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

$\eta_c(1S)$

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

Mass $m = 2983.9 \pm 0.4$ MeV (S = 1.2)

Full width $\Gamma = 32.0 \pm 0.7$ MeV

$\eta_c(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Decays involving hadronic resonances			
$\eta'(958)\pi\pi$	(4.1 $\pm$1.7) %		1323
$\eta'(958)K\overline{K}$	(3.5 $\pm$1.5) %		1131
$\rho\rho$	(1.8 $\pm$0.5) %		1275
$K^*(892)^0 K^-\pi^+ +$ c.c.	(2.0 $\pm$0.7) %		1278
$K^*(892)\overline{K}^*(892)$	(6.9 $\pm$1.3) $\times 10^{-3}$		1196
$K^*(892)^0 \overline{K}^*(892)^0 \pi^+\pi^-$	(1.1 $\pm$0.5) %		1073
$\phi K^+ K^-$	(2.9 $\pm$1.4) $\times 10^{-3}$		1104
$\phi\phi$	(1.74$\pm$0.19) $\times 10^{-3}$		1089
$\phi 2(\pi^+\pi^-)$	< 4 $\times 10^{-3}$	90%	1251
$a_0(980)\pi$	seen		1327
$a_2(1320)\pi$	< 2 %	90%	1196
$K^*(892)\overline{K} +$ c.c.	< 1.28 %	90%	1310
$f_2(1270)\eta$	< 1.1 %	90%	1145
$f_2(1270)\eta'$	seen		984
$\omega\omega$	(2.9 $\pm$0.8) $\times 10^{-3}$		1270
$\omega\phi$	< 2.5 $\times 10^{-4}$	90%	1185
$f_2(1270) f_2(1270)$	(9.8 $\pm$2.5) $\times 10^{-3}$		774
$f_2(1270) f'_2(1525)$	(9.5 $\pm$3.2) $\times 10^{-3}$		524
$f_0(500)\eta$	seen		–
$f_0(500)\eta'$	seen		–
$f_0(980)\eta$	seen		1264
$f_0(980)\eta'$	seen		1130
$f_0(1500)\eta$	seen		1025
$f_0(1710)\eta'$	seen		653
$f_0(2100)\eta'$	seen		†
$f_0(2200)\eta$	seen		498
$a_0(1320)\pi$	seen		–
$a_0(1450)\pi$	seen		1123
$a_0(1700)\pi$	seen		–
$a_0(1950)\pi$	seen		860

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

Decays into stable hadrons

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

Radiative decays

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

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

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

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

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

J/ψ(1S) DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	$(87.7 \pm 0.5\ )\%$		−
virtual $\gamma \to$ hadrons	$(13.50 \pm 0.30\ )\%$		−
$g\,g\,g$	$(64.1 \pm 1.0\ )\%$		−
$\gamma\,g\,g$	$(8.8 \pm 1.1\ )\%$		−
$e^+ e^-$	$(5.971 \pm 0.032)\%$		1548
$e^+ e^- \gamma$	[a] $(8.8 \pm 1.4\ )\times 10^{-3}$		1548
$\mu^+ \mu^-$	$(5.961 \pm 0.033)\%$		1545

Decays involving hadronic resonances

$\rho\pi$	$(1.69 \pm 0.15\ )\%$	S=2.4	1448
$\rho^0\pi^0$	$(5.6 \pm 0.7\ )\times 10^{-3}$		1448
$a_2(1320)\rho$	$(1.09 \pm 0.22\ )\%$		1123
$\eta\pi^+\pi^-$	$(3.8 \pm 0.7\ )\times 10^{-4}$		1487
$\eta\pi^+\pi^-\pi^0$	$(1.17 \pm 0.20\ )\%$		1470
$\eta\pi^+\pi^-3\pi^0$	$(4.9 \pm 1.0\ )\times 10^{-3}$		1419
$\eta\rho$	$(1.93 \pm 0.23\ )\times 10^{-4}$		1396
$\eta\phi(2170) \to \eta\phi f_0(980) \to \eta\phi\pi^+\pi^-$	$(1.2 \pm 0.4\ )\times 10^{-4}$		628
$\eta\phi(2170) \to \eta K^*(892)^0 \overline{K}^*(892)^0$	$< 2.52 \times 10^{-4}$	CL=90%	−
$\eta K^\pm K^0_S \pi^\mp$	[b] $(2.2 \pm 0.4\ )\times 10^{-3}$		1278
$\eta K^*(892)^0 \overline{K}^*(892)^0$	$(1.15 \pm 0.26\ )\times 10^{-3}$		1003
$\rho\eta'(958)$	$(8.1 \pm 0.8\ )\times 10^{-5}$	S=1.6	1281
$\rho^\pm\pi^\mp\pi^+\pi^-2\pi^0$	$(2.8 \pm 0.8\ )\%$		1364
$\rho^+\rho^-\pi^+\pi^-\pi^0$	$(6 \pm 4\ )\times 10^{-3}$		1186
$\rho^\mp K^\pm K^0_S$	$(1.9 \pm 0.4\ )\times 10^{-3}$		1269
$\rho(1450)\pi \to \pi^+\pi^-\pi^0$	$(2.3 \pm 0.7\ )\times 10^{-3}$		−
$\rho(1450)^\pm\pi^\mp \to K^0_S K^\pm\pi^\mp$	$(3.5 \pm 0.6\ )\times 10^{-4}$		−
$\rho(1450)^0\pi^0 \to K^+K^-\pi^0$	$(2.7 \pm 0.6\ )\times 10^{-4}$		−
$\rho(1450)\eta'(958) \to \pi^+\pi^-\eta'(958)$	$(3.3 \pm 0.7\ )\times 10^{-6}$		−
$\rho(1700)\pi \to \pi^+\pi^-\pi^0$	$(1.7 \pm 1.1\ )\times 10^{-4}$		−
$\rho(2150)\pi \to \pi^+\pi^-\pi^0$	$(8 \pm 40\ )\times 10^{-6}$		−
$\omega\pi^0$	$(4.5 \pm 0.5\ )\times 10^{-4}$	S=1.4	1446
$\omega\pi^0 \to \pi^+\pi^-\pi^0$	$(1.7 \pm 0.8\ )\times 10^{-5}$		−
$\omega\pi^+\pi^-$	$(7.2 \pm 1.0\ )\times 10^{-3}$		1435
$\omega\pi^0\pi^0$	$(3.4 \pm 0.8\ )\times 10^{-3}$		1436
$\omega3\pi^0$	$(1.9 \pm 0.6\ )\times 10^{-3}$		1419
$\omega f_2(1270)$	$(4.3 \pm 0.6\ )\times 10^{-3}$		1142
$\omega\eta$	$(1.74 \pm 0.20\ )\times 10^{-3}$	S=1.6	1394
$\omega\pi^+\pi^-\pi^0$	$(4.0 \pm 0.7\ )\times 10^{-3}$		1418
$\omega\pi^0\eta$	$(3.4 \pm 1.7\ )\times 10^{-4}$		1363

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

$K^*(1410)\overline{K}+$ c.c. $\rightarrow$ $K_S^0 K^\pm \pi^\mp$	$(\ 8\ \pm\ 6\ )\times 10^{-5}$		–
$K_2^*(1430)\overline{K}+$c.c. $\rightarrow$ $K^\pm K^\mp \pi^0$	$(\ 1.0\ \pm\ 0.5\ )\times 10^{-4}$		–
$K_2^*(1430)\overline{K}+$ c.c. $\rightarrow$ $K_S^0 K^\pm \pi^\mp$	$(\ 4.0\ \pm\ 1.0\ )\times 10^{-4}$		–
$\overline{K}_2^*(1430)K+$ c.c.	$<\ 4.0\ \times 10^{-3}$	CL=90%	1158
$K_2^*(1430)^+ K^- +$ c.c. $\rightarrow$ $K^+ K^- \pi^0$	$(\ 2.69\ {}^{+\ 0.25}_{-\ 0.19}\ )\times 10^{-4}$		–
$K_2^*(1430)^+ K_S^0 \pi^- +$ c.c.	$(\ 3.6\ \pm\ 1.8\ )\times 10^{-3}$		1116
$\overline{K}_2^*(1430)^0 K^*(892)^0 +$ c.c.	$(\ 4.67\ \pm\ 0.29\ )\times 10^{-3}$		1011
$K_2^*(1430)^- K^*(892)^+ +$ c.c.	$(\ 3.4\ \pm\ 2.9\ )\times 10^{-3}$		1011
$K_2^*(1430)^- K^*(892)^+ +$ c.c. $\rightarrow$ $K^*(892)^+ K_S^0 \pi^- +$ c.c.	$(\ 4\ \pm\ 4\ )\times 10^{-4}$		–
$K_2^*(1430)^0 \overline{K}_2^*(1430)^0$	$<\ 2.9\ \times 10^{-3}$	CL=90%	601
$\overline{K}_2(1770)^0 K^*(892)^0 +$ c.c. $\rightarrow$ $K^*(892)^0 K^- \pi^+ +$ c.c.	$(\ 6.9\ \pm\ 0.9\ )\times 10^{-4}$		–
$K_2^*(1980)^+ K^- +$ c.c. $\rightarrow$ $K^+ K^- \pi^0$	$(\ 1.10\ {}^{+\ 0.60}_{-\ 0.14}\ )\times 10^{-5}$		–
$K_4^*(2045)^+ K^- +$ c.c. $\rightarrow$ $K^+ K^- \pi^0$	$(\ 6.2\ {}^{+\ 2.9}_{-\ 1.6}\ )\times 10^{-6}$		–
$K_1(1270)^\pm K^\mp$	$<\ 3.0\ \times 10^{-3}$	CL=90%	1240
$K_1(1270)K_S^0 \rightarrow\ \gamma K_S^0 K_S^0$	$(\ 8.5\ \pm\ 2.5\ )\times 10^{-7}$		–
$a_2(1320)^\pm \pi^\mp$	[b] $<\ 4.3\ \times 10^{-3}$	CL=90%	1263
$\phi \pi^0$	3×10^{-6} or 1×10^{-7}		1377
$\phi \pi^+ \pi^-$	$(\ 9.4\ \pm\ 1.5\ )\times 10^{-4}$	S=1.7	1365
$\phi \pi^0 \pi^0$	$(\ 5.0\ \pm\ 1.0\ )\times 10^{-4}$		1366
$\phi 2(\pi^+ \pi^-)$	$(\ 1.60\ \pm\ 0.32\ )\times 10^{-3}$		1318
$\phi \eta$	$(\ 7.4\ \pm\ 0.8\ )\times 10^{-4}$	S=1.5	1320
$\phi \eta'(958)$	$(\ 4.6\ \pm\ 0.5\ )\times 10^{-4}$	S=2.2	1192
$\phi \eta \eta'$	$(\ 2.32\ \pm\ 0.17\ )\times 10^{-4}$		885
$\phi f_0(980)$	$(\ 3.2\ \pm\ 0.9\ )\times 10^{-4}$	S=1.9	1178
$\phi f_0(980) \rightarrow\ \phi \pi^+ \pi^-$	$(\ 2.60\ \pm\ 0.34\ )\times 10^{-4}$		–
$\phi f_0(980) \rightarrow\ \phi \pi^0 \pi^0$	$(\ 1.8\ \pm\ 0.5\ )\times 10^{-4}$		–
$\phi \pi^0 f_0(980) \rightarrow\ \phi \pi^0 \pi^+ \pi^-$	$(\ 4.5\ \pm\ 1.0\ )\times 10^{-6}$		–
$\phi \pi^0 f_0(980) \rightarrow\ \phi \pi^0 p^0 \pi^0$	$(\ 1.7\ \pm\ 0.6\ )\times 10^{-6}$		1045
$\phi f_0(980)\eta \rightarrow\ \eta \phi \pi^+ \pi^-$	$(\ 3.2\ \pm\ 1.0\ )\times 10^{-4}$		–
$\phi a_0(980)^0 \rightarrow\ \phi \eta \pi^0$	$(\ 4.4\ \pm\ 1.4\ )\times 10^{-6}$		–
$\phi f_2(1270)$	$(\ 3.2\ \pm\ 0.6\ )\times 10^{-4}$		1036
$\phi f_1(1285)$	$(\ 2.6\ \pm\ 0.5\ )\times 10^{-4}$		1032

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

Decays into stable hadrons

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

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

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

Radiative decays

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

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

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

Dalitz decays

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

Weak decays

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

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

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

Other decays

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

$\chi_{c0}(1P)$ $I^G(J^{PC}) = 0^+(0^{++})$

Mass $m = 3414.71 \pm 0.30$ MeV

Full width $\Gamma = 10.8 \pm 0.6$ MeV

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

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

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

Radiative decays

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

$\gamma\omega$	< 8	$\times 10^{-6}$	CL=90%	1618
$\gamma\phi$	< 6	$\times 10^{-6}$	CL=90%	1555
$\gamma\gamma$	$(2.04\pm0.09) \times 10^{-4}$			1707
$e^+ e^- J/\psi(1S)$	$(1.33\pm0.29) \times 10^{-4}$			303
$\mu^+ \mu^- J/\psi(1S)$	< 1.9	$\times 10^{-5}$	CL=90%	226

$\chi_{c1}(1P)$ $\qquad\qquad\qquad I^G(J^{PC}) = 0^+(1^{++})$

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

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$3(\pi^+ \pi^-)$	$(5.8 \pm 1.4) \times 10^{-3}$	S=1.2	1683
$2(\pi^+ \pi^-)$	$(7.6 \pm 2.6) \times 10^{-3}$		1728
$\pi^+ \pi^- \pi^0 \pi^0$	$(1.19\pm0.15) \%$		1729
$\rho^+ \pi^- \pi^0 +$ c.c.	$(1.45\pm0.24) \%$		1658
$\rho^0 \pi^+ \pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$		1657
$4\pi^0$	$(5.4 \pm 0.8) \times 10^{-4}$		1729
$\pi^+ \pi^- K^+ K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		1632
$K^+ K^- \pi^0 \pi^0$	$(1.12\pm0.27) \times 10^{-3}$		1634
$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.15\pm0.13) \%$		1598
$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	$(7.5 \pm 0.8) \times 10^{-3}$		1596
$K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	$(8.6 \pm 1.4) \times 10^{-3}$		1632
$\rho^- K^+ \overline{K}^0 +$ c.c.	$(5.0 \pm 1.2) \times 10^{-3}$		1514
$K^*(892)^0 \overline{K}^0 \pi^0 \to$ $\quad K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	$(2.3 \pm 0.6) \times 10^{-3}$		–
$K^+ K^- \eta \pi^0$	$(1.12\pm0.34) \times 10^{-3}$		1523
$\pi^+ \pi^- K_S^0 K_S^0$	$(6.9 \pm 2.9) \times 10^{-4}$		1630
$K^+ K^- \eta$	$(3.2 \pm 1.0) \times 10^{-4}$		1566
$\overline{K}^0 K^+ \pi^- +$ c.c.	$(7.0 \pm 0.6) \times 10^{-3}$		1661
$K^*(892)^0 \overline{K}^0 +$ c.c.	$(10 \quad \pm 4 \quad) \times 10^{-4}$		1602
$K^*(892)^+ K^- +$ c.c.	$(1.4 \pm 0.6) \times 10^{-3}$		1602
$K_J^*(1430)^0 \overline{K}^0 +$ c.c. $\to$ $\quad K_S^0 K^+ \pi^- +$ c.c.	$< 8 \qquad \times 10^{-4}$	CL=90%	–
$K_J^*(1430)^+ K^- +$ c.c. $\to$ $\quad K_S^0 K^+ \pi^- +$ c.c.	$< 2.1 \qquad \times 10^{-3}$	CL=90%	–
$K^+ K^- \pi^0$	$(1.81\pm0.24) \times 10^{-3}$		1662
$\eta \pi^+ \pi^-$	$(4.62\pm0.23) \times 10^{-3}$		1701
$a_0(980)^+ \pi^- +$ c.c. $\to \eta\pi^+\pi^-$	$(3.2 \pm 0.4) \times 10^{-3}$	S=2.2	–
$a_2(1320)^+ \pi^- +$ c.c. $\to \eta\pi^+\pi^-$	$(1.76\pm0.24) \times 10^{-4}$		–
$a_2(1700)^+ \pi^- +$ c.c. $\to \eta\pi^+\pi^-$	$(4.6 \pm 0.7) \times 10^{-5}$		–

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

$\overline{p}n\pi^+\pi^0$	$(1.01\pm0.12)\times10^{-3}$		1383
$\Lambda\overline{\Lambda}$	$(1.27\pm0.08)\times10^{-4}$		1355
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.9\pm0.5)\times10^{-4}$		1223
$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(2.5\pm0.6)\times10^{-4}$		1223
$\Sigma(1385)^+\overline{\Lambda}\pi^- +$ c.c.	$< 1.3 \times10^{-4}$	CL=90%	1157
$\Sigma(1385)^-\overline{\Lambda}\pi^+ +$ c.c.	$< 1.3 \times10^{-4}$	CL=90%	1157
$K^+\overline{p}\Lambda+$c.c.	$(4.2\pm0.4)\times10^{-4}$	S=1.2	1203
$nK_S^0\overline{\Lambda} +$ c.c.	$(1.66\pm0.17)\times10^{-4}$		1200
$K^*(892)^+\overline{p}\Lambda+$ c.c.	$(4.9\pm0.7)\times10^{-4}$		935
$K^+\overline{p}\Lambda(1520)+$ c.c.	$(1.7\pm0.4)\times10^{-4}$		951
$\Lambda(1520)\overline{\Lambda}(1520)$	$< 9 \times10^{-5}$	CL=90%	880
$\Sigma^0\overline{\Sigma}^0$	$(4.2\pm0.6)\times10^{-5}$		1288
$\Sigma^+\overline{p}K_S^0 +$ c.c.	$(1.53\pm0.12)\times10^{-4}$		1163
$\Sigma^0\overline{p}K^+ +$ c.c.	$(1.46\pm0.10)\times10^{-4}$		1163
$\Sigma^+\overline{\Sigma}^-$	$(3.6\pm0.7)\times10^{-5}$		1291
$\Sigma^-\overline{\Sigma}^+$	$(5.7\pm1.5)\times10^{-5}$		1283
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$< 9 \times10^{-5}$	CL=90%	1081
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$< 5 \times10^{-5}$	CL=90%	1081
$K^-\Lambda\overline{\Xi}^+ +$ c.c.	$(1.35\pm0.24)\times10^{-4}$		963
$\Xi^0\overline{\Xi}^0$	$< 6 \times10^{-5}$	CL=90%	1163
$\Xi^-\overline{\Xi}^+$	$(8.0\pm2.1)\times10^{-5}$		1155
$\pi^+\pi^- + K^+K^-$	$< 2.1 \times10^{-3}$		–
$K_S^0K_S^0$	$< 6 \times10^{-5}$	CL=90%	1683
$\eta_c\pi^+\pi^-$	$< 3.2 \times10^{-3}$	CL=90%	413

Radiative decays

$\gamma J/\psi(1S)$	$(34.3\pm1.0)\%$		389
$\gamma\rho^0$	$(2.16\pm0.17)\times10^{-4}$		1670
$\gamma\omega$	$(6.8\pm0.8)\times10^{-5}$		1668
$\gamma\phi$	$(2.4\pm0.5)\times10^{-5}$		1607
$\gamma\gamma$	$< 6.3 \times10^{-6}$	CL=90%	1755
$e^+e^- J/\psi(1S)$	$(3.46\pm0.22)\times10^{-3}$		389
$\mu^+\mu^- J/\psi(1S)$	$(2.33\pm0.29)\times10^{-4}$		335

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

Mass $m = 3525.38 \pm 0.11$ MeV
Full width $\Gamma = 0.7 \pm 0.4$ MeV

$h_c(1P)$ DECAY MODES	Fraction (Γ_i/Γ)		Confidence level	p (MeV/c)
$J/\psi(1S)\pi\pi$	not seen			312
$J/\psi(1S)\pi^+\pi^-$	< 2.3	$\times10^{-3}$	90%	305
$p\overline{p}$	< 1.5	$\times10^{-4}$	90%	1492

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

Radiative decays

$\gamma\eta$	$(\ 4.7\pm2.1)\times10^{-4}$		1720
$\gamma\eta'(958)$	$(\ 1.5\pm0.4)\times10^{-3}$		1633
$\gamma\eta_c(1S)$	$(50\ \pm9\ )\%$		500

$\chi_{c2}(1P)$

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

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

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	$(\ 1.02\pm0.09)\%$		1751
$\pi^+\pi^-\pi^0\pi^0$	$(\ 1.83\pm0.23)\%$		1752
$\rho^+\pi^-\pi^0 +$ c.c.	$(\ 2.19\pm0.34)\%$		1682
$4\pi^0$	$(\ 1.11\pm0.15)\times10^{-3}$		1752
$K^+K^-\pi^0\pi^0$	$(\ 2.1\ \pm0.4\ )\times10^{-3}$		1658
$K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	$(\ 1.38\pm0.20)\%$		1657
$\rho^-K^+\overline{K}^0 +$ c.c.	$(\ 4.1\ \pm1.2\ )\times10^{-3}$		1540
$K^*(892)^0 K^-\pi^+ \to$ $K^-\pi^+K^0\pi^0 +$ c.c.	$(\ 2.9\ \pm0.8\ )\times10^{-3}$		−
$K^*(892)^0\overline{K}^0\pi^0 \to$ $K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	$(\ 3.8\ \pm0.9\ )\times10^{-3}$		−
$K^*(892)^- K^+\pi^0 \to$ $K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	$(\ 3.7\ \pm0.8\ )\times10^{-3}$		−
$K^*(892)^+\overline{K}^0\pi^- \to$ $K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	$(\ 2.9\ \pm0.8\ )\times10^{-3}$		−

$K^+ K^- \eta \pi^0$	$(1.3 \pm 0.4) \times 10^{-3}$		1549
$K^+ K^- \pi^+ \pi^-$	$(8.4 \pm 0.9) \times 10^{-3}$		1656
$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.17 \pm 0.13)\%$		1623
$K^0_S K^\pm \pi^\mp \pi^+ \pi^-$	$(7.3 \pm 0.8) \times 10^{-3}$		1621
$K^+ \overline{K}{}^*(892)^0 \pi^- +$ c.c.	$(2.1 \pm 1.1) \times 10^{-3}$		1602
$K^*(892)^0 \overline{K}{}^*(892)^0$	$(2.3 \pm 0.4) \times 10^{-3}$		1538
$3(\pi^+ \pi^-)$	$(8.6 \pm 1.8) \times 10^{-3}$		1707
$\phi \phi$	$(1.06 \pm 0.09) \times 10^{-3}$		1457
$\phi \phi \eta$	$(5.3 \pm 0.6) \times 10^{-4}$		1206
$\omega \omega$	$(8.4 \pm 1.0) \times 10^{-4}$		1597
$\omega K^+ K^-$	$(7.3 \pm 0.9) \times 10^{-4}$		1540
$\omega \phi$	$(9.6 \pm 2.7) \times 10^{-6}$		1529
$\pi \pi$	$(2.23 \pm 0.09) \times 10^{-3}$		1773
$\rho^0 \pi^+ \pi^-$	$(3.7 \pm 1.6) \times 10^{-3}$		1682
$\pi^+ \pi^- \pi^0$ (non-resonant)	$(2.0 \pm 0.4) \times 10^{-5}$		1765
$\rho(770)^\pm \pi^\mp$	$(6 \pm 4) \times 10^{-6}$		–
$\pi^+ \pi^- \eta$	$(4.8 \pm 1.3) \times 10^{-4}$		1724
$\pi^+ \pi^- \eta'$	$(5.0 \pm 1.8) \times 10^{-4}$		1636
$\eta \eta$	$(5.4 \pm 0.4) \times 10^{-4}$		1692
$K^+ K^-$	$(1.01 \pm 0.06) \times 10^{-3}$		1708
$K^0_S K^0_S$	$(5.2 \pm 0.4) \times 10^{-4}$		1707
$K^*(892)^\pm K^\mp$	$(1.44 \pm 0.21) \times 10^{-4}$		1627
$K^*(892)^0 \overline{K}{}^0 +$ c.c.	$(1.24 \pm 0.27) \times 10^{-4}$		1627
$K^*_2(1430)^\pm K^\mp$	$(1.48 \pm 0.12) \times 10^{-3}$		–
$K^*_2(1430)^0 \overline{K}{}^0 +$ c.c.	$(1.24 \pm 0.17) \times 10^{-3}$		1443
$K^*_3(1780)^\pm K^\mp$	$(5.2 \pm 0.8) \times 10^{-4}$		–
$K^*_3(1780)^0 \overline{K}{}^0 +$ c.c.	$(5.6 \pm 2.1) \times 10^{-4}$		1274
$a_2(1320)^0 \pi^0$	$(1.29 \pm 0.34) \times 10^{-3}$		–
$a_2(1320)^\pm \pi^\mp$	$(1.8 \pm 0.6) \times 10^{-3}$		1530
$\overline{K}{}^0 K^+ \pi^- +$ c.c.	$(1.28 \pm 0.18) \times 10^{-3}$		1685
$K^+ K^- \pi^0$	$(3.0 \pm 0.8) \times 10^{-4}$		1686
$K^+ K^- \eta$	$< 3.2 \times 10^{-4}$	90%	1592
$K^+ K^- \eta'(958)$	$(1.94 \pm 0.34) \times 10^{-4}$		1488
$\eta \eta'$	$(2.2 \pm 0.5) \times 10^{-5}$		1600
$\eta' \eta'$	$(4.6 \pm 0.6) \times 10^{-5}$		1498
$\pi^+ \pi^- K^0_S K^0_S$	$(2.2 \pm 0.5) \times 10^{-3}$		1655
$K^+ K^- K^0_S K^0_S$	$< 4 \times 10^{-4}$	90%	1418
$K^0_S K^0_S K^0_S K^0_S$	$(1.13 \pm 0.18) \times 10^{-4}$		1415
$K^+ K^- K^+ K^-$	$(1.65 \pm 0.20) \times 10^{-3}$		1421
$K^+ K^- \phi$	$(1.42 \pm 0.29) \times 10^{-3}$		1468
$\overline{K}{}^0 K^+ \pi^- \phi +$ c.c.	$(4.8 \pm 0.7) \times 10^{-3}$		1416
$K^+ K^- \pi^0 \phi$	$(2.7 \pm 0.5) \times 10^{-3}$		1419
$\phi \pi^+ \pi^- \pi^0$	$(9.3 \pm 1.2) \times 10^{-4}$		1603

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

Radiative decays

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

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

$\boxed{\eta_c(2S)}$ $\qquad\qquad I^G(J^{PC}) = 0^+(0^{-+})$

Quantum numbers are quark model predictions.

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

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

$\boxed{\psi(2S)}$ $\qquad\qquad I^G(J^{PC}) = 0^-(1^{--})$

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

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

light hadrons	$(15.4 \quad \pm 1.5 \quad)\,\%$	$-$
K_S^0 anything	$(16.0 \quad \pm 1.1 \quad)\,\%$	$-$
$e^+ e^-$	$(\,7.93 \quad \pm 0.17\,) \times 10^{-3}$	1843
$\mu^+ \mu^-$	$(\,8.0 \quad \pm 0.6 \quad) \times 10^{-3}$	1840
$\tau^+ \tau^-$	$(\,3.1 \quad \pm 0.4 \quad) \times 10^{-3}$	489

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

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

Hadronic decays

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

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

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

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

Radiative decays

$\gamma\chi_{c0}(1P)$	(9.79 $\pm$0.20) %	261
$\gamma\chi_{c1}(1P)$	(9.75 $\pm$0.24) %	171
$\gamma\chi_{c2}(1P)$	(9.52 $\pm$0.20) %	128

$\gamma\eta_c(1S)$	$(\ 3.4\ \pm 0.5\ )\times 10^{-3}$	S=1.3	635
$\gamma\eta_c(2S)$	$(\ 7\ \pm 5\ )\times 10^{-4}$		48
$\gamma\pi^0$	$(\ 1.04\ \pm 0.22\ )\times 10^{-6}$	S=1.4	1841
$\gamma 2(\pi^+\pi^-)$	$(\ 4.0\ \pm 0.6\ )\times 10^{-4}$		1817
$\gamma 3(\pi^+\pi^-)$	$<\ 1.7\ \times 10^{-4}$	CL=90%	1774
$\gamma\eta'(958)$	$(\ 1.24\ \pm 0.04\ )\times 10^{-4}$		1719
$\gamma f_2(1270)$	$(\ 2.73\ ^{+0.29}_{-0.25}\ )\times 10^{-4}$	S=1.8	1622
$\gamma f_0(1370)\to\ \gamma K\overline{K}$	$(\ 3.1\ \pm 1.7\ )\times 10^{-5}$		1588
$\gamma f_0(1500)$	$(\ 9.3\ \pm 1.9\ )\times 10^{-5}$		1535
$\gamma f_2'(1525)$	$(\ 3.3\ \pm 0.8\ )\times 10^{-5}$		1531
$\gamma f_0(1710)\to\ \gamma\pi\pi$	$(\ 3.5\ \pm 0.6\ )\times 10^{-5}$		–
$\gamma f_0(1710)\to\ \gamma K\overline{K}$	$(\ 6.6\ \pm 0.7\ )\times 10^{-5}$		–
$\gamma f_0(2100)\to\ \gamma\pi\pi$	$(\ 4.8\ \pm 1.0\ )\times 10^{-6}$		1244
$\gamma f_0(2200)\to\ \gamma K\overline{K}$	$(\ 3.2\ \pm 1.0\ )\times 10^{-6}$		1193
$\gamma f_J(2220)\to\ \gamma\pi\pi$	$<\ 5.8\ \times 10^{-6}$	CL=90%	1168
$\gamma f_J(2220)\to\ \gamma K\overline{K}$	$<\ 9.5\ \times 10^{-6}$	CL=90%	1168
$\gamma\eta$	$(\ 9.2\ \pm 1.8\ )\times 10^{-7}$		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
$\gamma\eta(1405)\to\ \gamma\eta\pi^+\pi^-$	$(\ 3.6\ \pm 2.5\ )\times 10^{-5}$		–
$\gamma\eta(1405)\to\ \gamma f_0(980)\pi^0\to$ $\gamma\pi^+\pi^-\pi^0$	$<\ 5.0\ \times 10^{-7}$	CL=90%	–
$\gamma\eta(1475)\to\ \gamma K\overline{K}\pi$	$<\ 1.4\ \times 10^{-4}$	CL=90%	–
$\gamma\eta(1475)\to\ \gamma\eta\pi^+\pi^-$	$<\ 8.8\ \times 10^{-5}$	CL=90%	–
$\gamma K^{*0}K^+\pi^- +$ c.c.	$(\ 3.7\ \pm 0.9\ )\times 10^{-4}$		1674
$\gamma K^{*0}\overline{K}^{*0}$	$(\ 2.4\ \pm 0.7\ )\times 10^{-4}$		1613
$\gamma K_S^0 K^+\pi^- +$ 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
$\gamma K^+K^- 2(\pi^+\pi^-)$	$<\ 2.2\ \times 10^{-4}$	CL=90%	1654
$\gamma 2(K^+K^-)$	$<\ 4\ \times 10^{-5}$	CL=90%	1499
$\gamma p\overline{p}$	$(\ 3.9\ \pm 0.5\ )\times 10^{-5}$	S=2.0	1586
$\gamma f_2(1950)\to\ \gamma p\overline{p}$	$(\ 1.20\ \pm 0.22\ )\times 10^{-5}$		–
$\gamma f_2(2150)\to\ \gamma p\overline{p}$	$(\ 7.2\ \pm 1.8\ )\times 10^{-6}$		–
$\gamma X(1835)\to\ \gamma p\overline{p}$	$(\ 4.6\ ^{+1.8}_{-4.0}\ )\times 10^{-6}$		–
$\gamma X\to\ \gamma p\overline{p}$	[h] $<\ 2\ \times 10^{-6}$	CL=90%	–
$\gamma p\overline{p}\pi^+\pi^-$	$(\ 2.8\ \pm 1.4\ )\times 10^{-5}$		1491
$\gamma\gamma$	$<\ 1.5\ \times 10^{-4}$	CL=90%	1843
$\gamma\gamma J/\psi$	$(\ 3.1\ ^{+1.0}_{-1.2}\ )\times 10^{-4}$		542
$e^+e^-\eta'$	$(\ 1.90\ \pm 0.26\ )\times 10^{-6}$		1719
$e^+e^-\chi_{c0}(1P)$	$(\ 1.06\ \pm 0.24\ )\times 10^{-3}$		261
$e^+e^-\chi_{c1}(1P)$	$(\ 8.5\ \pm 0.6\ )\times 10^{-4}$		171
$e^+e^-\chi_{c2}(1P)$	$(\ 7.0\ \pm 0.8\ )\times 10^{-4}$		128

Weak decays

$D^0 e^+ e^-$ + c.c.	< 1.4	$\times 10^{-7}$ CL=90%	1371

Other decays

invisible	< 1.6	%	CL=90%	–

$\psi(3770)$

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

Mass $m = 3773.7 \pm 0.4$ MeV   (S = 1.4)

Full width $\Gamma = 27.2 \pm 1.0$ MeV

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D\overline{D}$	$(93\ ^{+8}_{-9}\ )\%$	S=2.0	287
$D^0\overline{D}^0$	$(52\ ^{+4}_{-5}\ )\%$	S=2.0	287
$D^+ D^-$	$(41\ \pm 4\ )\%$	S=2.0	254
$J/\psi X$	$(\ 5.0\ \pm 2.2\ )\times 10^{-3}$		–
$J/\psi \pi^+ \pi^-$	$(\ 1.93 \pm 0.28)\times 10^{-3}$		561
$J/\psi \pi^0 \pi^0$	$(\ 8.0\ \pm 3.0\ )\times 10^{-4}$		565
$J/\psi \eta$	$(\ 9\ \pm 4\ )\times 10^{-4}$		361
$J/\psi \pi^0$	< 2.8 $\times 10^{-4}$	CL=90%	604
$e^+ e^-$	$(\ 9.6\ \pm 0.7\ )\times 10^{-6}$	S=1.3	1887

Decays to light hadrons

$b_1(1235)\pi$	< 1.4	$\times 10^{-5}$	CL=90%	1684
$\phi\eta'$	< 7	$\times 10^{-4}$	CL=90%	1607
$\omega\eta'$	< 4	$\times 10^{-4}$	CL=90%	1672
$\rho^0\eta'$	< 6	$\times 10^{-4}$	CL=90%	1674
$\phi\eta$	$(\ 3.1\ \pm 0.7\ )\times 10^{-4}$		1703
$\omega\eta$	< 1.4	$\times 10^{-5}$	CL=90%	1762
$\rho^0\eta$	< 5	$\times 10^{-4}$	CL=90%	1764
$\phi\pi^0$	< 3	$\times 10^{-5}$	CL=90%	1746
$\omega\pi^0$	< 6	$\times 10^{-4}$	CL=90%	1803
$\pi^+ \pi^- \pi^0$	< 5	$\times 10^{-6}$	CL=90%	1874
$\rho\pi$	< 5	$\times 10^{-6}$	CL=90%	1805
$K^*(892)^+ K^-$ + c.c.	< 1.4	$\times 10^{-5}$	CL=90%	1745
$K^*(892)^0 \overline{K}^0$ + c.c.	< 1.2	$\times 10^{-3}$	CL=90%	1745
$K^0_S K^0_L$	< 1.2	$\times 10^{-5}$	CL=90%	1820
$2(\pi^+ \pi^-)$	< 1.12	$\times 10^{-3}$	CL=90%	1861
$2(\pi^+ \pi^-)\pi^0$	< 1.06	$\times 10^{-3}$	CL=90%	1844
$2(\pi^+ \pi^- \pi^0)$	< 5.85	%	CL=90%	1821
$\omega\pi^+ \pi^-$	< 6.0	$\times 10^{-4}$	CL=90%	1794
$3(\pi^+ \pi^-)$	< 9.1	$\times 10^{-3}$	CL=90%	1820
$3(\pi^+ \pi^-)\pi^0$	< 1.37	%	CL=90%	1792

$3(\pi^+\pi^-)2\pi^0$	< 11.74	%	CL=90%	1760
$\eta\pi^+\pi^-$	< 1.24	$\times 10^{-3}$	CL=90%	1836
$\pi^+\pi^- 2\pi^0$	< 8.9	$\times 10^{-3}$	CL=90%	1862
$\rho^0\pi^+\pi^-$	< 6.9	$\times 10^{-3}$	CL=90%	1796
$\eta 3\pi$	< 1.34	$\times 10^{-3}$	CL=90%	1824
$\eta 2(\pi^+\pi^-)$	< 2.43	%	CL=90%	1804
$\eta\rho^0\pi^+\pi^-$	< 1.45	%	CL=90%	1708
$\eta' 3\pi$	< 2.44	$\times 10^{-3}$	CL=90%	1741
$K^+K^-\pi^+\pi^-$	< 9.0	$\times 10^{-4}$	CL=90%	1773
$\phi\pi^+\pi^-$	< 4.1	$\times 10^{-4}$	CL=90%	1737
$K^+K^- 2\pi^0$	< 4.2	$\times 10^{-3}$	CL=90%	1774
$4(\pi^+\pi^-)$	< 1.67	%	CL=90%	1757
$4(\pi^+\pi^-)\pi^0$	< 3.06	%	CL=90%	1720
$\phi f_0(980)$	< 4.5	$\times 10^{-4}$	CL=90%	1597
$K^+K^-\pi^+\pi^-\pi^0$	< 2.36	$\times 10^{-3}$	CL=90%	1741
$K^+K^-\rho^0\pi^0$	< 8	$\times 10^{-4}$	CL=90%	1624
$K^+K^-\rho^+\pi^-$	< 1.46	%	CL=90%	1623
ωK^+K^-	< 3.4	$\times 10^{-4}$	CL=90%	1664
$\phi\pi^+\pi^-\pi^0$	< 3.8	$\times 10^{-3}$	CL=90%	1723
$K^{*0}K^-\pi^+\pi^0+$ c.c.	< 1.62	%	CL=90%	1694
$K^{*+}K^-\pi^+\pi^-+$ c.c.	< 3.23	%	CL=90%	1693
$K^+K^-\pi^+\pi^- 2\pi^0$	< 2.67	%	CL=90%	1705
$K^+K^- 2(\pi^+\pi^-)$	< 1.03	%	CL=90%	1702
$K^+K^- 2(\pi^+\pi^-)\pi^0$	< 3.60	%	CL=90%	1661
ηK^+K^-	< 4.1	$\times 10^{-4}$	CL=90%	1712
$\eta K^+K^-\pi^+\pi^-$	< 1.24	%	CL=90%	1624
$\rho^0 K^+K^-$	< 5.0	$\times 10^{-3}$	CL=90%	1666
$2(K^+K^-)$	< 6.0	$\times 10^{-4}$	CL=90%	1552
ϕK^+K^-	< 7.5	$\times 10^{-4}$	CL=90%	1598
$2(K^+K^-)\pi^0$	< 2.9	$\times 10^{-4}$	CL=90%	1494
$2(K^+K^-)\pi^+\pi^-$	< 3.2	$\times 10^{-3}$	CL=90%	1426
$K_S^0 K^-\pi^+$	< 3.2	$\times 10^{-3}$	CL=90%	1799
$K_S^0 K^-\pi^+\pi^0$	< 1.33	%	CL=90%	1773
$K_S^0 K^-\rho^+$	< 6.6	$\times 10^{-3}$	CL=90%	1665
$K_S^0 K^- 2\pi^+\pi^-$	< 8.7	$\times 10^{-3}$	CL=90%	1740
$K_S^0 K^-\pi^+\rho^0$	< 1.6	%	CL=90%	1621
$K_S^0 K^-\pi^+\eta$	< 1.3	%	CL=90%	1670
$K_S^0 K^- 2\pi^+\pi^-\pi^0$	< 4.18	%	CL=90%	1703
$K_S^0 K^- 2\pi^+\pi^-\eta$	< 4.8	%	CL=90%	1570
$K_S^0 K^-\pi^+ 2(\pi^+\pi^-)$	< 1.22	%	CL=90%	1658
$K_S^0 K^-\pi^+ 2\pi^0$	< 2.65	%	CL=90%	1742
$K_S^0 K^- K^+K^-\pi^+$	< 4.9	$\times 10^{-3}$	CL=90%	1491
$K_S^0 K^- K^+K^-\pi^+\pi^0$	< 3.0	%	CL=90%	1427

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

Radiative decays

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

$\psi_2(3823)$

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

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

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

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

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

$\psi_3(3842)$

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

Seen by a single experiment only.

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

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

$\chi_{c1}(3872)$

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

also known as $X(3872)$

Mass $m = 3871.65 \pm 0.06$ MeV

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

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

$\gamma\gamma$	< 11	%	90%	1936
$D^0\overline{D}^0$	< 29	%	90%	519
D^+D^-	< 19	%	90%	502
$\pi^0\chi_{c2}$	< 4	%	90%	273
$\pi^0\chi_{c1}$	(3.4± 1.6) %			319
$\pi^0\chi_{c0}$	< 70	%	90%	–
$\pi^+\pi^-\eta_c(1S)$	< 14	%	90%	745
$\pi^+\pi^-\chi_{c1}$	< 7	$\times 10^{-3}$	90%	218
$p\overline{p}$	< 2.4	$\times 10^{-5}$	95%	1693

Radiative decays

γD^+D^-	< 4	%	90%	502
$\gamma\overline{D}^0 D^0$	< 6	%	90%	519
$\gamma J/\psi$	(8 ± 4)$\times 10^{-3}$			697
$\gamma\chi_{c1}$	< 9	$\times 10^{-3}$	90%	344
$\gamma\chi_{c2}$	< 3.2	%	90%	303
$\gamma\psi(2S)$	(4.5± 2.0) %			181

C-violating decays

$\eta J/\psi$	< 1.8	%	90%	491

$Z_c(3900)$ $\qquad I^G(J^{PC}) = 1^+(1^{+-})$

was $X(3900)$

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

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

$\chi_{c0}(3915)$ $I^G(J^{PC}) = 0^+(0^{++})$

was $X(3915)$

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

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

$\chi_{c2}(3930)$ $I^G(J^{PC}) = 0^+(2^{++})$

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

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

$X(4020)^\pm$ $I^G(J^{PC}) = 1^+(?^{?-})$

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

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

$\eta_c \pi^+ \pi^-$	not seen	872
$J/\psi(1S)\pi^\pm$	not seen	811

$\psi(4040)$ [i]

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

Mass $m = 4039 \pm 1$ MeV

Full width $\Gamma = 80 \pm 10$ MeV

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

$\psi(4040)$ DECAY MODES	Fraction (Γ_i/Γ)		Confidence level	p (MeV/c)
$e^+ e^-$	$(1.07\pm0.16) \times 10^{-5}$			2019
$D\overline{D}$	seen			775
$\quad D^0\overline{D}^0$	seen			775
$\quad D^+ D^-$	seen			763
$D^*\overline{D}$+ c.c.	seen			569
$\quad D^*(2007)^0\overline{D}^0$ + c.c.	seen			575
$\quad D^*(2010)^+ D^-$ + c.c.	seen			561
$D^*\overline{D}^*$	seen			193
$\quad D^*(2007)^0\overline{D}^*(2007)^0$	seen			226
$\quad D^*(2010)^+ D^*(2010)^-$	seen			193
$\quad D^0 D^- \pi^+$ +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			–
$\quad D^0\overline{D}^{*-}\pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	seen			–
$D_s^+ D_s^-$	seen			452
$\quad J/\psi \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	794
$\quad J/\psi \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	797
$\quad J/\psi \eta$	$(5.2 \pm0.7) \times 10^{-3}$			675
$\quad J/\psi \pi^0$	< 2.8	$\times 10^{-4}$	90%	823
$\quad J/\psi \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	746
$\chi_{c1}\gamma$	< 3.4	$\times 10^{-3}$	90%	494
$\chi_{c2}\gamma$	< 5	$\times 10^{-3}$	90%	454
$\chi_{c1}\pi^+ \pi^- \pi^0$	< 1.1	%	90%	306
$\chi_{c2}\pi^+ \pi^- \pi^0$	< 3.2	%	90%	233
$h_c(1P)\pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	403
$\phi\pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	1880

$\Lambda\overline{\Lambda}\pi^+\pi^-$	< 2.9	$\times 10^{-4}$	90%	1578
$\Lambda\overline{\Lambda}\pi^0$	< 9	$\times 10^{-5}$	90%	1636
$\Lambda\overline{\Lambda}\eta$	< 3.0	$\times 10^{-4}$	90%	1452
$\Lambda\overline{\Lambda}$	< 6	$\times 10^{-6}$	90%	1683
$\Sigma^+\overline{\Sigma}^-$	< 1.3	$\times 10^{-4}$	90%	1632
$\Sigma^0\overline{\Sigma}^0$	< 7	$\times 10^{-5}$	90%	1630
$\Xi^+\overline{\Xi}^-$	< 1.6	$\times 10^{-4}$	90%	1527
$\Xi^0\overline{\Xi}^0$	< 1.8	$\times 10^{-4}$	90%	1533
$\mu^+\mu^-$	(9	± 6) $\times 10^{-6}$		2017

$\chi_{c1}(4140)$ $\qquad I^G(J^{PC}) = 0^+(1^{++})$

was $X(4140)$

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

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

$\psi(4160)$ [i] $\qquad I^G(J^{PC}) = 0^-(1^{--})$

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

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

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

$D^*(2010)^+ D^*(2010)^-$	seen			592
$D^0 D^- \pi^+$ +c.c. (excl. $D^*(2007)^0 \overline{D}{}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen			–
$D\overline{D}{}^* \pi$ +c.c. (excl. $D^* \overline{D}{}^*$)	seen			–
$D^0 D^{*-} \pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	not seen			–
$D_s^+ D_s^-$	not seen			719
$D_s^{*+} D_s^-$ +c.c.	seen			385
$J/\psi \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	919
$J/\psi \pi^0 \pi^0$	< 3	$\times 10^{-3}$	90%	922
$J/\psi K^+ K^-$	< 2	$\times 10^{-3}$	90%	407
$J/\psi \eta$	< 8	$\times 10^{-3}$	90%	822
$J/\psi \pi^0$	< 1	$\times 10^{-3}$	90%	944
$J/\psi \eta'$	< 5	$\times 10^{-3}$	90%	457
$J/\psi \pi^+ \pi^- \pi^0$	< 1	$\times 10^{-3}$	90%	879
$\psi(2S) \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	396
$\chi_{c1} \gamma$	< 5	$\times 10^{-3}$	90%	625
$\chi_{c2} \gamma$	< 1.3	%	90%	587
$\chi_{c1} \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	496
$\chi_{c2} \pi^+ \pi^- \pi^0$	< 8	$\times 10^{-3}$	90%	445
$h_c(1P) \pi^+ \pi^-$	< 5	$\times 10^{-3}$	90%	556
$h_c(1P) \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	560
$h_c(1P) \eta$	< 2	$\times 10^{-3}$	90%	348
$h_c(1P) \pi^0$	< 4	$\times 10^{-4}$	90%	600
$\phi \pi^+ \pi^-$	< 2	$\times 10^{-3}$	90%	1961
$\gamma \chi_{c1}(3872)$	< 1.8	$\times 10^{-3}$	90%	308
$\gamma \chi_{c0}(3915) \to \gamma J/\psi \pi^+ \pi^-$	< 1.36	$\times 10^{-4}$	90%	–
$\gamma X(3930) \to \gamma J/\psi \pi^+ \pi^-$	< 1.18	$\times 10^{-4}$	90%	–
$\gamma X(3940) \to \gamma J/\psi \pi^+ \pi^-$	< 1.47	$\times 10^{-4}$	90%	–
$\gamma \chi_{c0}(3915) \to \gamma \gamma J/\psi$	< 1.26	$\times 10^{-4}$	90%	–
$\gamma X(3930) \to \gamma \gamma J/\psi$	< 8.8	$\times 10^{-5}$	90%	–
$\gamma X(3940) \to \gamma \gamma J/\psi$	< 1.79	$\times 10^{-4}$	90%	–
$p \overline{p} p \overline{p}$	not seen			834
$\Lambda \overline{\Lambda}$	< 1.5	$\times 10^{-6}$	90%	1774

$\psi(4230)$

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

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

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

$\psi(4230)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\mu^+\mu^-$	$(3.1\pm2.8)\times10^{-5}$	2107
$\eta_c(1S)\pi^+\pi^-$	not seen	1027
$\eta_c(1S)\pi^+\pi^-\pi^0$	seen	992
$J/\psi\pi^+\pi^-$	seen	942
$\quad J/\psi f_0(980),\ f_0(980)\to\pi^+\pi^-$	seen	$-$
$\quad Z_c(3900)^\pm\pi^\mp,\ Z_c^\pm\to J/\psi\pi^\pm$	seen	$-$
$J/\psi\pi^0\pi^0$	seen	944
$J/\psi K^+K^-$	seen	460
$J/\psi K_S^0 K_S^0$	not seen	447
$J/\psi\eta$	seen	848
$J/\psi\pi^0$	not seen	966
$J/\psi\eta'$	seen	504
$J/\psi\pi^+\pi^-\pi^0$	not seen	904
$J/\psi\eta\pi^0$	not seen	770
$J/\psi\eta\eta$	not seen	211
$\psi(2S)\pi^+\pi^-$	seen	426
$\psi(2S)\eta$	not seen	$\dagger$
$\chi_{c0}\omega$	seen	171
$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	527
$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	477
$h_c(1P)\pi^+\pi^-$	seen	583
$\phi\pi^+\pi^-$	not seen	1976
$\quad \phi f_0(980)\to\phi\pi^+\pi^-$	not seen	$-$
$D\overline{D}$	not seen	987
$\quad D^0\overline{D}^0$	not seen	987
$\quad D^+D^-$	not seen	978
$D^*\overline{D}$+c.c.	not seen	887
$\quad D^*(2007)^0\overline{D}^0$+c.c.	not seen	$-$
$\quad D^*(2010)^+D^-$+c.c.	not seen	$-$
$\quad D^*(2007)^0\overline{D}^*(2007)^0$	not seen	652
$\quad D^*(2010)^+D^*(2010)^-$	not seen	641
$\quad D^0D^-\pi^+$+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	$-$
$\quad D^0D^*(2010)^-\pi^+$+c.c.	seen	716
$D_1(2420)\overline{D}+$ c.c.	not seen	$\dagger$
$D^*\overline{D}^*\pi$	not seen	367
$D_s^+D_s^-$	not seen	760

$D_s^{*+} D_s^-$ +c.c.	not seen	615
$D_s^{*+} D_s^{*-}$	not seen	†
$p\overline{p}$	not seen	1890
$p\overline{p}\pi^0$	not seen	1854
$p\overline{p}\eta$	not seen	1712
$p\overline{p}\omega$	not seen	1610
$\Xi^-\overline{\Xi}^+$	not seen	1645
$\pi^+\pi^+\pi^-\pi^-$	not seen	2087
$\pi^+\pi^+\pi^-\pi^-\pi^0$	not seen	2071
$K_S^0 K^\pm \pi^\mp$	not seen	2032
$K_S^0 K^\pm \pi^\mp \pi^0$	not seen	2009
$K_S^0 K^\pm \pi^\mp \eta$	not seen	1917
$K^+ K^- \pi^0$	not seen	2033
$K^+ K^- \pi^+ \pi^-$	not seen	2008
$K^+ K^- \pi^+ \pi^- \pi^0$	not seen	1981
$K^+ K^+ K^- K^-$	not seen	1813
$K^+ K^+ K^- K^- \pi^0$	not seen	1762
$p\overline{p}\pi^+\pi^-$	not seen	1810
$p\overline{p}\pi^+\pi^-\pi^0$	not seen	1764
$p\overline{p}p\overline{p}$	not seen	864
$\Lambda\overline{\Lambda}$	not seen	1791

Radiative decays

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

$\chi_{c1}(4274)$ $\qquad\qquad I^G(J^{PC}) = 0^+(1^{++})$

was $X(4274)$

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

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

$\psi(4360)$ $\qquad\qquad I^G(J^{PC}) = 0^-(1^{--})$

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

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

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

$\psi(4415)$ [i] $\qquad\qquad I^G(J^{PC}) = 0^-(1^{--})$

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

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

$\psi(4415)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D\overline{D}$	seen		1187
$\quad D^0 \overline{D}^0$	seen		1187
$\quad D^+ D^-$	seen		1179
$D^* \overline{D}+$ c.c.	seen		1063
$\quad D^*(2007)^0 \overline{D}^0 +$ c.c.	seen		1067
$\quad D^*(2010)^+ D^- +$ c.c.	seen		1059
$D^* \overline{D}^*$	seen		919
$\quad D^*(2007)^0 \overline{D}^*(2007)^0 +$ c.c.	seen		927
$\quad D^*(2010)^+ D^*(2010)^- +$ c.c.	seen		919
$D^0 D^- \pi^+$ (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.	< 2.3 %	90%	—
$D\overline{D}^*_2(2460) \to D^0 D^- \pi^+$ +c.c.	(10 ± 4) %		—
$D^0 D^{*-} \pi^+ +$c.c.	< 11 %	90%	926

$D_1(2420)\overline{D}+$ c.c.	possibly seen			537
$D_s^+ D_s^-$	not seen			1006
$\omega\chi_{c2}$	possibly seen			330
$D_s^{*+} D_s^- +$c.c.	seen			–
$D_s^{*+} D_s^{*-}$	not seen			652
$\psi_2(3823)\pi^+\pi^-$	possibly seen			492
$\psi(3770)\pi^+\pi^-$	possibly seen			541
$J/\psi\eta$	$<\ 6$	$\times 10^{-3}$	90%	1022
$\chi_{c1}\gamma$	$<\ 8$	$\times 10^{-4}$	90%	817
$\chi_{\underline{c2}}\gamma$	$<\ 4$	$\times 10^{-3}$	90%	780
$\Lambda\overline{\Lambda}$	$<\ 3.1$	$\times 10^{-6}$	90%	1908
$e^+ e^-$	$(\ 9.4\pm3.2)\times 10^{-6}$			2210
$\mu^+\mu^-$	$(\ 2.0\pm1.0)\times 10^{-5}$			2208

$Z_c(4430)$

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

was $X(4430)^\pm$

Quantum numbers not established.

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

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

$\psi(4660)$

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

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

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

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

NOTES

[a] For $E_\gamma > 100$ MeV.

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

[c] $\Theta(1540)$ is a hypothetical pentaquark state of 1.54 GeV/c^2 mass and a width of less than 25 MeV/c^2.

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

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

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

[g] For a dark photon U with mass between 100 and 2100 MeV.

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

[i] 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.