Meson Summary Table

$\chi_{c0}(1P)$ or $\chi_{c0}(3415)$

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

Mass $m = 3415.1 \pm 1.0$ MeV
Full width $\Gamma = 14 \pm 5$ MeV

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(3.7 ± 0.7) %		1679
$\pi^+\pi^- K^+ K^-$	(3.0 ± 0.7) %		1580
$\rho^0\pi^+\pi^-$	(1.6 ± 0.5) %		1608
$3(\pi^+\pi^-)$	(1.5 ± 0.5) %		1633
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(1.2 ± 0.4) %		1522
$\pi^+\pi^-$	$(7.5\pm2.1)\times10^{-3}$		1702
K^+K^-	$(7.1\pm2.4)\times10^{-3}$		1635
$\pi^+\pi^- p\overline{p}$	$(5.0\pm2.0)\times10^{-3}$		1320
$\pi^0\pi^0$	$(3.1\pm0.6)\times10^{-3}$		1702
$\eta\eta$	$(2.5\pm1.1)\times10^{-3}$		1617
$p\overline{p}$	$< 9.0 \times10^{-4}$	90%	1427
Radiative decays			
$\gamma J/\psi(1S)$	$(6.6\pm1.8)\times10^{-3}$		303
$\gamma\gamma$	$(4.0\pm2.3)\times10^{-4}$		1708

$\chi_{c1}(1P)$ or $\chi_{c1}(3510)$

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

Mass $m = 3510.53 \pm 0.12$ MeV
Full width $\Gamma = 0.88 \pm 0.14$ MeV

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
Hadronic decays		
$3(\pi^+\pi^-)$	(2.2 ± 0.8) %	1683
$2(\pi^+\pi^-)$	(1.6 ± 0.5) %	1727
$\pi^+\pi^- K^+ K^-$	$(9 \pm4)\times10^{-3}$	1632
$\rho^0\pi^+\pi^-$	$(3.9\pm3.5)\times10^{-3}$	1659
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2\pm2.1)\times10^{-3}$	1576
$\pi^+\pi^- p\overline{p}$	$(1.4\pm0.9)\times10^{-3}$	1381
$p\overline{p}$	$(8.6\pm1.2)\times10^{-5}$	1483
$\pi^+\pi^- + K^+K^-$	$< 2.1 \times10^{-3}$	–
Radiative decays		
$\gamma J/\psi(1S)$	(27.3 ± 1.6) %	389

$\chi_{c2}(1P)$ or $\chi_{c2}(3555)$

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

Mass $m = 3556.17 \pm 0.13$ MeV
Full width $\Gamma = 2.00 \pm 0.18$ MeV

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(2.2 ± 0.5) %		1751
$\pi^+\pi^- K^+ K^-$	(1.9 ± 0.5) %		1656
$3(\pi^+\pi^-)$	(1.2 ± 0.8) %		1707
$\rho^0\pi^+\pi^-$	$(7 \pm4)\times10^{-3}$		1683
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(4.8\pm2.8)\times10^{-3}$		1601
$\pi^+\pi^- p\overline{p}$	$(3.3\pm1.3)\times10^{-3}$		1410
$\pi^+\pi^-$	$(1.9\pm1.0)\times10^{-3}$		1773
K^+K^-	$(1.5\pm1.1)\times10^{-3}$		1708
$p\overline{p}$	$(10.0\pm1.0)\times10^{-5}$		1510
$\pi^0\pi^0$	$(1.10\pm0.28)\times10^{-3}$		1773
$\eta\eta$	$(8 \pm5)\times10^{-4}$		1692
$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	90%	185
Radiative decays			
$\gamma J/\psi(1S)$	(13.5 ± 1.1) %		430
$\gamma\gamma$	$(1.6\pm0.5)\times10^{-4}$		1778

$\psi(2S)$ or $\psi(3685)$

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

Mass $m = 3686.00 \pm 0.09$ MeV
Full width $\Gamma = 277 \pm 31$ keV (S = 1.1)
$\Gamma_{ee} = 2.14 \pm 0.21$ keV (Assuming $\Gamma_{ee} = \Gamma_{\mu\mu}$)

$\psi(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	(98.10 ± 0.30) %		–
virtual $\gamma \to$ hadrons	(2.9 ± 0.4) %		–
e^+e^-	$(8.8 \pm1.3)\times10^{-3}$		1843
$\mu^+\mu^-$	$(7.7 \pm1.7)\times10^{-3}$		1840
Decays into $J/\psi(1S)$ and anything			
$J/\psi(1S)$ anything	(57 ± 4) %		–
$J/\psi(1S)$ neutrals	(23.2 ± 2.6) %		–
$J/\psi(1S)\pi^+\pi^-$	(32.4 ± 2.6) %		477
$J/\psi(1S)\pi^0\pi^0$	(18.4 ± 2.7) %		481
$J/\psi(1S)\eta$	(2.7 ± 0.4) %	S=1.7	200
$J/\psi(1S)\pi^0$	$(9.7 \pm2.1)\times10^{-4}$		527
Hadronic decays			
$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm1.6)\times10^{-3}$		1746
$2(\pi^+\pi^-)\pi^0$	$(3.1 \pm0.7)\times10^{-3}$		1799
$\pi^+\pi^- K^+K^-$	$(1.6 \pm0.4)\times10^{-3}$		1726
$\pi^+\pi^- p\overline{p}$	$(8.0 \pm2.0)\times10^{-4}$		1491
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(6.7 \pm2.5)\times10^{-4}$		1673
$2(\pi^+\pi^-)$	$(4.5 \pm1.0)\times10^{-4}$		1817
$\rho^0\pi^+\pi^-$	$(4.2 \pm1.5)\times10^{-4}$		1751
$\overline{p}p$	$(1.9 \pm0.5)\times10^{-4}$		1586
$3(\pi^+\pi^-)$	$(1.5 \pm1.0)\times10^{-4}$		1774
$\overline{p}p\pi^0$	$(1.4 \pm0.5)\times10^{-4}$		1543
K^+K^-	$(1.0 \pm0.7)\times10^{-4}$		1776
$\pi^+\pi^-\pi^0$	$(9 \pm5)\times10^{-5}$		1830
$\pi^+\pi^-$	$(8 \pm5)\times10^{-5}$		1838
$\Lambda\overline{\Lambda}$	$< 4 \times10^{-4}$	CL=90%	1467
$\Xi^-\overline{\Xi}^+$	$< 2 \times10^{-4}$	CL=90%	1285
$\rho\pi$	$< 8.3 \times10^{-5}$	CL=90%	1760
$K^+K^-\pi^0$	$< 2.96 \times10^{-5}$	CL=90%	1754
$K^+\overline{K}^*(892)^-$ + c.c.	$< 1.79 \times10^{-5}$	CL=90%	1698
Radiative decays			
$\gamma\chi_{c0}(1P)$	(9.3 ± 0.8) %		261
$\gamma\chi_{c1}(1P)$	(8.7 ± 0.8) %		171
$\gamma\chi_{c2}(1P)$	(7.8 ± 0.8) %		127
$\gamma\eta_c(1S)$	$(2.8 \pm0.6)\times10^{-3}$		639
$\gamma\pi^0$	$< 5.4 \times10^{-3}$	CL=95%	1841
$\gamma\eta'(958)$	$< 1.1 \times10^{-3}$	CL=90%	1719
$\gamma\gamma$	$< 1.6 \times10^{-4}$	CL=90%	1843
$\gamma\eta(1440) \to \gamma K\overline{K}\pi$	[n] $< 1.2 \times10^{-4}$	CL=90%	1569

$\psi(3770)$

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

Mass $m = 3769.9 \pm 2.5$ MeV (S = 1.8)
Full width $\Gamma = 23.6 \pm 2.7$ MeV (S = 1.1)
$\Gamma_{ee} = 0.26 \pm 0.04$ keV (S = 1.2)

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$D\overline{D}$	dominant		242
e^+e^-	$(1.12\pm0.17)\times10^{-5}$	1.2	1885

$\psi(4040)$ [yy]

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

Mass $m = 4040 \pm 10$ MeV
Full width $\Gamma = 52 \pm 10$ MeV
$\Gamma_{ee} = 0.75 \pm 0.15$ keV

$\psi(4040)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	$(1.4\pm0.4)\times10^{-5}$	2020
$D^0\overline{D}^0$	seen	777
$D^*(2007)^0\overline{D}^0$ + c.c.	seen	578
$D^*(2007)^0\overline{D}^*(2007)^0$	seen	232