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

$\eta_c(1S)$

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

Mass $m = 2983.9 \pm 0.5$ MeV (S = 1.3)
Full width $\Gamma = 31.9 \pm 0.7$ MeV

$\eta_c(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Decays involving hadronic resonances			
$\eta'(958)\pi\pi$	(4.1 ±1.7) %		1323
$\rho\rho$	(1.8 ±0.5) %		1275
$K^*(892)^0 K^-\pi^+$ + c.c.	(2.0 ±0.7) %		1278
$K^*(892)\overline{K}^*(892)$	(7.1 ±1.3) $\times 10^{-3}$		1196
$K^*(892)^0\overline{K}^*(892)^0\pi^+\pi^-$	(1.1 ±0.5) %		1073
ϕK^+K^-	(2.9 ±1.4) $\times 10^{-3}$		1104
$\phi\phi$	(1.79±0.20) $\times 10^{-3}$		1089
$\phi 2(\pi^+\pi^-)$	$<$ 4 $\times 10^{-3}$	90%	1251
$a_0(980)\pi$	$<$ 2 %	90%	1327
$a_2(1320)\pi$	$<$ 2 %	90%	1197
$K^*(892)\overline{K}$ + c.c.	$<$ 1.28 %	90%	1310
$f_2(1270)\eta$	$<$ 1.1 %	90%	1145
$\omega\omega$	$<$ 3.1 $\times 10^{-3}$	90%	1270
$\omega\phi$	$<$ 2.5 $\times 10^{-4}$	90%	1185
$f_2(1270)f_2(1270)$	(9.8 ±2.5) $\times 10^{-3}$		774
$f_2(1270)f'_2(1525)$	(9.8 ±3.2) $\times 10^{-3}$		513
$f_0(980)\eta$	seen		1264
$f_0(1500)\eta$	seen		1025
$f_0(2200)\eta$	seen		498
$a_0(980)\pi$	seen		1327
$a_0(1320)\pi$	seen		–
$a_0(1450)\pi$	seen		1123
$a_0(1950)\pi$	seen		860
$K_0^*(1430)\overline{K}$	seen		–
$K_2^*(1430)\overline{K}$	seen		–
$K_0^*(1950)\overline{K}$	seen		–
Decays into stable hadrons			
$K\overline{K}\pi$	(7.3 ±0.5) %		1381
$K\overline{K}\eta$	(1.36±0.16) %		1265
$\eta\pi^+\pi^-$	(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
$K^0K^-\pi^+\pi^-\pi^+$+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
$\pi^+\pi^-\pi^0$	< 5	$\times 10^{-4}$	90%	1476
$\pi^+\pi^-\pi^0\pi^0$	(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
$3(\pi^+\pi^-)$	(1.8 ±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) $\times 10^{-3}$			991
$K^+\overline{p}\Lambda$+ c.c.	(2.5 ±0.4) $\times 10^{-3}$			772
$\overline{\Lambda}(1520)\Lambda$+ c.c.	(3.1 ±1.3) $\times 10^{-3}$			693
$\Sigma^+\overline{\Sigma}^-$	(2.1 ±0.6) $\times 10^{-3}$			901
$\Xi^-\overline{\Xi}^+$	(9.0 ±2.6) $\times 10^{-4}$			692
$\pi^+\pi^-p\overline{p}$	(5.3 ±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* < 4	$\times 10^{-5}$	90%	1486
K^+K^-	*P*,*CP* < 6	$\times 10^{-4}$	90%	1408
$K^0_SK^0_S$	*P*,*CP* < 3.1	$\times 10^{-4}$	90%	1407

$J/\psi(1S)$

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

Mass $m = 3096.900 \pm 0.006$ MeV
Full width $\Gamma = 92.9 \pm 2.8$ keV (S = 1.1)
$\Gamma_{ee} = 5.53 \pm 0.10$ keV
$\Gamma_{ee} < 5.4$ eV, CL = 90%

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

Decays involving hadronic resonances

$\rho\pi$	(1.69 ± 0.15) %	S=2.4	1448
$\rho^0\pi^0$	$(5.6 \pm 0.7) \times 10^{-3}$		1448
$\rho(770)^{\mp} K^{\pm} K^0_S$	$(1.9 \pm 0.4) \times 10^{-3}$		–
$\rho(1450)\pi \rightarrow \pi^+\pi^-\pi^0$	$(2.3 \pm 0.7) \times 10^{-3}$		–
$\rho(1450)^{\pm}\pi^{\mp} \rightarrow K^0_S K^{\pm}\pi^{\mp}$	$(3.5 \pm 0.6) \times 10^{-4}$		–
$\rho(1450)^0\pi^0 \rightarrow K^+K^-\pi^0$	$(2.0 \pm 0.5) \times 10^{-4}$		–
$\rho(1450)\eta'(958) \rightarrow \pi^+\pi^-\eta'(958)$	$(3.3 \pm 0.7) \times 10^{-6}$		–
$\rho(1700)\pi \rightarrow \pi^+\pi^-\pi^0$	$(1.7 \pm 1.1) \times 10^{-4}$		–
$\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0$	$(8 \pm 40) \times 10^{-6}$		–
$a_2(1320)\rho$	(1.09 ± 0.22) %		1124
$\omega\pi^+\pi^+\pi^-\pi^-$	$(8.5 \pm 3.4) \times 10^{-3}$		1392
$\omega\pi^+\pi^-\pi^0$	$(4.0 \pm 0.7) \times 10^{-3}$		1418
$\omega\pi^+\pi^-$	$(7.2 \pm 1.0) \times 10^{-3}$		1435
$\omega f_2(1270)$	$(4.3 \pm 0.6) \times 10^{-3}$		1142
$K^*(892)^0\overline{K}^*(892)^0$	$(2.3 \pm 0.6) \times 10^{-4}$		1266
$K^*(892)^{\pm}K^*(892)^{\mp}$	$(1.00 {}^{+0.22}_{-0.40}) \times 10^{-3}$		1266
$K^*(892)^{\pm}K^*(700)^{\mp}$	$(1.1 {}^{+1.0}_{-0.6}) \times 10^{-3}$		–
$K^0_S\pi^-K^*(892)^+ +$ c.c.	$(2.0 \pm 0.5) \times 10^{-3}$		1342
$K^0_S\pi^-K^*(892)^+ +$ c.c. $\rightarrow K^0_S K^0_S\pi^+\pi^-$	$(6.7 \pm 2.2) \times 10^{-4}$		–
$K^0_S K^*(892)^0 \rightarrow \gamma K^0_S K^0_S$	$(6.3 {}^{+0.6}_{-0.5}) \times 10^{-6}$		–
$\eta K^*(892)^0\overline{K}^*(892)^0$	$(1.15 \pm 0.26) \times 10^{-3}$		1003
$\eta' K^{*\pm}K^{\mp}$	$(1.48 \pm 0.13) \times 10^{-3}$		–
$\eta' K^{*0}\overline{K}^0 +$ c.c.	$(1.66 \pm 0.21) \times 10^{-3}$		1000
$\eta' h_1(1415) \rightarrow \eta' K^*\overline{K} +$ c.c.	$(2.16 \pm 0.31) \times 10^{-4}$		–
$\eta' h_1(1415) \rightarrow \eta' K^{*\pm}K^{\mp}$	$(1.51 \pm 0.23) \times 10^{-4}$		–
$K^*(1410)\overline{K}$ +c.c $\rightarrow K^{\pm}K^{\mp}\pi^0$	$(4.9 \pm 2.8) \times 10^{-5}$		–
$K^*(1410)\overline{K} +$ c.c. $\rightarrow K^0_S K^{\pm}\pi^{\mp}$	$(8 \pm 6) \times 10^{-5}$		–
$K^*_2(1430)\overline{K}$ +c.c. $\rightarrow K^{\pm}K^{\mp}\pi^0$	$(7.5 \pm 3.5) \times 10^{-5}$		–
$K^*_2(1430)\overline{K} +$ c.c. $\rightarrow K^0_S K^{\pm}\pi^{\mp}$	$(4.0 \pm 1.0) \times 10^{-4}$		–
$K^*(892)^0\overline{K}^*_2(1430)^0 +$ c.c.	$(4.66 \pm 0.31) \times 10^{-3}$		1012
$K^*(892)^+K^*_2(1430)^- +$ c.c.	$(3.4 \pm 2.9) \times 10^{-3}$		1012
$K^*(892)^+K^*_2(1430)^- +$ c.c. $\rightarrow K^*(892)^+K^0_S\pi^- +$ c.c.	$(4 \pm 4) \times 10^{-4}$		–

$K^*(892)^0 \overline{K}_2(1770)^0 +$ c.c. $\rightarrow$ $K^*(892)^0 K^- \pi^+ +$ c.c.		$(6.9 \pm 0.9) \times 10^{-4}$		–
$\omega K^*(892) \overline{K} +$ c.c.		$(6.1 \pm 0.9) \times 10^{-3}$		1097
$\overline{K} K^*(892) +$c.c. $\rightarrow$ $K^0_S K^\pm \pi^\mp$		$(5.0 \pm 0.5) \times 10^{-3}$		–
$K^+ K^*(892)^- +$ c.c.		$(5.0 \pm 0.4) \times 10^{-3}$		1373
$K^+ K^*(892)^- +$ c.c. $\rightarrow$ $K^+ K^- \pi^0$		$(1.98 \pm 0.21) \times 10^{-3}$		–
$K^+ K^*(892)^- +$ c.c. $\rightarrow$ $K^0 K^\pm \pi^\mp +$ c.c.		$(3.0 \pm 0.4) \times 10^{-3}$		–
$K^0 \overline{K}^*(892)^0 +$ c.c.		$(4.2 \pm 0.4) \times 10^{-3}$		1373
$K^0 \overline{K}^*(892)^0 +$ c.c. $\rightarrow$ $K^0 K^\pm \pi^\mp +$ c.c.		$(3.2 \pm 0.4) \times 10^{-3}$		–
$K_1(1400)^\pm K^\mp$		$(3.8 \pm 1.4) \times 10^{-3}$		1170
$\overline{K}^*(892)^0 K^+ \pi^- +$ c.c.		$(7.7 \pm 1.6) \times 10^{-3}$		1343
$K^*(892)^\pm K^\mp \pi^0$		$(4.1 \pm 1.3) \times 10^{-3}$		1344
$K^*(892)^0 K^0_S \pi^0$		$(6 \pm 4) \times 10^{-4}$		1343
$\omega \pi^0 \pi^0$		$(3.4 \pm 0.8) \times 10^{-3}$		1436
$\omega \pi^0 \eta$		$(3.4 \pm 1.7) \times 10^{-4}$		1363
$b_1(1235)^\pm \pi^\mp$	[b]	$(3.0 \pm 0.5) \times 10^{-3}$		1300
$\omega K^\pm K^0_S \pi^\mp$	[b]	$(3.4 \pm 0.5) \times 10^{-3}$		1210
$b_1(1235)^0 \pi^0$		$(2.3 \pm 0.6) \times 10^{-3}$		1300
$\eta K^\pm K^0_S \pi^\mp$	[b]	$(2.2 \pm 0.4) \times 10^{-3}$		1278
$\phi K^*(892) \overline{K} +$ c.c.		$(2.18 \pm 0.23) \times 10^{-3}$		969
$\omega K \overline{K}$		$(1.9 \pm 0.4) \times 10^{-3}$		1268
$\omega f_0(1710) \rightarrow \omega K \overline{K}$		$(4.8 \pm 1.1) \times 10^{-4}$		878
$\phi 2(\pi^+ \pi^-)$		$(1.60 \pm 0.32) \times 10^{-3}$		1318
$\Delta(1232)^{++} \overline{p} \pi^-$		$(1.6 \pm 0.5) \times 10^{-3}$		1030
$\omega \eta$		$(1.74 \pm 0.20) \times 10^{-3}$	S=1.6	1394
$\phi K \overline{K}$		$(1.77 \pm 0.16) \times 10^{-3}$	S=1.3	1179
$\phi K^0_S K^0_S$		$(5.9 \pm 1.5) \times 10^{-4}$		1176
$\phi f_0(1710) \rightarrow \phi K \overline{K}$		$(3.6 \pm 0.6) \times 10^{-4}$		875
$\phi K^+ K^-$		$(8.3 \pm 1.2) \times 10^{-4}$		1179
$\phi f_2(1270)$		$(3.2 \pm 0.6) \times 10^{-4}$		1036
$\Delta(1232)^{++} \overline{\Delta}(1232)^{--}$		$(1.10 \pm 0.29) \times 10^{-3}$		938
$\Sigma(1385)^- \overline{\Sigma}(1385)^+$ (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
$K^+ K^- f'_2(1525)$		$(1.04 \pm 0.35) \times 10^{-3}$		892
$\phi f'_2(1525)$		$(8 \pm 4) \times 10^{-4}$	S=2.7	871
$\phi \pi^+ \pi^-$		$(9.4 \pm 1.5) \times 10^{-4}$	S=1.7	1365
$\phi \pi^0 \pi^0$		$(5.0 \pm 1.0) \times 10^{-4}$		1366
$\phi K^\pm K^0_S \pi^\mp$	[b]	$(7.2 \pm 0.8) \times 10^{-4}$		1114
$\omega f_1(1420)$		$(6.8 \pm 2.4) \times 10^{-4}$		1062
$\phi \eta$		$(7.4 \pm 0.8) \times 10^{-4}$	S=1.5	1320

$\Xi^0 \overline{\Xi}^0$		$(1.17 \pm 0.04) \times 10^{-3}$		818
$\Xi(1530)^- \overline{\Xi}^+$		$(5.9 \pm 1.5) \times 10^{-4}$		600
$p K^- \overline{\Sigma}(1385)^0$		$(5.1 \pm 3.2) \times 10^{-4}$		646
$\omega \pi^0$		$(4.5 \pm 0.5) \times 10^{-4}$	S=1.4	1446
$\omega \pi^0 \rightarrow \pi^+ \pi^- \pi^0$		$(1.7 \pm 0.8) \times 10^{-5}$		–
$\phi \eta'(958)$		$(4.6 \pm 0.5) \times 10^{-4}$	S=2.2	1192
$\phi f_0(980)$		$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9	1178
$\phi f_0(980) \rightarrow \phi \pi^+ \pi^-$		$(2.59 \pm 0.34) \times 10^{-4}$		–
$\phi f_0(980) \rightarrow \phi \pi^0 \pi^0$		$(1.8 \pm 0.5) \times 10^{-4}$		–
$\phi \pi^0 f_0(980) \rightarrow \phi \pi^0 \pi^+ \pi^-$		$(4.5 \pm 1.0) \times 10^{-6}$		–
$\phi \pi^0 f_0(980) \rightarrow \phi \pi^0 p^0 \pi^0$		$(1.7 \pm 0.6) \times 10^{-6}$		1045
$\eta \phi f_0(980) \rightarrow \eta \phi \pi^+ \pi^-$		$(3.2 \pm 1.0) \times 10^{-4}$		–
$\phi a_0(980)^0 \rightarrow \phi \eta \pi^0$		$(4.4 \pm 1.4) \times 10^{-6}$		–
$\Xi(1530)^0 \overline{\Xi}^0$		$(3.2 \pm 1.4) \times 10^{-4}$		608
$\Sigma(1385)^- \overline{\Sigma}^+$ (or c.c.)	[*b*]	$(3.1 \pm 0.5) \times 10^{-4}$		855
$\phi f_1(1285)$		$(2.6 \pm 0.5) \times 10^{-4}$		1032
$\phi f_1(1285) \rightarrow \phi \pi^0 f_0(980) \rightarrow \phi \pi^0 \pi^+ \pi^-$		$(9.4 \pm 2.8) \times 10^{-7}$		952
$\phi f_1(1285) \rightarrow \phi \pi^0 f_0(980) \rightarrow \phi \pi^0 \pi^0 \pi^0$		$(2.1 \pm 2.2) \times 10^{-7}$		955
$\eta \pi^+ \pi^-$		$(4.2 \pm 0.8) \times 10^{-4}$		1487
$\eta \rho$		$(1.93 \pm 0.23) \times 10^{-4}$		1396
$\omega \eta'(958)$		$(1.89 \pm 0.18) \times 10^{-4}$		1279
$\omega f_0(980)$		$(1.4 \pm 0.5) \times 10^{-4}$		1267
$\rho \eta'(958)$		$(8.1 \pm 0.8) \times 10^{-5}$	S=1.6	1281
$a_2(1320)^\pm \pi^\mp$	[*b*]	$< 4.3 \times 10^{-3}$	CL=90%	1264
$K \overline{K}_2^*(1430) +$ c.c.		$< 4.0 \times 10^{-3}$	CL=90%	1159
$K_1(1270)^\pm K^\mp$		$< 3.0 \times 10^{-3}$	CL=90%	1231
$K_1(1270) K_S^0 \rightarrow \gamma K_S^0 K_S^0$		$(8.5 \pm 2.5) \times 10^{-7}$		–
$K_S^0 \pi^- K_2^*(1430)^+ +$ c.c.		$(3.6 \pm 1.8) \times 10^{-3}$		1117
$K_2^*(1430)^0 \overline{K}_2^*(1430)^0$		$< 2.9 \times 10^{-3}$	CL=90%	604
$\phi \pi^0$		3×10^{-6} or 1×10^{-7}		1377
$\phi \eta(1405) \rightarrow \phi \eta \pi^+ \pi^-$		$(2.0 \pm 1.0) \times 10^{-5}$		946
$\omega f_2'(1525)$		$< 2.2 \times 10^{-4}$	CL=90%	1003
$\omega X(1835) \rightarrow \omega p \overline{p}$		$< 3.9 \times 10^{-6}$	CL=95%	–
$\phi X(1835) \rightarrow \phi p \overline{p}$		$< 2.1 \times 10^{-7}$	CL=90%	–
$\phi X(1835) \rightarrow \phi \eta \pi^+ \pi^-$		$< 2.8 \times 10^{-4}$	CL=90%	578
$\phi X(1870) \rightarrow \phi \eta \pi^+ \pi^-$		$< 6.13 \times 10^{-5}$	CL=90%	–
$\eta \phi(2170) \rightarrow \eta \phi f_0(980) \rightarrow \eta \phi \pi^+ \pi^-$		$(1.2 \pm 0.4) \times 10^{-4}$		628
$\eta \phi(2170) \rightarrow \eta K^*(892)^0 \overline{K}^*(892)^0$		$< 2.52 \times 10^{-4}$	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%	–
$\overline{\Lambda}(1520) \Lambda+$ c.c.	$<$ 1.80	$\times 10^{-3}$	CL=90%	806
$\Theta(1540) \overline{\Theta}(1540) \rightarrow$ $K^0_S p K^- \overline{n}+$ c.c.	$<$ 1.1	$\times 10^{-5}$	CL=90%	–
$\Theta(1540) K^- \overline{n} \rightarrow K^0_S p K^- \overline{n}$	$<$ 2.1	$\times 10^{-5}$	CL=90%	–
$\Theta(1540) K^0_S \overline{p} \rightarrow K^0_S \overline{p} K^+ n$	$<$ 1.6	$\times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540) K^+ n \rightarrow K^0_S \overline{p} K^+ n$	$<$ 5.6	$\times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540) K^0_S p \rightarrow K^0_S p K^- \overline{n}$	$<$ 1.1	$\times 10^{-5}$	CL=90%	–

Decays into stable hadrons

$2(\pi^+ \pi^-) \pi^0$	(3.37 ± 0.26) %		1496
$3(\pi^+ \pi^-) \pi^0$	(2.9 ± 0.6) %		1433
$\pi^+ \pi^- \pi^0$	(2.10 ± 0.08) %	S=1.6	1533
$\pi^+ \pi^- \pi^0 \pi^0 \pi^0$	(2.71 ± 0.29) %		1497
$\rho^\pm \pi^\mp \pi^0 \pi^0$	(1.41 ± 0.22) %		1421
$\rho^+ \rho^- \pi^0$	(6.0 ± 1.1) $\times 10^{-3}$		1298
$\pi^+ \pi^- \pi^0 K^+ K^-$	(1.20 ± 0.30) %		1368
$4(\pi^+ \pi^-) \pi^0$	(9.0 ± 3.0) $\times 10^{-3}$		1345
$\pi^+ \pi^- K^+ K^-$	(6.84 ± 0.32) $\times 10^{-3}$		1407
$\pi^+ \pi^- K^0_S K^0_L$	(3.8 ± 0.6) $\times 10^{-3}$		1406
$\pi^+ \pi^- K^0_S K^0_S$	(1.68 ± 0.19) $\times 10^{-3}$		1406
$\pi^\pm \pi^0 K^\mp K^0_S$	(5.7 ± 0.5) $\times 10^{-3}$		1408
$K^+ K^- K^0_S K^0_S$	(4.1 ± 0.8) $\times 10^{-4}$		1127
$\pi^+ \pi^- K^+ K^- \eta$	(4.7 ± 0.7) $\times 10^{-3}$		1221
$\pi^0 \pi^0 K^+ K^-$	(2.12 ± 0.23) $\times 10^{-3}$		1410
$\pi^0 \pi^0 K^0_S K^0_L$	(1.9 ± 0.4) $\times 10^{-3}$		1408
$K \overline{K} \pi$	(6.1 ± 1.0) $\times 10^{-3}$		1442
$K^+ K^- \pi^0$	(2.14 ± 0.24) $\times 10^{-3}$		1442
$K^0_S K^\pm \pi^\mp$	(5.6 ± 0.5) $\times 10^{-3}$		1440
$K^0_S K^0_L \pi^0$	(2.06 ± 0.27) $\times 10^{-3}$		1440
$K^*(892)^0 \overline{K}^0+$ c.c. $\rightarrow$ $K^0_S K^0_L \pi^0$	(1.21 ± 0.18) $\times 10^{-3}$		–
$K^*_2(1430)^0 \overline{K}^0+$ c.c. $\rightarrow$ $K^0_S K^0_L \pi^0$	(4.3 ± 1.3) $\times 10^{-4}$		–
$K^0_S K^0_L \eta$	(1.44 ± 0.34) $\times 10^{-3}$		1328
$2(\pi^+ \pi^-)$	(3.57 ± 0.30) $\times 10^{-3}$		1517
$3(\pi^+ \pi^-)$	(4.3 ± 0.4) $\times 10^{-3}$		1466
$2(\pi^+ \pi^- \pi^0)$	(1.61 ± 0.21) %		1468
$2(\pi^+ \pi^-) \eta$	(2.26 ± 0.28) $\times 10^{-3}$		1446
$3(\pi^+ \pi^-) \eta$	(7.2 ± 1.5) $\times 10^{-4}$		1379
$\pi^+ \pi^- \pi^0 \pi^0 \eta$	(2.3 ± 0.5) $\times 10^{-3}$		1448

$\rho^{\pm}\pi^{\mp}\pi^{0}\eta$		$(1.9 \pm 0.8) \times 10^{-3}$		1326
$p\overline{p}$		$(2.121 \pm 0.029) \times 10^{-3}$		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
$p\overline{p}\pi^{+}\pi^{-}\pi^{0}$	[c]	$(2.3 \pm 0.9) \times 10^{-3}$	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
$p\overline{p}a_0(980) \rightarrow p\overline{p}\pi^{0}\eta$		$(6.8 \pm 1.8) \times 10^{-5}$		–
$p\overline{p}\phi$		$(5.19 \pm 0.33) \times 10^{-5}$		527
$n\overline{n}$		$(2.09 \pm 0.16) \times 10^{-3}$		1231
$n\overline{n}\pi^{+}\pi^{-}$		$(4 \pm 4) \times 10^{-3}$		1106
$\Sigma^{+}\overline{\Sigma}^{-}$		$(1.50 \pm 0.24) \times 10^{-3}$		992
$\Sigma^{0}\overline{\Sigma}^{0}$		$(1.172 \pm 0.032) \times 10^{-3}$	S=1.4	988
$2(\pi^{+}\pi^{-})K^{+}K^{-}$		$(3.1 \pm 1.3) \times 10^{-3}$		1320
$p\overline{n}\pi^{-}$		$(2.12 \pm 0.09) \times 10^{-3}$		1174
$nN(1440)$		seen		978
$nN(1520)$		seen		928
$nN(1535)$		seen		917
$\Xi^{-}\overline{\Xi}^{+}$		$(9.7 \pm 0.8) \times 10^{-4}$	S=1.4	807
$\Lambda\overline{\Lambda}$		$(1.89 \pm 0.09) \times 10^{-3}$	S=2.8	1074
$\Lambda\overline{\Sigma}^{-}\pi^{+}$ (or c.c.)	[b]	$(8.3 \pm 0.7) \times 10^{-4}$	S=1.2	950
$pK^{-}\overline{\Lambda}$+c.c.		$(8.7 \pm 1.1) \times 10^{-4}$		876
$2(K^{+}K^{-})$		$(7.2 \pm 0.8) \times 10^{-4}$		1131
$pK^{-}\overline{\Sigma}^{0}$		$(2.9 \pm 0.8) \times 10^{-4}$		819
$K^{+}K^{-}$		$(2.86 \pm 0.21) \times 10^{-4}$		1468
$K^{0}_{S}K^{0}_{L}$		$(1.95 \pm 0.11) \times 10^{-4}$	S=2.4	1466
$\Lambda\overline{\Lambda}\pi^{+}\pi^{-}$		$(4.3 \pm 1.0) \times 10^{-3}$		903
$\Lambda\overline{\Lambda}\eta$		$(1.62 \pm 0.17) \times 10^{-4}$		672
$\Lambda\overline{\Lambda}\pi^{0}$		$(3.8 \pm 0.4) \times 10^{-5}$		998
$\overline{\Lambda}nK^{0}_{S}$ + c.c.		$(6.5 \pm 1.1) \times 10^{-4}$		872
$\pi^{+}\pi^{-}$		$(1.47 \pm 0.14) \times 10^{-4}$		1542
$\Lambda\overline{\Sigma}$ + c.c.		$(2.83 \pm 0.23) \times 10^{-5}$		1034
$K^{0}_{S}K^{0}_{S}$		$< 1.4 \times 10^{-8}$	CL=95%	1466

Radiative decays

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
$\gamma\pi^{0}\pi^{0}$		$(1.15 \pm 0.05) \times 10^{-3}$		1543
$\gamma\eta\pi^{0}$		$(2.14 \pm 0.31) \times 10^{-5}$		1497
$\gamma a_0(980)^{0} \rightarrow \gamma\eta\pi^{0}$		$< 2.5 \times 10^{-6}$	CL=95%	–
$\gamma a_2(1320)^{0} \rightarrow \gamma\eta\pi^{0}$		$< 6.6 \times 10^{-6}$	CL=95%	–

$\gamma K^0_S K^0_S$		$(8.1 \pm 0.4) \times 10^{-4}$		1466
$\gamma \eta_c(1S)$		(1.7 ± 0.4) %	S=1.5	111
$\gamma \eta_c(1S) \rightarrow 3\gamma$		$(3.8 {}^{+1.3}_{-1.0}) \times 10^{-6}$	S=1.1	–
$\gamma \pi^+ \pi^- 2\pi^0$		$(8.3 \pm 3.1) \times 10^{-3}$		1518
$\gamma \eta \pi \pi$		$(6.1 \pm 1.0) \times 10^{-3}$		1487
$\gamma \eta_2(1870) \rightarrow \gamma \eta \pi^+ \pi^-$		$(6.2 \pm 2.4) \times 10^{-4}$		–
$\gamma \eta(1405/1475) \rightarrow \gamma K \overline{K} \pi$	[d]	$(2.8 \pm 0.6) \times 10^{-3}$	S=1.6	1223
$\gamma \eta(1405/1475) \rightarrow \gamma \gamma \rho^0$		$(7.8 \pm 2.0) \times 10^{-5}$	S=1.8	1223
$\gamma \eta(1405/1475) \rightarrow \gamma \eta \pi^+ \pi^-$		$(3.0 \pm 0.5) \times 10^{-4}$		–
$\gamma \eta(1405/1475) \rightarrow \gamma \gamma \phi$		$< 8.2 \times 10^{-5}$	CL=95%	–
$\gamma \eta(1405) \rightarrow \gamma \gamma \gamma$		$< 2.63 \times 10^{-6}$	CL=90%	–
$\gamma \eta(1475) \rightarrow \gamma \gamma \gamma$		$< 1.86 \times 10^{-6}$	CL=90%	–
$\gamma \rho \rho$		$(4.5 \pm 0.8) \times 10^{-3}$		1340
$\gamma \rho \omega$		$< 5.4 \times 10^{-4}$	CL=90%	1338
$\gamma \rho \phi$		$< 8.8 \times 10^{-5}$	CL=90%	1258
$\gamma \eta'(958)$		$(5.21 \pm 0.17) \times 10^{-3}$	S=1.4	1400
$\gamma 2\pi^+ 2\pi^-$		$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9	1517
$\gamma f_2(1270) f_2(1270)$		$(9.5 \pm 1.7) \times 10^{-4}$		878
$\gamma f_2(1270) f_2(1270)$(non resonant)		$(8.2 \pm 1.9) \times 10^{-4}$		–
$\gamma K^+ K^- \pi^+ \pi^-$		$(2.1 \pm 0.6) \times 10^{-3}$		1407
$\gamma f_4(2050)$		$(2.7 \pm 0.7) \times 10^{-3}$		891
$\gamma \omega \omega$		$(1.61 \pm 0.33) \times 10^{-3}$		1336
$\gamma \eta(1405/1475) \rightarrow \gamma \rho^0 \rho^0$		$(1.7 \pm 0.4) \times 10^{-3}$	S=1.3	1223
$\gamma f_2(1270)$		$(1.64 \pm 0.12) \times 10^{-3}$	S=1.3	1286
$\gamma f_2(1270) \rightarrow \gamma K^0_S K^0_S$		$(2.58 {}^{+0.60}_{-0.22}) \times 10^{-5}$		–
$\gamma f_0(1370) \rightarrow \gamma K \overline{K}$		$(4.2 \pm 1.5) \times 10^{-4}$		–
$\gamma f_0(1370) \rightarrow \gamma K^0_S K^0_S$		$(1.1 \pm 0.4) \times 10^{-5}$		–
$\gamma f_0(1500) \rightarrow \gamma K^0_S K^0_S$		$(1.59 {}^{+0.24}_{-0.60}) \times 10^{-5}$		–
$\gamma f_0(1710) \rightarrow \gamma K \overline{K}$		$(9.5 {}^{+1.0}_{-0.5}) \times 10^{-4}$	S=1.5	1075
$\gamma f_0(1710) \rightarrow \gamma \pi \pi$		$(3.8 \pm 0.5) \times 10^{-4}$		–
$\gamma f_0(1710) \rightarrow \gamma \omega \omega$		$(3.1 \pm 1.0) \times 10^{-4}$		–
$\gamma f_0(1710) \rightarrow \gamma \eta \eta$		$(2.4 {}^{+1.2}_{-0.7}) \times 10^{-4}$		–
$\gamma \eta$		$(1.108 \pm 0.027) \times 10^{-3}$		1500
$\gamma f_1(1420) \rightarrow \gamma K \overline{K} \pi$		$(7.9 \pm 1.3) \times 10^{-4}$		1220
$\gamma f_1(1285)$		$(6.1 \pm 0.8) \times 10^{-4}$		1283
$\gamma f_1(1510) \rightarrow \gamma \eta \pi^+ \pi^-$		$(4.5 \pm 1.2) \times 10^{-4}$		–
$\gamma f'_2(1525)$		$(5.7 {}^{+0.8}_{-0.5}) \times 10^{-4}$	S=1.5	1173
$\gamma f'_2(1525) \rightarrow \gamma K^0_S K^0_S$		$(8.0 {}^{+0.7}_{-0.5}) \times 10^{-5}$		–
$\gamma f'_2(1525) \rightarrow \gamma \eta \eta$		$(3.4 \pm 1.4) \times 10^{-5}$		–

$\gamma f_2(1640) \rightarrow \gamma\omega\omega$		$(2.8 \pm 1.8) \times 10^{-4}$		–
$\gamma f_2(1910) \rightarrow \gamma\omega\omega$		$(2.0 \pm 1.4) \times 10^{-4}$		–
$\gamma f_0(1750) \rightarrow \gamma K^0_S K^0_S$		$(1.11 {}^{+0.20}_{-0.33}) \times 10^{-5}$		–
$\gamma f_0(1800) \rightarrow \gamma\omega\phi$		$(2.5 \pm 0.6) \times 10^{-4}$		–
$\gamma f_2(1810) \rightarrow \gamma\eta\eta$		$(5.4 {}^{+3.5}_{-2.4}) \times 10^{-5}$		–
$\gamma f_2(1950) \rightarrow \gamma K^*(892)\overline{K}^*(892)$		$(7.0 \pm 2.2) \times 10^{-4}$		–
$\gamma K^*(892)\overline{K}^*(892)$		$(4.0 \pm 1.3) \times 10^{-3}$		1266
$\gamma\phi\phi$		$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1	1166
$\gamma p\overline{p}$		$(3.8 \pm 1.0) \times 10^{-4}$		1232
$\gamma\eta(2225)$		$(3.14 {}^{+0.50}_{-0.19}) \times 10^{-4}$		752
$\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0$		$(1.3 \pm 0.9) \times 10^{-4}$		1048
$\gamma\eta(1760) \rightarrow \gamma\omega\omega$		$(1.98 \pm 0.33) \times 10^{-3}$		–
$\gamma\eta(1760) \rightarrow \gamma\gamma\gamma$		$< 4.80 \times 10^{-6}$	CL=90%	–
$\gamma X(1835) \rightarrow \gamma\pi^+\pi^-\eta'$		$(2.77 {}^{+0.34}_{-0.40}) \times 10^{-4}$	S=1.1	1006
$\gamma X(1835) \rightarrow \gamma p\overline{p}$		$(7.7 {}^{+1.5}_{-0.9}) \times 10^{-5}$		–
$\gamma X(1835) \rightarrow \gamma K^0_S K^0_S \eta$		$(3.3 {}^{+2.0}_{-1.3}) \times 10^{-5}$		–
$\gamma X(1835) \rightarrow \gamma\gamma\gamma$		$< 3.56 \times 10^{-6}$	CL=90%	–
$\gamma X(1840) \rightarrow \gamma 3(\pi^+\pi^-)$		$(2.4 {}^{+0.7}_{-0.8}) \times 10^{-5}$		–
$\gamma(K\overline{K}\pi)$ $[J^{PC} = 0^{-+}]$		$(7 \pm 4) \times 10^{-4}$	S=2.1	1442
$\gamma\pi^0$		$(3.56 \pm 0.17) \times 10^{-5}$		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
$\gamma f_0(2100) \rightarrow \gamma\eta\eta$		$(1.13 {}^{+0.60}_{-0.30}) \times 10^{-4}$		–
$\gamma f_0(2100) \rightarrow \gamma\pi\pi$		$(6.2 \pm 1.0) \times 10^{-4}$		–
$\gamma f_0(2200) \rightarrow \gamma K\overline{K}$		$(5.9 \pm 1.3) \times 10^{-4}$		–
$\gamma f_0(2200) \rightarrow \gamma K^0_S K^0_S$		$(2.72 {}^{+0.19}_{-0.50}) \times 10^{-4}$		–
$\gamma f_J(2220) \rightarrow \gamma\pi\pi$		$< 3.9 \times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \rightarrow \gamma K\overline{K}$		$< 4.1 \times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \rightarrow \gamma p\overline{p}$		$(1.5 \pm 0.8) \times 10^{-5}$		–
$\gamma f_0(2330) \rightarrow \gamma K^0_S K^0_S$		$(4.9 \pm 0.7) \times 10^{-5}$		–
$\gamma f_2(2340) \rightarrow \gamma\eta\eta$		$(5.6 {}^{+2.4}_{-2.2}) \times 10^{-5}$		–
$\gamma f_2(2340) \rightarrow \gamma K^0_S K^0_S$		$(5.5 {}^{+4.0}_{-1.5}) \times 10^{-5}$		–
$\gamma f_0(1500) \rightarrow \gamma\pi\pi$		$(1.09 \pm 0.24) \times 10^{-4}$		1183
$\gamma f_0(1500) \rightarrow \gamma\eta\eta$		$(1.7 {}^{+0.6}_{-1.4}) \times 10^{-5}$		–
$\gamma A \rightarrow \gamma$invisible	[e]	$< 6.3 \times 10^{-6}$	CL=90%	–
$\gamma A^0 \rightarrow \gamma\mu^+\mu^-$	[f]	$< 5 \times 10^{-6}$	CL=90%	–

Dalitz decays

$\pi^0 e^+ e^-$	$(7.6 \pm 1.4) \times 10^{-7}$			1546
$\eta e^+ e^-$	$(1.43 \pm 0.07) \times 10^{-5}$			1500
$\eta'(958) e^+ e^-$	$(6.59 \pm 0.18) \times 10^{-5}$			1400
$\eta U \rightarrow \eta e^+ e^-$	$< 9.11 \times 10^{-7}$	CL=90%		–
$\eta'(958) U \rightarrow \eta'(958) e^+ e^-$	$< 2.0 \times 10^{-7}$	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.	$< 8.5 \times 10^{-8}$	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	$< 8.3 \times 10^{-6}$	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 $m = 3414.71 \pm 0.30$ MeV
Full width $\Gamma = 10.8 \pm 0.6$ MeV

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(2.34 ± 0.18) %		1679
$\rho^0 \pi^+ \pi^-$	$(9.1 \pm 2.9) \times 10^{-3}$		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.	(2.9 ± 0.4) %		1607
$4\pi^0$	$(3.3 \pm 0.4) \times 10^{-3}$		1681
$\pi^+\pi^- K^+ K^-$	(1.81 ± 0.14) %		1580

$K_0^*(1430)^0 \overline{K}_0^*(1430)^0 \rightarrow \pi^+\pi^- K^+ K^-$	$(9.8\ ^{+4.0}_{-2.8}) \times 10^{-4}$		–
$K_0^*(1430)^0 \overline{K}_2^*(1430)^0 +$ c.c. $\rightarrow \pi^+\pi^- K^+ K^-$	$(8.0\ ^{+2.0}_{-2.4}) \times 10^{-4}$		–
$K_1(1270)^+ K^- +$ c.c. $\rightarrow \pi^+\pi^- K^+ K^-$	$(6.3 \pm 1.9) \times 10^{-3}$		–
$K_1(1400)^+ K^- +$ 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
$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	$(4.2 \pm 0.4) \times 10^{-3}$		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.	$(4.6 \pm 1.2) \times 10^{-3}$		–
$K_S^0 K_S^0 \pi^+ \pi^-$	$(5.7 \pm 1.1) \times 10^{-3}$		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
$K_S^0 K_S^0$	$(3.16 \pm 0.17) \times 10^{-3}$		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 ± 0.5)	$\times 10^{-3}$		1331
$K^+ K^- K^+ K^-$	(2.82 ± 0.29)	$\times 10^{-3}$		1333
$K^+ K^- \phi$	(9.7 ± 2.5)	$\times 10^{-4}$		1381
$\overline{K}^0 K^+ \pi^- \phi +$ c.c.	(3.7 ± 0.6)	$\times 10^{-3}$		1326
$K^+ K^- \pi^0 \phi$	(1.90 ± 0.35)	$\times 10^{-3}$		1329
$\phi \pi^+ \pi^- \pi^0$	(1.18 ± 0.15)	$\times 10^{-3}$		1525
$\phi \phi$	(8.0 ± 0.7)	$\times 10^{-4}$		1370
$p \overline{p}$	(2.21 ± 0.08)	$\times 10^{-4}$		1426
$p \overline{p} \pi^0$	(7.0 ± 0.7)	$\times 10^{-4}$	S=1.3	1379
$p \overline{p} \eta$	(3.5 ± 0.4)	$\times 10^{-4}$		1187
$p \overline{p} \omega$	(5.2 ± 0.6)	$\times 10^{-4}$		1043
$p \overline{p} \phi$	(6.0 ± 1.4)	$\times 10^{-5}$		876
$p \overline{p} \pi^+ \pi^-$	(2.1 ± 0.7)	$\times 10^{-3}$	S=1.4	1320
$p \overline{p} \pi^0 \pi^0$	(1.04 ± 0.28)	$\times 10^{-3}$		1324
$p \overline{p} K^+ K^-$ (non-resonant)	(1.22 ± 0.26)	$\times 10^{-4}$		890
$p \overline{p} K^0_S K^0_S$	< 8.8	$\times 10^{-4}$	CL=90%	884
$p \overline{n} \pi^-$	(1.27 ± 0.11)	$\times 10^{-3}$		1376
$\overline{p} n \pi^+$	(1.37 ± 0.12)	$\times 10^{-3}$		1376
$p \overline{n} \pi^- \pi^0$	(2.34 ± 0.21)	$\times 10^{-3}$		1321
$\overline{p} n \pi^+ \pi^0$	(2.21 ± 0.18)	$\times 10^{-3}$		1321
$\Lambda \overline{\Lambda}$	(3.27 ± 0.24)	$\times 10^{-4}$		1292
$\Lambda \overline{\Lambda} \pi^+ \pi^-$	(1.18 ± 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 ± 0.12)	$\times 10^{-3}$	S=1.3	1132
$K^+ \overline{p} \Lambda(1520) +$ c.c.	(2.9 ± 0.7)	$\times 10^{-4}$		858
$\Lambda(1520) \overline{\Lambda}(1520)$	(3.1 ± 1.2)	$\times 10^{-4}$		779
$\Sigma^0 \overline{\Sigma}^0$	(4.68 ± 0.32)	$\times 10^{-4}$		1222
$\Sigma^+ \overline{\Sigma}^-$	(4.6 ± 0.8)	$\times 10^{-4}$	S=2.6	1225
$\Sigma(1385)^+ \overline{\Sigma}(1385)^-$	(1.6 ± 0.6)	$\times 10^{-4}$		1001
$\Sigma(1385)^- \overline{\Sigma}(1385)^+$	(2.3 ± 0.7)	$\times 10^{-4}$		1001
$K^- \Lambda \overline{\Xi}^+ +$ c.c.	(1.94 ± 0.35)	$\times 10^{-4}$		873
$\Xi^0 \overline{\Xi}^0$	(3.1 ± 0.8)	$\times 10^{-4}$		1089
$\Xi^- \overline{\Xi}^+$	(4.8 ± 0.7)	$\times 10^{-4}$		1081
$\eta_c \pi^+ \pi^-$	< 7	$\times 10^{-4}$	CL=90%	307

Radiative decays

$\gamma J/\psi(1S)$	(1.40 ± 0.05) %			303
$\gamma \rho^0$	< 9	$\times 10^{-6}$	CL=90%	1619
$\gamma \omega$	< 8	$\times 10^{-6}$	CL=90%	1618
$\gamma \phi$	< 6	$\times 10^{-6}$	CL=90%	1555

$\gamma\gamma$	$(2.04\pm0.09)\times10^{-4}$	1707
$e^+e^-J/\psi(1S)$	$(1.54\pm0.33)\times10^{-4}$	303

$\chi_{c1}(1P)$

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

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

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$3(\pi^+\pi^-)$	$(5.8\pm1.4)\times10^{-3}$	S=1.2	1683
$2(\pi^+\pi^-)$	$(7.6\pm2.6)\times10^{-3}$		1728
$\pi^+\pi^-\pi^0\pi^0$	(1.19 ± 0.15) %		1729
$\rho^+\pi^-\pi^0$ + c.c.	(1.45 ± 0.24) %		1658
$\rho^0\pi^+\pi^-$	$(3.9\pm3.5)\times10^{-3}$		1657
$4\pi^0$	$(5.4\pm0.8)\times10^{-4}$		1729
$\pi^+\pi^-K^+K^-$	$(4.5\pm1.0)\times10^{-3}$		1632
$K^+K^-\pi^0\pi^0$	$(1.12\pm0.27)\times10^{-3}$		1634
$K^+K^-\pi^+\pi^-\pi^0$	(1.15 ± 0.13) %		1598
$K^0_SK^\pm\pi^\mp\pi^+\pi^-$	$(7.5\pm0.8)\times10^{-3}$		1596
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(8.6\pm1.4)\times10^{-3}$		1632
$\rho^-K^+\overline{K}^0$ + c.c.	$(5.0\pm1.2)\times10^{-3}$		1514
$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(2.3\pm0.6)\times10^{-3}$		–
$K^+K^-\eta\pi^0$	$(1.12\pm0.34)\times10^{-3}$		1523
$\pi^+\pi^-K^0_SK^0_S$	$(6.9\pm2.9)\times10^{-4}$		1630
$K^+K^-\eta$	$(3.2\pm1.0)\times10^{-4}$		1566
$\overline{K}^0K^+\pi^-$ + c.c.	$(7.0\pm0.6)\times10^{-3}$		1661
$K^*(892)^0\overline{K}^0$ + c.c.	$(10\pm4)\times10^{-4}$		1602
$K^*(892)^+K^-$ + c.c.	$(1.4\pm0.6)\times10^{-3}$		1602
$K^*_J(1430)^0\overline{K}^0$ + c.c. $\to K^0_SK^+\pi^-$ + c.c.	$<8\times10^{-4}$	CL=90%	–
$K^*_J(1430)^+K^-$ + c.c. $\to K^0_SK^+\pi^-$ + c.c.	$<2.1\times10^{-3}$	CL=90%	–
$K^+K^-\pi^0$	$(1.81\pm0.24)\times10^{-3}$		1662
$\eta\pi^+\pi^-$	$(4.62\pm0.23)\times10^{-3}$		1701
$a_0(980)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(3.2\pm0.4)\times10^{-3}$	S=2.2	–
$a_2(1320)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(1.76\pm0.24)\times10^{-4}$		–
$a_2(1700)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(4.6\pm0.7)\times10^{-5}$		–
$f_2(1270)\eta \to \eta\pi^+\pi^-$	$(3.5\pm0.6)\times10^{-4}$		–
$f_4(2050)\eta \to \eta\pi^+\pi^-$	$(2.5\pm0.9)\times10^{-5}$		–

$\pi_1(1400)^+\pi^- +$ c.c. $\rightarrow$ $\eta\pi^+\pi^-$	$< 5 \times 10^{-5}$	CL=90%	–
$\pi_1(1600)^+\pi^- +$ c.c. $\rightarrow$ $\eta\pi^+\pi^-$	$< 1.5 \times 10^{-5}$	CL=90%	–
$\pi_1(2015)^+\pi^- +$ c.c. $\rightarrow$ $\eta\pi^+\pi^-$	$< 8 \times 10^{-6}$	CL=90%	–
$f_2(1270)\eta$	$(6.7 \pm 1.1) \times 10^{-4}$		1467
$\pi^+\pi^-\eta'$	$(2.2 \pm 0.4) \times 10^{-3}$		1612
$K^+K^-\eta'(958)$	$(8.8 \pm 0.9) \times 10^{-4}$		1461
$K_0^*(1430)^+K^-$ + c.c.	$(6.4 {}^{+2.2}_{-2.8}) \times 10^{-4}$		–
$f_0(980)\eta'(958)$	$(1.6 {}^{+1.4}_{-0.7}) \times 10^{-4}$		1460
$f_0(1710)\eta'(958)$	$(7 {}^{+7}_{-5}) \times 10^{-5}$		1118
$f_2'(1525)\eta'(958)$	$(9 \pm 6) \times 10^{-5}$		1225
$\pi^0 f_0(980) \rightarrow \pi^0\pi^+\pi^-$	$(3.5 \pm 0.9) \times 10^{-7}$		–
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$		1577
$K^*(892)^0\overline{K}^*(892)^0$	$(1.4 \pm 0.4) \times 10^{-3}$		1512
$K^+K^-K_S^0K_S^0$	$< 4 \times 10^{-4}$	CL=90%	1390
$K^+K^-K^+K^-$	$(5.4 \pm 1.1) \times 10^{-4}$		1393
$K^+K^-\phi$	$(4.1 \pm 1.5) \times 10^{-4}$		1440
$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(3.3 \pm 0.5) \times 10^{-3}$		1387
$K^+K^-\pi^0\phi$	$(1.62 \pm 0.30) \times 10^{-3}$		1390
$\phi\pi^+\pi^-\pi^0$	$(7.5 \pm 1.0) \times 10^{-4}$		1578
$\omega\omega$	$(5.7 \pm 0.7) \times 10^{-4}$		1571
ωK^+K^-	$(7.8 \pm 0.9) \times 10^{-4}$		1513
$\omega\phi$	$(2.7 \pm 0.4) \times 10^{-5}$		1503
$\phi\phi$	$(4.2 \pm 0.5) \times 10^{-4}$		1429
$p\overline{p}$	$(7.60 \pm 0.34) \times 10^{-5}$		1484
$p\overline{p}\pi^0$	$(1.55 \pm 0.18) \times 10^{-4}$		1438
$p\overline{p}\eta$	$(1.45 \pm 0.25) \times 10^{-4}$		1254
$p\overline{p}\omega$	$(2.12 \pm 0.31) \times 10^{-4}$		1117
$p\overline{p}\phi$	$< 1.7 \times 10^{-5}$	CL=90%	962
$p\overline{p}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$		1381
$p\overline{p}\pi^0\pi^0$	$< 5 \times 10^{-4}$	CL=90%	1385
$p\overline{p}K^+K^-$ (non-resonant)	$(1.27 \pm 0.22) \times 10^{-4}$		974
$p\overline{p}K_S^0K_S^0$	$< 4.5 \times 10^{-4}$	CL=90%	968
$p\overline{n}\pi^-$	$(3.8 \pm 0.5) \times 10^{-4}$		1435
$\overline{p}n\pi^+$	$(3.9 \pm 0.5) \times 10^{-4}$		1435
$p\overline{n}\pi^-\pi^0$	$(1.03 \pm 0.12) \times 10^{-3}$		1383
$\overline{p}n\pi^+\pi^0$	$(1.01 \pm 0.12) \times 10^{-3}$		1383
$\Lambda\overline{\Lambda}$	$(1.14 \pm 0.11) \times 10^{-4}$		1355
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.9 \pm 0.5) \times 10^{-4}$		1223
$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(2.5 \pm 0.6) \times 10^{-4}$		1223

$\Sigma(1385)^+\overline{\Lambda}\pi^- +$ c.c.	$< 1.3 \times 10^{-4}$	CL=90%	1157
$\Sigma(1385)^-\overline{\Lambda}\pi^+ +$ c.c.	$< 1.3 \times 10^{-4}$	CL=90%	1157
$K^+\overline{p}\Lambda$+c.c.	$(4.2 \pm 0.4) \times 10^{-4}$	S=1.2	1203
$K^+\overline{p}\Lambda(1520)+$ c.c.	$(1.7 \pm 0.4) \times 10^{-4}$		950
$\Lambda(1520)\overline{\Lambda}(1520)$	$< 9 \times 10^{-5}$	CL=90%	879
$\Sigma^0\overline{\Sigma}^0$	$(4.2 \pm 0.6) \times 10^{-5}$		1288
$\Sigma^+\overline{\Sigma}^-$	$(3.6 \pm 0.7) \times 10^{-5}$		1291
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$< 9 \times 10^{-5}$	CL=90%	1081
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$< 5 \times 10^{-5}$	CL=90%	1081
$K^-\Lambda\overline{\Xi}^+ +$ c.c.	$(1.35 \pm 0.24) \times 10^{-4}$		963
$\Xi^0\overline{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%	1163
$\Xi^-\overline{\Xi}^+$	$(8.0 \pm 2.1) \times 10^{-5}$		1155
$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$		–
$K^0_S K^0_S$	$< 6 \times 10^{-5}$	CL=90%	1683
$\eta_c\pi^+\pi^-$	$< 3.2 \times 10^{-3}$	CL=90%	413
Radiative decays			
$\gamma J/\psi(1S)$	(34.3 ± 1.0) %		389
$\gamma\rho^0$	$(2.16 \pm 0.17) \times 10^{-4}$		1670
$\gamma\omega$	$(6.8 \pm 0.8) \times 10^{-5}$		1668
$\gamma\phi$	$(2.4 \pm 0.5) \times 10^{-5}$		1607
$\gamma\gamma$	$< 6.3 \times 10^{-6}$	CL=90%	1755
$e^+e^- J/\psi(1S)$	$(3.65 \pm 0.25) \times 10^{-3}$		389

$h_c(1P)$

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

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
$J/\psi(1S)\pi^+\pi^-$	$< 2.3 \times 10^{-3}$	90%	305
$p\overline{p}$	$< 1.5 \times 10^{-4}$	90%	1492
$\pi^+\pi^-\pi^0$	$< 2.2 \times 10^{-3}$		1749
$2\pi^+2\pi^-\pi^0$	$(2.2^{+0.8}_{-0.7})$ %		1716
$3\pi^+3\pi^-\pi^0$	< 2.9 %		1661
Radiative decays			
$\gamma\eta$	$(4.7 \pm 2.1) \times 10^{-4}$		1720
$\gamma\eta'(958)$	$(1.5 \pm 0.4) \times 10^{-3}$		1633
$\gamma\eta_c(1S)$	(51 ± 6) %		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 ± 0.09) %		1751
$\pi^+\pi^-\pi^0\pi^0$	(1.83 ± 0.23) %		1752
$\rho^+\pi^-\pi^0 +$ c.c.	(2.19 ± 0.34) %		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 ± 0.20) %		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.	$(2.9\ \pm0.8\ )\times10^{-3}$		–
$K^+K^-\eta\pi^0$	$(1.3\ \pm0.4\ )\times10^{-3}$		1549
$K^+K^-\pi^+\pi^-$	$(8.4\ \pm0.9\ )\times10^{-3}$		1656
$K^+K^-\pi^+\pi^-\pi^0$	(1.17 ± 0.13) %		1623
$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(7.3\ \pm0.8\ )\times10^{-3}$		1621
$K^+\overline{K}^*(892)^0\pi^- +$ c.c.	$(2.1\ \pm1.1\ )\times10^{-3}$		1602
$K^*(892)^0\overline{K}^*(892)^0$	$(2.3\ \pm0.4\ )\times10^{-3}$		1538
$3(\pi^+\pi^-)$	$(8.6\ \pm1.8\ )\times10^{-3}$		1707
$\phi\phi$	$(1.06\pm0.09)\times10^{-3}$		1457
$\omega\omega$	$(8.4\ \pm1.0\ )\times10^{-4}$		1597
ωK^+K^-	$(7.3\ \pm0.9\ )\times10^{-4}$		1540
$\omega\phi$	$(9.6\ \pm2.7\ )\times10^{-6}$		1529
$\pi\pi$	$(2.23\pm0.09)\times10^{-3}$		1773
$\rho^0\pi^+\pi^-$	$(3.7\ \pm1.6\ )\times10^{-3}$		1682
$\pi^+\pi^-\pi^0$(non-resonant)	$(2.0\ \pm0.4\ )\times10^{-5}$		1765
$\rho(770)^\pm\pi^\mp$	$(6\ \ \pm4\ \ )\times10^{-6}$		–
$\pi^+\pi^-\eta$	$(4.8\ \pm1.3\ )\times10^{-4}$		1724
$\pi^+\pi^-\eta'$	$(5.0\ \pm1.8\ )\times10^{-4}$		1636
$\eta\eta$	$(5.4\ \pm0.4\ )\times10^{-4}$		1692
K^+K^-	$(1.01\pm0.06)\times10^{-3}$		1708
$K^0_S K^0_S$	$(5.2\ \pm0.4\ )\times10^{-4}$		1707
$K^*(892)^\pm K^\mp$	$(1.44\pm0.21)\times10^{-4}$		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.	$(1.24 \pm 0.17) \times 10^{-3}$		1444
$K_3^*(1780)^\pm K^\mp$	$(5.2 \pm 0.8) \times 10^{-4}$		–
$K_3^*(1780)^0 \overline{K}^0 +$ c.c.	$(5.6 \pm 2.1) \times 10^{-4}$		1276
$a_2(1320)^0 \pi^0$	$(1.29 \pm 0.34) \times 10^{-3}$		–
$a_2(1320)^\pm \pi^\mp$	$(1.8 \pm 0.6) \times 10^{-3}$		1531
$\overline{K}^0 K^+ \pi^- +$ 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
$\pi^+ \pi^- K_S^0 K_S^0$	$(2.2 \pm 0.5) \times 10^{-3}$		1655
$K^+ K^- K_S^0 K_S^0$	$< 4 \times 10^{-4}$	90%	1418
$K^+ K^- K^+ K^-$	$(1.65 \pm 0.20) \times 10^{-3}$		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
$p \overline{p}$	$(7.33 \pm 0.33) \times 10^{-5}$		1510
$p \overline{p} \pi^0$	$(4.7 \pm 0.4) \times 10^{-4}$		1465
$p \overline{p} \eta$	$(1.74 \pm 0.25) \times 10^{-4}$		1285
$p \overline{p} \omega$	$(3.6 \pm 0.4) \times 10^{-4}$		1152
$p \overline{p} \phi$	$(2.8 \pm 0.9) \times 10^{-5}$		1002
$p \overline{p} \pi^+ \pi^-$	$(1.32 \pm 0.34) \times 10^{-3}$		1410
$p \overline{p} \pi^0 \pi^0$	$(7.8 \pm 2.3) \times 10^{-4}$		1414
$p \overline{p} K^+ K^-$ (non-resonant)	$(1.91 \pm 0.32) \times 10^{-4}$		1013
$p \overline{p} K_S^0 K_S^0$	$< 7.9 \times 10^{-4}$	90%	1007
$p \overline{n} \pi^-$	$(8.5 \pm 0.9) \times 10^{-4}$		1463
$\overline{p} n \pi^+$	$(8.9 \pm 0.8) \times 10^{-4}$		1463
$p \overline{n} \pi^- \pi^0$	$(2.17 \pm 0.18) \times 10^{-3}$		1411
$\overline{p} n \pi^+ \pi^0$	$(2.11 \pm 0.18) \times 10^{-3}$		1411
$\Lambda \overline{\Lambda}$	$(1.84 \pm 0.15) \times 10^{-4}$		1384
$\Lambda \overline{\Lambda} \pi^+ \pi^-$	$(1.25 \pm 0.15) \times 10^{-3}$		1255
$\Lambda \overline{\Lambda} \pi^+ \pi^-$ (non-resonant)	$(6.6 \pm 1.5) \times 10^{-4}$		1255
$\Sigma(1385)^+ \overline{\Lambda} \pi^- +$ c.c.	$< 4 \times 10^{-4}$	90%	1192
$\Sigma(1385)^- \overline{\Lambda} \pi^+ +$ c.c.	$< 6 \times 10^{-4}$	90%	1192
$K^+ \overline{p} \Lambda$ + c.c.	$(7.8 \pm 0.5) \times 10^{-4}$		1236
$K^+ \overline{p} \Lambda(1520) +$ c.c.	$(2.8 \pm 0.7) \times 10^{-4}$		992
$\Lambda(1520) \overline{\Lambda}(1520)$	$(4.6 \pm 1.5) \times 10^{-4}$		923
$\Sigma^0 \overline{\Sigma}^0$	$(3.7 \pm 0.6) \times 10^{-5}$		1319
$\Sigma^+ \overline{\Sigma}^-$	$(3.4 \pm 0.7) \times 10^{-5}$		1322
$\Sigma(1385)^+ \overline{\Sigma}(1385)^-$	$< 1.6 \times 10^{-4}$	90%	1118

$\Sigma(1385)^- \overline{\Sigma}(1385)^+$	< 8	$\times 10^{-5}$	90%	1118
$K^- \Lambda \overline{\Xi}^+ +$ c.c.	(1.76 ± 0.32)	$\times 10^{-4}$		1004
$\Xi^0 \overline{\Xi}^0$	< 1.0	$\times 10^{-4}$	90%	1197
$\Xi^- \overline{\Xi}^+$	(1.42 ± 0.32)	$\times 10^{-4}$		1189
$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5	%	90%	185
$\pi^0 \eta_c$	< 3.2	$\times 10^{-3}$	90%	511
$\eta_c(1S)\pi^+\pi^-$	< 5.4	$\times 10^{-3}$	90%	459
Radiative decays				
$\gamma J/\psi(1S)$	(19.0 ± 0.5) %			430
$\gamma \rho^0$	< 1.9	$\times 10^{-5}$	90%	1694
$\gamma \omega$	< 6	$\times 10^{-6}$	90%	1692
$\gamma \phi$	< 7	$\times 10^{-6}$	90%	1632
$\gamma\gamma$	(2.85 ± 0.10)	$\times 10^{-4}$		1778
$e^+ e^- J/\psi(1S)$	(2.37 ± 0.16)	$\times 10^{-3}$		430

$\eta_c(2S)$

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

Quantum numbers are quark model predictions.

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

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

$\psi(2S)$

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

Mass $m = 3686.097 \pm 0.025$ MeV (S = 2.6)
Full width $\Gamma = 294 \pm 8$ keV
$\Gamma_{ee} = 2.33 \pm 0.04$ 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 ±1.5) %		–
e^+e^-	(7.93 ±0.17) $\times 10^{-3}$		1843
$\mu^+\mu^-$	(8.0 ±0.6) $\times 10^{-3}$		1840
$\tau^+\tau^-$	(3.1 ±0.4) $\times 10^{-3}$		489
Decays into $J/\psi(1S)$ and anything			
$J/\psi(1S)$ anything	(61.4 ±0.6) %		–
$J/\psi(1S)$ neutrals	(25.38 ±0.32) %		–
$J/\psi(1S)\pi^+\pi^-$	(34.68 ±0.30) %		477
$J/\psi(1S)\pi^0\pi^0$	(18.24 ±0.31) %		481
$J/\psi(1S)\eta$	(3.37 ±0.05) %		199
$J/\psi(1S)\pi^0$	(1.268±0.032) $\times 10^{-3}$		528
Hadronic decays			
$\pi^0 h_c(1P)$	(8.6 ±1.3) $\times 10^{-4}$		85
$3(\pi^+\pi^-)\pi^0$	(3.5 ±1.6) $\times 10^{-3}$		1746
$2(\pi^+\pi^-)\pi^0$	(2.9 ±1.0) $\times 10^{-3}$	S=4.7	1799
$\rho a_2(1320)$	(2.6 ±0.9) $\times 10^{-4}$		1501
$\pi^+\pi^-\pi^0\pi^0\pi^0$	(5.3 ±0.9) $\times 10^{-3}$		1800
$\rho^\pm\pi^\mp\pi^0\pi^0$	$<$ 2.7 $\times 10^{-3}$	CL=90%	1737
$p\overline{p}$	(2.94 ±0.08) $\times 10^{-4}$		1586
$n\overline{n}$	(3.06 ±0.15) $\times 10^{-4}$		1586
$\Delta^{++}\overline{\Delta}^{--}$	(1.28 ±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 ±0.4) $\times 10^{-5}$		1197
$\Lambda\overline{p}K^+$	(1.00 ±0.14) $\times 10^{-4}$		1327
$\Lambda\overline{p}K^+\pi^+\pi^-$	(1.8 ±0.4) $\times 10^{-4}$		1167
$\Lambda\overline{\Lambda}\pi^+\pi^-$	(2.8 ±0.6) $\times 10^{-4}$		1346
$\Lambda\overline{\Lambda}$	(3.81 ±0.13) $\times 10^{-4}$	S=1.4	1467
$\Lambda\overline{\Sigma}^+\pi^-$ + c.c.	(1.40 ±0.13) $\times 10^{-4}$		1376
$\Lambda\overline{\Sigma}^-\pi^+$ + c.c.	(1.54 ±0.14) $\times 10^{-4}$		1379
$\Lambda\overline{\Sigma}^0$	(1.23 ±0.24) $\times 10^{-5}$		1437
$\Sigma^0\overline{p}K^+$ + c.c.	(1.67 ±0.18) $\times 10^{-5}$		1291

$\Sigma^+ \overline{\Sigma}^-$	$(2.32 \pm 0.12) \times 10^{-4}$		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
$\Xi(1530)^0 \overline{\Xi}(1530)^0$	$(5.2 {}^{+3.2}_{-1.2}) \times 10^{-5}$		1025
$K^- \Lambda \overline{\Xi}^+ +$ c.c.	$(3.9 \pm 0.4) \times 10^{-5}$		1114
$\Xi(1690)^- \overline{\Xi}^+ \rightarrow K^- \Lambda \overline{\Xi}^+ +$ c.c.	$(5.2 \pm 1.6) \times 10^{-6}$		–
$\Xi(1820)^- \overline{\Xi}^+ \rightarrow K^- \Lambda \overline{\Xi}^+ +$ c.c.	$(1.20 \pm 0.32) \times 10^{-5}$		–
$K^- \Sigma^0 \overline{\Xi}^+ +$ c.c.	$(3.7 \pm 0.4) \times 10^{-5}$		1060
$\Omega^- \overline{\Omega}^+$	$(5.2 \pm 0.4) \times 10^{-5}$		774
$\pi^0 p \overline{p}$	$(1.53 \pm 0.07) \times 10^{-4}$		1543
$N(940) \overline{p} +$ c.c. $\rightarrow \pi^0 p \overline{p}$	$(6.4 {}^{+1.8}_{-1.3}) \times 10^{-5}$		–
$N(1440) \overline{p} +$ c.c. $\rightarrow \pi^0 p \overline{p}$	$(7.3 {}^{+1.7}_{-1.5}) \times 10^{-5}$	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. $\rightarrow \pi^0 p \overline{p}$	$(2.5 \pm 1.0) \times 10^{-5}$		–
$N(1650) \overline{p} +$ 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. $\rightarrow \pi^0 p \overline{p}$	$(2.13 {}^{+0.40}_{-0.31}) \times 10^{-5}$		–
$\pi^0 f_0(2100) \rightarrow \pi^0 p \overline{p}$	$(1.1 \pm 0.4) \times 10^{-5}$		–
$\eta p \overline{p}$	$(6.0 \pm 0.4) \times 10^{-5}$		1373
$\eta f_0(2100) \rightarrow \eta p \overline{p}$	$(1.2 \pm 0.4) \times 10^{-5}$		–
$N(1535) \overline{p} \rightarrow \eta p \overline{p}$	$(4.4 \pm 0.7) \times 10^{-5}$		–
$\omega p \overline{p}$	$(6.9 \pm 2.1) \times 10^{-5}$		1247
$\eta' p \overline{p}$	$(1.10 \pm 0.13) \times 10^{-5}$		1141
$\phi p \overline{p}$	$< 2.4 \times 10^{-5}$	CL=90%	1109
$\pi^+ \pi^- p \overline{p}$	$(6.0 \pm 0.4) \times 10^{-4}$		1491
$p \overline{n} \pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$		–
$p \overline{n} \pi^- \pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$		1492
$2(\pi^+ \pi^- \pi^0)$	$(4.8 \pm 1.5) \times 10^{-3}$		1776
$\eta \pi^+ \pi^-$	$< 1.6 \times 10^{-4}$	CL=90%	1791
$\eta \pi^+ \pi^- \pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$		1778
$2(\pi^+ \pi^-) \eta$	$(1.2 \pm 0.6) \times 10^{-3}$		1758
$\pi^+ \pi^- \pi^0 \pi^0 \eta$	$< 4 \times 10^{-4}$	CL=90%	1760
$\eta' \pi^+ \pi^- \pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$		1692

$\omega \pi^+ \pi^-$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1	1748
$b_1^\pm \pi^\mp$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1	1635
$b_1^0 \pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$		–
$\omega f_2(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$		1515
$\omega \pi^0 \pi^0$	$(1.11 \pm 0.35) \times 10^{-3}$		1749
$\pi^0 \pi^0 K^+ K^-$	$(2.6 \pm 1.3) \times 10^{-4}$		1728
$\pi^+ \pi^- K^+ K^-$	$(7.3 \pm 0.5) \times 10^{-4}$		1726
$\pi^0 \pi^0 K^0_S K^0_L$	$(1.3 \pm 0.6) \times 10^{-3}$		1726
$\rho^0 K^+ K^-$	$(2.2 \pm 0.4) \times 10^{-4}$		1616
$K^*(892)^0 \overline{K}^*_2(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		1418
$K^+ K^- \pi^+ \pi^- \eta$	$(1.3 \pm 0.7) \times 10^{-3}$		1574
$K^+ K^- 2(\pi^+ \pi^-) \pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$		1611
$K^+ K^- 2(\pi^+ \pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$		1654
$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$		1581
$K^0_S K^0_S \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$		1724
$\rho^0 p \overline{p}$	$(5.0 \pm 2.2) \times 10^{-5}$		1252
$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(6.7 \pm 2.5) \times 10^{-4}$		1674
$2(\pi^+ \pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2	1817
$\rho^0 \pi^+ \pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4	1750
$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$		1694
$\omega f_0(1710) \rightarrow \omega K^+ K^-$	$(5.9 \pm 2.2) \times 10^{-5}$		–
$K^*(892)^0 K^- \pi^+ \pi^0 +$ 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.	$(6.1 \pm 1.8) \times 10^{-4}$		–
$\eta K^+ K^-$, no $\eta \phi$	$(3.1 \pm 0.4) \times 10^{-5}$		1664
$\omega K^+ K^-$	$(1.62 \pm 0.11) \times 10^{-4}$	S=1.1	1614
$\omega K^*(892)^+ K^-$ + c.c.	$(2.07 \pm 0.26) \times 10^{-4}$		1482
$\omega K^*_2(1430)^+ K^-$ + c.c.	$(6.1 \pm 1.2) \times 10^{-5}$		1253
$\omega \overline{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$		1481
$\omega \overline{K}^*_2(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$		1251
$\omega X(1440) \rightarrow \omega K^0_S K^- \pi^+ +$ c.c.	$(1.6 \pm 0.4) \times 10^{-5}$		–
$\omega X(1440) \rightarrow \omega K^+ K^- \pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$		–
$\omega f_1(1285) \rightarrow \omega K^0_S K^- \pi^+ +$ c.c.	$(3.0 \pm 1.0) \times 10^{-6}$		–
$\omega f_1(1285) \rightarrow \omega K^+ K^- \pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$		–
$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8	1774
$p \overline{p} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$		1435
$K^+ K^-$	$(7.5 \pm 0.5) \times 10^{-5}$		1776
$K^0_S K^0_L$	$(5.34 \pm 0.33) \times 10^{-5}$		1775
$\pi^+ \pi^- \pi^0$	$(2.01 \pm 0.17) \times 10^{-4}$	S=1.7	1830
$\rho(2150) \pi \rightarrow \pi^+ \pi^- \pi^0$	$(1.9 {}^{+1.2}_{-0.4}) \times 10^{-4}$		–

$\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8	–
$\pi^+\pi^-$	$(7.8 \pm 2.6) \times 10^{-6}$		1838
$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%	1532
$K_2^*(1430)^\pm K^\mp$	$(7.1 {}^{+1.3}_{-0.9}) \times 10^{-5}$		–
$K^+K^-\pi^0$	$(4.07 \pm 0.31) \times 10^{-5}$		1754
$K_S^0 K_L^0 \pi^0$	$< 3.0 \times 10^{-4}$	CL=90%	1753
$K_S^0 K_L^0 \eta$	$(1.3 \pm 0.5) \times 10^{-3}$		1661
$K^+K^*(892)^- +$ c.c.	$(2.9 \pm 0.4) \times 10^{-5}$	S=1.2	1698
$K^*(892)^0\overline{K}^0 +$ c.c.	$(1.09 \pm 0.20) \times 10^{-4}$		1697
$\phi\pi^+\pi^-$	$(1.18 \pm 0.26) \times 10^{-4}$	S=1.5	1690
$\phi f_0(980) \rightarrow \pi^+\pi^-$	$(7.5 \pm 3.3) \times 10^{-5}$	S=1.6	–
$2(K^+K^-)$	$(6.3 \pm 1.3) \times 10^{-5}$		1499
ϕK^+K^-	$(7.0 \pm 1.6) \times 10^{-5}$		1546
$2(K^+K^-)\pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$		1440
$\phi\eta$	$(3.10 \pm 0.31) \times 10^{-5}$		1654
$\eta\phi(2170)$, $\phi(2170) \rightarrow \phi f_0(980)$, $f_0 \rightarrow \pi^+\pi^-$	$< 2.2 \times 10^{-6}$	CL=90%	–
$\phi\eta'$	$(3.1 \pm 1.6) \times 10^{-5}$		1555
$\omega\eta'$	$(3.2 {}^{+2.5}_{-2.1}) \times 10^{-5}$		1623
$\omega\pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$		1757
$\rho\eta'$	$(1.9 {}^{+1.7}_{-1.2}) \times 10^{-5}$		1625
$\rho\eta$	$(2.2 \pm 0.6) \times 10^{-5}$	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%	512
$p\overline{p}K^+K^-$	$(2.7 \pm 0.7) \times 10^{-5}$		1118
$\overline{\Lambda}nK_S^0 +$ c.c.	$(8.1 \pm 1.8) \times 10^{-5}$		1324
$\phi f_2'(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$		1321
$\Theta(1540)\overline{\Theta}(1540) \rightarrow K_S^0 pK^-\overline{n} +$ c.c.	$< 8.8 \times 10^{-6}$	CL=90%	–
$\Theta(1540)K^-\overline{n} \rightarrow K_S^0 pK^-\overline{n}$	$< 1.0 \times 10^{-5}$	CL=90%	–
$\Theta(1540)K_S^0\overline{p} \rightarrow K_S^0\overline{p}K^+n$	$< 7.0 \times 10^{-6}$	CL=90%	–
$\overline{\Theta}(1540)K^+n \rightarrow K_S^0\overline{p}K^+n$	$< 2.6 \times 10^{-5}$	CL=90%	–
$\overline{\Theta}(1540)K_S^0 p \rightarrow K_S^0 pK^-\overline{n}$	$< 6.0 \times 10^{-6}$	CL=90%	–
$K_S^0 K_S^0$	$< 4.6 \times 10^{-6}$		1775
$\Lambda_c^+\overline{p}e^+e^-$ + c.c.	$< 1.7 \times 10^{-6}$	CL=90%	830

Radiative decays

$\gamma\chi_{c0}(1P)$	(9.79 ± 0.20) %		261
$\gamma\chi_{c1}(1P)$	(9.75 ± 0.24) %		171
$\gamma\chi_{c2}(1P)$	(9.52 ± 0.20) %		128
$\gamma\eta_c(1S)$	$(3.4 \pm 0.5) \times 10^{-3}$	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
$\gamma\eta'(958)$	$(1.24 \pm 0.04) \times 10^{-4}$			1719
$\gamma f_2(1270)$	$(2.73 {}^{+0.29}_{-0.25}) \times 10^{-4}$	S=1.8		1622
$\gamma f_0(1370) \rightarrow \gamma K\overline{K}$	$(3.1 \pm 1.7) \times 10^{-5}$			1588
$\gamma f_0(1500)$	$(9.3 \pm 1.9) \times 10^{-5}$			1535
$\gamma f'_2(1525)$	$(3.3 \pm 0.8) \times 10^{-5}$			1528
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	$(3.5 \pm 0.6) \times 10^{-5}$			–
$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$	$(6.6 \pm 0.7) \times 10^{-5}$			–
$\gamma f_0(2100) \rightarrow \gamma\pi\pi$	$(4.8 \pm 1.0) \times 10^{-6}$			1244
$\gamma f_0(2200) \rightarrow \gamma K\overline{K}$	$(3.2 \pm 1.0) \times 10^{-6}$			1193
$\gamma f_J(2220) \rightarrow \gamma\pi\pi$	$< 5.8 \times 10^{-6}$	CL=90%		1168
$\gamma f_J(2220) \rightarrow \gamma K\overline{K}$	$< 9.5 \times 10^{-6}$	CL=90%		1168
$\gamma\gamma$	$< 1.5 \times 10^{-4}$	CL=90%		1843
$\gamma\eta$	$(9.2 \pm 1.8) \times 10^{-7}$			1802
$\gamma\eta\pi^+\pi^-$	$(8.7 \pm 2.1) \times 10^{-4}$			1791
$\gamma\eta(1405) \rightarrow \gamma K\overline{K}\pi$	$< 9 \times 10^{-5}$	CL=90%		1569
$\gamma\eta(1405) \rightarrow \eta\pi^+\pi^-$	$(3.6 \pm 2.5) \times 10^{-5}$			–
$\gamma\eta(1405) \rightarrow \gamma f_0(980)\pi^0 \rightarrow \gamma\pi^+\pi^-\pi^0$	$< 5.0 \times 10^{-7}$	CL=90%		–
$\gamma\eta(1475) \rightarrow K\overline{K}\pi$	$< 1.4 \times 10^{-4}$	CL=90%		–
$\gamma\eta(1475) \rightarrow \eta\pi^+\pi^-$	$< 8.8 \times 10^{-5}$	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
$\gamma f_2(1950) \rightarrow \gamma p\overline{p}$	$(1.20 \pm 0.22) \times 10^{-5}$			–
$\gamma f_2(2150) \rightarrow \gamma p\overline{p}$	$(7.2 \pm 1.8) \times 10^{-6}$			–
$\gamma X(1835) \rightarrow \gamma p\overline{p}$	$(4.6 {}^{+1.8}_{-4.0}) \times 10^{-6}$			–
$\gamma X \rightarrow \gamma p\overline{p}$ [g]	$< 2 \times 10^{-6}$	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
$e^+e^-\eta'$	$(1.90 \pm 0.26) \times 10^{-6}$			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 $m = 3773.13 \pm 0.35$ MeV (S = 1.1)
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	286
$D^0\overline{D}^0$	$(52\ ^{+4}_{-5})$ %	S=2.0	286
D^+D^-	(41 ± 4) %	S=2.0	252
$J/\psi\pi^+\pi^-$	$(1.93 \pm 0.28) \times 10^{-3}$		560
$J/\psi\pi^0\pi^0$	$(8.0 \pm 3.0) \times 10^{-4}$		564
$J/\psi\eta$	$(9 \pm 4) \times 10^{-4}$		360
$J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	CL=90%	603
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%	1683
$\phi\eta'$	$< 7 \times 10^{-4}$	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%	1804
$K^*(892)^+K^-$ + 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%	1744
$K^0_S K^0_L$	$< 1.2 \times 10^{-5}$	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%	1843
$2(\pi^+\pi^-\pi^0)$	$<$ 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%	1819
$3(\pi^+\pi^-)\pi^0$	$<$ 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%	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
$p\overline{p}\pi^0$	$<$	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%	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
$\Lambda\overline{\Lambda}\pi^0$	$<$	7	$\times 10^{-5}$	CL=90%	1468
$p\overline{p}2(\pi^+\pi^-)$	$<$	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%	1404
$\Lambda\overline{p}K^+$	$<$	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%	1262
$\Sigma^+\overline{\Sigma}^-$	$<$	1.0	$\times 10^{-4}$	CL=90%	1464
$\Sigma^0\overline{\Sigma}^0$	$<$	4	$\times 10^{-5}$	CL=90%	1462
$\Xi^+\overline{\Xi}^-$	$<$	1.5	$\times 10^{-4}$	CL=90%	1346
$\Xi^0\overline{\Xi}^0$	$<$	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)	$\times 10^{-3}$		253
$\gamma\chi_{c0}$	(	6.9 ±0.6)	$\times 10^{-3}$		341
$\gamma\eta_c$	$<$	7	$\times 10^{-4}$	CL=90%	707
$\gamma\eta_c(2S)$	$<$	9	$\times 10^{-4}$	CL=90%	133
$\gamma\eta'$	$<$	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.

Mass $m = 3822.2 \pm 1.2$ MeV
Full width $\Gamma < 16$ MeV, CL = 90%

$\psi_2(3823)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\chi_{c1}\gamma$	seen	299
$\chi_{c2}\gamma$	not seen	257

$\chi_{c1}(3872)$

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

Mass $m = 3871.69 \pm 0.17$ MeV
$m_{\chi_{c1}(3872)} - m_{J/\psi} = 775 \pm 4$ MeV
Full width $\Gamma < 1.2$ MeV, CL = 90%

$\chi_{c1}(3872)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^- J/\psi(1S)$	> 3.2 %	650
$\omega J/\psi(1S)$	> 2.3 %	†
$D^0\overline{D}^0\pi^0$	>40 %	117
$\overline{D}^{*0}D^0$	>30 %	4
$\gamma J/\psi$	$> 7 \times 10^{-3}$	697
$\gamma\psi(2S)$	> 4 %	181
$\pi^+\pi^-\eta_c(1S)$	not seen	746
$\pi^+\pi^-\chi_{c1}$	not seen	218
$p\overline{p}$	not seen	1693

$Z_c(3900)$

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

Mass $m = 3887.2 \pm 2.3$ MeV (S = 1.6)
Full width $\Gamma = 28.2 \pm 2.6$ MeV

$Z_c(3900)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\pi$	seen	699
$h_c\pi^\pm$	not seen	318
$\eta_c\pi^+\pi^-$	not seen	759
$(D\overline{D}^*)^\pm$	seen	–
D^0D^{*-} + c.c.	seen	153
D^-D^{*0} + c.c.	seen	144
$\omega\pi^\pm$	not seen	1862
$J/\psi\eta$	not seen	510
D^+D^{*-} + c.c	seen	–
$D^0\overline{D}^{*0}$ + c.c	seen	–

$X(3915)$

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

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

$X(3915)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega J/\psi$	seen	222
$\pi^+\pi^-\eta_c(1S)$	not seen	785
$\eta_c\eta$	not seen	665
$\eta_c\pi^0$	not seen	814
$K\overline{K}$	not seen	1896
$\gamma\gamma$	seen	1959

$\chi_{c2}(3930)$

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

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

$\chi_{c2}(3930)$ 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
$K\overline{K}$	not seen	1901

$X(4020)$

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

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

$X(4020)$ 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

$\psi(4040)$ [h]

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

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		226
$D^*(2010)^+D^*(2010)^-$	seen		193
$D^0D^-\pi^+$+c.c. (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen		–
$D\overline{D}^*\pi$(excl. $D^*\overline{D}^*$)	not seen		–
$D^0\overline{D}^{*-}\pi^+$+c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	seen		–
$D_s^+D_s^-$	seen		452
$J/\psi\pi^+\pi^-$	$< 4\times10^{-3}$	90%	794
$J/\psi\pi^0\pi^0$	$< 2\times10^{-3}$	90%	797
$J/\psi\eta$	$(5.2\ \pm0.7\ )\times10^{-3}$		675
$J/\psi\pi^0$	$< 2.8\times10^{-4}$	90%	823
$J/\psi\pi^+\pi^-\pi^0$	$< 2\times10^{-3}$	90%	746
$\chi_{c1}\gamma$	$< 3.4\times10^{-3}$	90%	494
$\chi_{c2}\gamma$	$< 5\times10^{-3}$	90%	454
$\chi_{c1}\pi^+\pi^-\pi^0$	< 1.1 %	90%	306
$\chi_{c2}\pi^+\pi^-\pi^0$	< 3.2 %	90%	233
$h_c(1P)\pi^+\pi^-$	$< 3\times10^{-3}$	90%	403
$\phi\pi^+\pi^-$	$< 3\times10^{-3}$	90%	1880
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 2.9\times10^{-4}$	90%	1578
$\Lambda\overline{\Lambda}\pi^0$	$< 9\times10^{-5}$	90%	1636
$\Lambda\overline{\Lambda}\eta$	$< 3.0\times10^{-4}$	90%	1452
$\Sigma^+\overline{\Sigma}^-$	$< 1.3\times10^{-4}$	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

$\chi_{c1}(4140)$

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

Mass $m = 4146.8 \pm 2.4$ MeV (S = 1.1)
Full width $\Gamma = 22^{+8}_{-7}$ MeV (S = 1.3)

$\chi_{c1}(4140)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\,\phi$	seen	217
$\gamma\gamma$	not seen	2073

$\psi(4160)$ [h]

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

Mass $m = 4191 \pm 5$ MeV
Full width $\Gamma = 70 \pm 10$ MeV
$\Gamma_{ee} = 0.48 \pm 0.22$ 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)
$e^+ e^-$	$(6.9 \pm 3.3) \times 10^{-6}$		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
$\gamma \chi_{c1}(3872) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 6.8	$\times 10^{-5}$	90%	–
$\gamma X(3915) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.36	$\times 10^{-4}$	90%	–
$\gamma X(3930) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.18	$\times 10^{-4}$	90%	–
$\gamma X(3940) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.47	$\times 10^{-4}$	90%	–
$\gamma \chi_{c1}(3872) \rightarrow \gamma \gamma J/\psi$	< 1.05	$\times 10^{-4}$	90%	–
$\gamma X(3915) \rightarrow \gamma \gamma J/\psi$	< 1.26	$\times 10^{-4}$	90%	–
$\gamma X(3930) \rightarrow \gamma \gamma J/\psi$	< 8.8	$\times 10^{-5}$	90%	–
$\gamma X(3940) \rightarrow \gamma \gamma J/\psi$	< 1.79	$\times 10^{-4}$	90%	–

$\psi(4260)$

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

Mass $m = 4230 \pm 8$ MeV (S = 2.9)
Full width $\Gamma = 55 \pm 19$ MeV (S = 4.4)

$\psi(4260)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi \pi^+ \pi^-$	seen	950
$J/\psi f_0(980)$, $f_0(980) \rightarrow \pi^+ \pi^-$	seen	–
$Z_c(3900)^\pm \pi^\mp$, $Z_c^\pm \rightarrow J/\psi \pi^\pm$	seen	–
$J/\psi \pi^0 \pi^0$	seen	952
$J/\psi K^+ K^-$	seen	477
$J/\psi K_S^0 K_S^0$	not seen	465
$J/\psi \eta$	not seen	857
$J/\psi \pi^0$	not seen	974

$J/\psi\eta'$	not seen	520
$J/\psi\pi^+\pi^-\pi^0$	not seen	912
$J/\psi\eta\pi^0$	not seen	780
$J/\psi\eta\eta$	not seen	247
$\psi(2S)\pi^+\pi^-$	not seen	437
$\psi(2S)\eta$	not seen	†
$\chi_{c0}\omega$	not seen	205
$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	537
$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	489
$h_c(1P)\pi^+\pi^-$	not seen	593
$\phi\pi^+\pi^-$	not seen	1982
$\phi f_0(980) \rightarrow \phi\pi^+\pi^-$	not seen	–
$D\overline{D}$	not seen	998
$D^0\overline{D}^0$	not seen	998
D^+D^-	not seen	989
$D^*\overline{D}$+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	657
$D^*(2007)^0\overline{D}^*(2007)^0$	not seen	668
$D^*(2010)^+D^*(2010)^-$	not seen	657
$D^0D^-\pi^+$+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	395
$D_s^+D_s^-$	not seen	774
$D_s^{*+}D_s^-$+c.c.	not seen	615
$D_s^{*+}D_s^{*-}$	not seen	109
$p\overline{p}$	not seen	1896
$p\overline{p}\pi^0$	not seen	1860
$K_S^0K^\pm\pi^\mp$	not seen	2037
$K^+K^-\pi^0$	not seen	2038

Radiative decays

$\eta_c(1S)\gamma$	possibly seen	1063
$\chi_{c1}\gamma$	not seen	658
$\chi_{c2}\gamma$	not seen	620
$\chi_{c1}(3872)\gamma$	seen	343

$\chi_{c1}(4274)$

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

Mass $m = 4274^{+8}_{-6}$ MeV
Full width $\Gamma = 49 \pm 12$ MeV

$\chi_{c1}(4274)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\,\phi$	seen	503

$\psi(4360)$

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

$\psi(4360)$ MASS $= 4368 \pm 13$ MeV (S = 3.7)
$\psi(4360)$ WIDTH $= 96 \pm 7$ MeV

$\psi(4360)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S)\,\pi^+\pi^-$	seen	573
$\psi_2(3823)\,\pi^+\pi^-$	possibly seen	440

$\psi(4415)$ [h]

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

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)
$D\overline{D}$	seen		1187
$D^0\overline{D}^0$	seen		1187
D^+D^-	seen		1179
$D^*\overline{D}+$ c.c.	seen		1063
$D^*(2007)^0\overline{D}^0+$ c.c.	seen		1067
$D^*(2010)^+D^-+$ c.c.	seen		1059
$D^*\overline{D}^*$	seen		919
$D^*(2007)^0\overline{D}^*(2007)^0+$ c.c.	seen		927
$D^*(2010)^+D^*(2010)^-+$ c.c.	seen		919
$D^0D^-\pi^+$ (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.	< 2.3 %	90%	–

$D\overline{D}_2^*(2460) \rightarrow D^0 D^- \pi^+$ +c.c.	(10 ±4) %		–
$D^0 D^{*-} \pi^+$ +c.c.	< 11 %	90%	926
$D_s^+ D_s^-$	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		494
$J/\psi \eta$	< 6 $\times 10^{-3}$	90%	1022
$\chi_{c1} \gamma$	< 8 $\times 10^{-4}$	90%	817
$\chi_{c2} \gamma$	< 4 $\times 10^{-3}$	90%	780
$e^+ e^-$	(9.4±3.2) $\times 10^{-6}$		2210

$Z_c(4430)$

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

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

$\psi(4660)$

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

$\psi(4660)$ MASS = 4643 ± 9 MeV (S = 1.2)
$\psi(4660)$ WIDTH = 72 ± 11 MeV

$\psi(4660)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S) \pi^+ \pi^-$	seen	820

NOTES

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

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

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

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

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

[*h*] 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.