453

$K_2^*(1430)^+\gamma$	(	1.4	± 0.4) $\times 10^{-5}$			2447
$K^*(1680)^+\gamma$	$<$	1.9	$\times 10^{-3}$		CL=90%	2360
$K_3^*(1780)^+\gamma$	$<$	3.9	$\times 10^{-5}$		CL=90%	2341
$K_4^*(2045)^+\gamma$	$<$	9.9	$\times 10^{-3}$		CL=90%	2244

Light unflavored meson modes

$\rho^+\gamma$	(	9.8	± 2.5) $\times 10^{-7}$			2583
$\pi^+\pi^0$	(	5.5	± 0.4) $\times 10^{-6}$		S=1.2	2636
$\pi^+\pi^+\pi^-$	(	1.52	± 0.14) $\times 10^{-5}$			2630
$\rho^0\pi^+$	(	8.3	± 1.2) $\times 10^{-6}$			2581
$\pi^+ f_0(980)\times$ B($f_0(980) \to \pi^+\pi^-$)	$<$	1.5	$\times 10^{-6}$		CL=90%	2545
$\pi^+ f_2(1270)$	(	1.6	$^{+0.7}_{-0.4}$) $\times 10^{-6}$			2484
$\rho(1450)^0\pi^+\times$ B($\rho^0 \to \pi^+\pi^-$)	(	1.4	$^{+0.6}_{-0.9}$) $\times 10^{-6}$			2434
$f_0(1370)\pi^+\times$B($f_0(1370) \to \pi^+\pi^-$)	$<$	4.0	$\times 10^{-6}$		CL=90%	2460
$f_0(500)\pi^+\times$B($f_0(500) \to \pi^+\pi^-$)	$<$	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	± 0.14) $\times 10^{-5}$			2581
$\pi^+\pi^-\pi^+\pi^0$	$<$	4.0	$\times 10^{-3}$		CL=90%	2622
$\rho^+\rho^0$	(	2.40	± 0.19) $\times 10^{-5}$			2523
$\rho^+ f_0(980)\times$B($f_0(980) \to \pi^+\pi^-$)	$<$	2.0	$\times 10^{-6}$		CL=90%	2486
$a_1(1260)^+\pi^0$	(	2.6	± 0.7) $\times 10^{-5}$			2494
$a_1(1260)^0\pi^+$	(	2.0	± 0.6) $\times 10^{-5}$			2494
$\omega\pi^+$	(	6.9	± 0.5) $\times 10^{-6}$			2580
$\omega\rho^+$	(	1.59	± 0.21) $\times 10^{-5}$			2522
$\eta\pi^+$	(	4.02	± 0.27) $\times 10^{-6}$			2609
$\eta\rho^+$	(	7.0	± 2.9) $\times 10^{-6}$		S=2.8	2553
$\eta'\pi^+$	(	2.7	± 0.9) $\times 10^{-6}$		S=1.9	2551
$\eta'\rho^+$	(	9.7	± 2.2) $\times 10^{-6}$			2492
$\phi\pi^+$	$<$	2.4	$\times 10^{-7}$		CL=90%	2539
$\phi\rho^+$	$<$	3.0	$\times 10^{-6}$		CL=90%	2480
$a_0(980)^0\pi^+\times$B($a_0(980)^0 \to \eta\pi^0$)	$<$	5.8	$\times 10^{-6}$		CL=90%	–
$a_0(980)^+\pi^0\times$ B($a_0^+ \to \eta\pi^+$)	$<$	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

$b_1^0\pi^+\times$ B($b_1^0\to\ \omega\pi^0$)	(	6.7	±2.0)	$\times10^{-6}$		–
$b_1^+\pi^0\times$ B($b_1^+\to\ \omega\pi^+$)	$<$	3.3		$\times10^{-6}$	CL=90%	–
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0$	$<$	6.3		$\times10^{-3}$	CL=90%	2592
$b_1^+\rho^0\times$ B($b_1^+\to\ \omega\pi^+$)	$<$	5.2		$\times10^{-6}$	CL=90%	–
$a_1(1260)^+a_1(1260)^0$	$<$	1.3		%	CL=90%	2336
$b_1^0\rho^+\times$ B($b_1^0\to\ \omega\pi^0$)	$<$	3.3		$\times10^{-6}$	CL=90%	–

Charged particle ($h^\pm$) modes

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

$h^+\pi^0$	(	1.6	$^{+0.7}_{-0.6}$)	$\times10^{-5}$		2636
ωh^+	(	1.38	$^{+0.27}_{-0.24}$)	$\times10^{-5}$		2580
h^+X^0(Familon)	$<$	4.9		$\times10^{-5}$	CL=90%	–

Baryon modes

$p\overline{p}\pi^+$	(	1.62	±0.20)	$\times10^{-6}$		2439
$p\overline{p}\pi^+$ nonresonant	$<$	5.3		$\times10^{-5}$	CL=90%	2439
$p\overline{p}K^+$	(	5.9	±0.5)	$\times10^{-6}$	S=1.5	2348
$\Theta(1710)^{++}\overline{p}\times$ B($\Theta(1710)^{++}\to\ pK^+$)	[zzz] $<$	9.1		$\times10^{-8}$	CL=90%	–
$f_J(2220)K^+\times$ B($f_J(2220)\to p\overline{p}$)	[zzz] $<$	4.1		$\times10^{-7}$	CL=90%	2135
$p\overline{\Lambda}(1520)$	$<$	1.5		$\times10^{-6}$	CL=90%	2322
$p\overline{p}K^+$ nonresonant	$<$	8.9		$\times10^{-5}$	CL=90%	2348
$p\overline{p}K^*(892)^+$	(	3.6	$^{+0.8}_{-0.7}$)	$\times10^{-6}$		2215
$f_J(2220)K^{*+}\times$ B($f_J(2220)\to p\overline{p}$)	$<$	7.7		$\times10^{-7}$	CL=90%	2059
$p\overline{\Lambda}$	$<$	3.2		$\times10^{-7}$	CL=90%	2430
$p\overline{\Lambda}\gamma$	(	2.4	$^{+0.5}_{-0.4}$)	$\times10^{-6}$		2430
$p\overline{\Lambda}\pi^0$	(	3.0	$^{+0.7}_{-0.6}$)	$\times10^{-6}$		2402
$p\overline{\Sigma}(1385)^0$	$<$	4.7		$\times10^{-7}$	CL=90%	2362
$\Delta^+\overline{\Lambda}$	$<$	8.2		$\times10^{-7}$	CL=90%	–
$p\overline{\Sigma}\gamma$	$<$	4.6		$\times10^{-6}$	CL=90%	2413
$p\overline{\Lambda}\pi^+\pi^-$	(	5.9	±1.1)	$\times10^{-6}$		2367
$p\overline{\Lambda}\rho^0$	(	4.8	±0.9)	$\times10^{-6}$		2214
$p\overline{\Lambda}f_2(1270)$	(	2.0	±0.8)	$\times10^{-6}$		2026
$\Lambda\overline{\Lambda}\pi^+$	$<$	9.4		$\times10^{-7}$	CL=90%	2358
$\Lambda\overline{\Lambda}K^+$	(	3.4	±0.6)	$\times10^{-6}$		2251
$\Lambda\overline{\Lambda}K^{*+}$	(	2.2	$^{+1.2}_{-0.9}$)	$\times10^{-6}$		2098
$\overline{\Delta}^0p$	$<$	1.38		$\times10^{-6}$	CL=90%	2403
$\Delta^{++}\overline{p}$	$<$	1.4		$\times10^{-7}$	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	± 0.27)	$\times 10^{-4}$		1789
$\overline{D}^{*0} p\overline{p}\pi^+$		(	3.73	± 0.32)	$\times 10^{-4}$		1709
$D^- p\overline{p}\pi^+\pi^-$		(	1.66	± 0.30)	$\times 10^{-4}$		1705
$D^{*-} p\overline{p}\pi^+\pi^-$		(	1.86	± 0.25)	$\times 10^{-4}$		1621
$p\overline{\Lambda}^0\overline{D}^0$		(	1.43	± 0.32)	$\times 10^{-5}$		–
$p\overline{\Lambda}^0\overline{D}^*(2007)^0$		<	5		$\times 10^{-5}$	CL=90%	–
$\overline{\Lambda}_c^- p\pi^+$		(	2.8	± 0.8)	$\times 10^{-4}$		1980
$\overline{\Lambda}_c^- \Delta(1232)^{++}$		<	1.9		$\times 10^{-5}$	CL=90%	1928
$\overline{\Lambda}_c^- \Delta_X(1600)^{++}$		(	5.9	± 1.9)	$\times 10^{-5}$		–
$\overline{\Lambda}_c^- \Delta_X(2420)^{++}$		(	4.7	± 1.6)	$\times 10^{-5}$		–
$(\overline{\Lambda}_c^- p)_s \pi^+$	[aaaa]	(	3.9	± 1.3)	$\times 10^{-5}$		–
$\overline{\Sigma}_c(2520)^0 p$		<	3		$\times 10^{-6}$	CL=90%	1904
$\overline{\Sigma}_c(2800)^0 p$		(	3.3	± 1.3)	$\times 10^{-5}$		–
$\overline{\Lambda}_c^- p\pi^+\pi^0$		(	1.8	± 0.6)	$\times 10^{-3}$		1935
$\overline{\Lambda}_c^- p\pi^+\pi^+\pi^-$		(	2.2	± 0.7)	$\times 10^{-3}$		1880
$\overline{\Lambda}_c^- p\pi^+\pi^+\pi^-\pi^0$		<	1.34		%	CL=90%	1823
$\Lambda_c^+ \Lambda_c^- K^+$		(	8.7	± 3.5)	$\times 10^{-4}$		–
$\overline{\Sigma}_c(2455)^0 p$		(	3.7	± 1.3)	$\times 10^{-5}$		1938
$\overline{\Sigma}_c(2455)^0 p\pi^0$		(	4.4	± 1.8)	$\times 10^{-4}$		1896
$\overline{\Sigma}_c(2455)^0 p\pi^-\pi^+$		(	4.4	± 1.7)	$\times 10^{-4}$		1845
$\overline{\Sigma}_c(2455)^{--} p\pi^+\pi^+$		(	3.0	± 0.8)	$\times 10^{-4}$		1845
$\overline{\Lambda}_c(2593)^-/\overline{\Lambda}_c(2625)^- p\pi^+$		<	1.9		$\times 10^{-4}$	CL=90%	–
$\overline{\Xi}_c^0 \Lambda_c^+ \times$ B($\overline{\Xi}_c^0 \to \overline{\Xi}^+\pi^-$)		(	3.0	± 1.1)	$\times 10^{-5}$		1144
$\overline{\Xi}_c^0 \Lambda_c^+ \times$ B($\overline{\Xi}_c^0 \to \Lambda K^+\pi^-$)		(	2.6	± 1.1)	$\times 10^{-5}$	S=1.1	1144

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
$\pi^+\mu^+\mu^-$	$B1$		(	2.4 ± 0.6)	$\times 10^{-8}$		2634
$\pi^+\nu\overline{\nu}$	$B1$		<	1.0	$\times 10^{-4}$	CL=90%	2638
$K^+\ell^+\ell^-$	$B1$	[sss]	(	4.51 ± 0.23)	$\times 10^{-7}$	S=1.1	2617
$K^+ e^+ e^-$	$B1$		(	5.5 ± 0.7)	$\times 10^{-7}$		2617
$K^+\mu^+\mu^-$	$B1$		(	4.49 ± 0.23)	$\times 10^{-7}$	S=1.1	2612
$K^+\overline{\nu}\nu$	$B1$		<	1.3	$\times 10^{-5}$	CL=90%	2617
$\rho^+\nu\overline{\nu}$	$B1$		<	1.5	$\times 10^{-4}$	CL=90%	2583
$K^*(892)^+\ell^+\ell^-$	$B1$	[sss]	(	1.29 ± 0.21)	$\times 10^{-6}$		2564
$K^*(892)^+ e^+ e^-$	$B1$		(	1.55 $^{+0.40}_{-0.31}$)	$\times 10^{-6}$		2564
$K^*(892)^+\mu^+\mu^-$	$B1$		(	1.12 ± 0.15)	$\times 10^{-6}$		2560
$K^*(892)^+\nu\overline{\nu}$	$B1$		<	8	$\times 10^{-5}$	CL=90%	2564
$\pi^+ e^+\mu^-$	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%	2333
$\pi^+ \mu^- \tau^+$	LF	$<$	4.5	$\times 10^{-5}$	CL=90%	2333
$\pi^+ \mu^\pm \tau^\mp$	LF	$<$	7.2	$\times 10^{-5}$	CL=90%	2333
$K^+ e^+ \mu^-$	LF	$<$	9.1	$\times 10^{-8}$	CL=90%	2615
$K^+ e^- \mu^+$	LF	$<$	1.3	$\times 10^{-7}$	CL=90%	2615
$K^+ e^\pm \mu^\mp$	LF	$<$	9.1	$\times 10^{-8}$	CL=90%	2615
$K^+ e^+ \tau^-$	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	$<$	1.3	$\times 10^{-8}$	CL=95%	2634
$\pi^- e^+ \mu^+$	L	$<$	1.3	$\times 10^{-6}$	CL=90%	2637
$\rho^- e^+ e^+$	L	$<$	2.6	$\times 10^{-6}$	CL=90%	2583
$\rho^- \mu^+ \mu^+$	L	$<$	5.0	$\times 10^{-6}$	CL=90%	2578
$\rho^- e^+ \mu^+$	L	$<$	3.3	$\times 10^{-6}$	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	$<$	2.0	$\times 10^{-6}$	CL=90%	2615
$K^*(892)^- e^+ e^+$	L	$<$	2.8	$\times 10^{-6}$	CL=90%	2564
$K^*(892)^- \mu^+ \mu^+$	L	$<$	8.3	$\times 10^{-6}$	CL=90%	2560
$K^*(892)^- e^+ \mu^+$	L	$<$	4.4	$\times 10^{-6}$	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 $m_{B^0} = 5279.58 \pm 0.17$ MeV
$m_{B^0} - m_{B^\pm} = 0.32 \pm 0.06$ MeV
Mean life $\tau_{B^0} = (1.519 \pm 0.007) \times 10^{-12}$ s
$c\tau = 455.4\ \mu$m
$\tau_{B^+}/\tau_{B^0} = 1.079 \pm 0.007$ (direct measurements)

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

$\chi_d = 0.1875 \pm 0.0020$
$\Delta m_{B^0} = m_{B^0_H} - m_{B^0_L} = (0.510 \pm 0.004) \times 10^{12}\ \hbar\ \mathrm{s}^{-1}$
$= (3.337 \pm 0.033) \times 10^{-10}$ MeV
$x_d = \Delta m_{B^0}/\Gamma_{B^0} = 0.775 \pm 0.006$
$\mathrm{Re}(\lambda_{CP}\ /\ |\lambda_{CP}|)\ \mathrm{Re(z)} = 0.01 \pm 0.05$
$\Delta\Gamma\ \mathrm{Re(z)} = -0.007 \pm 0.004$
$\mathrm{Re(z)} = (2 \pm 5) \times 10^{-2}$
$\mathrm{Im(z)} = (-0.8 \pm 0.4) \times 10^{-2}$

CP violation parameters

$\mathrm{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2) = (-0.2 \pm 0.7) \times 10^{-3}$
$A_{T/CP} = 0.005 \pm 0.018$
$A_{CP}(B^0 \to\ D^*(2010)^+ D^-) = 0.037 \pm 0.034$
$A_{CP}(B^0 \to\ [K^+K^-]_D K^*(892)^0) = -0.45 \pm 0.23$
$A_{CP}(B^0 \to\ [K^+\pi^-]_D K^*(892)^0) = -0.08 \pm 0.08$
A_{CP} ($B^0 \to\ K^+\pi^-$) $= -0.087 \pm 0.008$
$A_{CP}(B^0 \to\ \eta' K^*(892)^0) = 0.02 \pm 0.23$
$A_{CP}(B^0 \to\ \eta' K_0^*(1430)^0) = -0.19 \pm 0.17$
$A_{CP}(B^0 \to\ \eta' K_2^*(1430)^0) = 0.14 \pm 0.18$
$A_{CP}(B^0 \to\ \eta K^*(892)^0)$ $= 0.19 \pm 0.05$
$A_{CP}(B^0 \to\ \eta K_0^*(1430)^0) = 0.06 \pm 0.13$
$A_{CP}(B^0 \to\ \eta K_2^*(1430)^0) = -0.07 \pm 0.19$
$A_{CP}(B^0 \to\ b_1 K^+) = -0.07 \pm 0.12$
$A_{CP}(B^0 \to\ \omega K^{*0}) = 0.45 \pm 0.25$
$A_{CP}(B^0 \to\ \omega(K\pi)_0^{*0}) = -0.07 \pm 0.09$
$A_{CP}(B^0 \to\ \omega K_2^*(1430)^0) = -0.37 \pm 0.17$
$A_{CP}(B^0 \to\ K^+\pi^-\pi^0) = (0 \pm 6) \times 10^{-2}$
$A_{CP}(B^0 \to\ \rho^- K^+) = 0.20 \pm 0.11$
$A_{CP}(B^0 \to\ \rho(1450)^- K^+) = -0.10 \pm 0.33$
$A_{CP}(B^0 \to\ \rho(1700)^- K^+) = -0.4 \pm 0.6$

$A_{CP}(B^0 \to K^+\pi^-\pi^0 \text{nonresonant}) = 0.10 \pm 0.18$
$A_{CP}(B^0 \to K^0\pi^+\pi^-) = -0.01 \pm 0.05$
$A_{CP}(B^0 \to K^*(892)^+\pi^-) = -0.22 \pm 0.06$
$A_{CP}(B^0 \to (K\pi)_0^{*+}\pi^-) = 0.09 \pm 0.07$
$A_{CP}(B^0 \to (K\pi)_0^{*0}\pi^0) = -0.15 \pm 0.11$
$A_{CP}(B^0 \to K^{*0}\pi^0) = -0.15 \pm 0.13$
$A_{CP}(B^0 \to K^*(892)^0\pi^+\pi^-) = 0.07 \pm 0.05$
$A_{CP}(B^0 \to K^*(892)^0\rho^0) = -0.06 \pm 0.09$
$A_{CP}(B^0 \to K^{*0}f_0(980)) = 0.07 \pm 0.10$
$A_{CP}(B^0 \to K^{*+}\rho^-) = 0.21 \pm 0.15$
$A_{CP}(B^0 \to K^*(892)^0K^+K^-) = 0.01 \pm 0.05$
$A_{CP}(B^0 \to a_1^-K^+) = -0.16 \pm 0.12$
$A_{CP}(B^0 \to K^0K^0) = -0.6 \pm 0.7$
$A_{CP}(B^0 \to K^*(892)^0\phi) = 0.01 \pm 0.05$
$A_{CP}(B^0 \to K^*(892)^0K^-\pi^+) = 0.2 \pm 0.4$
$A_{CP}(B^0 \to \phi(K\pi)_0^{*0}) = 0.20 \pm 0.15$
$A_{CP}(B^0 \to \phi K_2^*(1430)^0) = -0.08 \pm 0.13$
$A_{CP}(B^0 \to K^*(892)^0\gamma) = -0.002 \pm 0.015$
$A_{CP}(B^0 \to K_2^*(1430)^0\gamma) = -0.08 \pm 0.15$
$A_{CP}(B^0 \to \rho^+\pi^-) = 0.08 \pm 0.12 \quad (S = 2.0)$
$A_{CP}(B^0 \to \rho^-\pi^+) = -0.16 \pm 0.23 \quad (S = 1.7)$
$A_{CP}(B^0 \to a_1(1260)^\pm\pi^\mp) = -0.07 \pm 0.06$
$A_{CP}(B^0 \to b_1^-\pi^+) = -0.05 \pm 0.10$
$A_{CP}(B^0 \to p\overline{p}K^*(892)^0) = 0.05 \pm 0.12$
$A_{CP}(B^0 \to p\overline{\Lambda}\pi^-) = 0.04 \pm 0.07$
$A_{CP}(B^0 \to K^{*0}\ell^+\ell^-) = -0.05 \pm 0.10$
$A_{CP}(B^0 \to K^{*0}e^+e^-) = -0.21 \pm 0.19$
$A_{CP}(B^0 \to K^{*0}\mu^+\mu^-) = -0.07 \pm 0.04$
$C_{D^{*-}D^+}\ (B^0 \to D^*(2010)^-D^+) = -0.01 \pm 0.11$
$\boldsymbol{S_{D^{*-}D^+}\ (B^0 \to D^*(2010)^-D^+)} = -0.72 \pm 0.15$
$C_{D^{*+}D^-}\ (B^0 \to D^*(2010)^+D^-) = 0.00 \pm 0.13 \quad (S = 1.3)$
$\boldsymbol{S_{D^{*+}D^-}\ (B^0 \to D^*(2010)^+D^-)} = -0.73 \pm 0.14$
$C_{D^{*+}D^{*-}}\ (B^0 \to D^{*+}D^{*-}) = 0.01 \pm 0.09 \quad (S = 1.6)$
$\boldsymbol{S_{D^{*+}D^{*-}}\ (B^0 \to D^{*+}D^{*-})} = -0.59 \pm 0.14 \quad (S = 1.8)$
$C_+\ (B^0 \to D^{*+}D^{*-}) = 0.00 \pm 0.10 \quad (S = 1.6)$
$\boldsymbol{S_+\ (B^0 \to D^{*+}D^{*-})} = -0.73 \pm 0.09$
$C_-\ (B^0 \to D^{*+}D^{*-}) = 0.19 \pm 0.31$
$S_-\ (B^0 \to D^{*+}D^{*-}) = 0.1 \pm 1.6 \quad (S = 3.5)$
$C\ (B^0 \to D^*(2010)^+D^*(2010)^-K_S^0) = 0.01 \pm 0.29$
$S\ (B^0 \to D^*(2010)^+D^*(2010)^-K_S^0) = 0.1 \pm 0.4$
$C_{D^+D^-}\ (B^0 \to D^+D^-) = -0.46 \pm 0.21 \quad (S = 1.8)$

$\boldsymbol{S_{D^+D^-}\ (B^0 \to\ D^+D^-)} = -0.99^{+0.17}_{-0.14}$
$C_{J/\psi(1S)\pi^0}\ (B^0 \to\ J/\psi(1S)\pi^0) = -0.13 \pm 0.13$
$\boldsymbol{S_{J/\psi(1S)\pi^0}\ (B^0 \to\ J/\psi(1S)\pi^0)} = -0.94 \pm 0.29$ (S = 1.9)
$C_{D^{(*)}_{CP}h^0}\ (B^0 \to\ D^{(*)}_{CP}h^0) = -0.23 \pm 0.16$
$S_{D^{(*)}_{CP}h^0}\ (B^0 \to\ D^{(*)}_{CP}h^0) = -0.56 \pm 0.24$
$C_{K^0\pi^0}\ (B^0 \to\ K^0\pi^0) = 0.00 \pm 0.13$ (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)
$C_{\eta' K^0}\ (B^0 \to\ \eta' K^0) = -0.05 \pm 0.05$
$\boldsymbol{S_{\eta' K^0}\ (B^0 \to\ \eta' K^0)} = 0.60 \pm 0.07$
$C_{\omega K^0_S}\ (B^0 \to\ \omega K^0_S) = -0.30 \pm 0.28$ (S = 1.6)
$S_{\omega K^0_S}\ (B^0 \to\ \omega K^0_S) = 0.43 \pm 0.24$
$C\ (B^0 \to\ K^0_S\pi^0\pi^0) = 0.2 \pm 0.5$
$S\ (B^0 \to\ K^0_S\pi^0\pi^0) = 0.7 \pm 0.7$
$C_{\rho^0 K^0_S}\ (B^0 \to\ \rho^0 K^0_S) = -0.04 \pm 0.20$
$S_{\rho^0 K^0_S}\ (B^0 \to\ \rho^0 K^0_S) = 0.50^{+0.17}_{-0.21}$
$C_{f_0 K^0_S}\ (B^0 \to\ f_0(980)K^0_S) = 0.29 \pm 0.20$
$S_{f_0 K^0_S}\ (B^0 \to\ f_0(980)K^0_S) = -0.50 \pm 0.16$
$S_{f_2 K^0_S}\ (B^0 \to\ f_2(1270)K^0_S) = -0.5 \pm 0.5$
$C_{f_2 K^0_S}\ (B^0 \to\ f_2(1270)K^0_S) = 0.3 \pm 0.4$
$S_{f_x K^0_S}\ (B^0 \to\ f_x(1300)K^0_S) = -0.2 \pm 0.5$
$C_{f_x K^0_S}\ (B^0 \to\ f_x(1300)K^0_S) = 0.13 \pm 0.35$
$S_{K^0\pi^+\pi^-}\ (B^0 \to\ K^0\pi^+\pi^-\text{nonresonant}) = -0.01 \pm 0.33$
$C_{K^0\pi^+\pi^-}\ (B^0 \to\ K^0\pi^+\pi^-\text{nonresonant}) = 0.01 \pm 0.26$
$C_{K^0_S K^0_S}\ (B^0 \to\ K^0_S K^0_S) = 0.0 \pm 0.4$ (S = 1.4)
$S_{K^0_S K^0_S}\ (B^0 \to\ K^0_S K^0_S) = -0.8 \pm 0.5$
$C_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{nonresonant}) = 0.06 \pm 0.08$
$\boldsymbol{S_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{nonresonant})} = -0.66 \pm 0.11$
$C_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{inclusive}) = 0.01 \pm 0.09$
$\boldsymbol{S_{K^+K^-K^0_S}\ (B^0 \to\ K^+K^-K^0_S\ \text{inclusive})} = -0.65 \pm 0.12$
$C_{\phi K^0_S}\ (B^0 \to\ \phi K^0_S) = 0.01 \pm 0.14$

$S_{\phi K^0_S}\ (B^0 \to\ \phi K^0_S) = 0.59 \pm 0.14$
$C_{K_S K_S K_S}(B^0 \to\ K_S K_S K_S) = -0.23 \pm 0.14$
$S_{K_S K_S K_S}(B^0 \to\ K_S K_S K_S) = -0.5 \pm 0.6$ (S = 3.0)
$C_{K^0_S \pi^0 \gamma}(B^0 \to\ K^0_S \pi^0 \gamma) = 0.36 \pm 0.33$
$S_{K^0_S \pi^0 \gamma}(B^0 \to\ K^0_S \pi^0 \gamma) = -0.8 \pm 0.6$
$C_{K^{*0}\gamma}\ (B^0 \to\ K^*(892)^0 \gamma) = -0.04 \pm 0.16$ (S = 1.2)
$S_{K^{*0}\gamma}\ (B^0 \to\ K^*(892)^0 \gamma) = -0.15 \pm 0.22$
$C_{\eta K^0 \gamma}\ (B^0 \to\ \eta K^0 \gamma) = -0.3 \pm 0.4$
$S_{\eta K^0 \gamma}\ (B^0 \to\ \eta K^0 \gamma) = -0.2 \pm 0.5$
$C_{K^0 \phi \gamma}\ (B^0 \to\ K^0 \phi \gamma) = -0.3 \pm 0.6$
$S_{K^0 \phi \gamma}\ (B^0 \to\ K^0 \phi \gamma) = 0.7^{+0.7}_{-1.1}$
$C(B^0 \to\ K^0_S \rho^0 \gamma) = -0.05 \pm 0.19$
$S(B^0 \to\ K^0_S \rho^0 \gamma) = 0.11 \pm 0.34$
$C\ (B^0 \to\ \rho^0 \gamma) = 0.4 \pm 0.5$
$S\ (B^0 \to\ \rho^0 \gamma) = -0.8 \pm 0.7$
$C_{\pi\pi}\ (B^0 \to\ \pi^+ \pi^-) = -0.38 \pm 0.15$ (S = 2.4)
$\boldsymbol{S_{\pi\pi}\ (B^0 \to\ \pi^+ \pi^-)} = -0.65 \pm 0.07$
$C_{\pi^0 \pi^0}(B^0 \to\ \pi^0 \pi^0) = -0.43 \pm 0.24$
$C_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-) = 0.01 \pm 0.14$ (S = 1.9)
$S_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-) = 0.01 \pm 0.09$
$\boldsymbol{\Delta C_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-)} = 0.37 \pm 0.08$
$\Delta S_{\rho\pi}\ (B^0 \to\ \rho^+ \pi^-) = -0.05 \pm 0.10$
$C_{\rho^0 \pi^0}\ (B^0 \to\ \rho^0 \pi^0) = 0.3 \pm 0.4$
$S_{\rho^0 \pi^0}\ (B^0 \to\ \rho^0 \pi^0) = 0.1 \pm 0.4$
$C_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = -0.05 \pm 0.11$
$S_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = -0.2 \pm 0.4$ (S = 3.2)
$\Delta C_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = 0.43 \pm 0.14$ (S = 1.3)
$\Delta S_{a_1 \pi}\ (B^0 \to\ a_1(1260)^+ \pi^-) = -0.11 \pm 0.12$
$C\ (B^0 \to\ b_1^- K^+) = -0.22 \pm 0.24$
$\Delta C\ (B^0 \to\ b_1^- \pi^+) = -1.04 \pm 0.24$
$C_{\rho^0 \rho^0}\ (B^0 \to\ \rho^0 \rho^0) = 0.2 \pm 0.9$
$S_{\rho^0 \rho^0}\ (B^0 \to\ \rho^0 \rho^0) = 0.3 \pm 0.7$
$C_{\rho\rho}\ (B^0 \to\ \rho^+ \rho^-) = -0.05 \pm 0.13$
$S_{\rho\rho}\ (B^0 \to\ \rho^+ \rho^-) = -0.06 \pm 0.17$
$\left|\lambda\right|\ (B^0 \to\ J/\psi K^*(892)^0) < 0.25$, CL = 95%
$\cos 2\beta\ (B^0 \to\ J/\psi K^*(892)^0) = 1.7^{+0.7}_{-0.9}$ (S = 1.6)
$\cos 2\beta\ (B^0 \to\ [K^0_S \pi^+ \pi^-]_{D^{(*)}}\ h^0) = 1.0^{+0.6}_{-0.7}$ (S = 1.8)

$(S_+ + S_-)/2\ (B^0 \to\ D^{*-}\pi^+) = -0.039 \pm 0.011$
$(S_- - S_+)/2\ (B^0 \to\ D^{*-}\pi^+) = -0.009 \pm 0.015$
$(S_+ + S_-)/2\ (B^0 \to\ D^-\pi^+) = -0.046 \pm 0.023$
$(S_- - S_+)/2\ (B^0 \to\ D^-\pi^+) = -0.022 \pm 0.021$
$(S_+ + S_-)/2\ (B^0 \to\ D^-\rho^+) = -0.024 \pm 0.032$
$(S_- - S_+)/2\ (B^0 \to\ D^-\rho^+) = -0.10 \pm 0.06$
$C_{\eta_c K^0_S}\ (B^0 \to\ \eta_c K^0_S) = 0.08 \pm 0.13$
$S_{\eta_c K^0_S}\ (B^0 \to\ \eta_c K^0_S) = 0.93 \pm 0.17$
$C_{c\overline{c}K^{(*)0}}\ (B^0 \to\ c\overline{c}K^{(*)0}) = (0.5 \pm 1.7) \times 10^{-2}$
$\sin(2\beta) = 0.682 \pm 0.019$
$C_{J/\psi(\mathrm{nS})K^0}\ (B^0 \to\ J/\psi(\mathrm{nS})K^0) = (0.5 \pm 2.0) \times 10^{-2}$
$S_{J/\psi(\mathrm{nS})K^0}\ (B^0 \to\ J/\psi(\mathrm{nS})K^0) = 0.676 \pm 0.021$
$C_{J/\psi K^{*0}}\ (B^0 \to\ J/\psi K^{*0}) = 0.03 \pm 0.10$
$S_{J/\psi K^{*0}}\ (B^0 \to\ J/\psi K^{*0}) = 0.60 \pm 0.25$
$C_{\chi_{c0}K^0_S}\ (B^0 \to\ \chi_{c0}K^0_S) = -0.3^{+0.5}_{-0.4}$
$S_{\chi_{c0}K^0_S}\ (B^0 \to\ \chi_{c0}K^0_S) = -0.7 \pm 0.5$
$C_{\chi_{c1}K^0_S}\ (B^0 \to\ \chi_{c1}K^0_S) = 0.06 \pm 0.07$
$S_{\chi_{c1}K^0_S}\ (B^0 \to\ \chi_{c1}K^0_S) = 0.63 \pm 0.10$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ \phi K^0) = 0.22 \pm 0.30$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ \phi K^*_0(1430)^0) = 0.97^{+0.03}_{-0.52}$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ K^+K^-K^0_S) = 0.77^{+0.13}_{-0.12}$
$\sin(2\beta_{\mathrm{eff}})(B^0 \to\ [K^0_S\pi^+\pi^-]_{D^{(*)}}\ h^0) = 0.45 \pm 0.28$
$|\lambda|\ (B^0 \to\ [K^0_S\pi^+\pi^-]_{D^{(*)}}\ h^0) = 1.01 \pm 0.08$
$|\sin(2\beta+\gamma)| > 0.40$, CL = 90%
$2\ \beta + \gamma = (83 \pm 60)^\circ$
$\gamma(B^0 \to\ D^0K^{*0}) = (162 \pm 60)^\circ$
$\alpha = (90 \pm 5)^\circ$

$\overline{B}^0$ 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.*, $B \to D^{\pm}$ anything, 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)
$\ell^+\nu_\ell$ anything	[*sss*]	(10.33± 0.28) %		–
$e^+\nu_e X_c$		(10.1 ± 0.4) %		–
$D\ell^+\nu_\ell$ anything		(9.2 ± 0.8) %		–
$D^-\ell^+\nu_\ell$	[*sss*]	(2.18± 0.12) %		2309
$D^-\tau^+\nu_\tau$		(1.02± 0.22) %		1909
$D^*(2010)^-\ell^+\nu_\ell$	[*sss*]	(4.93± 0.11) %		2257
$D^*(2010)^-\tau^+\nu_\tau$		(1.84± 0.22) %		1837
$\overline{D}^0\pi^-\ell^+\nu_\ell$		(4.3 ± 0.6) $\times 10^{-3}$		2308
$D_0^*(2400)^-\ell^+\nu_\ell \times$ B($D_0^{*-} \to \overline{D}^0\pi^-$)		(3.0 ± 1.2) $\times 10^{-3}$	S=1.8	–
$D_2^*(2460)^-\ell^+\nu_\ell \times$ B($D_2^{*-} \to \overline{D}^0\pi^-$)		(1.21± 0.33) $\times 10^{-3}$	S=1.8	2065
$\overline{D}^{(*)}\,\mathrm{n}\,\pi\ell^+\nu_\ell$(n $\geq$ 1)		(2.3 ± 0.5) %		–
$\overline{D}^{*0}\pi^-\ell^+\nu_\ell$		(4.9 ± 0.8) $\times 10^{-3}$		2256
$D_1(2420)^-\ell^+\nu_\ell \times$ B($D_1^- \to \overline{D}^{*0}\pi^-$)		(2.80± 0.28) $\times 10^{-3}$		–
$D_1'(2430)^-\ell^+\nu_\ell \times$ B($D_1'^- \to \overline{D}^{*0}\pi^-$)		(3.1 ± 0.9) $\times 10^{-3}$		–
$D_2^*(2460)^-\ell^+\nu_\ell$, $D_2^{*-} \to \overline{D}^{*0}\pi^-$		(6.8 ± 1.2) $\times 10^{-4}$		2065
$\rho^-\ell^+\nu_\ell$	[*sss*]	(2.34± 0.28) $\times 10^{-4}$		2583
$\pi^-\ell^+\nu_\ell$	[*sss*]	(1.44± 0.05) $\times 10^{-4}$		2638

Inclusive modes

$K^\pm$ anything	(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

$D^- \pi^+$	(2.68± 0.13) $\times 10^{-3}$		2306
$D^- \rho^+$	(7.8 ± 1.3) $\times 10^{-3}$		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
$D^- K^+$	(1.97± 0.21) $\times 10^{-4}$		2279
$D^- K^+ \pi^+ \pi^-$	(3.8 ± 0.9) $\times 10^{-4}$		2235
$D^- K^+ \overline{K}^0$	< 3.1 $\times 10^{-4}$	CL=90%	2188
$D^- K^+ \overline{K}^*(892)^0$	(8.8 ± 1.9) $\times 10^{-4}$		2070
$\overline{D}^0 \pi^+ \pi^-$	(8.4 ± 0.9) $\times 10^{-4}$		2301
$D^*(2010)^- \pi^+$	(2.76± 0.13) $\times 10^{-3}$		2255
$\overline{D}^0 K^+ K^-$	(4.7 ± 1.2) $\times 10^{-5}$		2191
$D^- \pi^+ \pi^+ \pi^-$	(6.4 ± 0.7) $\times 10^{-3}$		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) %		2247
$D^*(2010)^- \rho^+$	(6.8 ± 0.9) $\times 10^{-3}$		2180
$D^*(2010)^- K^+$	(2.14± 0.16) $\times 10^{-4}$		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
$D^*(2010)^- \pi^+ \pi^+ \pi^-$	(7.0 ± 0.8) $\times 10^{-3}$	S=1.3	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

$D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0$		(1.76 ± 0.27) %			2218
$D^{*-} 3\pi^+ 2\pi^-$		(4.7 ± 0.9) $\times 10^{-3}$			2195
$\overline{D}^*(2010)^- \omega \pi^+$		(2.89 ± 0.30) $\times 10^{-3}$			2148
$D_1(2430)^0 \omega \times$ B($D_1(2430)^0 \to D^{*-} \pi^+$)		(4.1 ± 1.6) $\times 10^{-4}$			1992
$\overline{D}^{**-} \pi^+$	[xxx]	(2.1 ± 1.0) $\times 10^{-3}$			–
$D_1(2420)^- \pi^+ \times$ B($D_1^- \to D^- \pi^+ \pi^-$)		($1.00^{+\ 0.21}_{-\ 0.25}$) $\times 10^{-4}$			–
$D_1(2420)^- \pi^+ \times$ B($D_1^- \to D^{*-} \pi^+ \pi^-$)		< 3.3	$\times 10^{-5}$	CL=90%	–
$\overline{D}_2^*(2460)^- \pi^+ \times$ B($D_2^*(2460)^- \to D^0 \pi^-$)		(2.15 ± 0.35) $\times 10^{-4}$			2062
$\overline{D}_0^*(2400)^- \pi^+ \times$ B($D_0^*(2400)^- \to D^0 \pi^-$)		(6.0 ± 3.0) $\times 10^{-5}$			2090
$D_2^*(2460)^- \pi^+ \times$ B($(D_2^*)^- \to D^{*-} \pi^+ \pi^-$)		< 2.4	$\times 10^{-5}$	CL=90%	–
$\overline{D}_2^*(2460)^- \rho^+$		< 4.9	$\times 10^{-3}$	CL=90%	1975
$D^0 \overline{D}^0$		< 4.3	$\times 10^{-5}$	CL=90%	1868
$D^{*0} \overline{D}^0$		< 2.9	$\times 10^{-4}$	CL=90%	1794
$D^- D^+$		(2.11 ± 0.18) $\times 10^{-4}$			1864
$D^\pm D^{*\mp}$ (*CP*-averaged)		(6.1 ± 0.6) $\times 10^{-4}$			–
$D^- D_s^+$		(7.2 ± 0.8) $\times 10^{-3}$			1812
$D^*(2010)^- D_s^+$		(8.0 ± 1.1) $\times 10^{-3}$			1735
$D^- D_s^{*+}$		(7.4 ± 1.6) $\times 10^{-3}$			1732
$D^*(2010)^- D_s^{*+}$		(1.77 ± 0.14) %			1649
$D_{s0}(2317)^- K^+ \times$ B($D_{s0}(2317)^- \to D_s^- \pi^0$)		(4.2 ± 1.4) $\times 10^{-5}$			2097
$D_{s0}(2317)^- \pi^+ \times$ B($D_{s0}(2317)^- \to D_s^- \pi^0$)		< 2.5	$\times 10^{-5}$	CL=90%	2128
$D_{sJ}(2457)^- K^+ \times$ B($D_{sJ}(2457)^- \to D_s^- \pi^0$)		< 9.4	$\times 10^{-6}$	CL=90%	–
$D_{sJ}(2457)^- \pi^+ \times$ B($D_{sJ}(2457)^- \to D_s^- \pi^0$)		< 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
$D_{s0}(2317)^+ D^- \times$ B($D_{s0}(2317)^+ \to D_s^+ \pi^0$)		($9.7\ ^{+\ 4.0}_{-\ 3.3}$) $\times 10^{-4}$		S=1.5	1602
$D_{s0}(2317)^+ D^- \times$ B($D_{s0}(2317)^+ \to D_s^{*+} \gamma$)		< 9.5	$\times 10^{-4}$	CL=90%	–

$D_{s0}(2317)^+ D^*(2010)^- \times$ B($D_{s0}(2317)^+ \to D_s^+ \pi^0$)	(1.5 ± 0.6)	$\times 10^{-3}$			1509
$D_{sJ}(2457)^+ D^-$	(3.5 ± 1.1)	$\times 10^{-3}$			–
$D_{sJ}(2457)^+ D^- \times$ B($D_{sJ}(2457)^+ \to D_s^+ \gamma$)	($6.5 \,^{+\,1.7}_{-\,1.4}$)	$\times 10^{-4}$			–
$D_{sJ}(2457)^+ D^- \times$ B($D_{sJ}(2457)^+ \to D_s^{*+} \gamma$)	< 6.0	$\times 10^{-4}$	CL=90%		–
$D_{sJ}(2457)^+ D^- \times$ B($D_{sJ}(2457)^+ \to D_s^+ \pi^+ \pi^-$)	< 2.0	$\times 10^{-4}$	CL=90%		–
$D_{sJ}(2457)^+ D^- \times$ B($D_{sJ}(2457)^+ \to D_s^+ \pi^0$)	< 3.6	$\times 10^{-4}$	CL=90%		–
$D^*(2010)^- D_{sJ}(2457)^+$	(9.3 ± 2.2)	$\times 10^{-3}$			–
$D_{sJ}(2457)^+ D^*(2010) \times$ B($D_{sJ}(2457)^+ \to D_s^+ \gamma$)	($2.3 \,^{+\,0.9}_{-\,0.7}$)	$\times 10^{-3}$			–
$D^- D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*0} K^+ + D^{*+} K^0$)	(2.8 ± 0.7)	$\times 10^{-4}$			1444
$D^- D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*0} K^+$)	(1.7 ± 0.6)	$\times 10^{-4}$			1444
$D^- D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*+} K^0$)	(2.6 ± 1.1)	$\times 10^{-4}$			1444
$D^*(2010)^- D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*0} K^+ + D^{*+} K^0$)	(5.0 ± 1.4)	$\times 10^{-4}$			1336
$D^*(2010)^- D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*0} K^+$)	(3.3 ± 1.1)	$\times 10^{-4}$			1336
$D^{*-} D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*+} K^0$)	(5.0 ± 1.7)	$\times 10^{-4}$			1336
$D^- D_{sJ}(2573)^+ \times$ B($D_{sJ}(2573)^+ \to D^0 K^+$)	< 1	$\times 10^{-4}$	CL=90%		1414
$D^*(2010)^- D_{sJ}(2573)^+ \times$ B($D_{sJ}(2573)^+ \to D^0 K^+$)	< 2	$\times 10^{-4}$	CL=90%		1304
$D^+ \pi^-$	(7.8 ± 1.4)	$\times 10^{-7}$			2306
$D_s^+ \pi^-$	(2.16± 0.26)	$\times 10^{-5}$			2270
$D_s^{*+} \pi^-$	(2.1 ± 0.4)	$\times 10^{-5}$	S=1.4		2215
$D_s^+ \rho^-$	< 2.4	$\times 10^{-5}$	CL=90%		2197
$D_s^{*+} \rho^-$	(4.1 ± 1.3)	$\times 10^{-5}$			2138

$D_s^+ a_0^-$	$<$	1.9	$\times 10^{-5}$	CL=90%	–
$D_s^{*+} a_0^-$	$<$	3.6	$\times 10^{-5}$	CL=90%	–
$D_s^+ a_1(1260)^-$	$<$	2.1	$\times 10^{-3}$	CL=90%	2080
$D_s^{*+} a_1(1260)^-$	$<$	1.7	$\times 10^{-3}$	CL=90%	2015
$D_s^+ a_2^-$	$<$	1.9	$\times 10^{-4}$	CL=90%	–
$D_s^{*+} a_2^-$	$<$	2.0	$\times 10^{-4}$	CL=90%	–
$D_s^- K^+$	(	2.2 ± 0.5)	$\times 10^{-5}$	S=1.8	2242
$D_s^{*-} K^+$	(	2.19± 0.30)	$\times 10^{-5}$		2185
$D_s^- K^*(892)^+$	(	3.5 ± 1.0)	$\times 10^{-5}$		2172
$D_s^{*-} K^*(892)^+$	(	$3.2\ ^{+\ 1.5}_{-\ 1.3}$)	$\times 10^{-5}$		2112
$D_s^- \pi^+ K^0$	(	1.10± 0.33)	$\times 10^{-4}$		2222
$D_s^{*-} \pi^+ K^0$	$<$	1.10	$\times 10^{-4}$	CL=90%	2164
$D_s^- K^+ \pi^+ \pi^-$	(	1.8 ± 0.5)	$\times 10^{-4}$		2197
$D_s^- \pi^+ K^*(892)^0$	$<$	3.0	$\times 10^{-3}$	CL=90%	2138
$D_s^{*-} \pi^+ K^*(892)^0$	$<$	1.6	$\times 10^{-3}$	CL=90%	2076
$\overline{D}^0 K^0$	(	5.2 ± 0.7)	$\times 10^{-5}$		2280
$\overline{D}^0 K^+ \pi^-$	(	8.8 ± 1.7)	$\times 10^{-5}$		2261
$\overline{D}^0 K^*(892)^0$	(	4.2 ± 0.6)	$\times 10^{-5}$		2213
$D_2^*(2460)^- K^+ \times$ B($D_2^*(2460)^- \to \overline{D}^0 \pi^-$)	(	1.8 ± 0.5)	$\times 10^{-5}$		2029
$\overline{D}^0 K^+ \pi^-$ non-resonant	$<$	3.7	$\times 10^{-5}$	CL=90%	–
$[K^+ K^-]_D K^*(892)^0$	(	$5.8\ ^{+\ 1.8}_{-\ 1.6}$)	$\times 10^{-5}$		–
$\overline{D}^0 \pi^0$	(	2.63± 0.14)	$\times 10^{-4}$		2308
$\overline{D}^0 \rho^0$	(	3.2 ± 0.5)	$\times 10^{-4}$		2237
$\overline{D}^0 f_2$	(	1.2 ± 0.4)	$\times 10^{-4}$		–
$\overline{D}^0 \eta$	(	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
$\overline{D}^0 \omega$	(	2.53± 0.16)	$\times 10^{-4}$		2235
$D^0 \phi$	$<$	1.16	$\times 10^{-5}$	CL=90%	2183
$D^0 K^+ \pi^-$	(	5.3 ± 3.2)	$\times 10^{-6}$		2261
$D^0 K^*(892)^0$	$<$	1.1	$\times 10^{-5}$	CL=90%	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)	$\times 10^{-4}$		2248
$\overline{D}^*(2007)^0 K^0$	(	3.6 ± 1.2)	$\times 10^{-5}$		2227
$\overline{D}^*(2007)^0 K^*(892)^0$	$<$	6.9	$\times 10^{-5}$	CL=90%	2157
$D^*(2007)^0 K^*(892)^0$	$<$	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) × 10^{-4}			1711
$\overline{D}^*(2007)^0 \omega$	(3.6 ± 1.1) × 10^{-4}	S=3.1		2180
$D^*(2010)^+ D^-$	(6.1 ± 1.5) × 10^{-4}	S=1.6		1790
$D^*(2007)^0 \overline{D}^*(2007)^0$	< 9 × 10^{-5}	CL=90%		1715
$D^- D^0 K^+$	(1.07± 0.11) × 10^{-3}			1574
$D^- D^*(2007)^0 K^+$	(3.5 ± 0.4) × 10^{-3}			1478
$D^*(2010)^- D^0 K^+$	(2.47± 0.21) × 10^{-3}			1479
$D^*(2010)^- D^*(2007)^0 K^+$	(1.06± 0.09) %			1366
$D^- D^+ K^0$	(7.5 ± 1.7) × 10^{-4}			1568
$D^*(2010)^- D^+ K^0$ + $D^- D^*(2010)^+ K^0$	(6.4 ± 0.5) × 10^{-3}			1473
$D^*(2010)^- D^*(2010)^+ K^0$	(8.1 ± 0.7) × 10^{-3}			1360
$D^{*-} D_{s1}(2536)^+ \times$ B($D_{s1}(2536)^+ \to D^{*+} K^0$)	(8.0 ± 2.4) × 10^{-4}			1336
$\overline{D}^0 D^0 K^0$	(2.7 ± 1.1) × 10^{-4}			1574
$\overline{D}^0 D^*(2007)^0 K^0$ + $\overline{D}^*(2007)^0 D^0 K^0$	(1.1 ± 0.5) × 10^{-3}			1478
$\overline{D}^*(2007)^0 D^*(2007)^0 K^0$	(2.4 ± 0.9) × 10^{-3}			1365
$(\overline{D}+\overline{D}^*)(D+D^*)K$	(3.68± 0.26) %			–

Charmonium modes

$\eta_c K^0$	(7.9 ± 1.2) × 10^{-4}			1751
$\eta_c K^*(892)^0$	(6.3 ± 0.9) × 10^{-4}			1646
$\eta_c(2S) K^{*0}$	< 3.9 × 10^{-4}	CL=90%		1157
$h_c(1P) K^{*0}$	< 4 × 10^{-4}	CL=90%		1253
$J/\psi(1S) K^0$	(8.73± 0.32) × 10^{-4}			1683
$J/\psi(1S) K^+ \pi^-$	(1.2 ± 0.6) × 10^{-3}			1652
$J/\psi(1S) K^*(892)^0$	(1.34± 0.06) × 10^{-3}			1571
$J/\psi(1S) \eta K^0_S$	(8 ± 4) × 10^{-5}			1508
$J/\psi(1S) \eta' K^0_S$	< 2.5 × 10^{-5}	CL=90%		1271
$J/\psi(1S) \phi K^0$	(9.4 ± 2.6) × 10^{-5}			1224
$J/\psi(1S) \omega K^0$	(2.3 ± 0.4) × 10^{-4}			1386
$X(3872) K^0 \times$ B($X \to J/\psi\omega$)	(6.0 ± 3.2) × 10^{-6}			1140
$X(3915) K^0 \times$ B($X \to J/\psi\omega$)	(2.1 ± 0.9) × 10^{-5}			1102
$J/\psi(1S) K(1270)^0$	(1.3 ± 0.5) × 10^{-3}			1390
$J/\psi(1S) \pi^0$	(1.76± 0.16) × 10^{-5}	S=1.1		1728
$J/\psi(1S) \eta$	(1.23± 0.19) × 10^{-5}			1672
$J/\psi(1S) \pi^+ \pi^-$	(4.03± 0.18) × 10^{-5}			1716
$J/\psi(1S) \pi^+ \pi^-$ nonresonant	< 1.2 × 10^{-5}	CL=90%		1716
$J/\psi(1S) f_0(500)$, $f_0 \to \pi\pi$	(6.5 $^{+\ 2.6}_{-\ 1.1}$) × 10^{-6}			–
$J/\psi(1S) f_2$	(4.2 ± 0.7) × 10^{-6}			–

$J/\psi(1S)\rho^0$		(	2.58 ± 0.21) $\times 10^{-5}$			1612
$J/\psi(1S) f_0(980)$, $f_0 \to \pi^+\pi^-$		<	1.1	$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)\rho(1450)^0$, $\rho^0 \to \pi\pi$		(	$2.1 \,^{+\,2.5}_{-\,0.7}$) $\times 10^{-6}$			–
$J/\psi(1S)\omega$		(	2.3 ± 0.6) $\times 10^{-5}$			1609
$J/\psi(1S)\phi$		<	9.4	$\times 10^{-7}$	CL=90%	1520
$J/\psi(1S)\eta'(958)$		<	7.4	$\times 10^{-6}$	CL=90%	1546
$J/\psi(1S) K^0\pi^+\pi^-$		(	1.0 ± 0.4) $\times 10^{-3}$			1611
$J/\psi(1S) K^0\rho^0$		(	5.4 ± 3.0) $\times 10^{-4}$			1390
$J/\psi(1S) K^*(892)^+\pi^-$		(	8 ± 4) $\times 10^{-4}$			1514
$J/\psi(1S) K^*(892)^0\pi^+\pi^-$		(	6.6 ± 2.2) $\times 10^{-4}$			1447
$X(3872)^- K^+$		<	5	$\times 10^{-4}$	CL=90%	–
$X(3872)^- K^+ \times$ B($X(3872)^- \to J/\psi(1S)\pi^-\pi^0$)	[yyy]	<	4.2	$\times 10^{-6}$	CL=90%	–
$X(3872) K^0 \times$ B($X \to J/\psi\pi^+\pi^-$)		(	4.3 ± 1.3) $\times 10^{-6}$			1140
$X(3872) K^0 \times$ B($X \to J/\psi\gamma$)		<	2.4	$\times 10^{-6}$	CL=90%	1140
$X(3872) K^*(892)^0 \times$ B($X \to J/\psi\gamma$)		<	2.8	$\times 10^{-6}$	CL=90%	940
$X(3872) K^0 \times$ B($X \to \psi(2S)\gamma$)		<	6.62	$\times 10^{-6}$	CL=90%	1140
$X(3872) K^*(892)^0 \times$ B($X \to \psi(2S)\gamma$)		<	4.4	$\times 10^{-6}$	CL=90%	940
$X(3872) K^0 \times$ B($X \to D^0\overline{D}^0\pi^0$)		(	1.7 ± 0.8) $\times 10^{-4}$			1140
$X(3872) K^0 \times$ B($X \to \overline{D}^{*0} D^0$)		(	1.2 ± 0.4) $\times 10^{-4}$			1140
$X(4430)^\pm K^\mp \times$ B($X^\pm \to \psi(2S)\pi^\pm$)		(	$3.2 \,^{+\,6.0}_{-\,1.8}$) $\times 10^{-5}$			621
$X(4430)^\pm K^\mp \times$ B($X^\pm \to J/\psi\pi^\pm$)		<	4	$\times 10^{-6}$	CL=95%	621
$J/\psi(1S) p\overline{p}$		<	8.3	$\times 10^{-7}$	CL=90%	862
$J/\psi(1S)\gamma$		<	1.6	$\times 10^{-6}$	CL=90%	1731
$J/\psi(1S)\overline{D}^0$		<	1.3	$\times 10^{-5}$	CL=90%	877
$\psi(2S) K^0$		(	6.2 ± 0.5) $\times 10^{-4}$			1283
$\psi(3770) K^0 \times$ B($\psi \to \overline{D}^0 D^0$)		<	1.23	$\times 10^{-4}$	CL=90%	1217
$\psi(3770) K^0 \times$ B($\psi \to D^- D^+$)		<	1.88	$\times 10^{-4}$	CL=90%	1217
$\psi(2S) K^+\pi^-$		(	5.7 ± 0.4) $\times 10^{-4}$			1238
$\psi(2S) K^*(892)^0$		(	6.1 ± 0.5) $\times 10^{-4}$		S=1.1	1116
$\chi_{c0}(1P) K^0$		(	1.47 ± 0.27) $\times 10^{-4}$			1477
$\chi_{c0} K^*(892)^0$		(	1.7 ± 0.4) $\times 10^{-4}$			1341
$\chi_{c2} K^0$		<	1.5	$\times 10^{-5}$	CL=90%	1378
$\chi_{c2} K^*(892)^0$		(	6.6 ± 1.9) $\times 10^{-5}$			1228

$\chi_{c1}(1P)\pi^0$	(1.12± 0.28) × 10^{-5}			1468
$\chi_{c1}(1P)K^0$	(3.93± 0.27) × 10^{-4}			1411
$\chi_{c1}(1P)K^-\pi^+$	(3.8 ± 0.4) × 10^{-4}			1371
$\chi_{c1}(1P)K^*(892)^0$	($2.22^{+\ 0.40}_{-\ 0.31}$) × 10^{-4}		S=1.6	1265
$X(4051)^+K^-\times$B($X^+\to\chi_{c1}\pi^+$)	($3.0^{+\ 4.0}_{-\ 1.8}$) × 10^{-5}			–
$X(4248)^+K^-\times$B($X^+\to\chi_{c1}\pi^+$)	($4.0^{+20.0}_{-\ 1.0}$) × 10^{-5}			–

K or K^* modes

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

$(K\pi)_0^{*+}\pi^-\times$ B($(K\pi)_0^{*+}\to K^+\pi^0$)		(	3.4 ± 0.5)	$\times10^{-5}$		–
$(K\pi)_0^{*0}\pi^0\times$B($(K\pi)_0^{*0}\to K^+\pi^-$)		(	8.6 ± 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
$K_x^{*0}\pi^0$	[*bbaa*]	(	6.1 ± 1.6)	$\times10^{-6}$		–
$K^0\pi^+\pi^-$ charmless		(	4.96± 0.20)	$\times10^{-5}$		2609
$K^0\pi^+\pi^-$ non-resonant		(	$1.47^{+\ 0.40}_{-\ 0.26}$)	$\times10^{-5}$	S=2.1	–
$K^0\rho^0$		(	4.7 ± 0.6)	$\times10^{-6}$		2558
$K^*(892)^+\pi^-$		(	8.4 ± 0.8)	$\times10^{-6}$		2563
$K_0^*(1430)^+\pi^-$		(	3.3 ± 0.7)	$\times10^{-5}$	S=2.0	–
$K_x^{*+}\pi^-$	[*bbaa*]	(	5.1 ± 1.6)	$\times10^{-6}$		–
$K^*(1410)^+\pi^-\times$ B($K^*(1410)^+\to K^0\pi^+$)		<	3.8	$\times10^{-6}$	CL=90%	–
$f_0(980)K^0\times$ B($f_0(980)\to\pi^+\pi^-$)		(	7.0 ± 0.9)	$\times10^{-6}$		2522
$f_2(1270)K^0$		(	$2.7\ ^{+\ 1.3}_{-\ 1.2}$)	$\times10^{-6}$		2459
$f_x(1300)K^0\times$ B($f_x\to\pi^+\pi^-$)		(	1.8 ± 0.7)	$\times10^{-6}$		–
$K^*(892)^0\pi^0$		(	3.3 ± 0.6)	$\times10^{-6}$		2563
$K_2^*(1430)^+\pi^-$		<	6	$\times10^{-6}$	CL=90%	2445
$K^*(1680)^+\pi^-$		<	1.0	$\times10^{-5}$	CL=90%	2358
$K^+\pi^-\pi^+\pi^-$	[*ccaa*]	<	2.3	$\times10^{-4}$	CL=90%	2600
$\rho^0K^+\pi^-$		(	2.8 ± 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 ± 0.5)	$\times10^{-5}$		2557
$K^*(892)^0\rho^0$		(	3.9 ± 1.3)	$\times10^{-6}$	S=1.9	2504
$K^*(892)^0f_0(980)$, $f_0\to\pi\pi$		(	$3.9\ ^{+\ 2.1}_{-\ 1.8}$)	$\times10^{-6}$	S=3.9	2466
$K_1(1270)^+\pi^-$		<	3.0	$\times10^{-5}$	CL=90%	2484
$K_1(1400)^+\pi^-$		<	2.7	$\times10^{-5}$	CL=90%	2451
$a_1(1260)^-K^+$	[*ccaa*]	(	1.6 ± 0.4)	$\times10^{-5}$		2471
$K^*(892)^+\rho^-$		(	1.03± 0.26)	$\times10^{-5}$		2504
$K_0^*(1430)^+\rho^-$		(	2.8 ± 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 ± 0.6)	$\times10^{-5}$		2381
$K_0^*(1430)^0f_0(980)$, $f_0\to\pi\pi$		(	2.7 ± 0.9)	$\times10^{-6}$		–
$K_2^*(1430)^0f_0(980)$, $f_0\to\pi\pi$		(	8.6 ± 2.0)	$\times10^{-6}$		–
K^+K^-		(	1.3 ± 0.5)	$\times10^{-7}$		2593
$K^0\overline{K}^0$		(	1.21± 0.16)	$\times10^{-6}$		2592

$K^0 K^- \pi^+$	(	6.4 ± 1.2)	$\times 10^{-6}$		2578
$\overline{K}^{*0} K^0 + K^{*0} \overline{K}^0$	$<$	1.9	$\times 10^{-6}$		–
$K^+ K^- \pi^0$	$<$	1.9	$\times 10^{-5}$	CL=90%	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%	2452
$K^0 K^+ K^-$	(	2.66 ± 0.12)	$\times 10^{-5}$		2522
$K^0 \phi$	(	7.3 ± 0.7)	$\times 10^{-6}$		2516
$f_0(980) K^0$, $f_0 \to K^+ K^-$	(	$7.0 \,^{+\,3.5}_{-\,3.0}$)	$\times 10^{-6}$		–
$f_0(1500) K^0$	(	$1.3 \,^{+\,0.7}_{-\,0.5}$)	$\times 10^{-5}$		2398
$f'_2(1525)^0 K^0$	(	$3 \,^{+\,5}_{-\,4}$)	$\times 10^{-7}$		–
$f_0(1710) K^0$, $f_0 \to K^+ K^-$	(	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)	$\times 10^{-6}$		–
$f_0(1710) K^0$, $f_0 \to K^0_S K^0_S$	(	$5.0 \,^{+\,5.0}_{-\,2.6}$)	$\times 10^{-7}$		–
$f_0(2010) K^0$, $f_0 \to K^0_S K^0_S$	(	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
$K^*(892)^0 \phi$	(	9.8 ± 0.6)	$\times 10^{-6}$		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 ± 5)	$\times 10^{-7}$	S=2.2	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 ± 0.7)	$\times 10^{-6}$		–
$\phi(K\pi)^{*0}_0$ $(1.60 < m_{K\pi} < 2.15)$ [ddaa]	$<$	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
$K_2^*(1430)^0\phi$		(	7.5 ± 1.0)	$\times 10^{-6}$		2333
$K^0\phi\phi$		(	4.5 ± 0.9)	$\times 10^{-6}$		2305
$\eta'\eta' K^0$		<	3.1	$\times 10^{-5}$	CL=90%	2337
$\eta K^0\gamma$		(	7.6 ± 1.8)	$\times 10^{-6}$		2587
$\eta' K^0\gamma$		<	6.4	$\times 10^{-6}$	CL=90%	2528
$K^0\phi\gamma$		(	2.7 ± 0.7)	$\times 10^{-6}$		2516
$K^+\pi^-\gamma$		(	4.6 ± 1.4)	$\times 10^{-6}$		2615
$K^*(892)^0\gamma$		(	4.33± 0.15)	$\times 10^{-5}$		2564
$K^*(1410)\gamma$		<	1.3	$\times 10^{-4}$	CL=90%	2451
$K^+\pi^-\gamma$ nonresonant		<	2.6	$\times 10^{-6}$	CL=90%	2615
$K^*(892)^0 X(214)\times$ B($X \to \mu^+\mu^-$)	[eeaa]	<	2.26	$\times 10^{-8}$	CL=90%	–
$K^0\pi^+\pi^-\gamma$		(	1.95± 0.22)	$\times 10^{-5}$		2609
$K^+\pi^-\pi^0\gamma$		(	4.1 ± 0.4)	$\times 10^{-5}$		2609
$K_1(1270)^0\gamma$		<	5.8	$\times 10^{-5}$	CL=90%	2486
$K_1(1400)^0\gamma$		<	1.2	$\times 10^{-5}$	CL=90%	2453
$K_2^*(1430)^0\gamma$		(	1.24± 0.24)	$\times 10^{-5}$		2447
$K^*(1680)^0\gamma$		<	2.0	$\times 10^{-3}$	CL=90%	2361
$K_3^*(1780)^0\gamma$		<	8.3	$\times 10^{-5}$	CL=90%	2341
$K_4^*(2045)^0\gamma$		<	4.3	$\times 10^{-3}$	CL=90%	2244

Light unflavored meson modes

$\rho^0\gamma$		(	8.6 ± 1.5)	$\times 10^{-7}$		2583
$\rho^0 X(214)\times$ B($X \to \mu^+\mu^-$)	[eeaa]	<	1.73	$\times 10^{-8}$	CL=90%	–
$\omega\gamma$		(	$4.4\ ^{+\ 1.8}_{-\ 1.6}$)	$\times 10^{-7}$		2582
$\phi\gamma$		<	8.5	$\times 10^{-7}$	CL=90%	2541
$\pi^+\pi^-$		(	5.12± 0.19)	$\times 10^{-6}$		2636
$\pi^0\pi^0$		(	1.91± 0.22)	$\times 10^{-6}$		2636
$\eta\pi^0$		<	1.5	$\times 10^{-6}$	CL=90%	2610
$\eta\eta$		<	1.0	$\times 10^{-6}$	CL=90%	2582
$\eta'\pi^0$		(	1.2 ± 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
$\eta' f_0(980)\times$ B($f_0(980) \to \pi^+\pi^-$)		<	9	$\times 10^{-7}$	CL=90%	2454
$\eta\rho^0$		<	1.5	$\times 10^{-6}$	CL=90%	2553
$\eta f_0(980)\times$ B($f_0(980) \to \pi^+\pi^-$)		<	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
$\omega f_0(980)\times$ B($f_0(980) \to \pi^+\pi^-$)		<	1.5	$\times 10^{-6}$	CL=90%	2485
$\omega\omega$		<	4.0	$\times 10^{-6}$	CL=90%	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
$\phi\rho^0$		<	3.3	$\times 10^{-7}$	CL=90%	2480
$\phi f_0(980)\times$ B($f_0 \to \pi^+\pi^-$)		<	3.8	$\times 10^{-7}$	CL=90%	2441
$\phi\omega$		<	1.2	$\times 10^{-6}$	CL=90%	2479
$\phi\phi$		<	2	$\times 10^{-7}$	CL=90%	2435
$a_0(980)^\pm\pi^\mp\times$ B($a_0(980)^\pm \to \eta\pi^\pm$)		<	3.1	$\times 10^{-6}$	CL=90%	–
$a_0(1450)^\pm\pi^\mp\times$ B($a_0(1450)^\pm \to \eta\pi^\pm$)		<	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
$\rho^\mp\pi^\pm$	[gg]	(	2.30± 0.23)	$\times 10^{-5}$		2581
$\pi^+\pi^-\pi^+\pi^-$		<	1.93	$\times 10^{-5}$	CL=90%	2621
$\rho^0\pi^+\pi^-$		<	8.8	$\times 10^{-6}$	CL=90%	2575
$\rho^0\rho^0$		(	7.3 ± 2.8)	$\times 10^{-7}$		2523
$f_0(980)\pi^+\pi^-$		<	3.8	$\times 10^{-6}$	CL=90%	2539
$\rho^0 f_0(980)\times$ B($f_0(980) \to \pi^+\pi^-$)		<	3	$\times 10^{-7}$	CL=90%	2486
$f_0(980)f_0(980)\times$ B$^2(f_0(980) \to \pi^+\pi^-)$		<	1	$\times 10^{-7}$	CL=90%	2447
$f_0(980)f_0(980)\times$ B($f_0 \to \pi^+\pi^-$) $\times$ B($f_0 \to K^+K^-$)		<	2.3	$\times 10^{-7}$	CL=90%	2447
$a_1(1260)^\mp\pi^\pm$	[gg]	(	2.6 ± 0.5)	$\times 10^{-5}$	S=1.9	2494
$a_2(1320)^\mp\pi^\pm$	[gg]	<	6.3	$\times 10^{-6}$	CL=90%	2473
$\pi^+\pi^-\pi^0\pi^0$		<	3.1	$\times 10^{-3}$	CL=90%	2622
$\rho^+\rho^-$		(	2.42± 0.31)	$\times 10^{-5}$		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
$b_1^\mp\pi^\pm\times$ B($b_1^\mp \to \omega\pi^\mp$)		(	1.09± 0.15)	$\times 10^{-5}$		–
$b_1^0\pi^0\times$ B($b_1^0 \to \omega\pi^0$)		<	1.9	$\times 10^{-6}$	CL=90%	–
$b_1^-\rho^+\times$ B($b_1^- \to \omega\pi^-$)		<	1.4	$\times 10^{-6}$	CL=90%	–
$b_1^0\rho^0\times$ B($b_1^0 \to \omega\pi^0$)		<	3.4	$\times 10^{-6}$	CL=90%	–

$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$		$<$	3.0	$\times 10^{-3}$	CL=90%	2592
$a_1(1260)^+ a_1(1260)^- \times$ B$^2(a_1^+ \to 2\pi^+\pi^-)$		(	1.18 $\pm$ 0.31)	$\times 10^{-5}$		2336
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$		$<$	1.1	%	CL=90%	2572

Baryon modes

$p\overline{p}$		$<$	1.1	$\times 10^{-7}$	CL=90%	2467
$p\overline{p}\pi^+\pi^-$		$<$	2.5	$\times 10^{-4}$	CL=90%	2406
$p\overline{p}K^0$		(	2.66 $\pm$ 0.32)	$\times 10^{-6}$		2347
$\Theta(1540)^+\overline{p}\times$ B$(\Theta(1540)^+ \to pK_S^0)$	[*ffaa*]	$<$	5	$\times 10^{-8}$	CL=90%	2318
$f_J(2220)K^0 \times$ B$(f_J(2220) \to p\overline{p})$		$<$	4.5	$\times 10^{-7}$	CL=90%	2135
$p\overline{p}K^*(892)^0$		(	$1.24^{+\ 0.28}_{-\ 0.25}$)	$\times 10^{-6}$		2216
$f_J(2220)K_0^*\times$ B$(f_J(2220) \to p\overline{p})$		$<$	1.5	$\times 10^{-7}$	CL=90%	–
$p\overline{\Lambda}\pi^-$		(	3.14 $\pm$ 0.29)	$\times 10^{-6}$		2401
$p\overline{\Sigma}(1385)^-$		$<$	2.6	$\times 10^{-7}$	CL=90%	2363
$\Delta^0\overline{\Lambda}$		$<$	9.3	$\times 10^{-7}$	CL=90%	2364
$p\overline{\Lambda}K^-$		$<$	8.2	$\times 10^{-7}$	CL=90%	2308
$p\overline{\Sigma}^0\pi^-$		$<$	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
$\overline{\Lambda}\Lambda D^0$		(	$1.1\ ^{+\ 0.6}_{-\ 0.5}$)	$\times 10^{-5}$		1661
$\Delta^0\overline{\Delta}^0$		$<$	1.5	$\times 10^{-3}$	CL=90%	2335
$\Delta^{++}\overline{\Delta}^{--}$		$<$	1.1	$\times 10^{-4}$	CL=90%	2335
$\overline{D}^0 p\overline{p}$		(	1.04 $\pm$ 0.07)	$\times 10^{-4}$		1863
$D_s^-\overline{\Lambda}p$		(	2.8 $\pm$ 0.9)	$\times 10^{-5}$		1710
$\overline{D}^*(2007)^0 p\overline{p}$		(	9.9 $\pm$ 1.1)	$\times 10^{-5}$		1788
$D^*(2010)^- p\overline{n}$		(	1.4 $\pm$ 0.4)	$\times 10^{-3}$		1785
$D^- p\overline{p}\pi^+$		(	3.32 $\pm$ 0.31)	$\times 10^{-4}$		1786
$D^*(2010)^- p\overline{p}\pi^+$		(	4.7 $\pm$ 0.5)	$\times 10^{-4}$	S=1.2	1707
$\overline{D}^0 p\overline{p}\pi^+\pi^-$		(	3.0 $\pm$ 0.5)	$\times 10^{-4}$		1708
$\overline{D}^{*0} p\overline{p}\pi^+\pi^-$		(	1.9 $\pm$ 0.5)	$\times 10^{-4}$		1623
$\Theta_c\overline{p}\pi^+\times$ B$(\Theta_c \to D^- p)$		$<$	9	$\times 10^{-6}$	CL=90%	–
$\Theta_c\overline{p}\pi^+\times$ B$(\Theta_c \to D^{*-} p)$		$<$	1.4	$\times 10^{-5}$	CL=90%	–
$\overline{\Sigma}_c^{--}\Delta^{++}$		$<$	1.0	$\times 10^{-3}$	CL=90%	1839
$\overline{\Lambda}_c^- p\pi^+\pi^-$		(	1.3 $\pm$ 0.4)	$\times 10^{-3}$		1934
$\overline{\Lambda}_c^- p$		(	2.0 $\pm$ 0.4)	$\times 10^{-5}$		2021
$\overline{\Lambda}_c^- p\pi^0$		(	1.9 $\pm$ 0.5)	$\times 10^{-4}$		1982

$\Sigma_c(2455)^- p$			$< 3.0 \times 10^{-5}$			–
$\overline{\Lambda}_c^- p\pi^+\pi^-\pi^0$			$< 5.07 \times 10^{-3}$		CL=90%	1882
$\overline{\Lambda}_c^- p\pi^+\pi^-\pi^+\pi^-$			$< 2.74 \times 10^{-3}$		CL=90%	1821
$\overline{\Lambda}_c^- p\pi^+\pi^-$			$(1.12 \pm 0.32) \times 10^{-3}$			1934
$\overline{\Lambda}_c^- p\pi^+\pi^-$ (nonresonant)			$(6.4 \pm 1.9) \times 10^{-4}$			1934
$\overline{\Sigma}_c(2520)^{--} p\pi^+$			$(1.2 \pm 0.4) \times 10^{-4}$			1860
$\overline{\Sigma}_c(2520)^0 p\pi^-$			$< 3.8 \times 10^{-5}$		CL=90%	1860
$\overline{\Sigma}_c(2455)^0 p\pi^-$			$(1.5 \pm 0.5) \times 10^{-4}$			1895
$\overline{\Sigma}_c(2455)^0 N^0 \times$ B($N^0 \to p\pi^-$)			$(8.0 \pm 2.9) \times 10^{-5}$			–
$\overline{\Sigma}_c(2455)^{--} p\pi^+$			$(2.2 \pm 0.7) \times 10^{-4}$			1895
$\Lambda_c^- pK^+\pi^-$			$(4.3 \pm 1.4) \times 10^{-5}$			–
$\overline{\Sigma}_c(2455)^{--} pK^+ \times$ B($\overline{\Sigma}_c^{--} \to \overline{\Lambda}_c^- \pi^-$)			$(1.1 \pm 0.4) \times 10^{-5}$			1754
$\Lambda_c^- pK^*(892)^0$			$< 2.42 \times 10^{-5}$		CL=90%	–
$\overline{\Lambda}_c^- \Lambda K^+$			$(3.8 \pm 1.3) \times 10^{-5}$			1767
$\overline{\Lambda}_c^- \Lambda_c^+$			$< 6.2 \times 10^{-5}$		CL=90%	1319
$\overline{\Lambda}_c(2593)^- \,/\, \overline{\Lambda}_c(2625)^- p$			$< 1.1 \times 10^{-4}$		CL=90%	–
$\overline{\Xi}_c^- \Lambda_c^+ \times$ B($\overline{\Xi}_c^- \to \overline{\Xi}^+\pi^-\pi^-$)			$(2.2 \pm 2.3) \times 10^{-5}$		S=1.9	1147
$\Lambda_c^+ \Lambda_c^- K^0$			$(5.4 \pm 3.2) \times 10^{-4}$			–

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

$\gamma\gamma$	$B1$		$< 3.2 \times 10^{-7}$		CL=90%	2640
$e^+ e^-$	$B1$		$< 8.3 \times 10^{-8}$		CL=90%	2640
$e^+ e^-\gamma$	$B1$		$< 1.2 \times 10^{-7}$		CL=90%	2640
$\mu^+\mu^-$	$B1$		$< 8.0 \times 10^{-10}$		CL=90%	2638
$\mu^+\mu^-\gamma$	$B1$		$< 1.6 \times 10^{-7}$		CL=90%	2638
$\tau^+\tau^-$	$B1$		$< 4.1 \times 10^{-3}$		CL=90%	1952
$\pi^0\ell^+\ell^-$	$B1$		$< 1.2 \times 10^{-7}$		CL=90%	2638
$\pi^0 e^+ e^-$	$B1$		$< 1.4 \times 10^{-7}$		CL=90%	2638
$\pi^0\mu^+\mu^-$	$B1$		$< 1.8 \times 10^{-7}$		CL=90%	2634
$\pi^0\nu\overline{\nu}$	$B1$		$< 2.2 \times 10^{-4}$		CL=90%	2638
$K^0\ell^+\ell^-$	$B1$	[sss]	$(3.1 \,^{+\,0.8}_{-\,0.7}) \times 10^{-7}$			2616
$K^0 e^+ e^-$	$B1$		$(1.6 \,^{+\,1.0}_{-\,0.8}) \times 10^{-7}$			2616
$K^0\mu^+\mu^-$	$B1$		$(3.4 \pm 0.5) \times 10^{-7}$			2612
$K^0\nu\overline{\nu}$	$B1$		$< 5.6 \times 10^{-5}$		CL=90%	2616
$\rho^0\nu\overline{\nu}$	$B1$		$< 4.4 \times 10^{-4}$		CL=90%	2583
$K^*(892)^0\ell^+\ell^-$	$B1$	[sss]	$(9.9 \,^{+\,1.2}_{-\,1.1}) \times 10^{-7}$			2564
$K^*(892)^0 e^+ e^-$	$B1$		$(1.03^{+\,0.19}_{-\,0.17}) \times 10^{-6}$			2564

$K^*(892)^0\mu^+\mu^-$	B1		(1.06± 0.10)	$\times 10^{-6}$		2560
$K^*(892)^0\nu\overline{\nu}$	B1	<	1.2	$\times 10^{-4}$	CL=90%	2564
$\phi\nu\overline{\nu}$	B1	<	5.8	$\times 10^{-5}$	CL=90%	2541
$e^\pm\mu^\mp$	LF	[gg] <	6.4	$\times 10^{-8}$	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	<	2.7	$\times 10^{-7}$	CL=90%	2615
$K^*(892)^0 e^+\mu^-$	LF	<	5.3	$\times 10^{-7}$	CL=90%	2563
$K^*(892)^0 e^-\mu^+$	LF	<	3.4	$\times 10^{-7}$	CL=90%	2563
$K^*(892)^0 e^\pm\mu^\mp$	LF	<	5.8	$\times 10^{-7}$	CL=90%	2563
$e^\pm\tau^\mp$	LF	[gg] <	2.8	$\times 10^{-5}$	CL=90%	2341
$\mu^\pm\tau^\mp$	LF	[gg] <	2.2	$\times 10^{-5}$	CL=90%	2339
invisible	B1	<	2.4	$\times 10^{-5}$	CL=90%	–
$\nu\overline{\nu}\gamma$	B1	<	1.7	$\times 10^{-5}$	CL=90%	2640
$\Lambda_c^+\mu^-$	L,B	<	1.8	$\times 10^{-6}$	CL=90%	2143
$\Lambda_c^+ e^-$	L,B	<	5	$\times 10^{-6}$	CL=90%	2145

$B^\pm/B^0$ ADMIXTURE

CP violation

$A_{CP}(B \to K^*(892)\gamma) = -0.003 \pm 0.017$
$A_{CP}(b \to s\gamma) = -0.008 \pm 0.029$
$A_{CP}(b \to (s+d)\gamma) = -0.01 \pm 0.05$
$A_{CP}(B \to X_s\ell^+\ell^-) = -0.22 \pm 0.26$
$A_{CP}(B \to K^* e^+ e^-) = -0.18 \pm 0.15$
$A_{CP}(B \to K^*\mu^+\mu^-) = -0.03 \pm 0.13$
$A_{CP}(B \to K^*\ell^+\ell^-) = -0.04 \pm 0.07$
$A_{CP}(B \to \eta\text{anything}) = -0.13^{+0.04}_{-0.05}$

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

For inclusive branching fractions, *e.g.*, $B \rightarrow D^{\pm}$ *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				
$e^+ \nu_e$ anything	[*ggaa*]	(10.72 ± 0.13) %		–
$\overline{p} e^+ \nu_e$ anything		< 5.9	$\times 10^{-4}$ CL=90%	–
$\mu^+ \nu_\mu$ anything	[*ggaa*]	(10.72 ± 0.13) %		–
$\ell^+ \nu_\ell$ anything	[*sss,ggaa*]	(10.72 ± 0.13) %		–
$D^- \ell^+ \nu_\ell$ anything	[*sss*]	(2.8 ± 0.9) %		–
$\overline{D}^0 \ell^+ \nu_\ell$ anything	[*sss*]	(7.2 ± 1.4) %		–
$\overline{D} \ell^+ \nu_\ell$		(2.39 ± 0.12) %		2310
$\overline{D} \tau^+ \nu_\tau$		(1.05 ± 0.18) %		1911
$D^{*-} \ell^+ \nu_\ell$ anything	[*hhaa*]	(6.7 ± 1.3) $\times 10^{-3}$		–
$D^* \ell^+ \nu_\ell$	[*iiaa*]	(4.95 ± 0.11) %		2257
$D^* \tau^+ \nu_\tau$		(1.64 ± 0.15) %		1837
$\overline{D}^{**} \ell^+ \nu_\ell$	[*sss,jjaa*]	(2.7 ± 0.7) %		–
$\overline{D}_1(2420) \ell^+ \nu_\ell$ anything		(3.8 ± 1.3) $\times 10^{-3}$	S=2.4	–
$D \pi \ell^+ \nu_\ell$ anything + $D^* \pi \ell^+ \nu_\ell$ anything		(2.6 ± 0.5) %	S=1.5	–
$D \pi \ell^+ \nu_\ell$ anything		(1.5 ± 0.6) %		–
$D^* \pi \ell^+ \nu_\ell$ 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) %		–
$D_s^- \ell^+ \nu_\ell$ anything	[*sss*]	< 7 $\times 10^{-3}$	CL=90%	–
$D_s^- \ell^+ \nu_\ell K^+$ anything	[*sss*]	< 5 $\times 10^{-3}$	CL=90%	–
$D_s^- \ell^+ \nu_\ell K^0$ anything	[*sss*]	< 7 $\times 10^{-3}$	CL=90%	–

$X_c \ell^+ \nu_\ell$		(	10.51	±	0.13) %			–
$X_u \ell^+ \nu_\ell$		(	2.12	±	0.31) $\times 10^{-3}$			–
$K^+ \ell^+ \nu_\ell$ anything	[*sss*]	(	6.2	±	0.5) %			–
$K^- \ell^+ \nu_\ell$ anything	[*sss*]	(	10	±	4) $\times 10^{-3}$			–
$K^0 / \overline{K}^0 \ell^+ \nu_\ell$ anything	[*sss*]	(	4.5	±	0.5) %			–

D, D^*, or D_s modes

$D^\pm$ anything		(	23.7	±	1.3) %			–
$D^0 / \overline{D}^0$ anything		(	62.7	±	2.9) %		S=1.3	–
$D^*(2010)^\pm$ anything		(	22.5	±	1.5) %			–
$D^*(2007)^0$ anything		(	26.0	±	2.7) %			–
$D_s^\pm$ anything	[*gg*]	(	8.3	±	0.8) %			–
$D_s^{*\pm}$ anything		(	6.3	±	1.0) %			–
$D_s^{*\pm} \overline{D}^{(*)}$		(	3.4	±	0.6) %			–
$D^{(*)} \overline{D}^{(*)} K^0$ + $D^{(*)} \overline{D}^{(*)} K^\pm$	[*gg,kkaa*]	(	7.1	$^{+\ 2.7}_{-\ 1.7}$	) %			–
$b \to c \overline{c} s$		(	22	±	4) %			–
$D_s^{(*)} \overline{D}^{(*)}$	[*gg,kkaa*]	(	3.9	±	0.4) %			–
$D^* D^*(2010)^\pm$	[*gg*]	<	5.9		$\times 10^{-3}$		CL=90%	1711
$D D^*(2010)^\pm$ + $D^* D^\pm$	[*gg*]	<	5.5		$\times 10^{-3}$		CL=90%	–
$D D^\pm$	[*gg*]	<	3.1		$\times 10^{-3}$		CL=90%	1866
$D_s^{(*)\pm} \overline{D}^{(*)} X(n\pi^\pm)$	[*gg,kkaa*]	(	9	$^{+\ 5}_{-\ 4}$	) %			–
$D^*(2010)\gamma$		<	1.1		$\times 10^{-3}$		CL=90%	2257
$D_s^+ \pi^-$, $D_s^{*+} \pi^-$, $D_s^+ \rho^-$, $D_s^{*+} \rho^-$, $D_s^+ \pi^0$, $D_s^{*+} \pi^0$, $D_s^+ \eta$, $D_s^{*+} \eta$, $D_s^+ \rho^0$, $D_s^{*+} \rho^0$, $D_s^+ \omega$, $D_s^{*+} \omega$	[*gg*]	<	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		(	3.86	±	0.27) $\times 10^{-3}$			–
$\chi_{c1}(1P)$ (direct) anything		(	3.20	±	0.25) $\times 10^{-3}$			–
$\chi_{c2}(1P)$ anything		(	1.3	±	0.4) $\times 10^{-3}$		S=1.9	–
$\chi_{c2}(1P)$ (direct) anything		(	1.65	±	0.31) $\times 10^{-3}$			–
$\eta_c(1S)$ anything		<	9		$\times 10^{-3}$		CL=90%	–
$K X(3872) \times$ B($X \to D^0 \overline{D}^0 \pi^0$)		(	1.2	±	0.4) $\times 10^{-4}$			1141

$K X(3872) \times$ B($X \to D^{*0} D^0$)		(	8.0	$\pm$	2.2	) $\times 10^{-5}$		1141
$K X(3940) \times$ B($X \to D^{*0} D^0$)		$<$	6.7			$\times 10^{-5}$	CL=90%	1084
$K X(3915) \times$ B($X \to \omega J/\psi$)	[*llaa*]	(	7.1	$\pm$	3.4	) $\times 10^{-5}$		1103
K or K^* modes								
$K^\pm$ anything	[*gg*]	(	78.9	$\pm$	2.5	) %		–
K^+ anything		(	66	$\pm$	5	) %		–
K^- anything		(	13	$\pm$	4	) %		–
$K^0 / \overline{K}^0$ anything	[*gg*]	(	64	$\pm$	4	) %		–
$K^*(892)^\pm$ anything		(	18	$\pm$	6	) %		–
$K^*(892)^0 / \overline{K}^*(892)^0$ anything	[*gg*]	(	14.6	$\pm$	2.6	) %		–
$K^*(892)\gamma$		(	4.2	$\pm$	0.6	) $\times 10^{-5}$		2564
$\eta K \gamma$		(	8.5	$^{+\ 1.8}_{-\ 1.6}$		) $\times 10^{-6}$		2588
$K_1(1400)\gamma$		$<$	1.27			$\times 10^{-4}$	CL=90%	2453
$K_2^*(1430)\gamma$		(	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%	2341
$K_4^*(2045)\gamma$		$<$	1.0			$\times 10^{-3}$	CL=90%	2244
$K \eta'(958)$		(	8.3	$\pm$	1.1	) $\times 10^{-5}$		2528
$K^*(892)\eta'(958)$		(	4.1	$\pm$	1.1	) $\times 10^{-6}$		2472
$K \eta$		$<$	5.2			$\times 10^{-6}$	CL=90%	2588
$K^*(892)\eta$		(	1.8	$\pm$	0.5	) $\times 10^{-5}$		2534
$K \phi \phi$		(	2.3	$\pm$	0.9	) $\times 10^{-6}$		2306
$\overline{b} \to \overline{s}\gamma$		(	3.40	$\pm$	0.21	) $\times 10^{-4}$		–
$\overline{b} \to \overline{d}\gamma$		(	9.2	$\pm$	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	$\pm$	0.9	) $\times 10^{-4}$		–
K^+ gluon (charmless)		$<$	1.87			$\times 10^{-4}$	CL=90%	–
K^0 gluon (charmless)		(	1.9	$\pm$	0.7	) $\times 10^{-4}$		–
Light unflavored meson modes								
$\rho\gamma$		(	1.39	$\pm$	0.25	) $\times 10^{-6}$	S=1.2	2583
$\rho/\omega\gamma$		(	1.30	$\pm$	0.23	) $\times 10^{-6}$	S=1.2	–
$\pi^\pm$ anything	[*gg,nnaa*]	(	358	$\pm$	7	) %		–
π^0 anything		(	235	$\pm$	11	) %		–
η anything		(	17.6	$\pm$	1.6	) %		–
ρ^0 anything		(	21	$\pm$	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			(	4.5	± 1.2	) %		–
Λ_c^+ anything		<		1.7		%	CL=90%	–
$\overline{\Lambda}_c^-$ anything		<		9		%	CL=90%	–
$\overline{\Lambda}_c^- \ell^+$ anything		<		1.1		$\times 10^{-3}$	CL=90%	–
$\overline{\Lambda}_c^- e^+$ anything		<		2.3		$\times 10^{-3}$	CL=90%	–
$\overline{\Lambda}_c^- \mu^+$ anything		<	−	1.8		$\times 10^{-3}$	CL=90%	–
$\overline{\Lambda}_c^- p$anything			(	2.6	± 0.8	) %		–
$\overline{\Lambda}_c^- p e^+ \nu_e$		<		1.0		$\times 10^{-3}$	CL=90%	2021
$\overline{\Sigma}_c^{--}$ anything			(	4.2	± 2.4	) $\times 10^{-3}$		–
$\overline{\Sigma}_c^-$ anything		<		9.6		$\times 10^{-3}$	CL=90%	–
$\overline{\Sigma}_c^0$ anything			(	4.6	± 2.4	) $\times 10^{-3}$		–
$\overline{\Sigma}_c^0 N(N = p$ or $n)$		<		1.5		$\times 10^{-3}$	CL=90%	1938
Ξ_c^0 anything			(	1.93	± 0.30	) $\times 10^{-4}$	S=1.1	–
$\times$ B($\Xi_c^0 \rightarrow \Xi^- \pi^+$)								
Ξ_c^+ anything			(	4.5	$^{+\ 1.3}_{-\ 1.2}$	) $\times 10^{-4}$		–
$\times$ B($\Xi_c^+ \rightarrow \Xi^- \pi^+ \pi^+$)								
$p/\overline{p}$anything	[gg]		(	8.0	± 0.4	) %		–
$p/\overline{p}$(direct) anything	[gg]		(	5.5	± 0.5	) %		–
$\Lambda/\overline{\Lambda}$anything	[gg]		(	4.0	± 0.5	) %		–
$\Xi^-/\overline{\Xi}^+$ anything	[gg]		(	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	[gg]		(	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*		(	4.7	± 1.3	) $\times 10^{-6}$		–
$s \mu^+ \mu^-$	*B1*		(	4.3	± 1.2	) $\times 10^{-6}$		–
$s \ell^+ \ell^-$	*B1*	[sss]	(	4.5	± 1.0	) $\times 10^{-6}$		–
$\pi \ell^+ \ell^-$	*B1*	<		6.2		$\times 10^{-8}$	CL=90%	2638
$K e^+ e^-$	*B1*		(	4.4	± 0.6	) $\times 10^{-7}$		2617
$K^*(892) e^+ e^-$	*B1*		(	1.19	± 0.20	) $\times 10^{-6}$	S=1.2	2564
$K \mu^+ \mu^-$	*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)	$\times 10^{-6}$		2564
$K\nu\overline{\nu}$	B1	<	1.4	$\times 10^{-5}$	CL=90%	2617
$K^*\nu\overline{\nu}$	B1	<	8	$\times 10^{-5}$	CL=90%	–
$s\,e^\pm\mu^\mp$	LF	[gg] <	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 $\tau = (1.568 \pm 0.009) \times 10^{-12}$ 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

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

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

$\text{Re}(\epsilon_b)\ /\ (1 + \left|\epsilon_b\right|^2) = (-2.0 \pm 0.5) \times 10^{-3}$

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 (HFAG) as described in the note "B^0-$\overline{B}^0$ Mixing" in the B^0 Particle Listings. The production fractions in b-hadronic Z decay or $p\overline{p}$ collisions at the Tevatron are also listed at the end of the section. Values assume

$\text{B}(\overline{b} \to B^+) = \text{B}(\overline{b} \to B^0)$

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

The correlation coefficients between production fractions are also reported:

$cor(B_s^0,\ b\text{-baryon}) = -0.277$
$cor(B_s^0,\ B^{\pm}{=}B^0) = -0.112$
$cor(b\text{-baryon},\ B^{\pm}{=}B^0) = -0.924.$

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^+		(40.2 ± 0.7) %		–
B^0		(40.2 ± 0.7) %		–
B_s^0		(10.4 ± 0.6) %		–
b-baryon		(9.3 ± 1.5) %		–

DECAY MODES

Semileptonic and leptonic modes

ν anything		(23.1 ± 1.5) %		–
$\ell^+ \nu_\ell$ anything	[*sss*]	(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	[*sss*]	(2.27± 0.35) %	S=1.7	–
$D^- \pi^+ \ell^+ \nu_\ell$ anything		(4.9 ± 1.9) $\times 10^{-3}$		–
$D^- \pi^- \ell^+ \nu_\ell$ anything		(2.6 ± 1.6) $\times 10^{-3}$		–
$\overline{D}^0 \ell^+ \nu_\ell$ anything	[*sss*]	(6.84± 0.35) %		–
$\overline{D}^0 \pi^- \ell^+ \nu_\ell$ anything		(1.07± 0.27) %		–
$\overline{D}^0 \pi^+ \ell^+ \nu_\ell$ anything		(2.3 ± 1.6) $\times 10^{-3}$		–
$D^{*-} \ell^+ \nu_\ell$ anything	[*sss*]	(2.75± 0.19) %		–
$D^{*-} \pi^- \ell^+ \nu_\ell$ anything		(6 ± 7) $\times 10^{-4}$		–
$D^{*-} \pi^+ \ell^+ \nu_\ell$ anything		(4.8 ± 1.0) $\times 10^{-3}$		–
$\overline{D}_j^0 \ell^+ \nu_\ell$ anything × $\mathrm{B}(\overline{D}_j^0 \to\ D^{*+} \pi^-)$	[*sss,ooaa*]	(2.6 ± 0.9) $\times 10^{-3}$		–
$D_j^- \ell^+ \nu_\ell$ anything × $\mathrm{B}(D_j^- \to\ D^0 \pi^-)$	[*sss,ooaa*]	(7.0 ± 2.3) $\times 10^{-3}$		–
$\overline{D}_2^*(2460)^0 \ell^+ \nu_\ell$ anything × $\mathrm{B}(\overline{D}_2^*(2460)^0 \to\ D^{*-} \pi^+)$		< 1.4 $\times 10^{-3}$	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 $\ell \overline{\nu}_\ell$	[*sss*]	(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	[*sss*]	(8.02± 0.19) %	–
$c \to \ \ell^+ \nu$ anything		(1.6 $^{+\ 0.4}_{-\ 0.5}$) %	–

Charmed meson and baryon modes

$\overline{D}^0$ anything		(59.8 ± 2.9) %	–
$D^0 D_s^\pm$ anything	[*gg*]	(9.1 $^{+\ 4.0}_{-\ 2.8}$) %	–
$D^\mp D_s^\pm$ anything	[*gg*]	(4.0 $^{+\ 2.3}_{-\ 1.8}$) %	–
$\overline{D}^0 D^0$ anything	[*gg*]	(5.1 $^{+\ 2.0}_{-\ 1.8}$) %	–
$D^0 D^\pm$ anything	[*gg*]	(2.7 $^{+\ 1.8}_{-\ 1.6}$) %	–
$D^\pm D^\mp$ anything	[*gg*]	< 9 × 10^{-3} CL=90%	–
D^- anything		(23.3 ± 1.7) %	–
$D^*(2010)^+$ anything		(17.3 ± 2.0) %	–
$D_1(2420)^0$ anything		(5.0 ± 1.5) %	–
$D^*(2010)^\mp D_s^\pm$ anything	[*gg*]	(3.3 $^{+\ 1.6}_{-\ 1.3}$) %	–
$D^0 D^*(2010)^\pm$ anything	[*gg*]	(3.0 $^{+\ 1.1}_{-\ 0.9}$) %	–
$D^*(2010)^\pm D^\mp$ anything	[*gg*]	(2.5 $^{+\ 1.2}_{-\ 1.0}$) %	–
$D^*(2010)^\pm D^*(2010)^\mp$ anything	[*gg*]	(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		(9.7 ± 2.9) %	–
$\overline{c}/c$ anything	[*nnaa*]	(116.2 ± 3.2) %	–

Charmonium modes

$J/\psi(1S)$ anything		(1.16± 0.10) %	–
$\psi(2S)$ anything		(2.83± 0.29) × 10^{-3}	–
$\chi_{c1}(1P)$ anything		(1.4 ± 0.4) %	–

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^0_S anything		(29.0 ± 2.9) %			–
Pion modes					
$\pi^{\pm}$ anything		(397 ±21) %			–
π^0 anything	[*nnaa*]	(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	[*nnaa*]	(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 $m_{B^*} = 5325.2 \pm 0.4$ MeV
$m_{B^*} - m_B = 45.78 \pm 0.35$ MeV
$m_{B^{*+}} - m_{B^+} = 45.0 \pm 0.4$ MeV

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

$B_1(5721)^0$

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

$B_1(5721)^0$ MASS = 5723.5 ± 2.0 MeV (S = 1.1)
$m_{B_1^0} - m_{B^+} = 444.3 \pm 2.0$ MeV (S = 1.1)

$B_1(5721)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B^{*+}\pi^-$	dominant	–

$B_2^*(5747)^0$

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

$B_2^*(5747)^0$ MASS $= 5743 \pm 5$ MeV (S = 2.9)
Full width $\Gamma = 23^{+5}_{-11}$ MeV
$m_{B_2^{*0}} - m_{B_1^0} = 19 \pm 6$ MeV (S = 3.0)

$B_2^*(5747)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B^+\pi^-$	dominant	424
$B^{*+}\pi^-$	dominant	–

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 $m_{B_s^0} = 5366.77 \pm 0.24$ MeV
$m_{B_s^0} - m_B = 87.35 \pm 0.23$ MeV
Mean life $\tau = (1.516 \pm 0.011) \times 10^{-12}$ s
$c\tau = 454.5\ \mu$m
$\Delta\Gamma_{B_s^0} = \Gamma_{B_{sL}^0} - \Gamma_{B_{sH}^0} = (0.081 \pm 0.011) \times 10^{12}$ s^{-1}

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

$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0} = (17.69 \pm 0.08) \times 10^{12}\ \hbar$ s^{-1}
$= (1.164 \pm 0.005) \times 10^{-8}$ MeV
$x_s = \Delta m_{B_s^0}/\Gamma_{B_s^0} = 26.82 \pm 0.23$
$\chi_s = 0.499309 \pm 0.000012$

CP violation parameters in B_s^0

$\mathrm{Re}(\epsilon_{B_s^0}) \,/\, (1 + |\epsilon_{B_s^0}|^2) = (-4.3 \pm 1.4) \times 10^{-3}$

CP Violation phase $\beta_s = (4^{+10}_{-13}) \times 10^{-2}$

$A_{CP}(B_s \to \pi^+ K^-) = 0.29 \pm 0.07$

$A_{CP}(B_s^0 \to [K^+ K^-]_D \overline{K}^*(892)^0) = 0.04 \pm 0.16$

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		(93 ±25) %		–
$\ell \nu_\ell X$		(9.5 ± 2.7) %		–
$D_s^- \ell^+ \nu_\ell$ anything	[*ppaa*]	(7.9 ± 2.4) %		–
$D_{s1}(2536)^- \mu^+ \nu_\mu$, $D_{s1}^- \to D^{*-} K_S^0$		(2.6 ± 0.7) $\times 10^{-3}$		–
$D_{s1}(2536)^- X \mu^+ \nu$, $D_{s1}^- \to \overline{D}^0 K^+$		(4.3 ± 1.7) $\times 10^{-3}$		–
$D_{s2}(2573)^- X \mu^+ \nu$, $D_{s2}^- \to \overline{D}^0 K^+$		(2.6 ± 1.2) $\times 10^{-3}$		–
$D_s^- \pi^+$		(3.04 ± 0.23) $\times 10^{-3}$		2320
$D_s^- \rho^+$		(7.0 ± 1.5) $\times 10^{-3}$		2248
$D_s^- \pi^+ \pi^+ \pi^-$		(6.3 ± 1.1) $\times 10^{-3}$		2301
$D_{s1}(2536)^- \pi^+$, $D_{s1}^- \to D_s^- \pi^+ \pi^-$		(2.5 ± 0.8) $\times 10^{-5}$		–
$D_s^\mp K^\pm$		(2.03 ± 0.28) $\times 10^{-4}$	S=1.3	2293
$D_s^- K^+ \pi^+ \pi^-$		(3.3 ± 0.7) $\times 10^{-4}$		2249
$D_s^+ D_s^-$		(5.3 ± 0.8) $\times 10^{-3}$		1824
$D_s^{*-} \pi^+$		(2.0 ± 0.5) $\times 10^{-3}$		2265
$D_s^{*-} \rho^+$		(9.7 ± 2.2) $\times 10^{-3}$		2191
$D_s^{*+} D_s^- + D_s^{*-} D_s^+$		(1.30 ± 0.22) %	S=1.1	1742
$D_s^{*+} D_s^{*-}$		(1.87 ± 0.30) %		1655
$D_s^{(*)+} D_s^{(*)-}$		(4.5 ± 1.4) %		–

$\overline{D}^0 \overline{K}^*(892)^0$		$(\ 4.7 \pm 1.4\ ) \times 10^{-4}$		2264
$\overline{D}^0 K^+ K^-$		$(\ 4.2 \pm 1.9\ ) \times 10^{-5}$		2242
$J/\psi(1S)\phi$		$(10.0\ ^{+\ 3.2}_{-\ 1.8}\ ) \times 10^{-4}$		1588
$J/\psi(1S)\pi^0$		$< 1.2 \times 10^{-3}$	CL=90%	1786
$J/\psi(1S)\eta$		$(\ 4.0 \pm 0.7\ ) \times 10^{-4}$	S=1.3	1733
$J/\psi(1S)K^0_S$		$(\ 2.1 \pm 0.6\ ) \times 10^{-5}$	S=2.1	1743
$J/\psi(1S)K^*(892)^0$		$(\ 4.4 \pm 0.9\ ) \times 10^{-5}$		1637
$J/\psi(1S)\eta'$		$(\ 3.4 \pm 0.5\ ) \times 10^{-4}$		1612
$J/\psi(1S)\pi^+\pi^-$		$(\ 2.0\ ^{+\ 0.6}_{-\ 0.4}\ ) \times 10^{-4}$		1775
$J/\psi(1S)f_0(980),\ f_0 \to \pi^+\pi^-$		$(\ 1.29\ ^{+\ 0.40}_{-\ 0.23}) \times 10^{-4}$		–
$J/\psi(1S)f_0(1370),\ f_0 \to \pi^+\pi^-$		$(\ 3.9\ ^{+\ 0.9}_{-\ 1.7}\ ) \times 10^{-5}$		–
$J/\psi(1S)f_2(1270),\ f_2 \to \pi^+\pi^-$		$(10\ ^{+\ 5}_{-\ 4}\ ) \times 10^{-7}$		–
$J/\psi(1S)\pi^+\pi^-$ (nonresonant)		$(\ 1.7\ ^{+\ 1.1}_{-\ 0.4}\ ) \times 10^{-5}$		1775
$J/\psi(1S)f_2'(1525)$		$(\ 2.6\ ^{+\ 0.9}_{-\ 0.6}\ ) \times 10^{-4}$		1304
$\psi(2S)f_2'(1525)$		$(\ 2.1\ ^{+\ 1.0}_{-\ 0.8}\ ) \times 10^{-4}$		587
$\psi(2S)\phi$		$(\ 5.0\ ^{+\ 1.6}_{-\ 1.0}\ ) \times 10^{-4}$		1120
$\pi^+\pi^-$		$(\ 7.6 \pm 1.9\ ) \times 10^{-7}$	S=1.4	2680
$\pi^0\pi^0$		$< 2.1 \times 10^{-4}$	CL=90%	2680
$\eta\pi^0$		$< 1.0 \times 10^{-3}$	CL=90%	2654
$\eta\eta$		$< 1.5 \times 10^{-3}$	CL=90%	2627
$\rho^0\rho^0$		$< 3.20 \times 10^{-4}$	CL=90%	2569
$\phi\rho^0$		$< 6.17 \times 10^{-4}$	CL=90%	2526
$\phi\phi$		$(\ 1.8\ ^{+\ 0.6}_{-\ 0.4}\ ) \times 10^{-5}$		2482
$\pi^+ K^-$		$(\ 5.5 \pm 0.6\ ) \times 10^{-6}$		2659
$K^+ K^-$		$(\ 2.52 \pm 0.17) \times 10^{-5}$		2638
$K^0\overline{K}^0$		$< 6.6 \times 10^{-5}$	CL=90%	2637
$\overline{K}^*(892)^0\rho^0$		$< 7.67 \times 10^{-4}$	CL=90%	2550
$\overline{K}^*(892)^0 K^*(892)^0$		$(\ 2.8 \pm 0.7\ ) \times 10^{-5}$		2531
$\phi K^*(892)^0$		$< 1.013 \times 10^{-3}$	CL=90%	2507
$p\overline{p}$		$< 5.9 \times 10^{-5}$	CL=90%	2514
$\gamma\gamma$	*B1*	$< 8.7 \times 10^{-6}$	CL=90%	2683
$\phi\gamma$		$(\ 3.6 \pm 0.4\ ) \times 10^{-5}$		2587

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

$\mu^+ \mu^-$	*B1*		$(3.2 \ ^{+ \ 1.5}_{- \ 1.2}) \times 10^{-9}$			2681
$e^+ e^-$	*B1*	<	2.8	$\times 10^{-7}$	CL=90%	2683
$e^\pm \mu^\mp$	*LF*	[*gg*] <	2.0	$\times 10^{-7}$	CL=90%	2682
$\phi(1020) \mu^+ \mu^-$	*B1*		$(1.13 \ ^{+ \ 0.40}_{- \ 0.29}) \times 10^{-6}$			2582
$\phi \nu \overline{\nu}$	*B1*	<	5.4	$\times 10^{-3}$	CL=90%	2587

B_s^*

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

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

Mass $m = 5415.4^{+2.4}_{-2.1}$ MeV (S = 3.0)

$m_{B_s^*} - m_{B_s} = 48.7^{+2.3}_{-2.1}$ MeV (S = 2.8)

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

$B_{s1}(5830)^0$

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

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

Mass $m = 5828.7 \pm 0.4$ MeV (S = 1.2)

$m_{B_{s1}^0} - m_{B^{*+}} = 504.41 \pm 0.25$ MeV

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

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

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

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

Mass $m = 5839.96 \pm 0.20$ MeV

$m_{B_{s2}^{*0}} - m_{B_{s1}^0} = 10.5 \pm 0.6$ MeV

Full width $\Gamma = 1.6 \pm 0.5$ MeV

$B_{s2}^*(5840)^0$ DECAY MODES	Fraction (Γ_i/Γ)	*p* (MeV/*c*)
$B^+ K^-$	dominant	253

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

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

$B_c^\pm$

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

Quantum numbers shown are quark-model predicitions.

Mass $m = 6.2745 \pm 0.0018$ GeV
Mean life $\tau = (0.452 \pm 0.033) \times 10^{-12}$ 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)
The following quantities are not pure branching ratios; rather the fraction $\Gamma_i/\Gamma \times$ B($\overline{b} \to B_c$).			
$J/\psi(1S)\ell^+\nu_\ell$ anything	$(5.2\ ^{+2.4}_{-2.1}) \times 10^{-5}$		–
$J/\psi(1S)\pi^+$	seen		2370
$J/\psi(1S)\pi^+\pi^+\pi^-$	seen		2350
$J/\psi(1S)a_1(1260)$	$< 1.2 \times 10^{-3}$	90%	2169
$D^*(2010)^+\overline{D}^0$	$< 6.2 \times 10^{-3}$	90%	2467
D^+K^{*0}	$< 0.20 \times 10^{-6}$	90%	2783
$D^+\overline{K}^{*0}$	$< 0.16 \times 10^{-6}$	90%	2783
$D_s^+K^{*0}$	$< 0.28 \times 10^{-6}$	90%	2751
$D_s^+\overline{K}^{*0}$	$< 0.4 \times 10^{-6}$	90%	2751
$D_s^+\phi$	$< 0.32 \times 10^{-6}$	90%	2727

$c\overline{c}$ MESONS

$\eta_c(1S)$

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

Mass $m = 2983.7 \pm 0.7$ MeV (S = 1.4)
Full width $\Gamma = 32.0 \pm 0.9$ 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
$\rho\rho$	(1.8 ±0.5) %		1275
$K^*(892)^0 K^-\pi^+$ + c.c.	(2.0 ±0.7) %		1277
$K^*(892)\overline{K}^*(892)$	(7.1 ±1.3) $\times 10^{-3}$		1196
$K^{*0}\overline{K}^{*0}\pi^+\pi^-$	(1.1 ±0.5) %		1073
$\phi K^+ K^-$	(2.9 ±1.4) $\times 10^{-3}$		1104
$\phi\phi$	(1.76±0.20) $\times 10^{-3}$		1089
$\phi 2(\pi^+\pi^-)$	< 3.5 $\times 10^{-3}$	90%	1251
$a_0(980)\pi$	< 2 %	90%	1327
$a_2(1320)\pi$	< 2 %	90%	1196
$K^*(892)\overline{K}$ + c.c.	< 1.28 %	90%	1309
$f_2(1270)\eta$	< 1.1 %	90%	1145
$\omega\omega$	< 3.1 $\times 10^{-3}$	90%	1270
$\omega\phi$	< 1.7 $\times 10^{-3}$	90%	1185
$f_2(1270) f_2(1270)$	(9.8 ±2.5) $\times 10^{-3}$		774
$f_2(1270) f_2'(1525)$	(9.7 ±3.2) $\times 10^{-3}$		513
Decays into stable hadrons			
$K\overline{K}\pi$	(7.3 ±0.5) %		1381
$\eta\pi^+\pi^-$	(1.7 ±0.5) %		1428
$\eta 2(\pi^+\pi^-)$	(4.4 ±1.3) %		1386
$K^+ K^-\pi^+\pi^-$	(6.9 ±1.1) $\times 10^{-3}$		1345
$K^+ K^-\pi^+\pi^-\pi^0$	(3.5 ±0.6) %		1304
$K^0 K^-\pi^+\pi^-\pi^+$ +c.c.	(5.6 ±1.5) %		–
$K^+ K^- 2(\pi^+\pi^-)$	(7.5 ±2.4) $\times 10^{-3}$		1254
$2(K^+ K^-)$	(1.47±0.31) $\times 10^{-3}$		1055
$\pi^+\pi^-\pi^0\pi^0$	(4.7 ±1.0) %		1460
$2(\pi^+\pi^-)$	(9.7 ±1.2) $\times 10^{-3}$		1459
$2(\pi^+\pi^-\pi^0)$	(17.4 ±3.3) %		1409
$3(\pi^+\pi^-)$	(1.7 ±0.4) %		1407
$p\overline{p}$	(1.51±0.16) $\times 10^{-3}$		1160
$p\overline{p}\pi^0$	(3.6 ±1.3) $\times 10^{-3}$		1101
$\Lambda\overline{\Lambda}$	(1.09±0.24) $\times 10^{-3}$		990
$K\overline{K}\eta$	(10 ±5) $\times 10^{-3}$		1265
$\pi^+\pi^- p\overline{p}$	(5.3 ±1.8) $\times 10^{-3}$		1027
Radiative decays			
$\gamma\gamma$	(1.57±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	$<$	3.5	$\times 10^{-5}$	90%	1486
K^+K^-	P,CP	$<$	6	$\times 10^{-4}$	90%	1408
$K^0_S K^0_S$	P,CP	$<$	3.1	$\times 10^{-4}$	90%	1406

$J/\psi(1S)$

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

Mass $m = 3096.916 \pm 0.011$ MeV
Full width $\Gamma = 92.9 \pm 2.8$ keV (S = 1.1)
$\Gamma_{ee} = 5.55 \pm 0.14 \pm 0.02$ keV

$J/\psi(1S)$ 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^-		(5.94 ±0.06) %		1548
$e^+e^-\gamma$	[$qqaa$]	(8.8 ±1.4) $\times 10^{-3}$		1548
$\mu^+\mu^-$		(5.93 ±0.06) %		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
$\omega\pi^+\pi^+\pi^-\pi^-$		(8.5 ±3.4) $\times 10^{-3}$		1392
$\omega\pi^+\pi^-\pi^0$		(4.0 ±0.7) $\times 10^{-3}$		1418
$\omega\pi^+\pi^-$		(8.6 ±0.7) $\times 10^{-3}$	S=1.1	1435
$\omega f_2(1270)$		(4.3 ±0.6) $\times 10^{-3}$		1142
$K^*(892)^0\overline{K}^*(892)^0$		(2.3 ±0.7) $\times 10^{-4}$		1266
$K^*(892)^\pm\overline{K}^*(892)^\mp$		(1.00 $^{+0.22}_{-0.40}$) $\times 10^{-3}$		1266
$K^*(892)^\pm\overline{K}^*(800)^\mp$		(1.1 $^{+1.0}_{-0.6}$) $\times 10^{-3}$		–
$\eta K^*(892)^0\overline{K}^*(892)^0$		(1.15 ±0.26) $\times 10^{-3}$		1003
$K^*(892)^0\overline{K}^*_2(1430)^0$ + c.c.		(6.0 ±0.6) $\times 10^{-3}$		1012
$K^*(892)^0\overline{K}_2(1770)^0$ + c.c. $\to$ $K^*(892)^0K^-\pi^+$ + c.c.		(6.9 ±0.9) $\times 10^{-4}$		–
$\omega K^*(892)\overline{K}$ + c.c.		(6.1 ±0.9) $\times 10^{-3}$		1097
$K^+\overline{K}^*(892)^-$ + c.c.		(5.12 ±0.30) $\times 10^{-3}$		1373
$K^+\overline{K}^*(892)^-$ + c.c. $\to$ $K^+K^-\pi^0$		(1.97 ±0.20) $\times 10^{-3}$		–
$K^+\overline{K}^*(892)^-$ + c.c. $\to$ $K^0K^\pm\pi^\mp$		(3.0 ±0.4) $\times 10^{-3}$		–

$K^0\overline{K}^*(892)^0 +$ c.c.		(4.39 ±0.31) $\times 10^{-3}$		1373
$K^0\overline{K}^*(892)^0 +$ c.c. $\rightarrow$ $K^0K^\pm\pi^\mp$		(3.2 ±0.4) $\times 10^{-3}$		–
$K_1(1400)^\pm K^\mp$		(3.8 ±1.4) $\times 10^{-3}$		1170
$\overline{K}^*(892)^0 K^+\pi^- +$ c.c.		seen		1343
$\omega\pi^0\pi^0$		(3.4 ±0.8) $\times 10^{-3}$		1436
$b_1(1235)^\pm\pi^\mp$	[gg]	(3.0 ±0.5) $\times 10^{-3}$		1300
$\omega K^\pm K^0_S\pi^\mp$	[gg]	(3.4 ±0.5) $\times 10^{-3}$		1210
$b_1(1235)^0\pi^0$		(2.3 ±0.6) $\times 10^{-3}$		1300
$\eta K^\pm K^0_S\pi^\mp$	[gg]	(2.2 ±0.4) $\times 10^{-3}$		1278
$\phi K^*(892)\overline{K} +$ c.c.		(2.18 ±0.23) $\times 10^{-3}$		969
$\omega K\overline{K}$		(1.70 ±0.32) $\times 10^{-3}$		1268
$\omega f_0(1710) \rightarrow \omega K\overline{K}$		(4.8 ±1.1) $\times 10^{-4}$		878
$\phi 2(\pi^+\pi^-)$		(1.66 ±0.23) $\times 10^{-3}$		1318
$\Delta(1232)^{++}\overline{p}\pi^-$		(1.6 ±0.5) $\times 10^{-3}$		1030
$\omega\eta$		(1.74 ±0.20) $\times 10^{-3}$	S=1.6	1394
$\phi K\overline{K}$		(1.83 ±0.24) $\times 10^{-3}$	S=1.5	1179
$\phi f_0(1710) \rightarrow \phi K\overline{K}$		(3.6 ±0.6) $\times 10^{-4}$		875
$\phi f_2(1270)$		(7.2 ±1.3) $\times 10^{-4}$		1036
$\Delta(1232)^{++}\overline{\Delta}(1232)^{--}$		(1.10 ±0.29) $\times 10^{-3}$		938
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)	[gg]	(1.10 ±0.12) $\times 10^{-3}$		697
$\phi f'_2(1525)$		(8 ±4) $\times 10^{-4}$	S=2.7	871
$\phi\pi^+\pi^-$		(9.4 ±0.9) $\times 10^{-4}$	S=1.2	1365
$\phi\pi^0\pi^0$		(5.6 ±1.6) $\times 10^{-4}$		1366
$\phi K^\pm K^0_S\pi^\mp$	[gg]	(7.2 ±0.8) $\times 10^{-4}$		1114
$\omega f_1(1420)$		(6.8 ±2.4) $\times 10^{-4}$		1062
$\phi\eta$		(7.5 ±0.8) $\times 10^{-4}$	S=1.5	1320
$\Xi^0\overline{\Xi}^0$		(1.20 ±0.24) $\times 10^{-3}$		818
$\Xi(1530)^-\overline{\Xi}^+$		(5.9 ±1.5) $\times 10^{-4}$		600
$pK^-\overline{\Sigma}(1385)^0$		(5.1 ±3.2) $\times 10^{-4}$		646
$\omega\pi^0$		(4.5 ±0.5) $\times 10^{-4}$	S=1.4	1446
$\phi\eta'(958)$		(4.0 ±0.7) $\times 10^{-4}$	S=2.1	1192
$\phi f_0(980)$		(3.2 ±0.9) $\times 10^{-4}$	S=1.9	1178
$\phi f_0(980) \rightarrow \phi\pi^+\pi^-$		(1.8 ±0.4) $\times 10^{-4}$		–
$\phi f_0(980) \rightarrow \phi\pi^0\pi^0$		(1.7 ±0.7) $\times 10^{-4}$		–
$\eta\phi f_0(980) \rightarrow \eta\phi\pi^+\pi^-$		(3.2 ±1.0) $\times 10^{-4}$		–
$\phi a_0(980)^0 \rightarrow \phi\eta\pi^0$		(5 ±4) $\times 10^{-6}$		–
$\Xi(1530)^0\overline{\Xi}^0$		(3.2 ±1.4) $\times 10^{-4}$		608
$\Sigma(1385)^-\overline{\Sigma}^+$ (or c.c.)	[gg]	(3.1 ±0.5) $\times 10^{-4}$		855
$\phi f_1(1285)$		(2.6 ±0.5) $\times 10^{-4}$	S=1.1	1032
$\eta\pi^+\pi^-$		(4.0 ±1.7) $\times 10^{-4}$		1487
$\rho\eta$		(1.93 ±0.23) $\times 10^{-4}$		1396
$\omega\eta'(958)$		(1.82 ±0.21) $\times 10^{-4}$		1279
$\omega f_0(980)$		(1.4 ±0.5) $\times 10^{-4}$		1267

$\rho\eta'(958)$		(1.05	± 0.18)	$\times 10^{-4}$		1281
$a_2(1320)^{\pm}\pi^{\mp}$	[*gg*]	$<$ 4.3		$\times 10^{-3}$	CL=90%	1263
$K\overline{K}_2^*(1430)+$ c.c.		$<$ 4.0		$\times 10^{-3}$	CL=90%	1159
$K_1(1270)^{\pm}K^{\mp}$		$<$ 3.0		$\times 10^{-3}$	CL=90%	1231
$K_2^*(1430)^0\overline{K}_2^*(1430)^0$		$<$ 2.9		$\times 10^{-3}$	CL=90%	604
$\phi\pi^0$		$<$ 6.4		$\times 10^{-6}$	CL=90%	1377
$\phi\eta(1405) \rightarrow \phi\eta\pi\pi$		$<$ 2.5		$\times 10^{-4}$	CL=90%	946
$\omega f_2'(1525)$		$<$ 2.2		$\times 10^{-4}$	CL=90%	1003
$\eta\phi(2170) \rightarrow \eta K^*(892)^0\overline{K}^*(892)^0$		$<$ 2.52		$\times 10^{-4}$	CL=90%	–
$\Sigma(1385)^0\overline{\Lambda}+$ c.c.		$<$ 8.2		$\times 10^{-6}$	CL=90%	912
$\Delta(1232)^+\overline{p}$		$<$ 1		$\times 10^{-4}$	CL=90%	1100
$\Lambda(1520)\overline{\Lambda}+$ c.c. $\rightarrow \gamma\Lambda\overline{\Lambda}$		$<$ 4.1		$\times 10^{-6}$	CL=90%	–
$\Theta(1540)\overline{\Theta}(1540) \rightarrow K_S^0 p K^- \overline{n}+$ c.c.		$<$ 1.1		$\times 10^{-5}$	CL=90%	–
$\Theta(1540)K^-\overline{n} \rightarrow K_S^0 p K^-\overline{n}$		$<$ 2.1		$\times 10^{-5}$	CL=90%	–
$\Theta(1540)K_S^0\overline{p} \rightarrow K_S^0\overline{p}K^+ n$		$<$ 1.6		$\times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540)K^+ n \rightarrow K_S^0\overline{p}K^+ n$		$<$ 5.6		$\times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540)K_S^0 p \rightarrow K_S^0 p K^-\overline{n}$		$<$ 1.1		$\times 10^{-5}$	CL=90%	–
$\Sigma^0\overline{\Lambda}$		$<$ 9		$\times 10^{-5}$	CL=90%	1032

Decays into stable hadrons

$2(\pi^+\pi^-)\pi^0$		(4.1	± 0.5)	%	S=2.4	1496
$3(\pi^+\pi^-)\pi^0$		(2.9	± 0.6)	%		1433
$\pi^+\pi^-\pi^0$		(2.11	± 0.07)	%	S=1.5	1533
$\pi^+\pi^-\pi^0 K^+K^-$		(1.79	± 0.29)	%	S=2.2	1368
$4(\pi^+\pi^-)\pi^0$		(9.0	± 3.0)	$\times 10^{-3}$		1345
$\pi^+\pi^- K^+K^-$		(6.6	± 0.5)	$\times 10^{-3}$		1407
$\pi^+\pi^- K^+K^-\eta$		(1.84	± 0.28)	$\times 10^{-3}$		1221
$\pi^0\pi^0 K^+K^-$		(2.45	± 0.31)	$\times 10^{-3}$		1410
$K\overline{K}\pi$		(6.1	± 1.0)	$\times 10^{-3}$		1442
$2(\pi^+\pi^-)$		(3.57	± 0.30)	$\times 10^{-3}$		1517
$3(\pi^+\pi^-)$		(4.3	± 0.4)	$\times 10^{-3}$		1466
$2(\pi^+\pi^-\pi^0)$		(1.62	± 0.21)	%		1468
$2(\pi^+\pi^-)\eta$		(2.29	± 0.24)	$\times 10^{-3}$		1446
$3(\pi^+\pi^-)\eta$		(7.2	± 1.5)	$\times 10^{-4}$		1379
$p\overline{p}$		(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
$p\overline{p}\pi^+\pi^-\pi^0$	[*rraa*]	(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
$p\overline{p}\omega$		(1.10	± 0.15)	$\times 10^{-3}$	S=1.3	768
$p\overline{p}\eta'(958)$		(2.1	± 0.4)	$\times 10^{-4}$		596

$p\overline{p}\phi$		(4.5 ±1.5) $\times 10^{-5}$			527
$n\overline{n}$		(2.09 ±0.16) $\times 10^{-3}$			1231
$n\overline{n}\pi^+\pi^-$		(4 ±4) $\times 10^{-3}$			1106
$\Sigma^+\overline{\Sigma}^-$		(1.50 ±0.24) $\times 10^{-3}$			992
$\Sigma^0\overline{\Sigma}^0$		(1.29 ±0.09) $\times 10^{-3}$			988
$2(\pi^+\pi^-)K^+K^-$		(4.7 ±0.7) $\times 10^{-3}$		S=1.3	1320
$p\overline{n}\pi^-$		(2.12 ±0.09) $\times 10^{-3}$			1174
$nN(1440)$		seen			978
$nN(1520)$		seen			924
$nN(1535)$		seen			914
$\Xi^-\overline{\Xi}^+$		(8.6 ±1.1) $\times 10^{-4}$		S=1.2	807
$\Lambda\overline{\Lambda}$		(1.61 ±0.15) $\times 10^{-3}$		S=1.9	1074
$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[gg]	(8.3 ±0.7) $\times 10^{-4}$		S=1.2	950
$pK^-\overline{\Lambda}$		(8.9 ±1.6) $\times 10^{-4}$			876
$2(K^+K^-)$		(7.6 ±0.9) $\times 10^{-4}$			1131
$pK^-\overline{\Sigma}^0$		(2.9 ±0.8) $\times 10^{-4}$			819
K^+K^-		(2.70 ±0.17) $\times 10^{-4}$			1468
$K^0_SK^0_L$		(2.1 ±0.4) $\times 10^{-4}$		S=3.2	1466
$\Lambda\overline{\Lambda}\pi^+\pi^-$		(4.3 ±1.0) $\times 10^{-3}$			903
$\Lambda\overline{\Lambda}\eta$		(1.62 ±0.17) $\times 10^{-4}$			672
$\Lambda\overline{\Lambda}\pi^0$		(3.8 ±0.4) $\times 10^{-5}$			998
$\overline{\Lambda}nK^0_S$ + c.c.		(6.5 ±1.1) $\times 10^{-4}$			872
$\pi^+\pi^-$		(1.47 ±0.14) $\times 10^{-4}$			1542
$\Lambda\overline{\Sigma}$ + c.c.		(2.83 ±0.23) $\times 10^{-3}$			1034
$K^0_SK^0_S$		< 1	$\times 10^{-6}$	CL=95%	1466

Radiative decays

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
$\gamma\eta_c(1S)$		(1.7 ±0.4) %		S=1.6	111
$\gamma\eta_c(1S) \rightarrow 3\gamma$		(3.8 $^{+1.3}_{-1.0}$) $\times 10^{-6}$		S=1.1	–
$\gamma\pi^+\pi^-2\pi^0$		(8.3 ±3.1) $\times 10^{-3}$			1518
$\gamma\eta\pi\pi$		(6.1 ±1.0) $\times 10^{-3}$			1487
$\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-$		(6.2 ±2.4) $\times 10^{-4}$			–
$\gamma\eta(1405/1475) \rightarrow \gamma K\overline{K}\pi$	[o]	(2.8 ±0.6) $\times 10^{-3}$		S=1.6	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$		(7.8 ±2.0) $\times 10^{-5}$		S=1.8	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$		(3.0 ±0.5) $\times 10^{-4}$			–
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi$		< 8.2	$\times 10^{-5}$	CL=95%	–
$\gamma\rho\rho$		(4.5 ±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
$\gamma\eta'(958)$		(5.15 ±0.16) $\times 10^{-3}$		S=1.2	1400
$\gamma 2\pi^+2\pi^-$		(2.8 ±0.5) $\times 10^{-3}$		S=1.9	1517

$\gamma f_2(1270) f_2(1270)$	(9.5	± 1.7)	$\times 10^{-4}$		879
$\gamma f_2(1270) f_2(1270)$(non resonant)	(8.2	± 1.9)	$\times 10^{-4}$		–
$\gamma K^+ K^- \pi^+ \pi^-$	(2.1	± 0.6)	$\times 10^{-3}$		1407
$\gamma f_4(2050)$	(2.7	± 0.7)	$\times 10^{-3}$		891
$\gamma\omega\omega$	(1.61	± 0.33)	$\times 10^{-3}$		1336
$\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$	(1.7	± 0.4)	$\times 10^{-3}$	S=1.3	1223
$\gamma f_2(1270)$	(1.43	± 0.11)	$\times 10^{-3}$		1286
$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$	(8.5	$^{+1.2}_{-0.9}$)	$\times 10^{-4}$	S=1.2	1075
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	(4.0	± 1.0)	$\times 10^{-4}$		–
$\gamma f_0(1710) \rightarrow \gamma\omega\omega$	(3.1	± 1.0)	$\times 10^{-4}$		–
$\gamma\eta$	(1.104	± 0.034)	$\times 10^{-3}$		1500
$\gamma f_1(1420) \rightarrow \gamma K\overline{K}\pi$	(7.9	± 1.3)	$\times 10^{-4}$		1220
$\gamma f_1(1285)$	(6.1	± 0.8)	$\times 10^{-4}$		1283
$\gamma f_1(1510) \rightarrow \gamma\eta\pi^+\pi^-$	(4.5	± 1.2)	$\times 10^{-4}$		–
$\gamma f_2'(1525)$	(4.5	$^{+0.7}_{-0.4}$)	$\times 10^{-4}$		1173
$\gamma f_2(1640) \rightarrow \gamma\omega\omega$	(2.8	± 1.8)	$\times 10^{-4}$		–
$\gamma f_2(1910) \rightarrow \gamma\omega\omega$	(2.0	± 1.4)	$\times 10^{-4}$		–
$\gamma f_0(1800) \rightarrow \gamma\omega\phi$	(2.5	± 0.6)	$\times 10^{-4}$		–
$\gamma f_2(1950) \rightarrow \gamma K^*(892)\overline{K}^*(892)$	(7.0	± 2.2)	$\times 10^{-4}$		–
$\gamma K^*(892)\overline{K}^*(892)$	(4.0	± 1.3)	$\times 10^{-3}$		1266
$\gamma\phi\phi$	(4.0	± 1.2)	$\times 10^{-4}$	S=2.1	1166
$\gamma p\overline{p}$	(3.8	± 1.0)	$\times 10^{-4}$		1232
$\gamma\eta(2225)$	(3.3	± 0.5)	$\times 10^{-4}$		749
$\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0$	(1.3	± 0.9)	$\times 10^{-4}$		1048
$\gamma\eta(1760) \rightarrow \gamma\omega\omega$	(1.98	± 0.33)	$\times 10^{-3}$		–
$\gamma X(1835) \rightarrow \gamma\pi^+\pi^-\eta'$	(2.6	± 0.4)	$\times 10^{-4}$		1006
$\gamma X(1835) \rightarrow \gamma p\overline{p}$	(7.7	$^{+1.5}_{-0.9}$)	$\times 10^{-5}$		–
$\gamma(K\overline{K}\pi)$ [$J^{PC} = 0^{-+}$]	(7	± 4)	$\times 10^{-4}$	S=2.1	1442
$\gamma\pi^0$	(3.49	$^{+0.33}_{-0.30}$)	$\times 10^{-5}$		1546
$\gamma p\overline{p}\pi^+\pi^-$	< 7.9		$\times 10^{-4}$	CL=90%	1107
$\gamma\Lambda\overline{\Lambda}$	< 1.3		$\times 10^{-4}$	CL=90%	1074
$\gamma f_J(2220)$	> 2.50		$\times 10^{-3}$	CL=99.9%	745
$\gamma f_J(2220) \rightarrow \gamma\pi\pi$	(8	± 4)	$\times 10^{-5}$		–
$\gamma f_J(2220) \rightarrow \gamma K\overline{K}$	< 3.6		$\times 10^{-5}$		–
$\gamma f_J(2220) \rightarrow \gamma p\overline{p}$	(1.5	± 0.8)	$\times 10^{-5}$		–
$\gamma f_0(1500)$	(1.01	± 0.32)	$\times 10^{-4}$		1183
$\gamma A \rightarrow \gamma$invisible	[*ssaa*] < 6.3		$\times 10^{-6}$	CL=90%	–
$\gamma A^0 \rightarrow \gamma\mu^+\mu^-$	[*ttaa*] < 2.1		$\times 10^{-5}$	CL=90%	–

Weak decays

$D^- e^+ \nu_e$ + c.c.	$<$	1.2	$\times 10^{-5}$	CL=90%	984
$\overline{D}^0 e^+ e^-$ + c.c.	$<$	1.1	$\times 10^{-5}$	CL=90%	987
$D_s^- e^+ \nu_e$ + c.c.	$<$	3.6	$\times 10^{-5}$	CL=90%	923
$D^- \pi^+$ + 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
$D_s^- \pi^+$ + c.c.	$<$	1.3	$\times 10^{-4}$	CL=90%	915

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

$\gamma\gamma$	C	$<$	5	$\times 10^{-6}$	CL=90%	1548
$e^\pm \mu^\mp$	LF	$<$	1.1	$\times 10^{-6}$	CL=90%	1547
$e^\pm \tau^\mp$	LF	$<$	8.3	$\times 10^{-6}$	CL=90%	1039
$\mu^\pm \tau^\mp$	LF	$<$	2.0	$\times 10^{-6}$	CL=90%	1035

Other decays

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

$\chi_{c0}(1P)$

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

Mass $m = 3414.75 \pm 0.31$ MeV
Full width $\Gamma = 10.3 \pm 0.6$ MeV

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(2.25±0.19) %		1679
$\rho^0\pi^+\pi^-$	$(8.8 \pm 2.8) \times 10^{-3}$		1607
$f_0(980) f_0(980)$	$(6.6 \pm 2.1) \times 10^{-4}$		1391
$\pi^+\pi^-\pi^0\pi^0$	(3.3 ±0.4) %		1680
$\rho^+\pi^-\pi^0$ + c.c.	(2.8 ±0.4) %		1607
$4\pi^0$	$(3.3 \pm 0.4) \times 10^{-3}$		1681
$\pi^+\pi^- K^+ K^-$	(1.77±0.15) %		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. $\to \pi^+\pi^- K^+ K^-$	$(6.2 \pm 1.9) \times 10^{-3}$		–
$K_1(1400)^+ K^-$ + c.c. $\to \pi^+\pi^- K^+ K^-$	$< 2.7 \times 10^{-3}$	CL=90%	–
$f_0(980) f_0(980)$	$(1.6\ ^{+1.0}_{-0.9}) \times 10^{-4}$		1391
$f_0(980) f_0(2200)$	$(7.9\ ^{+2.0}_{-2.5}) \times 10^{-4}$		584

$f_0(1370)f_0(1370)$	$< 2.7 \times 10^{-4}$	CL=90%	1019
$f_0(1370)f_0(1500)$	$< 1.7 \times 10^{-4}$	CL=90%	920
$f_0(1370)f_0(1710)$	$(6.7\ ^{+3.5}_{-2.3}) \times 10^{-4}$		723
$f_0(1500)f_0(1370)$	$< 1.3 \times 10^{-4}$	CL=90%	920
$f_0(1500)f_0(1500)$	$< 5 \times 10^{-5}$	CL=90%	805
$f_0(1500)f_0(1710)$	$< 7 \times 10^{-5}$	CL=90%	559
$K^+K^-\pi^+\pi^-\pi^0$	(1.12 ± 0.27) %		1545
$K^+K^-\pi^0\pi^0$	$(5.5\ \pm0.9\ ) \times 10^{-3}$		1582
$K^+\pi^-K^0\pi^0$ + c.c.	(2.47 ± 0.33) %		1581
$\rho^+K^-K^0$ + c.c.	(1.20 ± 0.21) %		1458
$K^*(892)^-K^+\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	$(4.6\ \pm1.2\ ) \times 10^{-3}$		–
$K^0_SK^0_S\pi^+\pi^-$	$(5.7\ \pm1.1\ ) \times 10^{-3}$		1579
$K^+K^-\eta\pi^0$	$(3.0\ \pm0.7\ ) \times 10^{-3}$		1468
$3(\pi^+\pi^-)$	(1.20 ± 0.18) %		1633
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(7.3\ \pm1.6\ ) \times 10^{-3}$		1523
$K^*(892)^0\overline{K}^*(892)^0$	$(1.7\ \pm0.6\ ) \times 10^{-3}$		1456
$\pi\pi$	$(8.5\ \pm0.4\ ) \times 10^{-3}$		1702
$\pi^0\eta$	$< 1.9 \times 10^{-4}$		1661
$\pi^0\eta'$	$< 1.2 \times 10^{-3}$		1570
$\eta\eta$	$(3.01\pm0.20) \times 10^{-3}$		1617
$\eta\eta'$	$< 2.3 \times 10^{-4}$	CL=90%	1521
$\eta'\eta'$	$(1.99\pm0.22) \times 10^{-3}$		1413
$\omega\omega$	$(9.6\ \pm1.1\ ) \times 10^{-4}$		1517
$\omega\phi$	$(1.17\pm0.22) \times 10^{-4}$		1447
K^+K^-	$(5.98\pm0.34) \times 10^{-3}$		1634
$K^0_SK^0_S$	$(3.10\pm0.18) \times 10^{-3}$		1633
$\pi^+\pi^-\eta$	$< 2.0 \times 10^{-4}$	CL=90%	1651
$\pi^+\pi^-\eta'$	$< 4 \times 10^{-4}$	CL=90%	1560
$\overline{K}^0K^+\pi^-$ + c.c.	$< 9 \times 10^{-5}$	CL=90%	1610
$K^+K^-\pi^0$	$< 6 \times 10^{-5}$	CL=90%	1611
$K^+K^-\eta$	$< 2.2 \times 10^{-4}$	CL=90%	1512
$K^+K^-K^0_SK^0_S$	$(1.4\ \pm0.5\ ) \times 10^{-3}$		1331
$K^+K^-K^+K^-$	$(2.77\pm0.29) \times 10^{-3}$		1333
$K^+K^-\phi$	$(9.6\ \pm2.5\ ) \times 10^{-4}$		1381
$\phi\phi$	$(7.9\ \pm0.8\ ) \times 10^{-4}$		1370
$p\overline{p}$	$(2.13\pm0.12) \times 10^{-4}$		1426
$p\overline{p}\pi^0$	$(6.9\ \pm0.7\ ) \times 10^{-4}$	S=1.2	1379
$p\overline{p}\eta$	$(3.5\ \pm0.4\ ) \times 10^{-4}$		1187
$p\overline{p}\omega$	$(5.2\ \pm0.6\ ) \times 10^{-4}$		1043
$p\overline{p}\phi$	$(6.0\ \pm1.4\ ) \times 10^{-5}$		876
$p\overline{p}\pi^+\pi^-$	$(2.1\ \pm0.7\ ) \times 10^{-3}$	S=1.4	1320
$p\overline{p}\pi^0\pi^0$	$(1.03\pm0.28) \times 10^{-3}$		1324
$p\overline{p}K^+K^-$ (non-resonant)	$(1.21\pm0.26) \times 10^{-4}$		890

$p\overline{p}K_S^0K_S^0$	$< 8.8 \times 10^{-4}$	CL=90%	884
$p\overline{n}\pi^-$	$(1.12\pm0.31)\times10^{-3}$		1376
$\Lambda\overline{\Lambda}$	$(3.3\ \pm0.4\ )\times10^{-4}$		1292
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 4.0 \times 10^{-3}$	CL=90%	1153
$K^+\overline{p}\Lambda$+ c.c.	$(1.24\pm0.12)\times10^{-3}$	S=1.3	1132
$K^+p\Lambda(1520)$+ c.c.	$(2.9\ \pm0.7\ )\times10^{-4}$		858
$\Lambda(1520)\overline{\Lambda}(1520)$	$(3.1\ \pm1.2\ )\times10^{-4}$		779
$\Sigma^0\overline{\Sigma}^0$	$(4.1\ \pm0.7\ )\times10^{-4}$		1222
$\Sigma^+\overline{\Sigma}^-$	$(3.0\ \pm0.7\ )\times10^{-4}$		1225
$\Xi^0\overline{\Xi}^0$	$(3.1\ \pm0.8\ )\times10^{-4}$		1089
$\Xi^-\overline{\Xi}^+$	$(4.8\ \pm0.7\ )\times10^{-4}$		1081
Radiative decays			
$\gamma J/\psi(1S)$	(1.30 ± 0.07) %		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
$\gamma\gamma$	$(2.25\pm0.17)\times10^{-4}$		1707

$\chi_{c1}(1P)$

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

Mass $m = 3510.66 \pm 0.07$ MeV (S = 1.5)
Full width $\Gamma = 0.86 \pm 0.05$ MeV

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$3(\pi^+\pi^-)$	$(\ 5.8\ \pm1.4\ )\times10^{-3}$	S=1.2	1683
$2(\pi^+\pi^-)$	$(\ 7.6\ \pm2.6\ )\times10^{-3}$		1728
$\pi^+\pi^-\pi^0\pi^0$	$(\ 1.25\pm0.17)$ %		1729
$\rho^+\pi^-\pi^0$ + c.c.	$(\ 1.53\pm0.26)$ %		1658
$\rho^0\pi^+\pi^-$	$(\ 3.9\ \pm3.5\ )\times10^{-3}$		1657
$4\pi^0$	$(\ 5.7\ \pm0.8\ )\times10^{-4}$		1729
$\pi^+\pi^-K^+K^-$	$(\ 4.5\ \pm1.0\ )\times10^{-3}$		1632
$K^+K^-\pi^0\pi^0$	$(\ 1.17\pm0.29)\times10^{-3}$		1634
$K^+\pi^-K^0\pi^0$ + c.c.	$(\ 9.0\ \pm1.4\ )\times10^{-3}$		1632
$\rho^+K^-K^0$ + c.c.	$(\ 5.3\ \pm1.3\ )\times10^{-3}$		1514
$K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	$(\ 2.4\ \pm0.7\ )\times10^{-3}$		–
$K^+K^-\eta\pi^0$	$(\ 1.2\ \pm0.4\ )\times10^{-3}$		1523
$\pi^+\pi^-K_S^0K_S^0$	$(\ 7.2\ \pm3.1\ )\times10^{-4}$		1630
$K^+K^-\eta$	$(\ 3.3\ \pm1.0\ )\times10^{-4}$		1566
$K^0K^+\pi^-$ + c.c.	$(\ 7.3\ \pm0.6\ )\times10^{-3}$		1661
$K^*(892)^0\overline{K}^0$ + c.c.	$(\ 1.0\ \pm0.4\ )\times10^{-3}$		1602

$K^*(892)^+ K^-$ + c.c.	(1.5 ±0.7) × 10^{-3}			1602
$K_J^*(1430)^0 \overline{K}^0$ + c.c. → $K_S^0 K^+ \pi^-$ + c.c.	< 8	× 10^{-4}	CL=90%	–
$K_J^*(1430)^+ K^-$ + c.c. → $K_S^0 K^+ \pi^-$ + c.c.	< 2.3	× 10^{-3}	CL=90%	–
$K^+ K^- \pi^0$	(1.91±0.26) × 10^{-3}			1662
$\eta \pi^+ \pi^-$	(5.0 ±0.5) × 10^{-3}			1701
$a_0(980)^+ \pi^-$ + c.c. → $\eta \pi^+ \pi^-$	(1.9 ±0.7) × 10^{-3}			–
$f_2(1270)\eta$	(2.8 ±0.8) × 10^{-3}			1468
$\pi^+ \pi^- \eta'$	(2.3 ±0.5) × 10^{-3}			1612
$\pi^0 f_0(980)$ → $\pi^0 \pi^+ \pi^-$	< 6	× 10^{-6}	CL=90%	–
$K^+ \overline{K}^*(892)^0 \pi^-$ + c.c.	(3.2 ±2.1) × 10^{-3}			1577
$K^*(892)^0 \overline{K}^*(892)^0$	(1.5 ±0.4) × 10^{-3}			1512
$K^+ K^- K_S^0 K_S^0$	< 5	× 10^{-4}	CL=90%	1390
$K^+ K^- K^+ K^-$	(5.6 ±1.2) × 10^{-4}			1393
$K^+ K^- \phi$	(4.3 ±1.6) × 10^{-4}			1440
$\omega\omega$	(6.0 ±0.7) × 10^{-4}			1571
$\omega\phi$	(2.2 ±0.6) × 10^{-5}			1503
$\phi\phi$	(4.4 ±0.6) × 10^{-4}			1429
$p\overline{p}$	(7.3 ±0.4) × 10^{-5}			1484
$p\overline{p}\pi^0$	(1.63±0.20) × 10^{-4}			1438
$p\overline{p}\eta$	(1.53±0.26) × 10^{-4}			1254
$p\overline{p}\omega$	(2.23±0.33) × 10^{-4}			1117
$p\overline{p}\phi$	< 1.8	× 10^{-5}	CL=90%	962
$p\overline{p}\pi^+ \pi^-$	(5.0 ±1.9) × 10^{-4}			1381
$p\overline{p}K^+ K^-$ (non-resonant)	(1.34±0.24) × 10^{-4}			974
$p\overline{p}K_S^0 K_S^0$	< 4.5	× 10^{-4}	CL=90%	968
$\Lambda\overline{\Lambda}$	(1.18±0.19) × 10^{-4}			1355
$\Lambda\overline{\Lambda}\pi^+ \pi^-$	< 1.5	× 10^{-3}	CL=90%	1223
$K^+ \overline{p}\Lambda$	(4.3 ±0.4) × 10^{-4}		S=1.1	1203
$K^+ p\Lambda(1520)$ + c.c.	(1.8 ±0.5) × 10^{-4}			950
$\Lambda(1520)\overline{\Lambda}(1520)$	< 1.0	× 10^{-4}	CL=90%	879
$\Sigma^0 \overline{\Sigma}^0$	< 4	× 10^{-5}	CL=90%	1288
$\Sigma^+ \overline{\Sigma}^-$	< 6	× 10^{-5}	CL=90%	1291
$\Xi^0 \overline{\Xi}^0$	< 6	× 10^{-5}	CL=90%	1163
$\Xi^- \overline{\Xi}^+$	(8.4 ±2.3) × 10^{-5}			1155
$\pi^+ \pi^-$ + $K^+ K^-$	< 2.1	× 10^{-3}		–
$K_S^0 K_S^0$	< 6	× 10^{-5}	CL=90%	1683

Radiative decays

$\gamma J/\psi(1S)$	(34.8 ±1.5) %	389
$\gamma\rho^0$	(2.27±0.19) × 10^{-4}	1670
$\gamma\omega$	(7.1 ±0.9) × 10^{-5}	1668
$\gamma\phi$	(2.6 ±0.6) × 10^{-5}	1607

$h_c(1P)$

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

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

$h_c(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi(1S)\pi\pi$	not seen	312
$\eta_c(1S)\gamma$	(51 ±6) %	500
$\pi^+\pi^-\pi^0$	< 2.2 × 10^{-3}	1749
$2\pi^+2\pi^-\pi^0$	($2.2^{+0.8}_{-0.7}$) %	1716
$3\pi^+3\pi^-\pi^0$	< 2.9 %	1661

$\chi_{c2}(1P)$

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

Mass m = 3556.20 ± 0.09 MeV
Full width Γ = 1.97 ± 0.11 MeV

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(1.10±0.11) %		1751
$\pi^+\pi^-\pi^0\pi^0$	(1.99±0.26) %		1752
$\rho^+\pi^-\pi^0$ + c.c.	(2.4 ±0.4) %		1682
$4\pi^0$	(1.21±0.17) × 10^{-3}		1752
$K^+K^-\pi^0\pi^0$	(2.2 ±0.4) × 10^{-3}		1658
$K^+\pi^-K^0\pi^0$ + c.c.	(1.50±0.22) %		1657
$\rho^+K^-K^0$ + c.c.	(4.5 ±1.4) × 10^{-3}		1540
$K^*(892)^0K^+\pi^- \to K^+\pi^-K^0\pi^0$ + c.c.	(3.2 ±0.9) × 10^{-3}		–
$K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	(4.2 ±0.9) × 10^{-3}		–
$K^*(892)^-K^+\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	(4.0 ±0.9) × 10^{-3}		–
$K^*(892)^+K^0\pi^- \to K^+\pi^-K^0\pi^0$ + c.c.	(3.2 ±0.9) × 10^{-3}		–
$K^+K^-\eta\pi^0$	(1.4 ±0.5) × 10^{-3}		1549

$K^+K^-\pi^+\pi^-$	(9.1 ±1.1)	$\times 10^{-3}$		1656
$K^+K^-\pi^+\pi^-\pi^0$	(1.3 ±0.4)	%		1623
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(2.3 ±1.2)	$\times 10^{-3}$		1602
$K^*(892)^0\overline{K}^*(892)^0$	(2.5 ±0.5)	$\times 10^{-3}$		1538
$3(\pi^+\pi^-)$	(8.6 ±1.8)	$\times 10^{-3}$		1707
$\phi\phi$	(1.16±0.10)	$\times 10^{-3}$		1457
$\omega\omega$	(9.2 ±1.1)	$\times 10^{-4}$		1597
$\pi\pi$	(2.42±0.13)	$\times 10^{-3}$		1773
$\rho^0\pi^+\pi^-$	(4.0 ±1.7)	$\times 10^{-3}$		1682
$\pi^+\pi^-\eta$	(5.2 ±1.4)	$\times 10^{-4}$		1724
$\pi^+\pi^-\eta'$	(5.4 ±2.0)	$\times 10^{-4}$		1636
$\eta\eta$	(5.9 ±0.5)	$\times 10^{-4}$		1692
K^+K^-	(1.09±0.08)	$\times 10^{-3}$		1708
$K^0_SK^0_S$	(5.8 ±0.5)	$\times 10^{-4}$		1707
$\overline{K}^0K^+\pi^-$ + c.c.	(1.39±0.20)	$\times 10^{-3}$		1685
$K^+K^-\pi^0$	(3.3 ±0.8)	$\times 10^{-4}$		1686
$K^+K^-\eta$	< 3.5	$\times 10^{-4}$	90%	1592
$\eta\eta'$	< 6	$\times 10^{-5}$	90%	1600
$\eta'\eta'$	< 1.1	$\times 10^{-4}$	90%	1498
$\pi^+\pi^-K^0_SK^0_S$	(2.4 ±0.6)	$\times 10^{-3}$		1655
$K^+K^-K^0_SK^0_S$	< 4	$\times 10^{-4}$	90%	1418
$K^+K^-K^+K^-$	(1.78±0.22)	$\times 10^{-3}$		1421
$K^+K^-\phi$	(1.54±0.32)	$\times 10^{-3}$		1468
$p\overline{p}$	(7.1 ±0.4)	$\times 10^{-5}$		1510
$p\overline{p}\pi^0$	(5.1 ±0.5)	$\times 10^{-4}$		1465
$p\overline{p}\eta$	(1.89±0.28)	$\times 10^{-4}$		1285
$p\overline{p}\omega$	(3.9 ±0.5)	$\times 10^{-4}$		1152
$p\overline{p}\phi$	(3.0 ±1.0)	$\times 10^{-5}$		1002
$p\overline{p}\pi^+\pi^-$	(1.32±0.34)	$\times 10^{-3}$		1410
$p\overline{p}\pi^0\pi^0$	(8.5 ±2.6)	$\times 10^{-4}$		1414
$p\overline{p}K^+K^-$ (non-resonant)	(2.08±0.35)	$\times 10^{-4}$		1013
$p\overline{p}K^0_SK^0_S$	< 7.9	$\times 10^{-4}$	90%	1007
$p\overline{n}\pi^-$	(1.1 ±0.4)	$\times 10^{-3}$		1463
$\Lambda\overline{\Lambda}$	(1.86±0.27)	$\times 10^{-4}$		1385
$\Lambda\overline{\Lambda}\pi^+\pi^-$	< 3.5	$\times 10^{-3}$	90%	1255
$K^+\overline{p}\Lambda$ + c.c.	(8.4 ±0.6)	$\times 10^{-4}$		1236
$K^+p\Lambda(1520)$ + c.c.	(3.1 ±0.7)	$\times 10^{-4}$		992
$\Lambda(1520)\overline{\Lambda}(1520)$	(5.0 ±1.6)	$\times 10^{-4}$		923
$\Sigma^0\overline{\Sigma}^0$	< 8	$\times 10^{-5}$	90%	1319
$\Sigma^+\overline{\Sigma}^-$	< 7	$\times 10^{-5}$	90%	1322
$\Xi^0\overline{\Xi}^0$	< 1.1	$\times 10^{-4}$	90%	1197
$\Xi^-\overline{\Xi}^+$	(1.55±0.35)	$\times 10^{-4}$		1189
$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5	%	90%	185
$\eta_c(1S)\pi^+\pi^-$	< 2.3	%	90%	459

Radiative decays

$\gamma J/\psi(1S)$	(19.8 ±0.8) %			430
$\gamma\rho^0$	< 2.1	$\times 10^{-5}$	90%	1694
$\gamma\omega$	< 6	$\times 10^{-6}$	90%	1692
$\gamma\phi$	< 8	$\times 10^{-6}$	90%	1632
$\gamma\gamma$	(2.61±0.16)	$\times 10^{-4}$		1778

$\eta_c(2S)$

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

Quantum numbers are quark model predictions.

Mass $m = 3639.4 \pm 1.3$ 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) %		1730
$2\pi^+2\pi^-$	not seen		1793
$\rho^0\rho^0$	not seen		1646
$3\pi^+3\pi^-$	not seen		1750
$K^+K^-\pi^+\pi^-$	not seen		1701
$K^{*0}\overline{K}^{*0}$	not seen		1586
$K^+K^-\pi^+\pi^-\pi^0$	(1.4±1.0) %		1668
$K^+K^-2\pi^+2\pi^-$	not seen		1628
$K^0_S K^-2\pi^+\pi^-$ + c.c.	seen		1667
$2K^+2K^-$	not seen		1471
$\phi\phi$	not seen		1507
$p\overline{p}$	< 2.9 $\times 10^{-4}$	90%	1559
$\gamma\gamma$	(1.9±1.3) $\times 10^{-4}$		1820
$\pi^+\pi^-\eta$	not seen		1767
$\pi^+\pi^-\eta'$	not seen		1681
$K^+K^-\eta$	not seen		1638
$\pi^+\pi^-\eta_c(1S)$	< 25 %	90%	539

$\psi(2S)$

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

Mass $m = 3686.109^{+0.012}_{-0.014}$ MeV
Full width $\Gamma = 303 \pm 9$ keV
$\Gamma_{ee} = 2.37 \pm 0.04$ keV

$\psi(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	$(97.85 \pm 0.13)\,\%$		–
virtual $\gamma \to$ hadrons	$(1.73 \pm 0.14)\,\%$	S=1.5	–
ggg	$(10.6 \pm 1.6)\,\%$		–
γgg	$(1.03 \pm 0.29)\,\%$		–
light hadrons	$(15.4 \pm 1.5)\,\%$		–
e^+e^-	$(7.82 \pm 0.17) \times 10^{-3}$		1843
$\mu^+\mu^-$	$(7.8 \pm 0.9) \times 10^{-3}$		1840
$\tau^+\tau^-$	$(3.1 \pm 0.4) \times 10^{-3}$		490
Decays into $J/\psi(1S)$ and anything			
$J/\psi(1S)$ anything	$(60.3 \pm 0.7)\,\%$		–
$J/\psi(1S)$ neutrals	$(24.9 \pm 0.4)\,\%$		–
$J/\psi(1S)\pi^+\pi^-$	$(34.0 \pm 0.4)\,\%$		477
$J/\psi(1S)\pi^0\pi^0$	$(17.93 \pm 0.33)\,\%$		481
$J/\psi(1S)\eta$	$(3.33 \pm 0.05)\,\%$		199
$J/\psi(1S)\pi^0$	$(1.268 \pm 0.032) \times 10^{-3}$		528
Hadronic decays			
$\pi^0 h_c(1P)$	$(8.6 \pm 1.3) \times 10^{-4}$		85
$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$		1746
$2(\pi^+\pi^-)\pi^0$	$(2.9 \pm 1.0) \times 10^{-3}$	S=4.6	1799
$\rho a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$		1500
$p\overline{p}$	$(2.75 \pm 0.12) \times 10^{-4}$		1586
$\Delta^{++}\overline{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$		1371
$\Lambda\overline{\Lambda}\pi^0$	$< 2.9 \times 10^{-6}$	CL=90%	1412
$\Lambda\overline{\Lambda}\eta$	$(2.5 \pm 0.4) \times 10^{-5}$		1197
$\Lambda\overline{p}K^+$	$(1.00 \pm 0.14) \times 10^{-4}$		1327
$\Lambda\overline{p}K^+\pi^+\pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$		1167
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$		1346
$\Lambda\overline{\Lambda}$	$(2.8 \pm 0.5) \times 10^{-4}$	S=2.6	1467
$\Sigma^0\overline{p}K^+ +$ c.c.	$(1.67 \pm 0.18) \times 10^{-5}$		1291
$\Sigma^+\overline{\Sigma}^-$	$(2.6 \pm 0.8) \times 10^{-4}$		1408
$\Sigma^0\overline{\Sigma}^0$	$(2.2 \pm 0.4) \times 10^{-4}$	S=1.5	1405
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$(1.1 \pm 0.4) \times 10^{-4}$		1218
$\Xi^-\overline{\Xi}^+$	$(1.8 \pm 0.6) \times 10^{-4}$	S=2.8	1284
$\Xi^0\overline{\Xi}^0$	$(2.8 \pm 0.9) \times 10^{-4}$		1292
$\Xi(1530)^0\overline{\Xi}(1530)^0$	$< 8.1 \times 10^{-5}$	CL=90%	1025
$\Omega^-\overline{\Omega}^+$	$< 7.3 \times 10^{-5}$	CL=90%	774
$\pi^0 p\overline{p}$	$(1.53 \pm 0.07) \times 10^{-4}$		1543
$N(940)\overline{p} +$ c.c. $\to \pi^0 p\overline{p}$	$(6.4\ ^{+1.8}_{-1.3}) \times 10^{-5}$		–
$N(1440)\overline{p} +$ c.c. $\to \pi^0 p\overline{p}$	$(7.3\ ^{+1.7}_{-1.5}) \times 10^{-5}$	S=2.5	–

$N(1520)\overline{p}+$ c.c. $\rightarrow$ $\pi^0 p\overline{p}$	(6.4	$^{+2.3}_{-1.8}$)	$\times 10^{-6}$		–
$N(1535)\overline{p}+$ c.c. $\rightarrow$ $\pi^0 p\overline{p}$	(2.5	± 1.0)	$\times 10^{-5}$		–
$N(1650)\overline{p}+$ c.c. $\rightarrow$ $\pi^0 p\overline{p}$	(3.8	$^{+1.4}_{-1.7}$)	$\times 10^{-5}$		–
$N(1720)\overline{p}+$ c.c. $\rightarrow$ $\pi^0 p\overline{p}$	(1.79	$^{+0.26}_{-0.70}$)	$\times 10^{-5}$		–
$N(2300)\overline{p}+$ c.c. $\rightarrow$ $\pi^0 p\overline{p}$	(2.6	$^{+1.2}_{-0.7}$)	$\times 10^{-5}$		–
$N(2570)\overline{p}+$ c.c. $\rightarrow$ $\pi^0 p\overline{p}$	(2.13	$^{+0.40}_{-0.31}$)	$\times 10^{-5}$		–
$\pi^0 f_0(2100) \rightarrow \pi^0 p\overline{p}$	(1.1	± 0.4)	$\times 10^{-5}$		–
$\eta p\overline{p}$	(5.7	± 0.6)	$\times 10^{-5}$		1373
$\eta f_0(2100) \rightarrow \eta p\overline{p}$	(1.2	± 0.4)	$\times 10^{-5}$		–
$N(1535)\overline{p} \rightarrow \eta p\overline{p}$	(4.4	± 0.7)	$\times 10^{-5}$		–
$\omega p\overline{p}$	(6.9	± 2.1)	$\times 10^{-5}$		1247
$\phi p\overline{p}$	$<$ 2.4		$\times 10^{-5}$	CL=90%	1109
$\pi^+\pi^- p\overline{p}$	(6.0	± 0.4)	$\times 10^{-4}$		1491
$p\overline{n}\pi^-$ or c.c.	(2.48	± 0.17)	$\times 10^{-4}$		–
$p\overline{n}\pi^-\pi^0$	(3.2	± 0.7)	$\times 10^{-4}$		1492
$2(\pi^+\pi^-\pi^0)$	(4.7	± 1.5)	$\times 10^{-3}$		1776
$\eta\pi^+\pi^-$	$<$ 1.6		$\times 10^{-4}$	CL=90%	1791
$\eta\pi^+\pi^-\pi^0$	(9.5	± 1.7)	$\times 10^{-4}$		1778
$2(\pi^+\pi^-)\eta$	(1.2	± 0.6)	$\times 10^{-3}$		1758
$\eta'\pi^+\pi^-\pi^0$	(4.5	± 2.1)	$\times 10^{-4}$		1692
$\omega\pi^+\pi^-$	(7.3	± 1.2)	$\times 10^{-4}$	S=2.1	1748
$b_1^{\pm}\pi^{\mp}$	(4.0	± 0.6)	$\times 10^{-4}$	S=1.1	1635
$b_1^0\pi^0$	(2.4	± 0.6)	$\times 10^{-4}$		–
$\omega f_2(1270)$	(2.2	± 0.4)	$\times 10^{-4}$		1515
$\pi^+\pi^- K^+K^-$	(7.5	± 0.9)	$\times 10^{-4}$	S=1.9	1726
$\rho^0 K^+K^-$	(2.2	± 0.4)	$\times 10^{-4}$		1616
$K^*(892)^0\overline{K}_2^*(1430)^0$	(1.9	± 0.5)	$\times 10^{-4}$		1418
$K^+K^-\pi^+\pi^-\eta$	(1.3	± 0.7)	$\times 10^{-3}$		1574
$K^+K^-2(\pi^+\pi^-)\pi^0$	(1.00	± 0.31)	$\times 10^{-3}$		1611
$K^+K^-2(\pi^+\pi^-)$	(1.9	± 0.9)	$\times 10^{-3}$		1654
$K_1(1270)^{\pm}K^{\mp}$	(1.00	± 0.28)	$\times 10^{-3}$		1581
$K_S^0 K_S^0\pi^+\pi^-$	(2.2	± 0.4)	$\times 10^{-4}$		1724
$\rho^0 p\overline{p}$	(5.0	± 2.2)	$\times 10^{-5}$		1252
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(6.7	± 2.5)	$\times 10^{-4}$		1674
$2(\pi^+\pi^-)$	(2.4	± 0.6)	$\times 10^{-4}$	S=2.2	1817
$\rho^0\pi^+\pi^-$	(2.2	± 0.6)	$\times 10^{-4}$	S=1.4	1750
$K^+K^-\pi^+\pi^-\pi^0$	(1.26	± 0.09)	$\times 10^{-3}$		1694
$\omega f_0(1710) \rightarrow \omega K^+K^-$	(5.9	± 2.2)	$\times 10^{-5}$		–
$K^*(892)^0 K^-\pi^+\pi^0$ + 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)	$\times 10^{-4}$		–

$K^*(892)^0 K^- \rho^+ +$ c.c.	(6.1	± 1.8)	$\times 10^{-4}$		–
$\eta K^+ K^-$, no $\eta\phi$	(3.1	± 0.4)	$\times 10^{-5}$		1664
$\omega K^+ K^-$	(1.85	± 0.25)	$\times 10^{-4}$	S=1.1	1614
$3(\pi^+\pi^-)$	(3.5	± 2.0)	$\times 10^{-4}$	S=2.8	1774
$p\overline{p}\pi^+\pi^-\pi^0$	(7.3	± 0.7)	$\times 10^{-4}$		1435
$K^+ K^-$	(7.1	± 0.5)	$\times 10^{-5}$	S=1.5	1776
$K^0_S K^0_L$	(5.34	± 0.33)	$\times 10^{-5}$		1775
$\pi^+\pi^-\pi^0$	(2.01	± 0.17)	$\times 10^{-4}$	S=1.7	1830
$\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0$	(1.9	$^{+1.2}_{-0.4}$)	$\times 10^{-4}$		–
$\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$	(3.2	± 1.2)	$\times 10^{-5}$	S=1.8	–
$\pi^+\pi^-$	(7.8	± 2.6)	$\times 10^{-6}$		1838
$K_1(1400)^\pm K^\mp$	$<$ 3.1		$\times 10^{-4}$	CL=90%	1532
$K^*_2(1430)^\pm K^\mp$	(7.1	$^{+1.3}_{-0.9}$)	$\times 10^{-5}$		–
$K^+ K^-\pi^0$	(4.07	± 0.31)	$\times 10^{-5}$		1754
$K^+ K^*(892)^-$ + c.c.	(2.9	± 0.4)	$\times 10^{-5}$	S=1.2	1698
$K^*(892)^0\overline{K}^0$ + c.c.	(1.09	± 0.20)	$\times 10^{-4}$		1697
$\phi\pi^+\pi^-$	(1.17	± 0.29)	$\times 10^{-4}$	S=1.7	1690
$\phi f_0(980) \rightarrow \pi^+\pi^-$	(6.8	± 2.4)	$\times 10^{-5}$	S=1.1	–
$2(K^+ K^-)$	(6.0	± 1.4)	$\times 10^{-5}$		1499
$\phi K^+ K^-$	(7.0	± 1.6)	$\times 10^{-5}$		1546
$2(K^+ K^-)\pi^0$	(1.10	± 0.28)	$\times 10^{-4}$		1440
$\phi\eta$	(3.10	± 0.31)	$\times 10^{-5}$		1654
$\phi\eta'$	(3.1	± 1.6)	$\times 10^{-5}$		1555
$\omega\eta'$	(3.2	$^{+2.5}_{-2.1}$)	$\times 10^{-5}$		1623
$\omega\pi^0$	(2.1	± 0.6)	$\times 10^{-5}$		1757
$\rho\eta'$	(1.9	$^{+1.7}_{-1.2}$)	$\times 10^{-5}$		1625
$\rho\eta$	(2.2	± 0.6)	$\times 10^{-5}$	S=1.1	1717
$\omega\eta$	$<$ 1.1		$\times 10^{-5}$	CL=90%	1715
$\phi\pi^0$	$<$ 4		$\times 10^{-7}$	CL=90%	1699
$\eta_c\pi^+\pi^-\pi^0$	$<$ 1.0		$\times 10^{-3}$	CL=90%	–
$p\overline{p}K^+ K^-$	(2.7	± 0.7)	$\times 10^{-5}$		1118
$\overline{\Lambda} n K^0_S$ + c.c.	(8.1	± 1.8)	$\times 10^{-5}$		1324
$\phi f'_2(1525)$	(4.4	± 1.6)	$\times 10^{-5}$		1321
$\Theta(1540)\overline{\Theta}(1540) \rightarrow K^0_S p K^-\overline{n}$ + c.c.	$<$ 8.8		$\times 10^{-6}$	CL=90%	–
$\Theta(1540) K^-\overline{n} \rightarrow K^0_S p K^-\overline{n}$	$<$ 1.0		$\times 10^{-5}$	CL=90%	–
$\Theta(1540) K^0_S\overline{p} \rightarrow K^0_S\overline{p}K^+ n$	$<$ 7.0		$\times 10^{-6}$	CL=90%	–
$\overline{\Theta}(1540) K^+ n \rightarrow K^0_S\overline{p}K^+ n$	$<$ 2.6		$\times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540) K^0_S p \rightarrow K^0_S p K^-\overline{n}$	$<$ 6.0		$\times 10^{-6}$	CL=90%	–
$K^0_S K^0_S$	$<$ 4.6		$\times 10^{-6}$		1775

Radiative decays

$\gamma\chi_{c0}(1P)$		(9.84	$\pm$0.31) %			261
$\gamma\chi_{c1}(1P)$		(9.3	$\pm$0.4) %			171
$\gamma\chi_{c2}(1P)$		(8.76	$\pm$0.34) %			128
$\gamma\eta_c(1S)$		(3.4	$\pm$0.5) $\times 10^{-3}$		S=1.3	636
$\gamma\eta_c(2S)$		(7	$\pm$5) $\times 10^{-4}$			46
$\gamma\pi^0$		(1.6	$\pm$0.4) $\times 10^{-6}$			1841
$\gamma\eta'(958)$		(1.23	$\pm$0.06) $\times 10^{-4}$			1719
$\gamma f_2(1270)$		(2.1	$\pm$0.4) $\times 10^{-4}$			1623
$\gamma f_0(1710) \to \gamma\pi\pi$		(3.0	$\pm$1.3) $\times 10^{-5}$			–
$\gamma f_0(1710) \to \gamma K\overline{K}$		(6.0	$\pm$1.6) $\times 10^{-5}$			–
$\gamma\gamma$		< 1.4		$\times 10^{-4}$	CL=90%	1843
$\gamma\eta$		(1.4	$\pm$0.5) $\times 10^{-6}$			1802
$\gamma\eta\pi^+\pi^-$		(8.7	$\pm$2.1) $\times 10^{-4}$			1791
$\gamma\eta(1405) \to \gamma K\overline{K}\pi$		< 9		$\times 10^{-5}$	CL=90%	1569
$\gamma\eta(1405) \to \eta\pi^+\pi^-$		(3.6	$\pm$2.5) $\times 10^{-5}$			–
$\gamma\eta(1475) \to K\overline{K}\pi$		< 1.4		$\times 10^{-4}$	CL=90%	–
$\gamma\eta(1475) \to \eta\pi^+\pi^-$		< 8.8		$\times 10^{-5}$	CL=90%	–
$\gamma 2(\pi^+\pi^-)$		(4.0	$\pm$0.6) $\times 10^{-4}$			1817
$\gamma K^{*0}K^+\pi^-$ + c.c.		(3.7	$\pm$0.9) $\times 10^{-4}$			1674
$\gamma K^{*0}\overline{K}^{*0}$		(2.4	$\pm$0.7) $\times 10^{-4}$			1613
$\gamma K^0_S K^+\pi^-$ + c.c.		(2.6	$\pm$0.5) $\times 10^{-4}$			1753
$\gamma K^+K^-\pi^+\pi^-$		(1.9	$\pm$0.5) $\times 10^{-4}$			1726
$\gamma p\overline{p}$		(3.9	$\pm$0.5) $\times 10^{-5}$		S=2.0	1586
$\gamma f_2(1950) \to \gamma p\overline{p}$		(1.20	$\pm$0.22) $\times 10^{-5}$			–
$\gamma f_2(2150) \to \gamma p\overline{p}$		(7.2	$\pm$1.8) $\times 10^{-6}$			–
$\gamma X(1835) \to \gamma p\overline{p}$		(4.6	$^{+1.8}_{-4.0}$) $\times 10^{-6}$			–
$\gamma X \to \gamma p\overline{p}$	[*uuaa*]	< 2		$\times 10^{-6}$	CL=90%	–
$\gamma\pi^+\pi^- p\overline{p}$		(2.8	$\pm$1.4) $\times 10^{-5}$			1491
$\gamma 2(\pi^+\pi^-)K^+K^-$		< 2.2		$\times 10^{-4}$	CL=90%	1654
$\gamma 3(\pi^+\pi^-)$		< 1.7		$\times 10^{-4}$	CL=90%	1774
$\gamma K^+K^-K^+K^-$		< 4		$\times 10^{-5}$	CL=90%	1499
$\gamma\gamma J/\psi$		(3.1	$^{+1.0}_{-1.2}$) $\times 10^{-4}$			542

$\psi(3770)$

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

Mass $m = 3773.15 \pm 0.33$ MeV
Full width $\Gamma = 27.2 \pm 1.0$ MeV
$\Gamma_{ee} = 0.262 \pm 0.018$ keV (S = 1.4)

In addition to the dominant decay mode to $D\overline{D}$, $\psi(3770)$ was found to decay into the final states containing the J/ψ (BAI 05, ADAM 06). ADAMS 06 and HUANG 06A searched for various decay modes with light hadrons and found a statistically significant signal for the decay to $\phi\eta$ only (ADAMS 06).

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D\overline{D}$	$(93\ ^{+8}_{-9})\%$	S=2.0	285
$D^0\overline{D}^0$	$(52\ \pm5)\%$	S=2.0	285
D^+D^-	$(41\ \pm4)\%$	S=2.0	252
$J/\psi\pi^+\pi^-$	$(1.93\pm0.28)\times10^{-3}$		560
$J/\psi\pi^0\pi^0$	$(8.0\ \pm3.0)\times10^{-4}$		564
$J/\psi\eta$	$(9\ \pm4)\times10^{-4}$		360
$J/\psi\pi^0$	$< 2.8\times10^{-4}$	CL=90%	603
e^+e^-	$(9.6\ \pm0.7)\times10^{-6}$	S=1.3	1887
Decays to light hadrons			
$b_1(1235)\pi$	$< 1.4\times10^{-5}$	CL=90%	1683
$\phi\eta'$	$< 7\times10^{-4}$	CL=90%	1607
$\omega\eta'$	$< 4\times10^{-4}$	CL=90%	1672
$\rho^0\eta'$	$< 6\times10^{-4}$	CL=90%	1674
$\phi\eta$	$(3.1\ \pm0.7)\times10^{-4}$		1703
$\omega\eta$	$< 1.4\times10^{-5}$	CL=90%	1762
$\rho^0\eta$	$< 5\times10^{-4}$	CL=90%	1764
$\phi\pi^0$	$< 3\times10^{-5}$	CL=90%	1746
$\omega\pi^0$	$< 6\times10^{-4}$	CL=90%	1803
$\pi^+\pi^-\pi^0$	$< 5\times10^{-6}$	CL=90%	1874
$\rho\pi$	$< 5\times10^{-6}$	CL=90%	1804
$K^*(892)^+K^-$ + c.c.	$< 1.4\times10^{-5}$	CL=90%	1745
$K^*(892)^0\overline{K}^0$ + c.c.	$< 1.2\times10^{-3}$	CL=90%	1744
$K^0_SK^0_L$	$< 1.2\times10^{-5}$	CL=90%	1820
$2(\pi^+\pi^-)$	$< 1.12\times10^{-3}$	CL=90%	1861
$2(\pi^+\pi^-)\pi^0$	$< 1.06\times10^{-3}$	CL=90%	1843
$2(\pi^+\pi^-\pi^0)$	< 5.85 %	CL=90%	1821
$\omega\pi^+\pi^-$	$< 6.0\times10^{-4}$	CL=90%	1794
$3(\pi^+\pi^-)$	$< 9.1\times10^{-3}$		1819
$3(\pi^+\pi^-)\pi^0$	< 1.37 %		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	%		1804
$\eta\rho^0\pi^+\pi^-$	$<$	1.45	%	CL=90%	1708
$\eta' 3\pi$	$<$	2.44	$\times 10^{-3}$	CL=90%	1740
$K^+K^-\pi^+\pi^-$	$<$	9.0	$\times 10^{-4}$	CL=90%	1772
$\phi\pi^+\pi^-$	$<$	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%	1622
ωK^+K^-	$<$	3.4	$\times 10^{-4}$	CL=90%	1664
$\phi\pi^+\pi^-\pi^0$	$<$	3.8	$\times 10^{-3}$	CL=90%	1722
$K^{*0}K^-\pi^+\pi^0 +$ c.c.	$<$	1.62	%	CL=90%	1693
$K^{*+}K^-\pi^+\pi^- +$ c.c.	$<$	3.23	%	CL=90%	1692
$K^+K^-\pi^+\pi^- 2\pi^0$	$<$	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%	1660
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%	1665
$2(K^+K^-)$	$<$	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%	1493
$2(K^+K^-)\pi^+\pi^-$	$<$	3.2	$\times 10^{-3}$	CL=90%	1425
$K^0_S K^-\pi^+$	$<$	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%	1664
$K^0_S K^- 2\pi^+\pi^-$	$<$	8.7	$\times 10^{-3}$	CL=90%	1739
$K^0_S K^-\pi^+\rho^0$	$<$	1.6	%	CL=90%	1621
$K^0_S K^-\pi^+\eta$	$<$	1.3	%	CL=90%	1669
$K^0_S K^- 2\pi^+\pi^-\pi^0$	$<$	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%	1490
$K^0_S K^- K^+ K^-\pi^+\pi^0$	$<$	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
$p\overline{p}\pi^0$	<	1.2	$\times 10^{-3}$		1595
$p\overline{p}\pi^+\pi^-$	<	5.8	$\times 10^{-4}$	CL=90%	1544
$\Lambda\overline{\Lambda}$	<	1.2	$\times 10^{-4}$	CL=90%	1521
$p\overline{p}\pi^+\pi^-\pi^0$	<	1.85	$\times 10^{-3}$	CL=90%	1490
$\omega p\overline{p}$	<	2.9	$\times 10^{-4}$	CL=90%	1309
$\Lambda\overline{\Lambda}\pi^0$	<	1.2	$\times 10^{-3}$	CL=90%	1469
$p\overline{p}2(\pi^+\pi^-)$	<	2.6	$\times 10^{-3}$	CL=90%	1425
$\eta p\overline{p}$	<	5.4	$\times 10^{-4}$	CL=90%	1430
$\eta p\overline{p}\pi^+\pi^-$	<	3.3	$\times 10^{-3}$	CL=90%	1284
$\rho^0 p\overline{p}$	<	1.7	$\times 10^{-3}$	CL=90%	1313
$p\overline{p}K^+K^-$	<	3.2	$\times 10^{-4}$	CL=90%	1185
$\eta p\overline{p}K^+K^-$	<	6.9	$\times 10^{-3}$	CL=90%	736
$\pi^0 p\overline{p}K^+K^-$	<	1.2	$\times 10^{-3}$	CL=90%	1093
$\phi p\overline{p}$	<	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

Radiative decays

$\gamma\chi_{c2}$	<	9	$\times 10^{-4}$	CL=90%	211
$\gamma\chi_{c1}$	(	2.9 ±0.6)	$\times 10^{-3}$		253
$\gamma\chi_{c0}$	(	7.3 ±0.9)	$\times 10^{-3}$		341
$\gamma\eta'$	<	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

X(3872)

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

Mass $m = 3871.68 \pm 0.17$ MeV
$m_{X(3872)} - m_{J/\psi} = 775 \pm 4$ MeV
$m_{X(3872)} - m_{\psi(2S)}$
Full width $\Gamma < 1.2$ MeV, CL = 90%

X(3872) DECAY MODES	Fraction (Γ_i/Γ)		p (MeV/c)
$\pi^+\pi^- J/\psi(1S)$	> 2.6 %		650
$\omega J/\psi(1S)$	> 1.9 %		†
$D^0\overline{D}^0\pi^0$	>32 %		116
$\overline{D}^{*0}D^0$	>24 %		†
$\gamma J/\psi$	> 6	$\times 10^{-3}$	697
$\gamma\psi(2S)$	[vvaa] > 3.0 %		181
$\pi^+\pi^-\eta_c(1S)$	not seen		746

$\chi_{c0}(2P)$ was $X(3915)$

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

Mass $m = 3918.4 \pm 1.9$ MeV
Full width $\Gamma = 20 \pm 5$ MeV (S = 1.1)

$\chi_{c0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega J/\psi$	seen	222
$\pi^+\pi^-\eta_c(1S)$	not seen	785
$\gamma\gamma$	seen	1959

$\chi_{c2}(2P)$

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

Mass $m = 3927.2 \pm 2.6$ MeV
Full width $\Gamma = 24 \pm 6$ MeV

$\chi_{c2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma$	seen	1964
$D\overline{D}$	seen	615
D^+D^-	seen	600
$D^0\overline{D}^0$	seen	615
$\pi^+\pi^-\eta_c(1S)$	not seen	792

$\psi(4040)$ [xxaa]

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

Mass $m = 4039 \pm 1$ MeV
Full width $\Gamma = 80 \pm 10$ MeV
$\Gamma_{ee} = 0.86 \pm 0.07$ keV

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			224
$D^*(2010)^+ D^*(2010)^-$	seen			193
$D^0 D^- \pi^+$ +c.c. (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen			–
$D \overline{D}^* \pi$ (excl. $D^* \overline{D}^*$)	not seen			–
$D^0 \overline{D}^{*-} \pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	seen			–
$D_s^+ D_s^-$	seen			451
$J/\psi \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	794
$J/\psi \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	797
$J/\psi \eta$	(5.2 ± 0.7)	$\times 10^{-3}$		675
$J/\psi \pi^0$	< 2.8	$\times 10^{-4}$	90%	823
$J/\psi \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	746
$\chi_{c1} \gamma$	< 1.1	%	90%	494
$\chi_{c2} \gamma$	< 1.7	%	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	$\times 10^{-3}$	90%	403
$\phi \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	1880

$\psi(4160)$ [xxaa]

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

Mass $m = 4153 \pm 3$ MeV
Full width $\Gamma = 103 \pm 8$ MeV
$\Gamma_{ee} = 0.83 \pm 0.07$ keV

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)
$e^+ e^-$	$(8.1 \pm 0.9) \times 10^{-6}$		2076
$D \overline{D}$	seen		913
$D^0 \overline{D}^0$	seen		913
$D^+ D^-$	seen		904
$D^* \overline{D}$ + c.c.	seen		746
$D^*(2007)^0 \overline{D}^0$ + c.c.	seen		751
$D^*(2010)^+ D^-$ + c.c.	seen		740
$D^* \overline{D}^*$	seen		520

$D^*(2007)^0\overline{D}^*(2007)^0$	seen			533
$D^*(2010)^+D^*(2010)^-$	seen			520
$D^0D^-\pi^+$+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. $D^*\overline{D}^*$)	seen			–
$D^0D^{*-}\pi^+$+c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	not seen			–
$D_s^+D_s^-$	not seen			661
$D_s^{*+}D_s^-$+c.c.	seen			385
$J/\psi\pi^+\pi^-$	< 3	$\times 10^{-3}$	90%	888
$J/\psi\pi^0\pi^0$	< 3	$\times 10^{-3}$	90%	891
$J/\psi K^+K^-$	< 2	$\times 10^{-3}$	90%	324
$J/\psi\eta$	< 8	$\times 10^{-3}$	90%	786
$J/\psi\pi^0$	< 1	$\times 10^{-3}$	90%	914
$J/\psi\eta'$	< 5	$\times 10^{-3}$	90%	385
$J/\psi\pi^+\pi^-\pi^0$	< 1	$\times 10^{-3}$	90%	847
$\psi(2S)\pi^+\pi^-$	< 4	$\times 10^{-3}$	90%	353
$\chi_{c1}\gamma$	< 7	$\times 10^{-3}$	90%	593
$\chi_{c2}\gamma$	< 1.3	%	90%	554
$\chi_{c1}\pi^+\pi^-\pi^0$	< 2	$\times 10^{-3}$	90%	452
$\chi_{c2}\pi^+\pi^-\pi^0$	< 8	$\times 10^{-3}$	90%	398
$h_c(1P)\pi^+\pi^-$	< 5	$\times 10^{-3}$	90%	519
$h_c(1P)\pi^0\pi^0$	< 2	$\times 10^{-3}$	90%	523
$h_c(1P)\eta$	< 2	$\times 10^{-3}$	90%	282
$h_c(1P)\pi^0$	< 4	$\times 10^{-4}$	90%	567
$\phi\pi^+\pi^-$	< 2	$\times 10^{-3}$	90%	1941

$X(4260)$

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

Mass $m = 4250 \pm 9$ MeV (S = 1.6)
Full width $\Gamma = 108 \pm 12$ MeV

$X(4260)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\pi^+\pi^-$	seen	966
$J/\psi f_0(980)$, $f_0(980) \to \pi^+\pi^-$	seen	–
$J/\psi\pi^0\pi^0$	seen	968
$J/\psi K^+K^-$	seen	510
$J/\psi\eta$	not seen	874
$J/\psi\pi^0$	not seen	990
$J/\psi\eta'$	not seen	550
$J/\psi\pi^+\pi^-\pi^0$	not seen	929
$J/\psi\eta\eta$	not seen	307

$\psi(2S)\pi^+\pi^-$	not seen	457
$\psi(2S)\eta$	not seen	124
$\chi_{c0}\omega$	not seen	262
$\chi_{c1}\gamma$	not seen	675
$\chi_{c2}\gamma$	not seen	637
$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	558
$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	510
$h_c(1P)\pi^+\pi^-$	not seen	611
$\phi\pi^+\pi^-$	not seen	1992
$\phi f_0(980) \rightarrow \phi\pi^+\pi^-$	not seen	–
$D\overline{D}$	not seen	1019
$D^0\overline{D}^0$	not seen	1019
D^+D^-	not seen	1010
$D^*\overline{D}$ +c.c.	not seen	887
$D^*(2007)^0\overline{D}^0$ +c.c.	not seen	–
$D^*(2010)^+D^-$ +c.c.	not seen	–
$D^*\overline{D}^*$	not seen	689
$D^*(2007)^0\overline{D}^*(2007)^0$	not seen	698
$D^*(2010)^+D^*(2010)^-$	not seen	689
$D^0D^-\pi^+$ +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.	not seen	716
$D^*\overline{D}^*\pi$	not seen	445
$D_s^+D_s^-$	not seen	800
$D_s^{*+}D_s^-$ +c.c.	not seen	615
$D_s^{*+}D_s^{*-}$	not seen	231
$p\overline{p}$	not seen	1907
$K_S^0K^\pm\pi^\mp$	not seen	2047
$K^+K^-\pi^0$	not seen	2049

X(4360)

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

$X(4360)$ MASS $= 4361 \pm 13$ MeV
$X(4360)$ WIDTH $= 74 \pm 18$ MeV

X(4360) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S)\pi^+\pi^-$	seen	567

$\psi(4415)$ [xxaa]

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

Mass $m = 4421 \pm 4$ MeV
Full width $\Gamma = 62 \pm 20$ MeV
$\Gamma_{ee} = 0.58 \pm 0.07$ keV

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.

$\psi(4415)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D\overline{D}$	not seen		1187
$D^0\overline{D}^0$	seen		1187
D^+D^-	seen		1179
$D^*\overline{D}$ + c.c.	not seen		1063
$D^*(2007)^0\overline{D}^0$ + c.c.	seen		1066
$D^*(2010)^+D^-$ + c.c.	seen		1059
$D^*\overline{D}^*$	not seen		919
$D^*(2007)^0\overline{D}^*(2007)^0$ + c.c.	seen		926
$D^*(2010)^+D^*(2010)^-$ + 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 ±4) %		–
$D^0D^{*-}\pi^+$+c.c.	< 11 %	90%	926
$D_s^+D_s^-$	not seen		1006
$D_s^{*+}D_s^-$+c.c.	seen		–
$D_s^{*+}D_s^{*-}$	not seen		651
e^+e^-	$(9.4\pm3.2)\times10^{-6}$		2210

$X(4660)$

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

$X(4660)$ MASS $= 4664 \pm 12$ MeV
$X(4660)$ WIDTH $= 48 \pm 15$ MeV

$X(4660)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S)\pi^+\pi^-$	seen	838

$b\overline{b}$ MESONS

$\Upsilon(1S)$

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

Mass $m = 9460.30 \pm 0.26$ MeV (S = 3.3)
Full width $\Gamma = 54.02 \pm 1.25$ keV
$\Gamma_{ee} = 1.340 \pm 0.018$ keV

$\Upsilon(1S)$ DECAY MODES		Fraction (Γ_i/Γ)	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		(6.5 ±0.7) $\times 10^{-4}$		4223
χ_{c0} anything		$< 5 \times 10^{-3}$	90%	–
χ_{c1} anything		(2.3 ±0.7) $\times 10^{-4}$		–
χ_{c2} anything		(3.4 ±1.0) $\times 10^{-4}$		–
$\psi(2S)$ anything		(2.7 ±0.9) $\times 10^{-4}$		–
$\rho\pi$		$< 2 \times 10^{-4}$	90%	4697
$\pi^+\pi^-$		$< 5 \times 10^{-4}$	90%	4728
K^+K^-		$< 5 \times 10^{-4}$	90%	4704
$p\overline{p}$		$< 5 \times 10^{-4}$	90%	4636
$\pi^0\pi^+\pi^-$		$< 1.84 \times 10^{-5}$	90%	4725
$D^*(2010)^\pm$ anything		(2.52 ±0.20) %		–
$\overline{d}$ anything		(2.86 ±0.28) $\times 10^{-5}$		–
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
$\gamma\pi^0\eta$		$< 2.4 \times 10^{-6}$	90%	4713
γK^+K^-	[yyaa]	(1.14 ±0.13) $\times 10^{-5}$		4704
$\gamma p\overline{p}$	[zzaa]	$< 6 \times 10^{-6}$	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	± 0.6)	$\times 10^{-4}$		4604
$\gamma 2\pi^+ 2\pi^- p\overline{p}$		(4	± 6)	$\times 10^{-5}$		4563
$\gamma 2K^+ 2K^-$		(2.0	± 2.0)	$\times 10^{-5}$		4601
$\gamma \eta'(958)$		$<$ 1.9		$\times 10^{-6}$	90%	4682
$\gamma \eta$		$<$ 1.0		$\times 10^{-6}$	90%	4714
$\gamma f_0(980)$		$<$ 3		$\times 10^{-5}$	90%	4678
$\gamma f_2'(1525)$		(3.8	± 0.9)	$\times 10^{-5}$		4607
$\gamma f_2(1270)$		(1.01	± 0.09)	$\times 10^{-4}$		4644
$\gamma \eta(1405)$		$<$ 8.2		$\times 10^{-5}$	90%	4625
$\gamma f_0(1500)$		$<$ 1.5		$\times 10^{-5}$	90%	4610
$\gamma f_0(1710)$		$<$ 2.6		$\times 10^{-4}$	90%	4574
$\gamma f_0(1710) \to \gamma K^+ K^-$		$<$ 7		$\times 10^{-6}$	90%	–
$\gamma f_0(1710) \to \gamma \pi^0 \pi^0$		$<$ 1.4		$\times 10^{-6}$	90%	–
$\gamma f_0(1710) \to \gamma \eta \eta$		$<$ 1.8		$\times 10^{-6}$	90%	–
$\gamma f_4(2050)$		$<$ 5.3		$\times 10^{-5}$	90%	4515
$\gamma f_0(2200) \to \gamma K^+ K^-$		$<$ 2		$\times 10^{-4}$	90%	4475
$\gamma f_J(2220) \to \gamma K^+ K^-$		$<$ 8		$\times 10^{-7}$	90%	4469
$\gamma f_J(2220) \to \gamma \pi^+ \pi^-$		$<$ 6		$\times 10^{-7}$	90%	–
$\gamma f_J(2220) \to \gamma p\overline{p}$		$<$ 1.1		$\times 10^{-6}$	90%	–
$\gamma \eta(2225) \to \gamma \phi \phi$		$<$ 3		$\times 10^{-3}$	90%	4469
$\gamma \eta_c(1S)$		$<$ 5.7		$\times 10^{-5}$	90%	4260
$\gamma \chi_{c0}$		$<$ 6.5		$\times 10^{-4}$	90%	4114
$\gamma \chi_{c1}$		$<$ 2.3		$\times 10^{-5}$	90%	4079
$\gamma \chi_{c2}$		$<$ 7.6		$\times 10^{-6}$	90%	4062
$\gamma X(3872) \to \pi^+ \pi^- J/\psi$		$<$ 1.6		$\times 10^{-6}$	90%	–
$\gamma X(3872) \to \pi^+ \pi^- \pi^0 J/\psi$		$<$ 2.8		$\times 10^{-6}$	90%	–
$\gamma X(3915) \to \omega J/\psi$		$<$ 3.0		$\times 10^{-6}$	90%	–
$\gamma X(4140) \to \phi J/\psi$		$<$ 2.2		$\times 10^{-6}$	90%	–
γX	[*aabb*]	$<$ 4.5		$\times 10^{-6}$	90%	–
$\gamma X\overline{X}(m_X < 3.1$ GeV)	[*bbbb*]	$<$ 1		$\times 10^{-3}$	90%	–
$\gamma X\overline{X}(m_X < 4.5$ GeV)	[*ccbb*]	$<$ 2.4		$\times 10^{-4}$	90%	–
$\gamma X \to \gamma +\geq 4$ prongs	[*ddbb*]	$<$ 1.78		$\times 10^{-4}$	95%	–
$\gamma a_1^0 \to \gamma \mu^+ \mu^-$	[*eebb*]	$<$ 9		$\times 10^{-6}$	90%	–
$\gamma a_1^0 \to \gamma \tau^+ \tau^-$	[*yyaa*]	$<$ 5.0		$\times 10^{-5}$	90%	–
Lepton Family number (*LF*) violating modes						
$\mu^\pm \tau^\mp$	*LF*	$<$ 6.0		$\times 10^{-6}$	95%	4563
Other decays						
invisible		$<$ 3.0		$\times 10^{-4}$	90%	–

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

$I^G(J^{PC}) = 0^+(0^{++})$
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)
$\gamma\,\Upsilon(1S)$	(1.76±0.35) %		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
$2\pi^+\pi^-K^-K^0_S2\pi^0$	< 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

$\chi_{b1}(1P)$ [ffbb]

$I^G(J^{PC}) = 0^+(1^{++})$
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)
$\gamma\,\Upsilon(1S)$	(33.9±2.2) %		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
$2\pi^+\pi^-K^-K^0_S2\pi^0$	< 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

$3\pi^+3\pi^-K^+K^-$	$(\ 2.6\pm0.8)\times10^{-4}$	4844
$3\pi^+3\pi^-K^+K^-\pi^0$	$(\ 7.5\pm2.6)\times10^{-4}$	4825
$4\pi^+4\pi^-$	$(\ 2.6\pm0.9)\times10^{-4}$	4897
$4\pi^+4\pi^-2\pi^0$	$(\ 1.4\pm0.6)\times10^{-3}$	4867

$h_b(1P)$

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

Mass $m = 9899.3 \pm 1.0$ MeV

$h_b(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta_b(1S)\gamma$	(49^{+8}_{-7}) %	489

$\chi_{b2}(1P)$ [ffbb]

$I^G(J^{PC}) = 0^+(2^{++})$
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)
$\gamma\,\Upsilon(1S)$	(19.1±1.2) %		442
D^0X	$<$ 7.9 %	90%	–
$\pi^+\pi^-K^+K^-\pi^0$	$(\ 8\ \pm5\ )\times10^{-5}$		4902
$2\pi^+\pi^-K^-K^0_S$	$<$ 1.0 $\times10^{-4}$	90%	4901
$2\pi^+\pi^-K^-K^0_S2\pi^0$	$(\ 5.3\pm2.4)\times10^{-4}$		4873
$2\pi^+2\pi^-2\pi^0$	$(\ 3.5\pm1.4)\times10^{-4}$		4931
$2\pi^+2\pi^-K^+K^-$	$(\ 1.1\pm0.4)\times10^{-4}$		4888
$2\pi^+2\pi^-K^+K^-\pi^0$	$(\ 2.1\pm0.9)\times10^{-4}$		4872
$2\pi^+2\pi^-K^+K^-2\pi^0$	$(\ 3.9\pm1.8)\times10^{-4}$		4855
$3\pi^+2\pi^-K^-K^0_S\pi^0$	$<$ 5 $\times10^{-4}$	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

$\Upsilon(2S)$

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

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
$\Gamma_{ee} = 0.612 \pm 0.011$ 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
$\Upsilon(1S)\pi^0$		$< 4 \times 10^{-5}$	CL=90%	531
$\Upsilon(1S)\eta$		$(2.9 \pm 0.4) \times 10^{-4}$	S=2.0	126
$J/\psi(1S)$ anything		$< 6 \times 10^{-3}$	CL=90%	4533
$\overline{d}$ anything		$(3.4 \pm 0.6) \times 10^{-5}$		–
hadrons		(94 ±11) %		–
ggg		(58.8 ± 1.2) %		–
γgg		(8.8 ± 1.1) %		–
Sum of 100 exclusive modes		$(2.90 \pm 0.30) \times 10^{-3}$		–
Radiative decays				
$\gamma\chi_{b1}(1P)$		(6.9 ± 0.4) %		130
$\gamma\chi_{b2}(1P)$		(7.15 ± 0.35) %		110
$\gamma\chi_{b0}(1P)$		(3.8 ± 0.4) %		162
$\gamma f_0(1710)$		$< 5.9 \times 10^{-4}$	CL=90%	4864
$\gamma f_2'(1525)$		$< 5.3 \times 10^{-4}$	CL=90%	4896
$\gamma f_2(1270)$		$< 2.41 \times 10^{-4}$	CL=90%	4931
$\gamma\eta_c(1S)$		$< 2.7 \times 10^{-5}$	CL=90%	4568
$\gamma\chi_{c0}$		$< 1.0 \times 10^{-4}$	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
$\gamma X(3872) \to \pi^+\pi^- J/\psi$		$< 8 \times 10^{-7}$	CL=90%	–
$\gamma X(3872) \to \pi^+\pi^-\pi^0 J/\psi$		$< 2.4 \times 10^{-6}$	CL=90%	–
$\gamma X(3915) \to \omega J/\psi$		$< 2.8 \times 10^{-6}$	CL=90%	–
$\gamma X(4140) \to \phi J/\psi$		$< 1.2 \times 10^{-6}$	CL=90%	–
$\gamma X(4350) \to \phi J/\psi$		$< 1.3 \times 10^{-6}$	CL=90%	–
$\gamma\eta_b(1S)$		$(3.9 \pm 1.5) \times 10^{-4}$		606
$\gamma X \to \gamma +$ ≥ 4 prongs	[*ggbb*]	$< 1.95 \times 10^{-4}$	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

$\Upsilon(1D)$

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

Mass $m = 10163.7 \pm 1.4$ MeV (S = 1.7)

$\Upsilon(1D)$ 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

$\chi_{b0}(2P)$ [*ffbb*]

$I^G(J^{PC}) = 0^+(0^{++})$
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)
$\gamma\,\Upsilon(2S)$	(4.6 ± 2.1) %			207
$\gamma\,\Upsilon(1S)$	$(9\ \ \pm6\ \ )\times10^{-3}$			743
D^0X	$<$ 8.2	%	90%	–
$\pi^+\pi^-K^+K^-\pi^0$	$<$ 3.4	$\times10^{-5}$	90%	5064
$2\pi^+\pi^-K^-K^0_S$	$<$ 5	$\times10^{-5}$	90%	5063
$2\pi^+\pi^-K^-K^0_S2\pi^0$	$<$ 2.2	$\times10^{-4}$	90%	5036
$2\pi^+2\pi^-2\pi^0$	$<$ 2.4	$\times10^{-4}$	90%	5092
$2\pi^+2\pi^-K^+K^-$	$<$ 1.5	$\times10^{-4}$	90%	5050
$2\pi^+2\pi^-K^+K^-\pi^0$	$<$ 2.2	$\times10^{-4}$	90%	5035
$2\pi^+2\pi^-K^+K^-2\pi^0$	$<$ 1.1	$\times10^{-3}$	90%	5019
$3\pi^+2\pi^-K^-K^0_S\pi^0$	$<$ 7	$\times10^{-4}$	90%	5018
$3\pi^+3\pi^-$	$<$ 7	$\times10^{-5}$	90%	5091
$3\pi^+3\pi^-2\pi^0$	$<$ 1.2	$\times10^{-3}$	90%	5070
$3\pi^+3\pi^-K^+K^-$	$<$ 1.5	$\times10^{-4}$	90%	5017
$3\pi^+3\pi^-K^+K^-\pi^0$	$<$ 7	$\times10^{-4}$	90%	4999
$4\pi^+4\pi^-$	$<$ 1.7	$\times10^{-4}$	90%	5069
$4\pi^+4\pi^-2\pi^0$	$<$ 6	$\times10^{-4}$	90%	5039

$\chi_{b1}(2P)$ [ffbb]

$I^G(J^{PC}) = 0^+(1^{++})$
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)	Scale factor	p (MeV/c)
$\omega\,\Upsilon(1S)$	$(\ 1.63^{+0.40}_{-0.34})$ %		135
$\gamma\,\Upsilon(2S)$	(19.9 ±1.9) %		230
$\gamma\,\Upsilon(1S)$	(9.2 ±0.8) %	1.1	764
$\pi\pi\,\chi_{b1}(1P)$	(9.1 ±1.3) $\times 10^{-3}$		238
$D^0 X$	(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
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	(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

$\chi_{b2}(2P)$ [ffbb]

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

Mass $m = 102686.5 \pm 0.22 \pm 0.50$ MeV
$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)} = 13.5 \pm 0.6$ MeV

$\chi_{b2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\omega\,\Upsilon(1S)$	$(\ 1.10^{+0.34}_{-0.30})$ %		50904
$\gamma\,\Upsilon(2S)$	(10.6 ±2.6) %	S=2.0	50854
$\gamma\,\Upsilon(1S)$	(7.0 ±0.7) %		50907
$\pi\pi\,\chi_{b2}(1P)$	(5.1 ±0.9) $\times 10^{-3}$		50864
$D^0 X$	< 2.4 %	CL=90%	–
$\pi^+\pi^- K^+ K^- \pi^0$	< 1.1 $\times 10^{-4}$	CL=90%	51338
$2\pi^+\pi^- K^- K^0_S$	< 9 $\times 10^{-5}$	CL=90%	51338

$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$<$ 7	$\times 10^{-4}$	CL=90%	51335
$2\pi^+ 2\pi^- 2\pi^0$	(3.9 $\pm$1.6)	$\times 10^{-4}$		51341
$2\pi^+ 2\pi^- K^+ K^-$	(9 $\pm$4)	$\times 10^{-5}$		51337
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	(2.4 $\pm$1.1)	$\times 10^{-4}$		51335
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	(4.7 $\pm$2.3)	$\times 10^{-4}$		51334
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$<$ 4	$\times 10^{-4}$	CL=90%	51333
$3\pi^+ 3\pi^-$	(9 $\pm$4)	$\times 10^{-5}$		51341
$3\pi^+ 3\pi^- 2\pi^0$	(1.2 $\pm$0.4)	$\times 10^{-3}$		51339
$3\pi^+ 3\pi^- K^+ K^-$	(1.4 $\pm$0.7)	$\times 10^{-4}$		51333
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	(4.2 $\pm$1.7)	$\times 10^{-4}$		51332
$4\pi^+ 4\pi^-$	(9 $\pm$5)	$\times 10^{-5}$		51339
$4\pi^+ 4\pi^- 2\pi^0$	(1.3 $\pm$0.5)	$\times 10^{-3}$		51336

$\Upsilon(3S)$

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

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
$\Gamma_{ee} = 0.443 \pm 0.008$ keV

$\Upsilon(3S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\Upsilon(2S)$ anything	(10.6 $\pm$0.8) %		296
$\Upsilon(2S)\pi^+\pi^-$	(2.82$\pm$0.18) %	S=1.6	177
$\Upsilon(2S)\pi^0\pi^0$	(1.85$\pm$0.14) %		190
$\Upsilon(2S)\gamma\gamma$	(5.0 $\pm$0.7) %		327
$\Upsilon(2S)\pi^0$	$<$ 5.1 $\times 10^{-4}$	CL=90%	298
$\Upsilon(1S)\pi^+\pi^-$	(4.37$\pm$0.08) %		813
$\Upsilon(1S)\pi^0\pi^0$	(2.20$\pm$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
$h_b(1P)\pi^0 \rightarrow \gamma\eta_b(1S)\pi^0$	(4.3 $\pm$1.4) $\times 10^{-4}$		–
$h_b(1P)\pi^+\pi^-$	$<$ 1.2 $\times 10^{-4}$	CL=90%	353
$\tau^+\tau^-$	(2.29$\pm$0.30) %		4863
$\mu^+\mu^-$	(2.18$\pm$0.21) %	S=2.1	5177
e^+e^-	seen		5178
ggg	(35.7 $\pm$2.6) %		–
γgg	(9.7 $\pm$1.8) $\times 10^{-3}$		–

Radiative decays

$\gamma\chi_{b2}(2P)$		(13.1 ±1.6) %		S=3.4	†
$\gamma\chi_{b1}(2P)$		(12.6 ±1.2) %		S=2.4	99
$\gamma\chi_{b0}(2P)$		(5.9 ±0.6) %		S=1.4	122
$\gamma\chi_{b2}(1P)$		(9.9 ±1.3) $\times 10^{-3}$		S=2.0	434
$\gamma A^0 \rightarrow$ γhadrons		< 8	$\times 10^{-5}$	CL=90%	–
$\gamma\chi_{b1}(1P)$		(9 ±5) $\times 10^{-4}$		S=1.9	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) $\times 10^{-4}$			913
$\gamma X \rightarrow$ $\gamma + \geq 4$ prongs	[*hhbb*]	< 2.2	$\times 10^{-4}$	CL=95%	–
$\gamma a_1^0 \rightarrow$ $\gamma\mu^+\mu^-$		< 5.5	$\times 10^{-6}$	CL=90%	–
$\gamma a_1^0 \rightarrow$ $\gamma\tau^+\tau^-$	[*iibb*]	< 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

$\chi_b(3P)$

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

Mass $m = 10534 \pm 9$ MeV

$\chi_b(3P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\gamma$	seen	1019
$\Upsilon(2S)\gamma$	seen	498

$\Upsilon(4S)$ or $\Upsilon(10580)$

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

Mass $m = 10579.4 \pm 1.2$ MeV
Full width $\Gamma = 20.5 \pm 2.5$ MeV
$\Gamma_{ee} = 0.272 \pm 0.029$ keV (S = 1.5)

$\Upsilon(4S)$ DECAY MODES	Fraction (Γ_i/Γ)		Confidence level	p (MeV/c)
$B\overline{B}$	> 96	%	95%	327
B^+B^-	(51.3 ±0.6) %			332
D_s^+ anything + c.c.	(17.8 ±2.6) %			–
$B^0\overline{B}^0$	(48.7 ±0.6) %			327
$J/\psi K_S^0(J/\psi,\ \eta_c)K_S^0$	< 4	$\times 10^{-7}$	90%	–
non-$B\overline{B}$	< 4	%	95%	–
e^+e^-	(1.57±0.08)	$\times 10^{-5}$		5290
$\rho^+\rho^-$	< 5.7	$\times 10^{-6}$	90%	5233

$J/\psi(1S)$ anything	< 1.9	$\times 10^{-4}$	95%	–
D^{*+} anything + c.c.	< 7.4	%	90%	5099
ϕ anything	(7.1 ± 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
$\Upsilon(1S)\pi^+\pi^-$	$(8.1 \pm 0.6) \times 10^{-5}$			1026
$\Upsilon(1S)\eta$	$(1.96 \pm 0.28) \times 10^{-4}$			924
$\Upsilon(2S)\pi^+\pi^-$	$(8.6 \pm 1.3) \times 10^{-5}$			468
$h_b(1P)\pi^+\pi^-$	not seen			600
$\overline{d}$ anything	< 1.3	$\times 10^{-5}$	90%	–

$\Upsilon(10860)$

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

Mass $m = 10876 \pm 11$ MeV
Full width $\Gamma = 55 \pm 28$ MeV
$\Gamma_{ee} = 0.31 \pm 0.07$ keV (S = 1.3)

$\Upsilon(10860)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\overline{B}X$	$(75.9 \ ^{+2.7}_{-4.0})$ %		–
$B\overline{B}$	(5.5 ± 1.0) %		1303
$B\overline{B}^* +$ c.c.	(13.7 ± 1.6) %		–
$B^*\overline{B}^*$	(38.1 ± 3.4) %		1102
$B\overline{B}^{(*)}\pi$	< 19.7 %	90%	990
$B\overline{B}\pi$	(0.0 ± 1.2) %		990
$B^*\overline{B}\pi + B\overline{B}^*\pi$	(7.3 ± 2.3) %		–
$B^*\overline{B}^*\pi$	(1.0 ± 1.4) %		701
$B\overline{B}\pi\pi$	< 8.9 %	90%	504
$B_s^{(*)}\overline{B}_s^{(*)}$	(19.9 ± 3.0) %		877
$B_s\overline{B}_s$	$(5 \pm 5) \times 10^{-3}$		877
$B_s\overline{B}_s^* +$ c.c.	(1.34 ± 0.32) %		–
$B_s^*\overline{B}_s^*$	(17.5 ± 2.6) %		495
no open-bottom	$(4.2 \ ^{+5.0}_{-0.6})$ %		–
e^+e^-	$(5.6 \pm 3.1) \times 10^{-6}$		5438
$\Upsilon(1S)\pi^+\pi^-$	$(5.3 \pm 0.6) \times 10^{-3}$		1297
$\Upsilon(2S)\pi^+\pi^-$	$(7.8 \pm 1.3) \times 10^{-3}$		774
$\Upsilon(3S)\pi^+\pi^-$	$(4.8 \ ^{+1.9}_{-1.7}) \times 10^{-3}$		429

$\Upsilon(1S)K^+K^-$	(6.1 $\pm$1.8) $\times 10^{-4}$	947
$h_b(1P)\pi^+\pi^-$	(3.5 $^{+1.0}_{-1.3}$) $\times 10^{-3}$	894
$h_b(2P)\pi^+\pi^-$	(6.0 $^{+2.1}_{-1.8}$) $\times 10^{-3}$	534

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 $m = 11019 \pm 8$ MeV
Full width $\Gamma = 79 \pm 16$ MeV
$\Gamma_{ee} = 0.130 \pm 0.030$ keV

$\Upsilon(11020)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	(1.6$\pm$0.5) $\times 10^{-6}$	5510

NOTES

[a] See the "Note on $\pi^\pm \to \ell^\pm \nu\gamma$ and $K^\pm \to \ell^\pm \nu\gamma$ Form Factors" in the $\pi^\pm$ Particle Listings 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 $[\Gamma(e^+\nu_e) + \Gamma(\mu^+\nu_\mu)]/\Gamma_{\rm total} = 100\%$.

[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}; see the π^0 Particle Listings.

[f] C parity forbids this to occur as a single-photon process.

[g] See the "Note on scalar mesons" in the $f_0(500)$ Particle Listings . The interpretation of this entry as a particle is controversial.

[h] See the "Note on $\rho(770)$" in the $\rho(770)$ Particle Listings .

[i] The $\omega\rho$ interference is then due to $\omega\rho$ mixing only, and is expected to be small. If $e\mu$ universality holds, $\Gamma(\rho^0 \to \mu^+\mu^-) = \Gamma(\rho^0 \to e^+e^-) \times 0.99785$.

[j] See the "Note on scalar mesons" in the $f_0(500)$ Particle Listings .

[k] See the "Note on $a_1(1260)$" in the $a_1(1260)$ Particle Listings in PDG 06, Journal of Physics, G **33** 1 (2006).

[l] This is only an educated guess; the error given is larger than the error on the average of the published values. See the Particle Listings for details.

[n] See the "Note on non-$q\overline{q}$ mesons" in the Particle Listings in PDG 06, Journal of Physics, G **33** 1 (2006).

[o] See the "Note on the $\eta(1405)$" in the $\eta(1405)$ Particle Listings.

[p] See the "Note on the $f_1(1420)$" in the $\eta(1405)$ Particle Listings.

[q] See also the $\omega(1650)$ Particle Listings.

[r] See the "Note on the $\rho(1450)$ and the $\rho(1700)$" in the $\rho(1700)$ Particle Listings.

[s] See also the $\omega(1420)$ Particle Listings.

[t] See the "Note on $f_0(1710)$" in the $f_0(1710)$ Particle Listings in 2004 edition of *Review of Particle Physics*.

[u] See the note in the $K^\pm$ Particle Listings.

[*v*] The definition of the slope parameter g 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):

$$|M|^2 = 1 + g(s_3 - s_0)/m^2_{\pi^+} + \cdots .$$

[*x*] For more details and definitions of parameters see the Particle Listings.

[*y*] See the $K^{\pm}$ Particle Listings for the energy limits used in this measurement.

[*z*] Most of this radiative mode, the low-momentum γ part, is also included in the parent mode listed without γ's.

[*aa*] Structure-dependent part.

[*bb*] Direct-emission branching fraction.

[*cc*] Violates angular-momentum conservation.

[*dd*] 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."

[*ee*] 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 $\mathrm{Re}(\eta_{000}) \simeq 0$.

[*ff*] See the K^0_S Particle Listings for the energy limits used in this measurement.

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

[*hh*] $\mathrm{Re}(\epsilon'/\epsilon) = \epsilon'/\epsilon$ to a very good approximation provided the phases satisfy *CPT* invariance.

[*ii*] This mode includes gammas from inner bremsstrahlung but not the direct emission mode $K_L^0 \to \pi^+\pi^-\gamma$(DE).

[*jj*] See the K_L^0 Particle Listings for the energy limits used in this measurement.

[*kk*] Allowed by higher-order electroweak interactions.

[*ll*] Violates *CP* in leading order. Test of direct *CP* violation since the indirect *CP*-violating and *CP*-conserving contributions are expected to be suppressed.

[*nn*] See the "Note on $f_0(1370)$" in the $f_0(1370)$ Particle Listings and in the 1994 edition.

[*oo*] See the note in the $L(1770)$ Particle Listings in Reviews of Modern Physics **56** S1 (1984), p. S200. See also the "Note on $K_2(1770)$ and the $K_2(1820)$" in the $K_2(1770)$ Particle Listings .

[*pp*] See the "Note on $K_2(1770)$ and the $K_2(1820)$" in the $K_2(1770)$ Particle Listings .

[*qq*] 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.

[*rr*] See the Particle Listings for the (complicated) definition of this quantity.

[*ss*] 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.

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

[*uu*] Submodes of the $D^+ \to K^-2\pi^+\pi^0$ and $K_S^0 2\pi^+\pi^-$ 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.

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

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

[*yy*] This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

[*zz*] In the 2010 *Review*, the values for these quantities were given using a measure of the asymmetry that was inconsistent with the usual definition.

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

[*bbb*] 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.

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

[*ddd*] 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 6.19 ± 0.17 %.

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

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

[*ggg*] 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.

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

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

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

[*kkk*] 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, K^{*0}, or $f_0(980)$ — is 7.0 ± 0.4 %

[*lll*] This fraction includes η from η' decays.

[*nnn*] Two times (to include μ decays) the $\eta'e^+\nu_e$ branching fraction, plus the $\eta'\pi^+$, $\eta'\rho^+$, and $\eta'K^+$ fractions, is (18.6 ± 2.3)%, which considerably exceeds the inclusive η' fraction of (11.7 ± 1.8)%. Our best guess is that the $\eta'\rho^+$ fraction, (12.5 ± 2.2)%, is too large.

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

[*ppp*] 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}.

[*qqq*] 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.

[*rrr*] 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.

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

[*ttt*] An *CP*(±1) indicates the *CP*=+1 and *CP*=−1 eigenstates of the D^0-$\overline{D}^0$ system.

[*uuu*] D denotes D^0 or $\overline{D}^0$.

[*vvv*] D^{*0}_{CP+} decays into $D^0\pi^0$ with the D^0 reconstructed in *CP*-even eigenstates K^+K^- and $\pi^+\pi^-$.

[*xxx*] $\overline{D}^{**}$ represents an excited state with mass $2.2 < \mathrm{M} < 2.8$ GeV/c^2.

[*yyy*] $X(3872)^+$ is a hypothetical charged partner of the $X(3872)$.

[*zzz*] $\Theta(1710)^{++}$ is a possible narrow pentaquark state and $G(2220)$ is a possible glueball resonance.

[*aaaa*] $(\overline{\Lambda}_c^- p)_s$ denotes a low-mass enhancement near 3.35 GeV/c^2.

[*bbaa*] Stands for the possible candidates of $K^*(1410)$, $K_0^*(1430)$ and $K_2^*(1430)$.

[*ccaa*] B^0 and B_s^0 contributions not separated. Limit is on weighted average of the two decay rates.

[*ddaa*] 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.

[*eeaa*] $X(214)$ is a hypothetical particle of mass 214 MeV/c^2 reported by the HyperCP experiment, Physical Review Letters **94** 021801 (2005)

[*ffaa*] $\Theta(1540)^+$ denotes a possible narrow pentaquark state.

[*ggaa*] These values are model dependent.

[*hhaa*] Here "anything" means at least one particle observed.

[*iiaa*] This is a B($B^0 \rightarrow$ $D^{*-}\ell^+\nu_\ell$) value.

[*jjaa*] 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.

[*kkaa*] $D^{(*)}\overline{D}^{(*)}$ stands for the sum of $D^*\overline{D}^*$, $D^*\overline{D}$, $D\overline{D}^*$, and $D\overline{D}$.

[*llaa*] $X(3915)$ denotes a near-threshold enhancement in the $\omega J/\psi$ mass spectrum.

[*nnaa*] Inclusive branching fractions have a multiplicity definition and can be greater than 100%.

[*ooaa*] D_j represents an unresolved mixture of pseudoscalar and tensor D^{**} (P-wave) states.

[*ppaa*] Not a pure measurement. See note at head of B_s^0 Decay Modes.

[*qqaa*] For $E_\gamma > 100$ MeV.

[*rraa*] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$.

[*ssaa*] For a narrow state A with mass less than 960 MeV.

[*ttaa*] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV.

[*uuaa*] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.

[*vvaa*] BHARDWAJ 11 does not observe this decay and presents a stronger 90% CL limit than this value. See measurements listings for details.

[*xxaa*] 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.

[*yyaa*] $2m_\tau < \mathrm{M}(\tau^+\tau^-) < 7500$ MeV

[*zzaa*] $2 < m_{K^+K^-} < 3$ GeV

[*aabb*] X = scalar with $m < 8.0$ GeV

[*bbbb*] $X\overline{X}$ = vectors with $m < 3.1$ GeV

[*ccbb*] X and $\overline{X}$ = zero spin with $m < 4.5$ GeV

[*ddbb*] 1.5 GeV $< m_X <$ 5.0 GeV

[*eebb*] $201 < \mathrm{M}(\mu^+\mu^-) < 3565$ MeV

[*ffbb*] Spectroscopic labeling for these states is theoretical, pending experimental information.

[*ggbb*] 1.5 GeV $< m_X <$ 5.0 GeV

[*hhbb*] 1.5 GeV $< m_X <$ 5.0 GeV

[*iibb*] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV.