$c\bar{c}$ MESONS

$\eta_c(1S)$

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

Mass $m = 2983.4 \pm 0.5$ MeV (S = 1.2)
Full width $\Gamma = 31.8 \pm 0.8$ 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) %		1274
$K^*(892)^0 K^-\pi^+$ + c.c.	(2.0 ±0.7) %		1277
$K^*(892)\overline{K}^*(892)$	(7.0 ±1.3) $\times 10^{-3}$		1196
$K^*(892)^0\overline{K}^*(892)^0\pi^+\pi^-$	(1.1 ±0.5) %		1073
$\phi K^+ K^-$	(2.9 ±1.4) $\times 10^{-3}$		1104
$\phi\phi$	(1.75±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%	1196
$K^*(892)\overline{K}$ + c.c.	< 1.28 %	90%	1309
$f_2(1270)\eta$	< 1.1 %	90%	1145
$\omega\omega$	< 3.1 $\times 10^{-3}$	90%	1270
$\omega\phi$	< 1.7 $\times 10^{-3}$	90%	1185
$f_2(1270)f_2(1270)$	(9.8 ±2.5) $\times 10^{-3}$		774
$f_2(1270)f_2'(1525)$	(9.7 ±3.2) $\times 10^{-3}$		513
$f_0(980)\eta$	seen		1264
$f_0(1500)\eta$	seen		1026
$f_0(2200)\eta$	seen		496
$a_0(980)\pi$	seen		1327
$a_0(1320)\pi$	seen		–
$a_0(1450)\pi$	seen		1123
$a_0(1950)\pi$	seen		859
$a_2(1950)\pi$	not seen		–
$K_0^*(1430)\overline{K}$	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
$K\overline{K}\eta$	(1.35±0.16) %	1265
$\eta\pi^+\pi^-$	(1.7 ±0.5) %	1427
$\eta 2(\pi^+\pi^-)$	(4.4 ±1.3) %	1385
$K^+K^-\pi^+\pi^-$	(6.9 ±1.1) × 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) × 10^{-3}	1253
$2(K^+K^-)$	(1.46±0.30) × 10^{-3}	1055
$\pi^+\pi^-\pi^0\pi^0$	(4.7 ±1.0) %	1460
$2(\pi^+\pi^-)$	(9.7 ±1.2) × 10^{-3}	1459
$2(\pi^+\pi^-\pi^0)$	(17.4 ±3.3) %	1409
$3(\pi^+\pi^-)$	(1.8 ±0.4) %	1406
$p\overline{p}$	(1.50±0.16) × 10^{-3}	1160
$p\overline{p}\pi^0$	(3.6 ±1.3) × 10^{-3}	1101
$\Lambda\overline{\Lambda}$	(1.09±0.24) × 10^{-3}	990
$\Sigma^+\overline{\Sigma}^-$	(2.1 ±0.6) × 10^{-3}	900
$\Xi^-\overline{\Xi}^+$	(8.9 ±2.7) × 10^{-4}	692
$\pi^+\pi^-p\overline{p}$	(5.3 ±1.8) × 10^{-3}	1027

Radiative decays

$\gamma\gamma$	(1.59±0.13) × 10^{-4}	1492

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

$\pi^+\pi^-$	*P*,*CP*	< 1.1	× 10^{-4}	90%	1485
$\pi^0\pi^0$	*P*,*CP*	< 4	× 10^{-5}	90%	1486
K^+K^-	*P*,*CP*	< 6	× 10^{-4}	90%	1408
$K^0_SK^0_S$	*P*,*CP*	< 3.1	× 10^{-4}	90%	1406

$J/\psi(1S)$

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

Mass m = 3096.900 ± 0.006 MeV
Full width Γ = 92.9 ± 2.8 keV (S = 1.1)
Γ_{ee} = 5.55 ± 0.14 ± 0.02 keV

$J/\psi(1S)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons		(87.7 ±0.5) %		–
virtual $\gamma \rightarrow$ 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) × 10^{-3}		1548
$\mu^+\mu^-$		(5.961±0.033) %		1545

Decays involving hadronic resonances

$\rho\pi$		(1.69 ±0.15) %	S=2.4	1448
$\rho^0\pi^0$		(5.6 ±0.7) $\times 10^{-3}$		1448
$a_2(1320)\rho$		(1.09 ±0.22) %		1123
$\omega\pi^+\pi^+\pi^-\pi^-$		(8.5 ±3.4) $\times 10^{-3}$		1392
$\omega\pi^+\pi^-\pi^0$		(4.0 ±0.7) $\times 10^{-3}$		1418
$\omega\pi^+\pi^-$		(8.6 ±0.7) $\times 10^{-3}$	S=1.1	1435
$\omega f_2(1270)$		(4.3 ±0.6) $\times 10^{-3}$		1142
$K^*(892)^0\overline{K}^*(892)^0$		(2.3 ±0.6) $\times 10^{-4}$		1266
$K^*(892)^\pm K^*(892)^\mp$		(1.00 $^{+0.22}_{-0.40}$) $\times 10^{-3}$		1266
$K^*(892)^\pm K^*(800)^\mp$		(1.1 $^{+1.0}_{-0.6}$) $\times 10^{-3}$		–
$K^0_S\pi^- K^*(892)^+$ + c.c.		(2.7 ±0.9) $\times 10^{-3}$		1342
$K^0_S\pi^- K^*(892)^+$ + c.c. → $K^0_S K^0_S\pi^+\pi^-$		(6.7 ±2.2) $\times 10^{-4}$		–
$\eta K^*(892)^0\overline{K}^*(892)^0$		(1.15 ±0.26) $\times 10^{-3}$		1003
$K^*(892)^0\overline{K}^*_2(1430)^0$ + c.c.		(4.66 ±0.31) $\times 10^{-3}$		1012
$K^*(892)^+ K^*_2(1430)^-$ + c.c.		(3.4 ±2.9) $\times 10^{-3}$		1012
$K^*(892)^+ K^*_2(1430)^-$ + c.c. → $K^*(892)^+ K^0_S\pi^-$ + c.c.		(4 ±4) $\times 10^{-4}$		–
$K^*(892)^0\overline{K}_2(1770)^0$ + c.c. → $K^*(892)^0 K^-\pi^+$ + c.c.		(6.9 ±0.9) $\times 10^{-4}$		–
$\omega K^*(892)\overline{K}$ + c.c.		(6.1 ±0.9) $\times 10^{-3}$		1097
$K^+ K^*(892)^-$ + c.c.		(5.12 ±0.30) $\times 10^{-3}$		1373
$K^+ K^*(892)^-$ + c.c. → $K^+ K^-\pi^0$		(1.97 ±0.20) $\times 10^{-3}$		–
$K^+ K^*(892)^-$ + c.c. → $K^0 K^\pm\pi^\mp$ + c.c.		(3.0 ±0.4) $\times 10^{-3}$		–
$K^0\overline{K}^*(892)^0$ + c.c.		(4.39 ±0.31) $\times 10^{-3}$		1373
$K^0\overline{K}^*(892)^0$ + c.c. → $K^0 K^\pm\pi^\mp$ + c.c.		(3.2 ±0.4) $\times 10^{-3}$		–
$K_1(1400)^\pm K^\mp$		(3.8 ±1.4) $\times 10^{-3}$		1170
$\overline{K}^*(892)^0 K^+\pi^-$ + c.c.		seen		1343
$\omega\pi^0\pi^0$		(3.4 ±0.8) $\times 10^{-3}$		1436
$b_1(1235)^\pm\pi^\mp$	[b]	(3.0 ±0.5) $\times 10^{-3}$		1300
$\omega K^\pm K^0_S\pi^\mp$	[b]	(3.4 ±0.5) $\times 10^{-3}$		1210
$b_1(1235)^0\pi^0$		(2.3 ±0.6) $\times 10^{-3}$		1300
$\eta K^\pm K^0_S\pi^\mp$	[b]	(2.2 ±0.4) $\times 10^{-3}$		1278
$\phi K^*(892)\overline{K}$ + c.c.		(2.18 ±0.23) $\times 10^{-3}$		969
$\omega K\overline{K}$		(1.70 ±0.32) $\times 10^{-3}$		1268
$\omega f_0(1710) \rightarrow \omega K\overline{K}$		(4.8 ±1.1) $\times 10^{-4}$		878
$\phi 2(\pi^+\pi^-)$		(1.66 ±0.23) $\times 10^{-3}$		1318
$\Delta(1232)^{++}\overline{p}\pi^-$		(1.6 ±0.5) $\times 10^{-3}$		1030

$\omega\eta$		(1.74	±0.20)	$\times 10^{-3}$	S=1.6	1394
$\phi K\overline{K}$		(1.77	±0.16)	$\times 10^{-3}$	S=1.3	1179
$\phi K^0_S K^0_S$		(5.9	±1.5)	$\times 10^{-4}$		1176
$\phi f_0(1710) \rightarrow \phi K\overline{K}$		(3.6	±0.6)	$\times 10^{-4}$		875
$\phi K^+ K^-$		(8.3	±1.2)	$\times 10^{-4}$		1179
$\phi f_2(1270)$		(3.2	±0.6)	$\times 10^{-4}$		1036
$\Delta(1232)^{++}\overline{\Delta}(1232)^{--}$		(1.10	±0.29)	$\times 10^{-3}$		938
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)	[b]	(1.16	±0.05)	$\times 10^{-3}$		697
$K^+K^- f'_2(1525)$		(1.04	±0.35)	$\times 10^{-3}$		892
$\phi f'_2(1525)$		(8	±4)	$\times 10^{-4}$	S=2.7	871
$\phi\pi^+\pi^-$		(8.7	±0.9)	$\times 10^{-4}$	S=1.4	1365
$\phi\pi^0\pi^0$		(5.0	±1.0)	$\times 10^{-4}$		1366
$\phi K^\pm K^0_S \pi^\mp$	[b]	(7.2	±0.8)	$\times 10^{-4}$		1114
$\omega f_1(1420)$		(6.8	±2.4)	$\times 10^{-4}$		1062
$\phi\eta$		(7.5	±0.8)	$\times 10^{-4}$	S=1.5	1320
$\Xi^0\overline{\Xi}^0$		(1.20	±0.24)	$\times 10^{-3}$		818
$\Xi(1530)^-\overline{\Xi}^+$		(5.9	±1.5)	$\times 10^{-4}$		600
$pK^-\overline{\Sigma}(1385)^0$		(5.1	±3.2)	$\times 10^{-4}$		646
$\omega\pi^0$		(4.5	±0.5)	$\times 10^{-4}$	S=1.4	1446
$\phi\eta'(958)$		(4.6	±0.5)	$\times 10^{-4}$	S=2.2	1192
$\phi f_0(980)$		(3.2	±0.9)	$\times 10^{-4}$	S=1.9	1178
$\phi f_0(980) \rightarrow \phi\pi^+\pi^-$		(2.60	±0.35)	$\times 10^{-4}$		–
$\phi f_0(980) \rightarrow \phi\pi^0\pi^0$		(1.8	±0.5)	$\times 10^{-4}$		–
$\phi\pi^0 f_0(980) \rightarrow \phi\pi^0\pi^+\pi^-$		(4.5	±1.0)	$\times 10^{-6}$		–
$\phi\pi^0 f_0(980) \rightarrow \phi\pi^0 p^0\pi^0$		(1.7	±0.6)	$\times 10^{-6}$		1045
$\eta\phi f_0(980) \rightarrow \eta\phi\pi^+\pi^-$		(3.2	±1.0)	$\times 10^{-4}$		–
$\phi a_0(980)^0 \rightarrow \phi\eta\pi^0$		(5	±4)	$\times 10^{-6}$		–
$\Xi(1530)^0\overline{\Xi}^0$		(3.2	±1.4)	$\times 10^{-4}$		608
$\Sigma(1385)^-\overline{\Sigma}^+$ (or c.c.)	[b]	(3.1	±0.5)	$\times 10^{-4}$		855
$\phi f_1(1285)$		(2.6	±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	±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	±2.2)	$\times 10^{-7}$		955
$\eta\pi^+\pi^-$		(4.0	±1.7)	$\times 10^{-4}$		1487
$\eta\rho$		(1.93	±0.23)	$\times 10^{-4}$		1396
$\omega\eta'(958)$		(1.82	±0.21)	$\times 10^{-4}$		1279
$\omega f_0(980)$		(1.4	±0.5)	$\times 10^{-4}$		1267
$\rho\eta'(958)$		(1.05	±0.18)	$\times 10^{-4}$		1281
$a_2(1320)^\pm\pi^\mp$	[b]	< 4.3		$\times 10^{-3}$	CL=90%	1263
$K\overline{K}^*_2(1430)+$ c.c.		< 4.0		$\times 10^{-3}$	CL=90%	1159
$K_1(1270)^\pm K^\mp$		< 3.0		$\times 10^{-3}$	CL=90%	1231

$K^0_S\pi^- K^*_2(1430)^+ +$ c.c.	$(3.6 \pm 1.8) \times 10^{-3}$		1117
$K^0_S\pi^- K^*_2(1430)^+ +$ c.c. $\rightarrow$ $K^0_S K^0_S \pi^+\pi^-$	$(4.5 \pm 2.2) \times 10^{-4}$		–
$K^*_2(1430)^0\overline{K}^*_2(1430)^0$	$< 2.9 \times 10^{-3}$	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%	–
$\Theta(1540)\overline{\Theta}(1540) \rightarrow K^0_S p K^-\overline{n}+$ 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%	–
$\Sigma^0\overline{\Lambda}$	$< 9 \times 10^{-5}$	CL=90%	1032

Decays into stable hadrons

$2(\pi^+\pi^-)\pi^0$	$(4.1 \pm 0.5)\%$	S=2.4	1496
$3(\pi^+\pi^-)\pi^0$	$(2.9 \pm 0.6)\%$		1433
$\pi^+\pi^-\pi^0$	$(2.11 \pm 0.07)\%$	S=1.5	1533
$\pi^+\pi^-\pi^0 K^+ K^-$	$(1.79 \pm 0.29)\%$	S=2.2	1368
$4(\pi^+\pi^-)\pi^0$	$(9.0 \pm 3.0) \times 10^{-3}$		1345
$\pi^+\pi^- K^+ K^-$	$(6.84 \pm 0.32) \times 10^{-3}$		1407
$\pi^+\pi^- K^0_S K^0_L$	$(3.8 \pm 0.6) \times 10^{-3}$		1406
$\pi^+\pi^- K^0_S K^0_S$	$(1.68 \pm 0.19) \times 10^{-3}$		1406
$K^+ K^- K^0_S K^0_S$	$(4.1 \pm 0.8) \times 10^{-4}$		1127
$\pi^+\pi^- K^+ K^-\eta$	$(1.84 \pm 0.28) \times 10^{-3}$		1221
$\pi^0\pi^0 K^+ K^-$	$(2.12 \pm 0.23) \times 10^{-3}$		1410
$K\overline{K}\pi$	$(6.1 \pm 1.0) \times 10^{-3}$		1442
$2(\pi^+\pi^-)$	$(3.57 \pm 0.30) \times 10^{-3}$		1517
$3(\pi^+\pi^-)$	$(4.3 \pm 0.4) \times 10^{-3}$		1466
$2(\pi^+\pi^-\pi^0)$	$(1.62 \pm 0.21)\%$		1468
$2(\pi^+\pi^-)\eta$	$(2.29 \pm 0.24) \times 10^{-3}$		1446

$3(\pi^+\pi^-)\eta$		$(7.2 \pm 1.5) \times 10^{-4}$		1379
$p\overline{p}$		$(2.120 \pm 0.029) \times 10^{-3}$		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
$p\overline{p}\pi^+\pi^-\pi^0$	[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
$p\overline{p}\eta'(958)$		$(2.1 \pm 0.4) \times 10^{-4}$		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
$\Sigma^0\overline{\Sigma}^0$		$(1.29 \pm 0.09) \times 10^{-3}$		988
$2(\pi^+\pi^-)K^+K^-$		$(4.7 \pm 0.7) \times 10^{-3}$	S=1.3	1320
$p\overline{n}\pi^-$		$(2.12 \pm 0.09) \times 10^{-3}$		1174
$nN(1440)$		seen		984
$nN(1520)$		seen		928
$nN(1535)$		seen		914
$\Xi^-\overline{\Xi}^+$		$(9.7 \pm 0.8) \times 10^{-4}$	S=1.4	807
$\Lambda\overline{\Lambda}$		$(1.61 \pm 0.15) \times 10^{-3}$	S=1.9	1074
$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[b]	$(8.3 \pm 0.7) \times 10^{-4}$	S=1.2	950
$pK^-\overline{\Lambda}$		$(8.9 \pm 1.6) \times 10^{-4}$		876
$2(K^+K^-)$		$(7.4 \pm 0.7) \times 10^{-4}$		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
$K^0_S K^0_L$		$(2.1 \pm 0.4) \times 10^{-4}$	S=3.2	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
$K^0_S K^0_S$		$< 1 \times 10^{-6}$	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%	–

$\gamma\eta_c(1S)$		(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	± 3.1	) $\times 10^{-3}$		1518
$\gamma\eta\pi\pi$		(6.1	± 1.0	) $\times 10^{-3}$		1487
$\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-$		(6.2	± 2.4	) $\times 10^{-4}$		–
$\gamma\eta(1405/1475) \rightarrow \gamma K\overline{K}\pi$	[d]	(2.8	± 0.6	) $\times 10^{-3}$	S=1.6	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$		(7.8	± 2.0	) $\times 10^{-5}$	S=1.8	1223
$\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$		(3.0	± 0.5	) $\times 10^{-4}$		–
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi$		< 8.2		$\times 10^{-5}$	CL=95%	–
$\gamma\rho\rho$		(4.5	± 0.8	) $\times 10^{-3}$		1340
$\gamma\rho\omega$		< 5.4		$\times 10^{-4}$	CL=90%	1338
$\gamma\rho\phi$		< 8.8		$\times 10^{-5}$	CL=90%	1258
$\gamma\eta'(958)$		(5.13	± 0.17	) $\times 10^{-3}$	S=1.3	1400
$\gamma 2\pi^+2\pi^-$		(2.8	± 0.5	) $\times 10^{-3}$	S=1.9	1517
$\gamma f_2(1270) f_2(1270)$		(9.5	± 1.7	) $\times 10^{-4}$		878
$\gamma f_2(1270) f_2(1270)$(non resonant)		(8.2	± 1.9	) $\times 10^{-4}$		–
$\gamma K^+K^-\pi^+\pi^-$		(2.1	± 0.6	) $\times 10^{-3}$		1407
$\gamma f_4(2050)$		(2.7	± 0.7	) $\times 10^{-3}$		891
$\gamma\omega\omega$		(1.61	± 0.33	) $\times 10^{-3}$		1336
$\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$		(1.7	± 0.4	) $\times 10^{-3}$	S=1.3	1223
$\gamma f_2(1270)$		(1.64	± 0.12	) $\times 10^{-3}$	S=1.3	1286
$\gamma f_0(1370) \rightarrow \gamma K\overline{K}$		(4.2	± 1.5	) $\times 10^{-4}$		–
$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$		(1.00	$^{+0.11}_{-0.09}$	) $\times 10^{-3}$	S=1.5	1075
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$		(3.8	± 0.5	) $\times 10^{-4}$		–
$\gamma f_0(1710) \rightarrow \gamma\omega\omega$		(3.1	± 1.0	) $\times 10^{-4}$		–
$\gamma f_0(1710) \rightarrow \gamma\eta\eta$		(2.4	$^{+1.2}_{-0.7}$	) $\times 10^{-4}$		–
$\gamma\eta$		(1.104	± 0.034	) $\times 10^{-3}$		1500
$\gamma f_1(1420) \rightarrow \gamma K\overline{K}\pi$		(7.9	± 1.3	) $\times 10^{-4}$		1220
$\gamma f_1(1285)$		(6.1	± 0.8	) $\times 10^{-4}$		1283
$\gamma f_1(1510) \rightarrow \gamma\eta\pi^+\pi^-$		(4.5	± 1.2	) $\times 10^{-4}$		–
$\gamma f_2'(1525)$		(5.7	$^{+0.8}_{-0.5}$	) $\times 10^{-4}$	S=1.5	1173
$\gamma f_2'(1525) \rightarrow \gamma\eta\eta$		(3.4	± 1.4	) $\times 10^{-5}$		–
$\gamma f_2(1640) \rightarrow \gamma\omega\omega$		(2.8	± 1.8	) $\times 10^{-4}$		–
$\gamma f_2(1910) \rightarrow \gamma\omega\omega$		(2.0	± 1.4	) $\times 10^{-4}$		–
$\gamma f_0(1800) \rightarrow \gamma\omega\phi$		(2.5	± 0.6	) $\times 10^{-4}$		–
$\gamma f_2(1810) \rightarrow \gamma\eta\eta$		(5.4	$^{+3.5}_{-2.4}$	) $\times 10^{-5}$		–
$\gamma f_2(1950) \rightarrow \gamma K^*(892)\overline{K}^*(892)$		(7.0	± 2.2	) $\times 10^{-4}$		–
$\gamma K^*(892)\overline{K}^*(892)$		(4.0	± 1.3	) $\times 10^{-3}$		1266
$\gamma\phi\phi$		(4.0	± 1.2	) $\times 10^{-4}$	S=2.1	1166

$\gamma p\overline{p}$		$(3.8 \pm 1.0) \times 10^{-4}$			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
$\gamma\eta(1760) \rightarrow \gamma\omega\omega$		$(1.98 \pm 0.33) \times 10^{-3}$			–
$\gamma X(1835) \rightarrow \gamma\pi^+\pi^-\eta'$		$(2.77 \,^{+0.34}_{-0.40}) \times 10^{-4}$		S=1.1	1006
$\gamma X(1835) \rightarrow \gamma p\overline{p}$		$(7.7 \,^{+1.5}_{-0.9}) \times 10^{-5}$			–
$\gamma X(1835) \rightarrow \gamma K^0_S K^0_S \eta$		$(3.3 \,^{+2.0}_{-1.3}) \times 10^{-5}$			–
$\gamma X(1840) \rightarrow \gamma 3(\pi^+\pi^-)$		$(2.4 \,^{+0.7}_{-0.8}) \times 10^{-5}$			–
$\gamma(K\overline{K}\pi)$ $[J^{PC} = 0^{-+}]$		$(7 \pm 4) \times 10^{-4}$		S=2.1	1442
$\gamma\pi^0$		$(3.49 \,^{+0.33}_{-0.30}) \times 10^{-5}$			1546
$\gamma p\overline{p}\pi^+\pi^-$		< 7.9	$\times 10^{-4}$	CL=90%	1107
$\gamma\Lambda\overline{\Lambda}$		< 1.3	$\times 10^{-4}$	CL=90%	1074
$\gamma f_0(2100) \rightarrow \gamma\eta\eta$		$(1.13 \,^{+0.60}_{-0.30}) \times 10^{-4}$			–
$\gamma f_0(2100) \rightarrow \gamma\pi\pi$		$(6.2 \pm 1.0) \times 10^{-4}$			–
$\gamma f_0(2200) \rightarrow \gamma K\overline{K}$		$(5.9 \pm 1.3) \times 10^{-4}$			–
$\gamma f_J(2220) \rightarrow \gamma\pi\pi$		< 3.9	$\times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \rightarrow \gamma K\overline{K}$		< 4.1	$\times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \rightarrow \gamma p\overline{p}$		$(1.5 \pm 0.8) \times 10^{-5}$			–
$\gamma f_2(2340) \rightarrow \gamma\eta\eta$		$(5.6 \,^{+2.4}_{-2.2}) \times 10^{-5}$			–
$\gamma f_0(1500) \rightarrow \gamma\pi\pi$		$(1.09 \pm 0.24) \times 10^{-4}$			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
$\eta e^+ e^-$		$(1.16 \pm 0.09) \times 10^{-5}$			1500
$\eta'(958) e^+ e^-$		$(5.81 \pm 0.35) \times 10^{-5}$			1400

Weak decays

$D^- e^+ \nu_e$ + c.c.		< 1.2	$\times 10^{-5}$	CL=90%	984
$\overline{D}^0 e^+ e^-$ + c.c.		< 1.1	$\times 10^{-5}$	CL=90%	987
$D^-_s e^+ \nu_e$ + c.c.		< 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%	916
$D^-_s\rho^+$ + 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 $m = 3414.75 \pm 0.31$ MeV
Full width $\Gamma = 10.5 \pm 0.6$ MeV

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(2.24±0.18) %		1679
$\rho^0\pi^+\pi^-$	$(8.7 \pm 2.8) \times 10^{-3}$		1607
$f_0(980)f_0(980)$	$(6.5 \pm 2.1) \times 10^{-4}$		1391
$\pi^+\pi^-\pi^0\pi^0$	(3.3 ±0.4) %		1680
$\rho^+\pi^-\pi^0$ + c.c.	(2.8 ±0.4) %		1607
$4\pi^0$	$(3.2 \pm 0.4) \times 10^{-3}$		1681
$\pi^+\pi^- K^+K^-$	(1.75±0.14) %		1580
$K_0^*(1430)^0\overline{K}_0^*(1430)^0 \to \pi^+\pi^- K^+K^-$	$(9.6\ ^{+3.5}_{-2.8}) \times 10^{-4}$		–
$K_0^*(1430)^0\overline{K}_2^*(1430)^0$ + c.c. $\to \pi^+\pi^- K^+K^-$	$(7.8\ ^{+1.9}_{-2.4}) \times 10^{-4}$		–
$K_1(1270)^+K^-$ + c.c. $\to \pi^+\pi^- K^+K^-$	$(6.1 \pm 1.9) \times 10^{-3}$		–
$K_1(1400)^+K^-$ + c.c. $\to \pi^+\pi^- K^+K^-$	$< 2.6 \times 10^{-3}$	CL=90%	–
$f_0(980)f_0(980)$	$(1.6\ ^{+1.0}_{-0.9}) \times 10^{-4}$		1391
$f_0(980)f_0(2200)$	$(7.8\ ^{+2.0}_{-2.5}) \times 10^{-4}$		584
$f_0(1370)f_0(1370)$	$< 2.7 \times 10^{-4}$	CL=90%	1019
$f_0(1370)f_0(1500)$	$< 1.7 \times 10^{-4}$	CL=90%	921
$f_0(1370)f_0(1710)$	$(6.6\ ^{+3.5}_{-2.3}) \times 10^{-4}$		720
$f_0(1500)f_0(1370)$	$< 1.3 \times 10^{-4}$	CL=90%	921
$f_0(1500)f_0(1500)$	$< 5 \times 10^{-5}$	CL=90%	807
$f_0(1500)f_0(1710)$	$< 7 \times 10^{-5}$	CL=90%	557

$K^+K^-\pi^+\pi^-\pi^0$	$(8.6\ \pm0.9\ )\times10^{-3}$		1545
$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(4.2\ \pm0.4\ )\times10^{-3}$		1544
$K^+K^-\pi^0\pi^0$	$(5.4\ \pm0.9\ )\times10^{-3}$		1582
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(2.44±0.33) %		1581
$\rho^+K^-K^0$ + c.c.	(1.18±0.21) %		1458
$K^*(892)^-K^+\pi^0 \to$ $K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(4.5\ \pm1.1\ )\times10^{-3}$		–
$K^0_S K^0_S\pi^+\pi^-$	$(5.6\ \pm1.0\ )\times10^{-3}$		1579
$K^+K^-\eta\pi^0$	$(3.0\ \pm0.7\ )\times10^{-3}$		1468
$3(\pi^+\pi^-)$	(1.20±0.18) %		1633
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(7.2\ \pm1.6\ )\times10^{-3}$		1523
$K^*(892)^0\overline{K}^*(892)^0$	$(1.7\ \pm0.6\ )\times10^{-3}$		1456
$\pi\pi$	$(8.33\pm0.35)\times10^{-3}$		1702
$\pi^0\eta$	$< 1.8 \times10^{-4}$		1661
$\pi^0\eta'$	$< 1.1 \times10^{-3}$		1570
$\pi^0\eta_c$	$< 1.6 \times10^{-3}$	CL=90%	384
$\eta\eta$	$(2.95\pm0.19)\times10^{-3}$		1617
$\eta\eta'$	$< 2.3 \times10^{-4}$	CL=90%	1521
$\eta'\eta'$	$(1.96\pm0.21)\times10^{-3}$		1413
$\omega\omega$	$(9.5\ \pm1.1\ )\times10^{-4}$		1517
$\omega\phi$	$(1.16\pm0.21)\times10^{-4}$		1447
ωK^+K^-	$(1.94\pm0.21)\times10^{-3}$		1457
K^+K^-	$(5.91\pm0.32)\times10^{-3}$		1634
$K^0_S K^0_S$	$(3.10\pm0.18)\times10^{-3}$		1633
$\pi^+\pi^-\eta$	$< 1.9 \times10^{-4}$	CL=90%	1651
$\pi^+\pi^-\eta'$	$< 3.5 \times10^{-4}$	CL=90%	1560
$\overline{K}^0K^+\pi^-$ + c.c.	$< 9 \times10^{-5}$	CL=90%	1610
$K^+K^-\pi^0$	$< 6 \times10^{-5}$	CL=90%	1611
$K^+K^-\eta$	$< 2.2 \times10^{-4}$	CL=90%	1512
$K^+K^-K^0_S K^0_S$	$(1.4\ \pm0.5\ )\times10^{-3}$		1331
$K^+K^-K^+K^-$	$(2.75\pm0.28)\times10^{-3}$		1333
$K^+K^-\phi$	$(9.5\ \pm2.4\ )\times10^{-4}$		1381
$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(3.7\ \pm0.6\ )\times10^{-3}$		1326
$K^+K^-\pi^0\phi$	$(1.90\pm0.35)\times10^{-3}$		1329
$\phi\pi^+\pi^-\pi^0$	$(1.18\pm0.15)\times10^{-3}$		1525
$\phi\phi$	$(7.7\ \pm0.7\ )\times10^{-4}$		1370
$p\overline{p}$	$(2.25\pm0.09)\times10^{-4}$		1426
$p\overline{p}\pi^0$	$(6.8\ \pm0.7\ )\times10^{-4}$	S=1.3	1379
$p\overline{p}\eta$	$(3.5\ \pm0.4\ )\times10^{-4}$		1187
$p\overline{p}\omega$	$(5.1\ \pm0.6\ )\times10^{-4}$		1043
$p\overline{p}\phi$	$(5.9\ \pm1.4\ )\times10^{-5}$		876
$p\overline{p}\pi^+\pi^-$	$(2.1\ \pm0.7\ )\times10^{-3}$	S=1.4	1320
$p\overline{p}\pi^0\pi^0$	$(1.02\pm0.27)\times10^{-3}$		1324
$p\overline{p}K^+K^-$(non-resonant)	$(1.19\pm0.26)\times10^{-4}$		890

$p\overline{p}K^0_S K^0_S$	< 8.8	$\times 10^{-4}$	CL=90%	884
$p\overline{n}\pi^-$	(1.24 ± 0.11)	$\times 10^{-3}$		1376
$\overline{p}n\pi^+$	(1.34 ± 0.12)	$\times 10^{-3}$		1376
$p\overline{n}\pi^-\pi^0$	(2.29 ± 0.21)	$\times 10^{-3}$		1321
$\overline{p}n\pi^+\pi^0$	(2.16 ± 0.18)	$\times 10^{-3}$		1321
$\Lambda\overline{\Lambda}$	(3.21 ± 0.25)	$\times 10^{-4}$		1292
$\Lambda\overline{\Lambda}\pi^+\pi^-$	(1.15 ± 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.	(1.22 ± 0.12)	$\times 10^{-3}$	S=1.3	1132
$K^+\overline{p}\Lambda(1520)$ + c.c.	$(2.9\ \pm0.7\ )$	$\times 10^{-4}$		858
$\Lambda(1520)\overline{\Lambda}(1520)$	$(3.1\ \pm1.2\ )$	$\times 10^{-4}$		779
$\Sigma^0\overline{\Sigma}^0$	$(4.4\ \pm0.4\ )$	$\times 10^{-4}$		1222
$\Sigma^+\overline{\Sigma}^-$	$(3.9\ \pm0.7\ )$	$\times 10^{-4}$	S=1.7	1225
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$(1.6\ \pm0.6\ )$	$\times 10^{-4}$		1001
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$(2.3\ \pm0.6\ )$	$\times 10^{-4}$		1001
$K^-\Lambda\overline{\Xi}^+$ + c.c.	(1.90 ± 0.34)	$\times 10^{-4}$		873
$\Xi^0\overline{\Xi}^0$	$(3.1\ \pm0.8\ )$	$\times 10^{-4}$		1089
$\Xi^-\overline{\Xi}^+$	$(4.7\ \pm0.7\ )$	$\times 10^{-4}$		1081
$\eta_c\pi^+\pi^-$	< 7	$\times 10^{-4}$	CL=90%	308

Radiative decays

$\gamma J/\psi(1S)$	(1.27 ± 0.06) %			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
$\gamma\gamma$	(2.23 ± 0.13)	$\times 10^{-4}$		1707

$\chi_{c1}(1P)$

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

Mass $m = 3510.66 \pm 0.07$ MeV (S = 1.5)
Full width $\Gamma = 0.84 \pm 0.04$ MeV

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)

Hadronic decays

$3(\pi^+\pi^-)$	$(\ 5.8\ \pm1.4\ )$	$\times 10^{-3}$	S=1.2	1683
$2(\pi^+\pi^-)$	$(\ 7.6\ \pm2.6\ )$	$\times 10^{-3}$		1728
$\pi^+\pi^-\pi^0\pi^0$	$(\ 1.22\pm0.16)$ %			1729
$\rho^+\pi^-\pi^0$ + c.c.	$(\ 1.48\pm0.25)$ %			1658
$\rho^0\pi^+\pi^-$	$(\ 3.9\ \pm3.5\ )$	$\times 10^{-3}$		1657
$4\pi^0$	$(\ 5.5\ \pm0.8\ )$	$\times 10^{-4}$		1729
$\pi^+\pi^-K^+K^-$	$(\ 4.5\ \pm1.0\ )$	$\times 10^{-3}$		1632

$K^+K^-\pi^0\pi^0$	$(\ 1.14\pm0.28)\times10^{-3}$		1634
$K^+K^-\pi^+\pi^-\pi^0$	$(\ 1.15\pm0.13)$ %		1598
$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(\ 7.5\ \pm0.8\ )\times10^{-3}$		1596
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 8.7\ \pm1.4\ )\times10^{-3}$		1632
$\rho^- K^+\overline{K}^0$ + c.c.	$(\ 5.1\ \pm1.2\ )\times10^{-3}$		1514
$K^*(892)^0\overline{K}^0\pi^0 \to$ $K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 2.4\ \pm0.7\ )\times10^{-3}$		–
$K^+K^-\eta\pi^0$	$(\ 1.14\pm0.35)\times10^{-3}$		1523
$\pi^+\pi^- K^0_S K^0_S$	$(\ 7.0\ \pm3.0\ )\times10^{-4}$		1630
$K^+K^-\eta$	$(\ 3.2\ \pm1.0\ )\times10^{-4}$		1566
$\overline{K}^0 K^+\pi^-$ + c.c.	$(\ 7.1\ \pm0.6\ )\times10^{-3}$		1661
$K^*(892)^0\overline{K}^0$ + c.c.	$(\ 1.0\ \pm0.4\ )\times10^{-3}$		1602
$K^*(892)^+K^-$ + c.c.	$(\ 1.5\ \pm0.7\ )\times10^{-3}$		1602
$K^*_J(1430)^0\overline{K}^0$ + c.c. $\to$ $K^0_S K^+\pi^-$ + c.c.	$<\ 8\ \times10^{-4}$	CL=90%	–
$K^*_J(1430)^+K^-$ + c.c. $\to$ $K^0_S K^+\pi^-$ + c.c.	$<\ 2.2\ \times10^{-3}$	CL=90%	–
$K^+K^-\pi^0$	$(\ 1.85\pm0.25)\times10^{-3}$		1662
$\eta\pi^+\pi^-$	$(\ 4.9\ \pm0.5\ )\times10^{-3}$		1701
$a_0(980)^+\pi^-$ + c.c. $\to$ $\eta\pi^+\pi^-$	$(\ 1.8\ \pm0.6\ )\times10^{-3}$		–
$f_2(1270)\eta$	$(\ 2.7\ \pm0.8\ )\times10^{-3}$		1467
$\pi^+\pi^-\eta'$	$(\ 2.3\ \pm0.5\ )\times10^{-3}$		1612
$K^+K^-\eta'(958)$	$(\ 8.8\ \pm0.9\ )\times10^{-4}$		1461
$K^*_0(1430)^+K^-$ + c.c.	$(\ 6.4\ ^{+2.2}_{-2.8}\ )\times10^{-4}$		–
$f_0(980)\eta'(958)$	$(\ 1.6\ ^{+1.4}_{-0.7}\ )\times10^{-4}$		1460
$f_0(1710)\eta'(958)$	$(\ 7\ ^{+7}_{-5}\ )\times10^{-5}$		1106
$f'_2(1525)\eta'(958)$	$(\ 9\ \pm6\ )\times10^{-5}$		1225
$\pi^0 f_0(980) \to \pi^0\pi^+\pi^-$	$<\ 6\ \times10^{-6}$	CL=90%	–
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(\ 3.2\ \pm2.1\ )\times10^{-3}$		1577
$K^*(892)^0\overline{K}^*(892)^0$	$(\ 1.5\ \pm0.4\ )\times10^{-3}$		1512
$K^+K^- K^0_S K^0_S$	$<\ 4\ \times10^{-4}$	CL=90%	1390
$K^+K^-K^+K^-$	$(\ 5.5\ \pm1.1\ )\times10^{-4}$		1393
$K^+K^-\phi$	$(\ 4.2\ \pm1.6\ )\times10^{-4}$		1440
$\overline{K}^0 K^+\pi^-\phi$ + c.c.	$(\ 3.3\ \pm0.5\ )\times10^{-3}$		1387
$K^+K^-\pi^0\phi$	$(\ 1.62\pm0.30)\times10^{-3}$		1390
$\phi\pi^+\pi^-\pi^0$	$(\ 7.5\ \pm1.0\ )\times10^{-4}$		1578
$\omega\omega$	$(\ 5.8\ \pm0.7\ )\times10^{-4}$		1571
ωK^+K^-	$(\ 7.8\ \pm0.9\ )\times10^{-4}$		1513
$\omega\phi$	$(\ 2.1\ \pm0.6\ )\times10^{-5}$		1503
$\phi\phi$	$(\ 4.2\ \pm0.5\ )\times10^{-4}$		1429
$p\overline{p}$	$(\ 7.72\pm0.35)\times10^{-5}$		1484

$p\overline{p}\pi^0$	$(\ 1.59\pm0.19)\times10^{-4}$		1438
$p\overline{p}\eta$	$(\ 1.48\pm0.25)\times10^{-4}$		1254
$p\overline{p}\omega$	$(\ 2.16\pm0.31)\times10^{-4}$		1117
$p\overline{p}\phi$	$<\ 1.8\times10^{-5}$	CL=90%	962
$p\overline{p}\pi^+\pi^-$	$(\ 5.0\ \pm1.9\ )\times10^{-4}$		1381
$p\overline{p}K^+K^-$ (non-resonant)	$(\ 1.30\pm0.23)\times10^{-4}$		974
$p\overline{p}K^0_SK^0_S$	$<\ 4.5\times10^{-4}$	CL=90%	968
$p\overline{n}\pi^-$	$(\ 3.9\ \pm0.5\ )\times10^{-4}$		1435
$\overline{p}n\pi^+$	$(\ 4.0\ \pm0.5\ )\times10^{-4}$		1435
$p\overline{n}\pi^-\pi^0$	$(\ 1.05\pm0.12)\times10^{-3}$		1383
$\overline{p}n\pi^+\pi^0$	$(\ 1.03\pm0.12)\times10^{-3}$		1383
$\Lambda\overline{\Lambda}$	$(\ 1.16\pm0.12)\times10^{-4}$		1355
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(\ 3.0\ \pm0.5\ )\times10^{-4}$		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
$K^+\overline{p}\Lambda$	$(\ 4.2\ \pm0.4\ )\times10^{-4}$	S=1.1	1203
$K^+\overline{p}\Lambda(1520)$ + c.c.	$(\ 1.7\ \pm0.5\ )\times10^{-4}$		950
$\Lambda(1520)\overline{\Lambda}(1520)$	$<\ 1.0\times10^{-4}$	CL=90%	879
$\Sigma^0\overline{\Sigma}^0$	$<\ 4\times10^{-5}$	CL=90%	1288
$\Sigma^+\overline{\Sigma}^-$	$<\ 6\times10^{-5}$	CL=90%	1291
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$<\ 1.0\times10^{-4}$	CL=90%	1081
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$<\ 5\times10^{-5}$	CL=90%	1081
$K^-\Lambda\overline{\Xi}^+$ + c.c.	$(\ 1.38\pm0.25)\times10^{-4}$		963
$\Xi^0\overline{\Xi}^0$	$<\ 6\times10^{-5}$	CL=90%	1163
$\Xi^-\overline{\Xi}^+$	$(\ 8.2\ \pm2.2\ )\times10^{-5}$		1155
$\pi^+\pi^-\ +\ K^+K^-$	$<\ 2.1\times10^{-3}$		–
$K^0_SK^0_S$	$<\ 6\times10^{-5}$	CL=90%	1683
$\eta_c\pi^+\pi^-$	$<\ 3.2\times10^{-3}$	CL=90%	413

Radiative decays

$\gamma J/\psi(1S)$	(33.9 ±1.2) %		389
$\gamma\rho^0$	$(\ 2.20\pm0.18)\times10^{-4}$		1670
$\gamma\omega$	$(\ 6.9\ \pm0.8\ )\times10^{-5}$		1668
$\gamma\phi$	$(\ 2.5\ \pm0.5\ )\times10^{-5}$		1607

$h_c(1P)$

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

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
$p\overline{p}$	$< 1.5 \times 10^{-4}$	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			
$\gamma\eta$	$(4.7\pm2.1) \times 10^{-4}$		1720
$\gamma\eta'(958)$	$(1.5\pm0.4) \times 10^{-3}$		1633
$\gamma\eta_c(1S)$	(51 $\pm$6) %		500

$\chi_{c2}(1P)$

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

Mass $m = 3556.20 \pm 0.09$ MeV
Full width $\Gamma = 1.93 \pm 0.11$ MeV

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(1.07 ± 0.10) %		1751
$\pi^+\pi^-\pi^0\pi^0$	(1.91 ± 0.25) %		1752
$\rho^+\pi^-\pi^0$ + c.c.	(2.3 $\pm$0.4) %		1682
$4\pi^0$	$(1.16\pm0.16) \times 10^{-3}$		1752
$K^+K^-\pi^0\pi^0$	(2.2 $\pm$0.4) $\times 10^{-3}$		1658
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(1.44 ± 0.21) %		1657
$\rho^-K^+\overline{K}^0$ + c.c.	(4.3 $\pm$1.3) $\times 10^{-3}$		1540
$K^*(892)^0K^-\pi^+ \to K^-\pi^+K^0\pi^0$ + c.c.	(3.1 $\pm$0.8) $\times 10^{-3}$		–
$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(4.0 $\pm$0.9) $\times 10^{-3}$		–
$K^*(892)^-K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(3.9 $\pm$0.9) $\times 10^{-3}$		–
$K^*(892)^+\overline{K}^0\pi^- \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(3.1 $\pm$0.8) $\times 10^{-3}$		–
$K^+K^-\eta\pi^0$	(1.3 $\pm$0.5) $\times 10^{-3}$		1549
$K^+K^-\pi^+\pi^-$	(8.9 $\pm$1.0) $\times 10^{-3}$		1656
$K^+K^-\pi^+\pi^-\pi^0$	(1.17 ± 0.13) %		1623

$K^0_S K^\pm \pi^\mp \pi^+ \pi^-$	(7.3 ±0.8)	$\times 10^{-3}$		1621
$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	(2.2 ±1.1)	$\times 10^{-3}$		1602
$K^*(892)^0 \overline{K}^*(892)^0$	(2.4 ±0.5)	$\times 10^{-3}$		1538
$3(\pi^+ \pi^-)$	(8.6 ±1.8)	$\times 10^{-3}$		1707
$\phi\phi$	(1.12±0.10)	$\times 10^{-3}$		1457
$\omega\omega$	(8.8 ±1.1)	$\times 10^{-4}$		1597
$\omega K^+ K^-$	(7.3 ±0.9)	$\times 10^{-4}$		1540
$\pi\pi$	(2.33±0.12)	$\times 10^{-3}$		1773
$\rho^0 \pi^+ \pi^-$	(3.8 ±1.6)	$\times 10^{-3}$		1682
$\pi^+ \pi^- \eta$	(5.0 ±1.3)	$\times 10^{-4}$		1724
$\pi^+ \pi^- \eta'$	(5.2 ±1.9)	$\times 10^{-4}$		1636
$\eta\eta$	(5.7 ±0.5)	$\times 10^{-4}$		1692
$K^+ K^-$	(1.05±0.07)	$\times 10^{-3}$		1708
$K^0_S K^0_S$	(5.5 ±0.4)	$\times 10^{-4}$		1707
$\overline{K}^0 K^+ \pi^- +$ c.c.	(1.34±0.19)	$\times 10^{-3}$		1685
$K^+ K^- \pi^0$	(3.2 ±0.8)	$\times 10^{-4}$		1686
$K^+ K^- \eta$	< 3.4	$\times 10^{-4}$	90%	1592
$K^+ K^- \eta'(958)$	(1.94±0.34)	$\times 10^{-4}$		1488
$\eta\eta'$	< 6	$\times 10^{-5}$	90%	1600
$\eta'\eta'$	< 1.0	$\times 10^{-4}$	90%	1498
$\pi^+ \pi^- K^0_S K^0_S$	(2.3 ±0.6)	$\times 10^{-3}$		1655
$K^+ K^- K^0_S K^0_S$	< 4	$\times 10^{-4}$	90%	1418
$K^+ K^- K^+ K^-$	(1.73±0.21)	$\times 10^{-3}$		1421
$K^+ K^- \phi$	(1.48±0.31)	$\times 10^{-3}$		1468
$\overline{K}^0 K^+ \pi^- \phi +$ c.c.	(4.8 ±0.7)	$\times 10^{-3}$		1416
$K^+ K^- \pi^0 \phi$	(2.7 ±0.5)	$\times 10^{-3}$		1419
$\phi \pi^+ \pi^- \pi^0$	(9.3 ±1.2)	$\times 10^{-4}$		1603
$p\overline{p}$	(7.5 ±0.4)	$\times 10^{-5}$		1510
$p\overline{p}\pi^0$	(4.9 ±0.4)	$\times 10^{-4}$		1465
$p\overline{p}\eta$	(1.82±0.26)	$\times 10^{-4}$		1285
$p\overline{p}\omega$	(3.8 ±0.5)	$\times 10^{-4}$		1152
$p\overline{p}\phi$	(2.9 ±0.9)	$\times 10^{-5}$		1002
$p\overline{p}\pi^+ \pi^-$	(1.32±0.34)	$\times 10^{-3}$		1410
$p\overline{p}\pi^0 \pi^0$	(8.2 ±2.5)	$\times 10^{-4}$		1414
$p\overline{p} K^+ K^-$ (non-resonant)	(2.00±0.34)	$\times 10^{-4}$		1013
$p\overline{p} K^0_S K^0_S$	< 7.9	$\times 10^{-4}$	90%	1007
$p\overline{n}\pi^-$	(8.9 ±1.0)	$\times 10^{-4}$		1463
$\overline{p}n\pi^+$	(9.3 ±0.9)	$\times 10^{-4}$		1463
$p\overline{n}\pi^-\pi^0$	(2.27±0.19)	$\times 10^{-3}$		1411
$\overline{p}n\pi^+\pi^0$	(2.21±0.20)	$\times 10^{-3}$		1411
$\Lambda\overline{\Lambda}$	(1.92±0.16)	$\times 10^{-4}$		1385
$\Lambda\overline{\Lambda}\pi^+\pi^-$	(1.31±0.17)	$\times 10^{-3}$		1255
$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	(6.9 ±1.6)	$\times 10^{-4}$		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.	(8.1 $\pm$0.6)	$\times 10^{-4}$		1236
$K^+\overline{p}\Lambda(1520)$ + c.c.	(2.9 $\pm$0.7)	$\times 10^{-4}$		992
$\Lambda(1520)\overline{\Lambda}(1520)$	(4.8 $\pm$1.5)	$\times 10^{-4}$		923
$\Sigma^0\overline{\Sigma}^0$	$<$ 6	$\times 10^{-5}$	90%	1319
$\Sigma^+\overline{\Sigma}^-$	$<$ 7	$\times 10^{-5}$	90%	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.	(1.84$\pm$0.34)	$\times 10^{-4}$		1004
$\Xi^0\overline{\Xi}^0$	$<$ 1.1	$\times 10^{-4}$	90%	1197
$\Xi^-\overline{\Xi}^+$	(1.48$\pm$0.33)	$\times 10^{-4}$		1189
$J/\psi(1S)\pi^+\pi^-\pi^0$	$<$ 1.5	%	90%	185
$\pi^0\eta_c$	$<$ 3.2	$\times 10^{-3}$	90%	512
$\eta_c(1S)\pi^+\pi^-$	$<$ 5.4	$\times 10^{-3}$	90%	459

Radiative decays

$\gamma J/\psi(1S)$	(19.2 $\pm$0.7) %			430
$\gamma\rho^0$	$<$ 2.0	$\times 10^{-5}$	90%	1694
$\gamma\omega$	$<$ 6	$\times 10^{-6}$	90%	1692
$\gamma\phi$	$<$ 8	$\times 10^{-6}$	90%	1632
$\gamma\gamma$	(2.74$\pm$0.14)	$\times 10^{-4}$		1778

$\eta_c(2S)$

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

Quantum numbers are quark model predictions.

Mass $m = 3639.2 \pm 1.2$ MeV
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$\pm$1.2) %		1730
$K\overline{K}\eta$	(5 $\pm$4) $\times 10^{-3}$		1638
$2\pi^+2\pi^-$	not seen		1793
$\rho^0\rho^0$	not seen		1646
$3\pi^+3\pi^-$	not seen		1750
$K^+K^-\pi^+\pi^-$	not seen		1701
$K^{*0}\overline{K}^{*0}$	not seen		1586
$K^+K^-\pi^+\pi^-\pi^0$	(1.4$\pm$1.0) %		1668
$K^+K^-2\pi^+2\pi^-$	not seen		1628
$K^0_S K^-2\pi^+\pi^-$ + c.c.	seen		1667
$2K^+2K^-$	not seen		1471

$\phi\phi$	not seen			1507
$p\overline{p}$	< 2.0	$\times 10^{-3}$	90%	1559
$\gamma\gamma$	(1.9 ± 1.3)	$\times 10^{-4}$		1820
$\pi^+\pi^-\eta$	not seen			1767
$\pi^+\pi^-\eta'$	not seen			1681
$\pi^+\pi^-\eta_c(1S)$	< 25	%	90%	539

$\psi(2S)$

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

Mass $m = 3686.097 \pm 0.025$ MeV (S = 2.6)
Full width $\Gamma = 296 \pm 8$ keV
$\Gamma_{ee} = 2.34 \pm 0.04$ keV

$\psi(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	(97.85 ± 0.13) %		–
virtual $\gamma \rightarrow$ hadrons	(1.73 ± 0.14) %	S=1.5	–
ggg	(10.6 ± 1.6) %		–
γgg	(1.03 ± 0.29) %		–
light hadrons	(15.4 ± 1.5) %		–
e^+e^-	$(7.89 \pm 0.17) \times 10^{-3}$		1843
$\mu^+\mu^-$	$(7.9 \pm 0.9) \times 10^{-3}$		1840
$\tau^+\tau^-$	$(3.1 \pm 0.4) \times 10^{-3}$		489
Decays into $J/\psi(1S)$ and anything			
$J/\psi(1S)$ anything	(61.0 ± 0.6) %		–
$J/\psi(1S)$ neutrals	(25.14 ± 0.33) %		–
$J/\psi(1S)\pi^+\pi^-$	(34.49 ± 0.30) %		477
$J/\psi(1S)\pi^0\pi^0$	(18.17 ± 0.31) %		481
$J/\psi(1S)\eta$	(3.36 ± 0.05) %		199
$J/\psi(1S)\pi^0$	$(1.268\pm0.032) \times 10^{-3}$		528
Hadronic decays			
$\pi^0 h_c(1P)$	$(8.6 \pm 1.3) \times 10^{-4}$		85
$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$		1746
$2(\pi^+\pi^-)\pi^0$	$(2.9 \pm 1.0) \times 10^{-3}$	S=4.7	1799
$\rho a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$		1500
$p\overline{p}$	$(2.88 \pm 0.10) \times 10^{-4}$		1586
$\Delta^{++}\overline{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$		1371
$\Lambda\overline{\Lambda}\pi^0$	$< 2.9 \times 10^{-6}$	CL=90%	1412
$\Lambda\overline{\Lambda}\eta$	$(2.5 \pm 0.4) \times 10^{-5}$		1197
$\Lambda\overline{p}K^+$	$(1.00 \pm 0.14) \times 10^{-4}$		1327
$\Lambda\overline{p}K^+\pi^+\pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$		1167
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$		1346

$\Lambda\overline{\Lambda}$	$(3.57 \pm 0.18) \times 10^{-4}$		1467
$\Lambda\overline{\Sigma}^{+}\pi^{-}$ + 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
$\Sigma^{0}\overline{p}K^{+}$ + c.c.	$(1.67 \pm 0.18) \times 10^{-5}$		1291
$\Sigma^{+}\overline{\Sigma}^{-}$	$(2.51 \pm 0.21) \times 10^{-4}$		1408
$\Sigma^{0}\overline{\Sigma}^{0}$	$(2.32 \pm 0.16) \times 10^{-4}$		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
$\Xi^{-}\overline{\Xi}^{+}$	$(2.72 \pm 0.12) \times 10^{-4}$		1284
$\Xi^{0}\overline{\Xi}^{0}$	$(2.07 \pm 0.23) \times 10^{-4}$		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
$\Omega^{-}\overline{\Omega}^{+}$	$(4.7 \pm 1.0) \times 10^{-5}$		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
$\phi p\overline{p}$	$< 2.4 \times 10^{-5}$	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

$\eta'\pi^+\pi^-\pi^0$	(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
$\pi^0\pi^0K^+K^-$	(2.6 $\pm$1.3) $\times 10^{-4}$		1728
$\pi^+\pi^-K^+K^-$	(7.3 $\pm$0.5) $\times 10^{-4}$		1726
$\rho^0K^+K^-$	(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
$K_S^0K_S^0\pi^+\pi^-$	(2.2 $\pm$0.4) $\times 10^{-4}$		1724
$\rho^0p\overline{p}$	(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) $\times 10^{-5}$		–
$K^*(892)^0K^-\pi^+\pi^0$ + 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) $\times 10^{-4}$		–
$K^*(892)^0K^-\rho^+$ + c.c.	(6.1 $\pm$1.8) $\times 10^{-4}$		–
ηK^+K^-, no $\eta\phi$	(3.1 $\pm$0.4) $\times 10^{-5}$		1664
ωK^+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
$\omega\overline{K}^*(892)^0K^0$	(1.68 $\pm$0.30) $\times 10^{-4}$		1481
$\omega\overline{K}_2^*(1430)^0K^0$	(5.8 $\pm$2.2) $\times 10^{-5}$		1251
$\omega X(1440) \rightarrow \omega K_S^0K^-\pi^+$ + c.c.	(1.6 $\pm$0.4) $\times 10^{-5}$		–
$\omega X(1440) \rightarrow \omega K^+K^-\pi^0$	(1.09 $\pm$0.26) $\times 10^{-5}$		–
$\omega f_1(1285) \rightarrow \omega K_S^0K^-\pi^+$ + 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
$K_S^0K_L^0$	(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	± 2.6)	$\times 10^{-6}$		1838
$K_1(1400)^\pm K^\mp$	$<$ 3.1		$\times 10^{-4}$	CL=90%	1532
$K_2^*(1430)^\pm K^\mp$	(7.1	$^{+1.3}_{-0.9}$)	$\times 10^{-5}$		–
$K^+K^-\pi^0$	(4.07	± 0.31)	$\times 10^{-5}$		1754
$K^+K^*(892)^-$ + c.c.	(2.9	± 0.4)	$\times 10^{-5}$	S=1.2	1698
$K^*(892)^0\overline{K}^0$ + c.c.	(1.09	± 0.20)	$\times 10^{-4}$		1697
$\phi\pi^+\pi^-$	(1.18	± 0.26)	$\times 10^{-4}$	S=1.5	1690
$\phi f_0(980) \rightarrow \pi^+\pi^-$	(7.5	± 3.3)	$\times 10^{-5}$	S=1.6	–
$2(K^+K^-)$	(6.3	± 1.3)	$\times 10^{-5}$		1499
ϕK^+K^-	(7.0	± 1.6)	$\times 10^{-5}$		1546
$2(K^+K^-)\pi^0$	(1.10	± 0.28)	$\times 10^{-4}$		1440
$\phi\eta$	(3.10	± 0.31)	$\times 10^{-5}$		1654
$\phi\eta'$	(3.1	± 1.6)	$\times 10^{-5}$		1555
$\omega\eta'$	(3.2	$^{+2.5}_{-2.1}$)	$\times 10^{-5}$		1623
$\omega\pi^0$	(2.1	± 0.6)	$\times 10^{-5}$		1757
$\rho\eta'$	(1.9	$^{+1.7}_{-1.2}$)	$\times 10^{-5}$		1625
$\rho\eta$	(2.2	± 0.6)	$\times 10^{-5}$	S=1.1	1717
$\omega\eta$	$<$ 1.1		$\times 10^{-5}$	CL=90%	1715
$\phi\pi^0$	$<$ 4		$\times 10^{-7}$	CL=90%	1699
$\eta_c\pi^+\pi^-\pi^0$	$<$ 1.0		$\times 10^{-3}$	CL=90%	513
$p\overline{p}K^+K^-$	(2.7	± 0.7)	$\times 10^{-5}$		1118
$\overline{\Lambda}nK_S^0$ + c.c.	(8.1	± 1.8)	$\times 10^{-5}$		1324
$\phi f_2'(1525)$	(4.4	± 1.6)	$\times 10^{-5}$		1321
$\Theta(1540)\overline{\Theta}(1540) \rightarrow K_S^0 pK^-\overline{n}$ + 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%	–
$K_S^0K_S^0$	$<$ 4.6		$\times 10^{-6}$		1775

Radiative decays

$\gamma\chi_{c0}(1P)$	(9.99	± 0.27)	%		261
$\gamma\chi_{c1}(1P)$	(9.55	± 0.31)	%		171
$\gamma\chi_{c2}(1P)$	(9.11	± 0.31)	%		128
$\gamma\eta_c(1S)$	(3.4	± 0.5)	$\times 10^{-3}$	S=1.3	636
$\gamma\eta_c(2S)$	(7	± 5)	$\times 10^{-4}$		47
$\gamma\pi^0$	(1.6	± 0.4)	$\times 10^{-6}$		1841
$\gamma\eta'(958)$	(1.23	± 0.06)	$\times 10^{-4}$		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	± 1.7)	$\times 10^{-5}$		1588
$\gamma f_0(1500)$	(9.2	± 1.9)	$\times 10^{-5}$		1536

$\gamma f_2'(1525)$		(3.3	± 0.8	) $\times 10^{-5}$		1528
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$		(3.5	± 0.6	) $\times 10^{-5}$		–
$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$		(6.6	± 0.7	) $\times 10^{-5}$		–
$\gamma f_0(2100) \rightarrow \gamma\pi\pi$		(4.8	± 1.0	) $\times 10^{-6}$		1244
$\gamma f_0(2200) \rightarrow \gamma K\overline{K}$		(3.2	± 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
$\gamma\eta$		(1.4	± 0.5	) $\times 10^{-6}$		1802
$\gamma\eta\pi^+\pi^-$		(8.7	± 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	± 2.5	) $\times 10^{-5}$		–
$\gamma\eta(1475) \rightarrow K\overline{K}\pi$		$<$ 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	± 0.6	) $\times 10^{-4}$		1817
$\gamma K^{*0} K^+\pi^-$ + c.c.		(3.7	± 0.9	) $\times 10^{-4}$		1674
$\gamma K^{*0}\overline{K}^{*0}$		(2.4	± 0.7	) $\times 10^{-4}$		1613
$\gamma K_S^0 K^+\pi^-$ + c.c.		(2.6	± 0.5	) $\times 10^{-4}$		1753
$\gamma K^+ K^-\pi^+\pi^-$		(1.9	± 0.5	) $\times 10^{-4}$		1726
$\gamma p\overline{p}$		(3.9	± 0.5	) $\times 10^{-5}$	S=2.0	1586
$\gamma f_2(1950) \rightarrow \gamma p\overline{p}$		(1.20	± 0.22	) $\times 10^{-5}$		–
$\gamma f_2(2150) \rightarrow \gamma p\overline{p}$		(7.2	± 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	± 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

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	253
$J/\psi\pi^+\pi^-$	(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 ± 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
$\gamma\chi_{c1}$	(	2.48±0.23)	$\times 10^{-3}$		253
$\gamma\chi_{c0}$	(	7.0 ±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%	132
$\gamma\eta'$	$<$	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

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

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

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

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

X(3872)

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

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

X(3872) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^- J/\psi(1S)$	> 2.6 %	650
$\omega J/\psi(1S)$	> 1.9 %	†
$D^0\overline{D}^0\pi^0$	>32 %	117
$\overline{D}^{*0} D^0$	>24 %	2
$\gamma J/\psi$	$> 6 \times 10^{-3}$	697
$\gamma\psi(2S)$	> 3.0 %	181
$\pi^+\pi^-\eta_c(1S)$	not seen	746
$\pi^+\pi^-\chi_{c1}$	not seen	218
$p\overline{p}$	not seen	1693

X(3900)

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

Mass $m = 3886.6 \pm 2.4$ MeV (S = 1.6)
Full width $\Gamma = 28.1 \pm 2.6$ MeV

X(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	–
$D^0 D^{*-}$ + c.c.	seen	150
$D^- D^{*0}$ + c.c.	seen	141
$\omega\pi^\pm$	not seen	1862
$J/\psi\eta$	not seen	509
$D^+ D^{*-}$ + c.c	seen	–
$D^0\overline{D}^{*0}$ + c.c	seen	–

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

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

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	815
$K\overline{K}$	not seen	1896
$\gamma\gamma$	seen	1959

$\chi_{c2}(2P)$

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

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

$\chi_{c2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma$	seen	1964
$D\overline{D}$	seen	615
D^+D^-	seen	600
$D^0\overline{D}^0$	seen	615
$\pi^+\pi^-\eta_c(1S)$	not seen	793
$K\overline{K}$	not seen	1901

X(4020)

$I(J^P) = 1(?^?)$

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

$\psi(4040)$ [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
$\Gamma_{ee} < 2.9$ eV, CL = 90%
$\Gamma_{ee} < 4.6$ eV, CL = 90%

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		764
$D^*\overline{D}+$ 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
$\Sigma^0\overline{\Sigma}^0$	$<7\times10^{-5}$	90%	1630
$\Xi^+\overline{\Xi}^-$	$<1.6\times10^{-4}$	90%	1527
$\Xi^0\overline{\Xi}^0$	$<1.8\times10^{-4}$	90%	1533

X(4140)

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

Mass $m = 4146.8 \pm 2.5$ MeV (S = 1.1)
Full width $\Gamma = 19^{+8}_{-7}$ MeV (S = 1.4)

X(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
$\Gamma_{ee} < 2.2$ eV, CL = 90%

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
$D^0D^-\pi^+$ +c.c. (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen		–
$D\overline{D}^*\pi$ +c.c. (excl. $D^*\overline{D}^*$)	seen		–
$D^0D^{*-}\pi^+$ +c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	not seen		–
$D_s^+D_s^-$	not seen		720
$D_s^{*+}D_s^-$ +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
$\gamma X(3872) \rightarrow \gamma J/\psi\pi^+\pi^-$	< 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%	–
$\gamma X(3872) \rightarrow \gamma\gamma J/\psi$	< 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%	–

$X(4260)$

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

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

***X*(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	–
$X(3900)^\pm\pi^\mp$, $X^\pm \rightarrow J/\psi\pi^\pm$	seen	–
$J/\psi\pi^0\pi^0$	seen	952
$J/\psi K^+K^-$	seen	477
$J/\psi K^0_S K^0_S$	not seen	465
$X(3872)\gamma$	seen	343
$J/\psi\eta$	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
$\chi_{c1}\gamma$	not seen	658
$\chi_{c2}\gamma$	not seen	620
$\chi_{c1}\pi^+\pi^-\pi^0$	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	111
$p\overline{p}$	not seen	1896
$K_S^0K^\pm\pi^\mp$	not seen	2037
$K^+K^-\pi^0$	not seen	2038

X(4360)

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

$X(4360)$ MASS $= 4341 \pm 8$ MeV (S = 1.3)
$X(4360)$ WIDTH $= 102 \pm 9$ MeV
$\Gamma_{ee} < 0.57$ eV, CL = 90%
$\Gamma_{ee} < 1.9$ eV, CL = 90%

X(4360) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S)\pi^+\pi^-$	seen	547
$\psi(3823)\pi^+\pi^-$	possibly seen	411

$\psi(4415)$ [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
$\Gamma_{ee} < 3.6$ eV, CL = 90%
$\Gamma_{ee} < 0.47$ eV, CL = 90%
$\Gamma_{ee} < 2.3$ eV, CL = 90%

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%	–
$D\overline{D}_2^*(2460) \to D^0D^-\pi^+$+c.c.	(10 ±4) %		–
$D^0D^{*-}\pi^+$+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
$\psi(3823)\pi^+\pi^-$	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^-	$(9.4\pm3.2) \times 10^{-6}$		2210

$X(4430)^{\pm}$ $I(J^P) = ?(1^+)$

Quantum numbers not established.

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

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

$X(4660)$ $I^G(J^{PC}) = ?^?(1^{--})$

$X(4660)$ MASS $= 4643 \pm 9$ MeV (S = 1.2)
$X(4660)$ WIDTH $= 72 \pm 11$ MeV
$\Gamma_{ee} < 0.45$ eV, CL = 90%
$\Gamma_{ee} < 2.1$ eV, CL = 90%

$X(4660)$ 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.