

LIGHT UNFLAVORED MESONS

($S = C = B = 0$)

For $I = 1$ (π, b, ρ, a): $u\bar{d}, (u\bar{u}-d\bar{d})/\sqrt{2}, d\bar{u}$;
for $I = 0$ ($\eta, \eta', h, h', \omega, \phi, f, f'$): $c_1(u\bar{u} + d\bar{d}) + c_2(s\bar{s})$

$f_0(500)$ ^[a]

or σ

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

Mass $m = (400-1200)$ MeV

Full width $\Gamma = (600-1000)$ MeV

$f_0(500)$ DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	dominant	—
$\gamma\gamma$	seen	—

$\rho(770)$ ^[b]

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

Mass $m = 775.49 \pm 0.34$ MeV

Full width $\Gamma = 149.1 \pm 0.8$ MeV

$\Gamma_{ee} = 7.04 \pm 0.06$ keV

$\rho(770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
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$\pi\pi$	~ 100	%	363
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$\rho(770)^\pm$ decays

$\pi^\pm\gamma$	(4.5 ± 0.5) $\times 10^{-4}$	S=2.2	375
$\pi^\pm\eta$	< 6 $\times 10^{-3}$	CL=84%	153
$\pi^\pm\pi^+\pi^-\pi^0$	< 2.0 $\times 10^{-3}$	CL=84%	254

$\rho(770)^0$ decays

$\pi^+\pi^-\gamma$	(9.9 ± 1.6) $\times 10^{-3}$		362
$\pi^0\gamma$	(6.0 ± 0.8) $\times 10^{-4}$		376
$\eta\gamma$	(3.00 ± 0.20) $\times 10^{-4}$		194
$\pi^0\pi^0\gamma$	(4.5 ± 0.8) $\times 10^{-5}$		363
$\mu^+\mu^-$	[c] (4.55 ± 0.28) $\times 10^{-5}$		373
e^+e^-	[c] (4.72 ± 0.05) $\times 10^{-5}$		388
$\pi^+\pi^-\pi^0$	($1.01^{+0.54}_{-0.36} \pm 0.34$) $\times 10^{-4}$		323
$\pi^+\pi^-\pi^+\pi^-$	(1.8 ± 0.9) $\times 10^{-5}$		251
$\pi^+\pi^-\pi^0\pi^0$	(1.6 ± 0.8) $\times 10^{-5}$		257
$\pi^0e^+e^-$	< 1.2 $\times 10^{-5}$	CL=90%	376

$\omega(782)$

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

Mass $m = 782.65 \pm 0.12$ MeV ($S = 1.9$)

Full width $\Gamma = 8.49 \pm 0.08$ MeV

$\Gamma_{ee} = 0.60 \pm 0.02$ keV

NODE=MXXX005

NODE=M014

NODE=M014M;DTYPE=M;OUR EST;

→ NOT CHECKED ←

NODE=M014W;DTYPE=G;OUR EST;

→ NOT CHECKED ←

NODE=M014215;DESIG=1;OUR EST;

→ NOT CHECKED ←

DESIG=5;OUR EST;→ NOT CHECKED ←

NODE=M009

NODE=M009M0;DTYPE=M

NODE=M009W5;DTYPE=G

NODE=M009W4;DTYPE=E

NODE=M009225;DESIG=1;OUR EVAL;

→ NOT CHECKED ←

NODE=M009;CLUMP=A

DESIG=3

DESIG=5

DESIG=21

NODE=M009;CLUMP=B

DESIG=60

DESIG=40

DESIG=8

DESIG=80

DESIG=6

DESIG=4

DESIG=7;OUR EVAL;→ NOT CHECKED ←

DESIG=22

DESIG=30

DESIG=9

NODE=M001

NODE=M001M;DTYPE=M

NODE=M001W;DTYPE=G

NODE=M001W7;DTYPE=E;OUR EVAL;

→ NOT CHECKED ←

$\omega(782)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$\pi^+\pi^-\pi^0$	(89.2 $\pm$ 0.7) %		327	NODE=M001215;DESIG=1
$\pi^0\gamma$	(8.28 $\pm$ 0.28) %	S=2.1	380	DESIG=3
$\pi^+\pi^-$	(1.53 $^{+0.11}_{-0.13}$) %	S=1.2	366	DESIG=2
neutrals (excluding $\pi^0\gamma$)	(8 $^{+8}_{-5}$) $\times 10^{-3}$	S=1.1	—	DESIG=13
$\eta\gamma$	(4.6 $\pm$ 0.4) $\times 10^{-4}$	S=1.1	200	DESIG=6
$\pi^0e^+e^-$	(7.7 $\pm$ 0.6) $\times 10^{-4}$		380	DESIG=14
$\pi^0\mu^+\mu^-$	(1.3 $\pm$ 0.4) $\times 10^{-4}$	S=2.1	349	DESIG=11
e^+e^-	(7.28 $\pm$ 0.14) $\times 10^{-5}$	S=1.3	391	DESIG=7
$\pi^+\pi^-\pi^0\pi^0$	< 2 $\times 10^{-4}$	CL=90%	262	DESIG=12
$\pi^+\pi^-\gamma$	< 3.6 $\times 10^{-3}$	CL=95%	366	DESIG=4
$\pi^+\pi^-\pi^+\pi^-$	< 1 $\times 10^{-3}$	CL=90%	256	DESIG=15
$\pi^0\pi^0\gamma$	(6.6 $\pm$ 1.1) $\times 10^{-5}$		367	DESIG=5
$\eta\pi^0\gamma$	< 3.3 $\times 10^{-5}$	CL=90%	162	DESIG=17
$\mu^+\mu^-$	(9.0 $\pm$ 3.1) $\times 10^{-5}$		377	DESIG=8
3γ	< 1.9 $\times 10^{-4}$	CL=95%	391	DESIG=10
Charge conjugation (C) violating modes				
$\eta\pi^0$	C < 2.1 $\times 10^{-4}$	CL=90%	162	NODE=M001;CLUMP=A DESIG=9
$2\pi^0$	C < 2.1 $\times 10^{-4}$	CL=90%	367	DESIG=193
$3\pi^0$	C < 2.3 $\times 10^{-4}$	CL=90%	330	DESIG=16

 $\eta'(958)$

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

Mass $m = 957.78 \pm 0.06$ MeVFull width $\Gamma = 0.199 \pm 0.009$ MeV

NODE=M002

NODE=M002M;DTYPE=M

NODE=M002W;DTYPE=G

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\pi^+\pi^-\eta$	(43.4 $\pm$ 0.7) %		232	NODE=M002215;DESIG=1
$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.3 $\pm$ 0.6) %		165	DESIG=9
$\pi^0\pi^0\eta$	(21.6 $\pm$ 0.8) %		239	DESIG=2
$\omega\gamma$	(2.75 $\pm$ 0.22) %		159	DESIG=7
$\gamma\gamma$	(2.18 $\pm$ 0.08) %		479	DESIG=6
$3\pi^0$	(1.68 $\pm$ 0.22) $\times 10^{-3}$		430	DESIG=8
$\mu^+\mu^-\gamma$	(1.07 $\pm$ 0.26) $\times 10^{-4}$		467	DESIG=20
$\pi^+\pi^-\mu^+\mu^-$	< 2.2 $\times 10^{-4}$	90%	401	DESIG=201
$\pi^+\pi^-\pi^0$	(3.6 $^{+1.1}_{-0.9}$) $\times 10^{-3}$		428	DESIG=121
$\pi^0\rho^0$	< 4 %	90%	111	DESIG=18
$2(\pi^+\pi^-)$	< 2.4 $\times 10^{-4}$	90%	372	DESIG=131
$\pi^+\pi^-2\pi^0$	< 2.6 $\times 10^{-3}$	90%	376	DESIG=202
$2(\pi^+\pi^-)$ neutrals	< 1 %	95%	—	DESIG=132
$2(\pi^+\pi^-)\pi^0$	< 1.9 $\times 10^{-3}$	90%	298	DESIG=141
$2(\pi^+\pi^-)2\pi^0$	< 1 %	95%	197	DESIG=15
$3(\pi^+\pi^-)$	< 5 $\times 10^{-4}$	90%	189	DESIG=203
$\pi^+\pi^-e^+e^-$	(2.4 $^{+1.3}_{-1.0}$) $\times 10^{-3}$		458	DESIG=10
γe^+e^-	< 9 $\times 10^{-4}$	90%	479	DESIG=28
$\pi^0\gamma\gamma$	< 8 $\times 10^{-4}$	90%	469	DESIG=24
$4\pi^0$	< 5 $\times 10^{-4}$	90%	380	DESIG=26
e^+e^-	< 2.1 $\times 10^{-7}$	90%	479	DESIG=150
invisible	< 9 $\times 10^{-4}$	90%	—	DESIG=200

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

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

NODE=M002;CLUMP=B

DESIG=111
DESIG=25
DESIG=16
DESIG=17
DESIG=23
DESIG=22
DESIG=21
DESIG=27

 $f_0(980)$ [e]

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

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

NODE=M003

NODE=M003M1;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M003W1;DTYPE=G;OUR EST;
→ NOT CHECKED ←

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

NODE=M003215;DESIG=2;OUR EVAL;
→ NOT CHECKED ←
DESIG=1;OUR EVAL;→ NOT CHECKED ←
DESIG=5;OUR EVAL;→ NOT CHECKED ←

 $a_0(980)$ [e]

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

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

NODE=M036

NODE=M036MX;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M036W1;DTYPE=G;OUR EST;
→ NOT CHECKED ←

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

NODE=M036215;DESIG=1;OUR EST;
→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←
DESIG=5;OUR EST;→ NOT CHECKED ←

 $\phi(1020)$

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

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

NODE=M004

NODE=M004M;DTYPE=M
NODE=M004W;DTYPE=G

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$K^+ K^-$	(48.9 $\pm$ 0.5) %	S=1.1	127	NODE=M004215;DESIG=1
$K_L^0 K_S^0$	(34.2 $\pm$ 0.4) %	S=1.1	110	DESIG=2
$\rho\pi^+ + \pi^+\pi^-\pi^0$	(15.32 $\pm$ 0.32) %	S=1.1	—	DESIG=24
$\eta\gamma$	(1.309 $\pm$ 0.024) %	S=1.2	363	DESIG=4
$\pi^0\gamma$	(1.27 $\pm$ 0.06) $\times 10^{-3}$		501	DESIG=7
$\ell^+\ell^-$	—		510	DESIG=256;OUR EVAL; → NOT CHECKED ←
e^+e^-	(2.954 $\pm$ 0.030) $\times 10^{-4}$	S=1.1	510	DESIG=5
$\mu^+\mu^-$	(2.87 $\pm$ 0.19) $\times 10^{-4}$		499	DESIG=6
ηe^+e^-	(1.15 $\pm$ 0.10) $\times 10^{-4}$		363	DESIG=17
$\pi^+\pi^-$	(7.4 $\pm$ 1.3) $\times 10^{-5}$		490	DESIG=8
$\omega\pi^0$	(4.7 $\pm$ 0.5) $\times 10^{-5}$		171	DESIG=25
$\omega\gamma$	< 5 %	CL=84%	209	DESIG=10
$\rho\gamma$	< 1.2 $\times 10^{-5}$	CL=90%	215	DESIG=12
$\pi^+\pi^-\gamma$	(4.1 $\pm$ 1.3) $\times 10^{-5}$		490	DESIG=9
$f_0(980)\gamma$	(3.22 $\pm$ 0.19) $\times 10^{-4}$	S=1.1	39	DESIG=20
$\pi^0\pi^0\gamma$	(1.13 $\pm$ 0.06) $\times 10^{-4}$		492	DESIG=19
$\pi^+\pi^-\pi^+\pi^-$	(4.0 $\pm$ 2.8 -2.2) $\times 10^{-6}$		410	DESIG=15
$\pi^+\pi^+\pi^-\pi^-\pi^0$	< 4.6 $\times 10^{-6}$	CL=90%	342	DESIG=14
$\pi^0 e^+ e^-$	(1.12 $\pm$ 0.28) $\times 10^{-5}$		501	DESIG=21
$\pi^0\eta\gamma$	(7.27 $\pm$ 0.30) $\times 10^{-5}$	S=1.5	346	DESIG=22
$a_0(980)\gamma$	(7.6 $\pm$ 0.6) $\times 10^{-5}$		39	DESIG=23
$K^0\bar{K}^0\gamma$	< 1.9 $\times 10^{-8}$	CL=90%	110	DESIG=257
$\eta'(958)\gamma$	(6.25 $\pm$ 0.21) $\times 10^{-5}$		60	DESIG=194
$\eta\pi^0\pi^0\gamma$	< 2 $\times 10^{-5}$	CL=90%	293	DESIG=195
$\mu^+\mu^-\gamma$	(1.4 $\pm$ 0.5) $\times 10^{-5}$		499	DESIG=196
$\rho\gamma\gamma$	< 1.2 $\times 10^{-4}$	CL=90%	215	DESIG=250
$\eta\pi^+\pi^-$	< 1.8 $\times 10^{-5}$	CL=90%	288	DESIG=255
$\eta\mu^+\mu^-$	< 9.4 $\times 10^{-6}$	CL=90%	321	DESIG=26
Lepton Family number (LF) violating modes				
$e^\pm\mu^\mp$	LF < 2 $\times 10^{-6}$	CL=90%	504	NODE=M004;CLUMP=A DESIG=258

 $h_1(1170)$

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

Mass $m = 1170 \pm 20$ MeVFull width $\Gamma = 360 \pm 40$ MeV

NODE=M030

NODE=M030M;DTYPE=M;OUR EST;

→ NOT CHECKED ←

NODE=M030W;DTYPE=G;OUR EST;

→ NOT CHECKED ←

$h_1(1170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	307

NODE=M030215;DESIG=1;OUR EST;

→ NOT CHECKED ←

 $b_1(1235)$

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

Mass $m = 1229.5 \pm 3.2$ MeV ($S = 1.6$)Full width $\Gamma = 142 \pm 9$ MeV ($S = 1.2$)

NODE=M011

NODE=M011M;DTYPE=M

NODE=M011W;DTYPE=G

$b_1(1235)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\omega\pi$	dominant		348
[D/S amplitude ratio = 0.277 ± 0.027]			
$\pi^\pm\gamma$	(1.6 ± 0.4) $\times 10^{-3}$		607
$\eta\rho$	seen		†
$\pi^+\pi^+\pi^-\pi^0$	< 50 %	84%	535
$K^*(892)^\pm K^\mp$	seen		†
$(K\bar{K})^\pm\pi^0$	< 8 %	90%	248
$K_S^0 K_L^0 \pi^\pm$	< 6 %	90%	235
$K_S^0 K_S^0 \pi^\pm$	< 2 %	90%	235
$\phi\pi$	< 1.5 %	84%	147

NODE=M011215;DESIG=1;OUR EST;
→ NOT CHECKED ←

DESIG=9

DESIG=8;OUR EST;→ NOT CHECKED ←

DESIG=2;OUR EST;→ NOT CHECKED ←

DESIG=74

DESIG=71;OUR EST;→ NOT CHECKED ←

DESIG=73;OUR EST;→ NOT CHECKED ←

DESIG=72;OUR EST;→ NOT CHECKED ←

DESIG=5;OUR EST;→ NOT CHECKED ←

$a_1(1260)$ [f]

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

Mass $m = 1230 \pm 40$ MeV [g]

Full width $\Gamma = 250$ to 600 MeV

NODE=M010

NODE=M010M;DTYPE=M;OUR EST;

→ NOT CHECKED ←

NODE=M010W;DTYPE=G;OUR EST;

→ NOT CHECKED ←

$a_1(1260)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$(\rho\pi)_{S\text{-wave}}$	seen	353
$(\rho\pi)_{D\text{-wave}}$	seen	353
$(\rho(1450)\pi)_{S\text{-wave}}$	seen	†
$(\rho(1450)\pi)_{D\text{-wave}}$	seen	†
$\sigma\pi$	seen	—
$f_0(980)\pi$	not seen	189
$f_0(1370)\pi$	seen	†
$f_2(1270)\pi$	seen	†
$K\bar{K}^*(892)^+ \text{ c.c.}$	seen	†
$\pi\gamma$	seen	608

NODE=M010215;DESIG=7;OUR EST;

→ NOT CHECKED ←

DESIG=8;OUR EST;→ NOT CHECKED ←

DESIG=9;OUR EST;→ NOT CHECKED ←

DESIG=10;OUR EST;→ NOT CHECKED ←

DESIG=16;OUR EST;→ NOT CHECKED ←

DESIG=11;OUR EST;→ NOT CHECKED ←

DESIG=12;OUR EST;→ NOT CHECKED ←

DESIG=13;OUR EST;→ NOT CHECKED ←

DESIG=14;OUR EST;→ NOT CHECKED ←

DESIG=4;OUR EST;→ NOT CHECKED ←

$f_2(1270)$

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

Mass $m = 1275.1 \pm 1.2$ MeV (S = 1.1)

Full width $\Gamma = 185.1^{+2.9}_{-2.4}$ MeV (S = 1.5)

NODE=M005

NODE=M005M;DTYPE=M

NODE=M005W;DTYPE=G

$f_2(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$	($84.8^{+2.4}_{-1.2}$) %	S=1.2	623
$\pi^+\pi^-\pi^0$	($7.1^{+1.4}_{-2.7}$) %	S=1.3	562
$K\bar{K}$	(4.6 ± 0.4) %	S=2.8	403
$2\pi^+2\pi^-$	(2.8 ± 0.4) %	S=1.2	559
$\eta\eta$	(4.0 ± 0.8) $\times 10^{-3}$	S=2.1	326
$4\pi^0$	(3.0 ± 1.0) $\times 10^{-3}$		564
$\gamma\gamma$	(1.64 ± 0.19) $\times 10^{-5}$	S=1.9	638
$\eta\pi\pi$	< 8 $\times 10^{-3}$	CL=95%	477
$K^0 K^- \pi^+ + \text{c.c.}$	< 3.4 $\times 10^{-3}$	CL=95%	293
e^+e^-	< 6 $\times 10^{-10}$	CL=90%	638

NODE=M005215;DESIG=1

DESIG=3

DESIG=4

DESIG=2

DESIG=7

DESIG=9

DESIG=8

DESIG=6

DESIG=5

DESIG=10

$f_1(1285)$

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

Mass $m = 1282.1 \pm 0.6$ MeV (S = 1.7)

Full width $\Gamma = 24.2 \pm 1.1$ MeV (S = 1.3)

NODE=M008

NODE=M008M;DTYPE=M

NODE=M008W;DTYPE=G

f₁(1285) DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
4π	$(33.1^{+2.1}_{-1.8})\%$	S=1.3	568	NODE=M008215;DESIG=21
$\pi^0\pi^0\pi^+\pi^-$	$(22.0^{+1.4}_{-1.2})\%$	S=1.3	566	DESIG=22
$2\pi^+2\pi^-$	$(11.0^{+0.7}_{-0.6})\%$	S=1.3	563	DESIG=20
$\rho^0\pi^+\pi^-$	$(11.0^{+0.7}_{-0.6})\%$	S=1.3	336	DESIG=191
$\rho^0\rho^0$	seen		†	DESIG=23;OUR EST;→ NOT CHECKED ←
$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	568	DESIG=7
$\eta\pi^+\pi^-$	$(35 \pm 15)\%$		479	DESIG=198
$\eta\pi\pi$	$(52.4^{+1.9}_{-2.2})\%$	S=1.2	482	DESIG=3
$a_0(980)\pi$ [ignoring $a_0(980) \rightarrow K\bar{K}$]	$(36 \pm 7)\%$		238	DESIG=4
$\eta\pi\pi$ [excluding $a_0(980)\pi$]	$(16 \pm 7)\%$		482	DESIG=5
$K\bar{K}\pi$	$(9.0 \pm 0.4)\%$	S=1.1	308	DESIG=1
$K\bar{K}^*(892)$	not seen		†	DESIG=6
$\pi^+\pi^-\pi^0$	$(3.0 \pm 0.9) \times 10^{-3}$		603	DESIG=197
$\rho^\pm\pi^\mp$	$< 3.1 \times 10^{-3}$	CL=95%	390	DESIG=199
$\gamma\rho^0$	$(5.5 \pm 1.3)\%$	S=2.8	407	DESIG=13
$\phi\gamma$	$(7.4 \pm 2.6) \times 10^{-4}$		236	DESIG=10

 $\eta(1295)$

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

Mass $m = 1294 \pm 4$ MeV (S = 1.6)Full width $\Gamma = 55 \pm 5$ MeV

NODE=M037

NODE=M037M;DTYPE=M

NODE=M037W;DTYPE=G

$\eta(1295)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\pi^+\pi^-$	seen	487	
$a_0(980)\pi$	seen	248	
$\eta\pi^0\pi^0$	seen	490	
$\eta(\pi\pi)_S\text{-wave}$	seen	—	

NODE=M037215;DESIG=2;OUR EST;
 → NOT CHECKED ←
 DESIG=1;OUR EST;→ NOT CHECKED ←
 DESIG=4;OUR EST;→ NOT CHECKED ←
 DESIG=5;OUR EST;→ NOT CHECKED ←

 $\pi(1300)$

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

Mass $m = 1300 \pm 100$ MeV [g]Full width $\Gamma = 200$ to 600 MeV

NODE=M058

NODE=M058M;DTYPE=M;OUR EST;

→ NOT CHECKED ←
 NODE=M058W;DTYPE=G;OUR EST;
 → NOT CHECKED ←

$\pi(1300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\rho\pi$	seen	404	
$\pi(\pi\pi)_S\text{-wave}$	seen	—	

NODE=M058215;DESIG=1;OUR EST;
 → NOT CHECKED ←
 DESIG=3;OUR EST;→ NOT CHECKED ←

 $a_2(1320)$

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

Mass $m = 1318.3^{+0.5}_{-0.6}$ MeV (S = 1.2)Full width $\Gamma = 107 \pm 5$ MeV [g]

NODE=M012

NODE=M012M0;DTYPE=M

NODE=M012W0;DTYPE=G;OUR EST;
 → NOT CHECKED ←

$a_2(1320)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
3π	(70.1 $\pm$ 2.7) %	S=1.2	624
$\eta\pi$	(14.5 $\pm$ 1.2) %		535
$\omega\pi\pi$	(10.6 $\pm$ 3.2) %	S=1.3	366
$K\bar{K}$	(4.9 $\pm$ 0.8) %		437
$\eta'(958)\pi$	(5.3 $\pm$ 0.9) $\times 10^{-3}$		288
$\pi^\pm\gamma$	(2.68 $\pm$ 0.31) $\times 10^{-3}$		652
$\gamma\gamma$	(9.4 $\pm$ 0.7) $\times 10^{-6}$		659
e^+e^-	< 5 $\times 10^{-9}$	CL=90%	659

NODE=M012215;DESIG=1

DESIG=3

DESIG=4

DESIG=2

DESIG=8

DESIG=7

DESIG=9

DESIG=10

 $f_0(1370)$ ^[e]

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

Mass $m = 1200$ to 1500 MeVFull width $\Gamma = 200$ to 500 MeV

NODE=M147

NODE=M147M;DTYPE=M;OUR EST;

→ NOT CHECKED ←

NODE=M147W;DTYPE=G;OUR EST;

→ NOT CHECKED ←

$f_0(1370)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	672
4π	seen	617
$4\pi^0$	seen	617
$2\pi^+2\pi^-$	seen	612
$\pi^+\pi^-2\pi^0$	seen	615
$\rho\rho$	dominant	†
$2(\pi\pi)_{S\text{-wave}}$	seen	—
$\pi(1300)\pi$	seen	†
$a_1(1260)\pi$	seen	35
$\eta\eta$	seen	411
$K\bar{K}$	seen	475
$K\bar{K}n\pi$	not seen	†
6π	not seen	508
$\omega\omega$	not seen	†
$\gamma\gamma$	seen	685
e^+e^-	not seen	685

NODE=M147215;DESIG=1;OUR EST;

→ NOT CHECKED ←

DESIG=10;OUR EST;→ NOT CHECKED ←

DESIG=4;OUR EST;→ NOT CHECKED ←

DESIG=5;OUR EST;→ NOT CHECKED ←

DESIG=6;OUR EST;→ NOT CHECKED ←

DESIG=14;OUR EST;→ NOT CHECKED ←

DESIG=15;OUR EST;→ NOT CHECKED ←

DESIG=16;OUR EVAL;

→ NOT CHECKED ←

DESIG=17;OUR EVAL;

→ NOT CHECKED ←

DESIG=2;OUR EST;→ NOT CHECKED ←

DESIG=11;OUR EST;→ NOT CHECKED ←

DESIG=18;OUR EVAL;

→ NOT CHECKED ←

DESIG=19;OUR EVAL;

→ NOT CHECKED ←

DESIG=20;OUR EVAL;

→ NOT CHECKED ←

DESIG=12;OUR EST;→ NOT CHECKED ←

DESIG=13;OUR EST;→ NOT CHECKED ←

 $\pi_1(1400)$ ^[h]

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

Mass $m = 1354 \pm 25$ MeV ($S = 1.8$)Full width $\Gamma = 330 \pm 35$ MeV

NODE=M111

NODE=M111M;DTYPE=M

NODE=M111W;DTYPE=G

$\pi_1(1400)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi^0$	seen	557
$\eta\pi^-$	seen	556

NODE=M111215;DESIG=1;OUR EST;

→ NOT CHECKED ←

DESIG=4;OUR EST;→ NOT CHECKED ←

 $\eta(1405)$ ^[i]

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

Mass $m = 1408.9 \pm 2.4$ MeV ^[g] ($S = 2.3$)Full width $\Gamma = 51.1 \pm 3.2$ MeV ^[g] ($S = 2.0$)

NODE=M027

NODE=M027MX;DTYPE=M

NODE=M027WX;DTYPE=G

$\eta(1405)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\bar{K}\pi$	seen		424
$\eta\pi\pi$	seen		562
$a_0(980)\pi$	seen		345
$\eta(\pi\pi)_{S\text{-wave}}$	seen		—
$f_0(980)\eta$	seen		†
4π	seen		639
$\rho\rho$	<58 %	99.85%	†
$\rho^0\gamma$	seen		491
$K^*(892)K$	seen		123

NODE=M027215;DESIG=2;OUR EST;
→ NOT CHECKED ←
DESIG=5;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=9;OUR EST;→ NOT CHECKED ←
DESIG=10;OUR EST;→ NOT CHECKED ←
DESIG=6;OUR EST;→ NOT CHECKED ←
DESIG=12
DESIG=8;OUR EST;→ NOT CHECKED ←
DESIG=11;OUR EST;→ NOT CHECKED ←

$f_1(1420)$ [j]

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

Mass $m = 1426.4 \pm 0.9$ MeV (S = 1.1)

Full width $\Gamma = 54.9 \pm 2.6$ MeV

NODE=M006

NODE=M006M2;DTYPE=M
NODE=M006W;DTYPE=G

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

NODE=M006215;DESIG=2;OUR EST;
→ NOT CHECKED ←
DESIG=1;OUR EST;→ NOT CHECKED ←
DESIG=5;OUR EST;→ NOT CHECKED ←
DESIG=9;OUR EST;→ NOT CHECKED ←

$\omega(1420)$ [k]

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

Mass m (1400–1450) MeV

Full width Γ (180–250) MeV

NODE=M125

NODE=M125M;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M125W;DTYPE=G;OUR EST;
→ NOT CHECKED ←

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

NODE=M125215;DESIG=1;OUR EST;
→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=5;OUR EST;→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←

$a_0(1450)$ [e]

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

Mass $m = 1474 \pm 19$ MeV

Full width $\Gamma = 265 \pm 13$ MeV

NODE=M149

NODE=M149M;DTYPE=M
NODE=M149W;DTYPE=G

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

NODE=M149215;DESIG=1;OUR EST;
→ NOT CHECKED ←
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=5
DESIG=6

$\rho(1450)$ [l]

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

Mass $m = 1465 \pm 25$ MeV [g]

Full width $\Gamma = 400 \pm 60$ MeV [g]

NODE=M105

NODE=M105M0;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M105W0;DTYPE=G;OUR EST;
→ NOT CHECKED ←

$\rho(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	720
4π	seen	669
e^+e^-	seen	732
$\eta\rho$	possibly seen	310
$a_2(1320)\pi$	not seen	54
$K\bar{K}$	not seen	541
$K\bar{K}^*(892) + \text{c.c.}$	possibly seen	229
$\eta\gamma$	possibly seen	630
$f_0(500)\gamma$	not seen	—
$f_0(980)\gamma$	not seen	405
$f_0(1370)\gamma$	not seen	92
$f_2(1270)\gamma$	not seen	178

NODE=M105215;DESIG=1;OUR EST;
 → NOT CHECKED ←
 DESIG=2;OUR EST;→ NOT CHECKED ←
 DESIG=4;OUR EST;→ NOT CHECKED ←
 DESIG=3;OUR EVAL;→ NOT CHECKED ←
 DESIG=8;OUR EST;→ NOT CHECKED ←
 DESIG=7;OUR EVAL;→ NOT CHECKED ←
 DESIG=15;OUR EST;→ NOT CHECKED ←
 DESIG=9;OUR EST;→ NOT CHECKED ←
 DESIG=16;OUR EST;→ NOT CHECKED ←
 DESIG=17;OUR EST;→ NOT CHECKED ←
 DESIG=18;OUR EST;→ NOT CHECKED ←
 DESIG=19;OUR EST;→ NOT CHECKED ←

$\eta(1475)$ ^[i]

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

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

NODE=M175

NODE=M175M5;DTYPE=M
 NODE=M175W5;DTYPE=G

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

NODE=M175215;DESIG=2;OUR EST;
 → NOT CHECKED ←
 DESIG=1;OUR EST;→ NOT CHECKED ←
 DESIG=4;OUR EST;→ NOT CHECKED ←
 DESIG=7;OUR EST;→ NOT CHECKED ←

$f_0(1500)$ ^[h]

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

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

NODE=M152

NODE=M152M;DTYPE=M
 NODE=M152W;DTYPE=G

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

NODE=M152215;DESIG=8
 DESIG=9
 DESIG=3;OUR EST;→ NOT CHECKED ←
 DESIG=7
 DESIG=5;OUR EST;→ NOT CHECKED ←
 DESIG=6;OUR EST;→ NOT CHECKED ←
 DESIG=11;OUR EST;→ NOT CHECKED ←
 DESIG=12;OUR EST;→ NOT CHECKED ←
 DESIG=13;OUR EST;→ NOT CHECKED ←
 DESIG=14;OUR EST;→ NOT CHECKED ←
 DESIG=1
 DESIG=2
 DESIG=4
 DESIG=10;OUR EST;→ NOT CHECKED ←

$f'_2(1525)$

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

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

NODE=M013

NODE=M013MX;DTYPE=M;OUR EST;
 → NOT CHECKED ←
 NODE=M013WX;DTYPE=G

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

NODE=M013215;DESIG=2
DESIG=4
DESIG=1
DESIG=8

$\pi_1(1600)$ ^[h]

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

Mass $m = 1662^{+8}_{-9}$ MeV

Full width $\Gamma = 241 \pm 40$ MeV ($S = 1.4$)

NODE=M164

NODE=M164M;DTYPE=M
NODE=M164W;DTYPE=G

$\pi_1(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	not seen	803
$\rho^0\pi^-$	not seen	641
$f_2(1270)\pi^-$	not seen	318
$b_1(1235)\pi$	seen	357
$\eta'(958)\pi^-$	seen	543
$f_1(1285)\pi$	seen	314

NODE=M164215;DESIG=1;OUR EST;
→ NOT CHECKED ←
DESIG=2
DESIG=4
DESIG=5
DESIG=3
DESIG=6;OUR EST;→ NOT CHECKED ←

$\eta_2(1645)$

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

Mass $m = 1617 \pm 5$ MeV

Full width $\Gamma = 181 \pm 11$ MeV

NODE=M154

NODE=M154M;DTYPE=M
NODE=M154W;DTYPE=G

$\eta_2(1645)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$a_2(1320)\pi$	seen	242
$K\bar{K}\pi$	seen	580
$K^*\bar{K}$	seen	404
$\eta\pi^+\pi^-$	seen	685
$a_0(980)\pi$	seen	499
$f_2(1270)\eta$	not seen	†

NODE=M154215;DESIG=1;OUR EST;
→ NOT CHECKED ←
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=5;OUR EST;→ NOT CHECKED ←
DESIG=6;OUR EST;→ NOT CHECKED ←

$\omega(1650)$ ^[m]

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

Mass $m = 1670 \pm 30$ MeV

Full width $\Gamma = 315 \pm 35$ MeV

NODE=M126

NODE=M126M;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M126W;DTYPE=G;OUR EST;
→ NOT CHECKED ←

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	646
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835

NODE=M126215;DESIG=1;OUR EST;
→ NOT CHECKED ←
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←

$\omega_3(1670)$

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

Mass $m = 1667 \pm 4$ MeV

Full width $\Gamma = 168 \pm 10$ MeV [g]

NODE=M045

NODE=M045M;DTYPE=M
NODE=M045W;DTYPE=G

$\omega_3(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	645
$\omega\pi\pi$	seen	615
$b_1(1235)\pi$	possibly seen	361

NODE=M045215;DESIG=1;OUR EST;
 NOT CHECKED → NOT CHECKED ←
 DESIG=2;OUR EST;→ NOT CHECKED ←
 DESIG=3;OUR EST;→ NOT CHECKED ←

 $\pi_2(1670)$

$$J^{PC} = 1^-(2^--)$$

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

NODE=M034
 NODE=M034M;DTYPE=M
 NODE=M034W;DTYPE=G

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

NODE=M034215;DESIG=20
 DESIG=8
 DESIG=2
 DESIG=13
 DESIG=11
 DESIG=5
 DESIG=14
 DESIG=12
 DESIG=15
 DESIG=16
 DESIG=25
 DESIG=26

 $\phi(1680)$

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

Mass $m = 1680 \pm 20$ MeV [g]
 Full width $\Gamma = 150 \pm 50$ MeV [g]

NODE=M067
 NODE=M067M1;DTYPE=M;OUR EST;
 NOT CHECKED → NOT CHECKED ←
 NODE=M067W1;DTYPE=G;OUR EST;
 → NOT CHECKED ←

$\phi(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\bar{K}^*(892) + \text{c.c.}$	dominant	462
$K_S^0 K\pi$	seen	621
$K\bar{K}$	seen	680
e^+e^-	seen	840
$\omega\pi\pi$	not seen	623
$K^+K^-\pi^+\pi^-$	seen	544

NODE=M067215;DESIG=4;OUR EST;
 NOT CHECKED → NOT CHECKED ←
 DESIG=3;OUR EST;→ NOT CHECKED ←
 DESIG=6;OUR EST;→ NOT CHECKED ←
 DESIG=1;OUR EST;→ NOT CHECKED ←
 DESIG=12;OUR EVAL;
 → NOT CHECKED ←

 $\rho_3(1690)$

$$J^{PC} = 1^+(3^--)$$

Mass $m = 1688.8 \pm 2.1$ MeV [g]
 Full width $\Gamma = 161 \pm 10$ MeV [g] ($S = 1.5$)

NODE=M015
 NODE=M015M;DTYPE=M
 NODE=M015W;DTYPE=G

$\rho_3(1690)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
4π	(71.1 ± 1.9) %		790
$\pi^\pm\pi^+\pi^-\pi^0$	(67 ± 22) %		787
$\omega\pi$	(16 ± 6) %		655
$\pi\pi$	(23.6 ± 1.3) %		834
$K\bar{K}\pi$	(3.8 ± 1.2) %		629
$K\bar{K}$	(1.58 ± 0.26) %	1.2	685
$\eta\pi^+\pi^-$	seen		727
$\rho(770)\eta$	seen		520
$\pi\pi\rho$	seen		633
Excluding 2ρ and $a_2(1320)\pi$.			
$a_2(1320)\pi$	seen		307
$\rho\rho$	seen		334

NODE=M015215;DESIG=2
 DESIG=11
 DESIG=7
 DESIG=1
 DESIG=3
 DESIG=4
 DESIG=13
 DESIG=14;OUR EST;→ NOT CHECKED ←
 DESIG=5;OUR EST;→ NOT CHECKED ←
 DESIG=6;OUR EST;→ NOT CHECKED ←
 DESIG=8;OUR EST;→ NOT CHECKED ←

 $\rho(1700)$ [f]

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

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

NODE=M065
 NODE=M065M0;DTYPE=M;OUR EST;
 NOT CHECKED → NOT CHECKED ←
 NODE=M065W0;DTYPE=G;OUR EST;
 → NOT CHECKED ←

$\rho(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$2(\pi^+\pi^-)$	large	803
$\rho\pi\pi$	dominant	653
$\rho^0\pi^+\pi^-$	large	650
$\rho^\pm\pi^\mp\pi^0$	large	652
$a_1(1260)\pi$	seen	404
$h_1(1170)\pi$	seen	447
$\pi(1300)\pi$	seen	349
$\rho\rho$	seen	372
$\pi^+\pi^-$	seen	849
$\pi\pi$	seen	849
$K\bar{K}^*(892) + \text{c.c.}$	seen	496
$\eta\rho$	seen	545
$a_2(1320)\pi$	not seen	334
$K\bar{K}$	seen	704
e^+e^-	seen	860
$\pi^0\omega$	seen	674

NODE=M065215;DESIG=2;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=12;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=1;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=9;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=15;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=16;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=17;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=18;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=4;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=13;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=10;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=11;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=14;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=8;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=6;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

$f_0(1710)$ ^[n]

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

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

NODE=M068

NODE=M068M;DTYPE=M
NODE=M068W;DTYPE=G

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

NODE=M068215;DESIG=2;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=1;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=4

$\pi(1800)$

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

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

NODE=M075

NODE=M075M;DTYPE=M
NODE=M075W;DTYPE=G

$\pi(1800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^-\pi^-$	seen	879
$f_0(500)\pi^-$	seen	—
$f_0(980)\pi^-$	seen	631
$f_0(1370)\pi^-$	seen	368
$f_0(1500)\pi^-$	not seen	250
$\rho\pi^-$	not seen	732
$\eta\eta\pi^-$	seen	661
$a_0(980)\eta$	seen	473
$a_2(1320)\eta$	not seen	†
$f_2(1270)\pi$	not seen	442
$f_0(1370)\pi^-$	not seen	368
$f_0(1500)\pi^-$	seen	250
$\eta\eta'(958)\pi^-$	seen	375
$K_0^*(1430)K^-$	seen	†
$K^*(892)K^-$	not seen	570

NODE=M075215;DESIG=10;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=11;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=3;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=1
DESIG=12
DESIG=2
DESIG=7;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=13
DESIG=14
DESIG=15
DESIG=6;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=8;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=4
DESIG=9

$\phi_3(1850)$

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

Mass $m = 1854 \pm 7$ MeV
Full width $\Gamma = 87^{+28}_{-23}$ MeV (S = 1.2)

NODE=M054

NODE=M054M;DTYPE=M
NODE=M054W;DTYPE=G

$\phi_3(1850)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\bar{K}$	seen	785
$K\bar{K}^*(892) + \text{c.c.}$	seen	602

NODE=M054215;DESIG=1;OUR EST;
DESIG=2;OUR EST;→ NOT CHECKED ←

$\pi_2(1880)$

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

Mass $m = 1895 \pm 16$ MeV

Full width $\Gamma = 235 \pm 34$ MeV

NODE=M185
NODE=M185M;DTYPE=M
NODE=M185W;DTYPE=G

$f_2(1950)$

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

Mass $m = 1944 \pm 12$ MeV ($S = 1.5$)

Full width $\Gamma = 472 \pm 18$ MeV

NODE=M135
NODE=M135M;DTYPE=M
NODE=M135W;DTYPE=G

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

NODE=M135215;DESIG=1
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=10;OUR EST;→ NOT CHECKED ←
DESIG=7;OUR EST;→ NOT CHECKED ←
DESIG=6;OUR EST;→ NOT CHECKED ←
DESIG=8;OUR EST;→ NOT CHECKED ←
DESIG=9;OUR EST;→ NOT CHECKED ←
DESIG=12

$f_2(2010)$

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

Mass $m = 2011^{+60}_{-80}$ MeV

Full width $\Gamma = 202 \pm 60$ MeV

NODE=M106
NODE=M106M;DTYPE=M
NODE=M106W;DTYPE=G

$f_2(2010)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	†
$K\bar{K}$	seen	876

NODE=M106215;DESIG=1;OUR EST;
DESIG=2;OUR EST;→ NOT CHECKED ←

$a_4(2040)$

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

Mass $m = 1996^{+10}_{-9}$ MeV ($S = 1.1$)

Full width $\Gamma = 255^{+28}_{-24}$ MeV ($S = 1.3$)

NODE=M017
NODE=M017M;DTYPE=M
NODE=M017W;DTYPE=G

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

NODE=M017215;DESIG=1
DESIG=2
DESIG=5;OUR EST;→ NOT CHECKED ←
DESIG=6;OUR EST;→ NOT CHECKED ←
DESIG=7;OUR EST;→ NOT CHECKED ←
DESIG=8
DESIG=3
DESIG=4;OUR EST;→ NOT CHECKED ←

$f_4(2050)$

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

Mass $m = 2018 \pm 11$ MeV ($S = 2.1$)

Full width $\Gamma = 237 \pm 18$ MeV ($S = 1.9$)

NODE=M016
NODE=M016M;DTYPE=M
NODE=M016W;DTYPE=G

$f_4(2050)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega\omega$	seen	637
$\pi\pi$	$(17.0 \pm 1.5) \%$	1000
$K\bar{K}$	$(6.8^{+3.4}_{-1.8}) \times 10^{-3}$	880
$\eta\eta$	$(2.1 \pm 0.8) \times 10^{-3}$	848
$4\pi^0$	$< 1.2 \%$	964
$a_2(1320)\pi$	seen	567

NODE=M016215;DESIG=6
DESIG=1
DESIG=2
DESIG=3
DESIG=5
DESIG=7

 $\phi(2170)$

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

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

NODE=M103
NODE=M103M;DTYPE=M
NODE=M103W;DTYPE=G

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	seen	1087
$\phi f_0(980)$	seen	427
$K^+K^- f_0(980) \rightarrow$	seen	—
$K^+K^-\pi^+\pi^-$		
$K^+K^- f_0(980) \rightarrow K^+K^-\pi^0\pi^0$	seen	—
$K^{*0}K^\pm\pi^\mp$	not seen	770
$K^*(892)^0\bar{K}^*(892)^0$	not seen	622

NODE=M103215;DESIG=1;OUR EVAL;
DESIG=2;OUR EVAL;
DESIG=6
DESIG=7
DESIG=8
DESIG=10

 $f_2(2300)$

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

Mass $m = 2297 \pm 28$ MeV
Full width $\Gamma = 149 \pm 40$ MeV

NODE=M107
NODE=M107M;DTYPE=M
NODE=M107W;DTYPE=G

$f_2(2300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	529
$K\bar{K}$	seen	1037
$\gamma\gamma$	seen	1149

NODE=M107215;DESIG=1;OUR EST;
DESIG=2;OUR EST;
DESIG=3;OUR EST;

 $f_2(2340)$

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

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

NODE=M108
NODE=M108M;DTYPE=M
NODE=M108W;DTYPE=G

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

NODE=M108215;DESIG=1;OUR EST;
DESIG=2

STRANGE MESONS ($S = \pm 1, C = B = 0$)

$K^+ = u\bar{s}, K^0 = d\bar{s}, \bar{K}^0 = \bar{d}s, K^- = \bar{u}s$, similarly for K^{*} 's

NODE=MXXX020

 $K^*(892)$

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

$K^*(892)^\pm$ mass $m = 891.66 \pm 0.26$ MeV
Mass $m = 895.5 \pm 0.8$ MeV
 $K^*(892)^0$ mass $m = 895.94 \pm 0.22$ MeV ($S = 1.4$)
 $K^*(892)^\pm$ full width $\Gamma = 50.8 \pm 0.9$ MeV
Full width $\Gamma = 46.2 \pm 1.3$ MeV
 $K^*(892)^0$ full width $\Gamma = 48.7 \pm 0.8$ MeV ($S = 1.7$)

NODE=M018
NODE=M018M1;DTYPE=M
NODE=M018MCT;DTYPE=M
NODE=M018M2;DTYPE=M
NODE=M018W1;DTYPE=G
NODE=M018W5;DTYPE=G
NODE=M018W2;DTYPE=G

$K^*(892)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\pi$	~ 100	%	289
$K^0\gamma$	$(2.39 \pm 0.21) \times 10^{-3}$		307
$K^\pm\gamma$	$(9.9 \pm 0.9) \times 10^{-4}$		309
$K\pi\pi$	< 7	$\times 10^{-4}$	95% 223

NODE=M018220;DESIG=1;OUR EVAL;
 $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=4
DESIG=3
DESIG=2

$K_1(1270)$

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

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

NODE=M028
NODE=M028MX;DTYPE=M
NODE=M028WX;DTYPE=G;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$

$K_1(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\rho$	$(42 \pm 6) \%$	45
$K_0^*(1430)\pi$	$(28 \pm 4) \%$	$\dagger$
$K^*(892)\pi$	$(16 \pm 5) \%$	302
$K\omega$	$(11.0 \pm 2.0) \%$	$\dagger$
$Kf_0(1370)$	$(3.0 \pm 2.0) \%$	$\dagger$
γK^0	seen	539

NODE=M028215;DESIG=2
DESIG=7
DESIG=1
DESIG=5
DESIG=8
DESIG=9;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

$K_1(1400)$

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

Mass $m = 1403 \pm 7$ MeV
Full width $\Gamma = 174 \pm 13$ MeV (S = 1.6)

NODE=M064
NODE=M064M;DTYPE=M
NODE=M064W;DTYPE=G

$K_1(1400)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	$(94 \pm 6) \%$	402
$K\rho$	$(1.2 \pm 0.6) \%$	292
$Kf_0(1370)$	$(2.0 \pm 2.0) \%$	$\dagger$
$K\omega$	$(1.0 \pm 1.0) \%$	284
$K_0^*(1430)\pi$	not seen	$\dagger$
γK^0	seen	613

NODE=M064215;DESIG=1
DESIG=2
DESIG=8
DESIG=5
DESIG=7;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=9;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

$K^*(1410)$

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

Mass $m = 1414 \pm 15$ MeV (S = 1.3)
Full width $\Gamma = 232 \pm 21$ MeV (S = 1.1)

NODE=M094
NODE=M094M;DTYPE=M
NODE=M094W;DTYPE=G

$K^*(1410)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K^*(892)\pi$	> 40	%	95% 410
$K\pi$	$(6.6 \pm 1.3) \%$		612
$K\rho$	< 7	%	95% 305
γK^0	seen		619

NODE=M094215;DESIG=2;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=1
DESIG=3;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$
DESIG=4;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

$K_0^*(1430)^{[0]}$

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

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

NODE=M019
NODE=M019M;DTYPE=M;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$
NODE=M019W;DTYPE=G;OUR EST;
 $\rightarrow$ NOT CHECKED $\leftarrow$

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

NODE=M019215;DESIG=1

 $K_2^*(1430)$

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

NODE=M022

 $K_2^*(1430)^\pm$ mass $m = 1425.6 \pm 1.5$ MeV (S = 1.1)

 $K_2^*(1430)^0$ mass $m = 1432.4 \pm 1.3$ MeV

 $K_2^*(1430)^\pm$ full width $\Gamma = 98.5 \pm 2.7$ MeV (S = 1.1)

 $K_2^*(1430)^0$ full width $\Gamma = 109 \pm 5$ MeV (S = 1.9)

NODE=M022M1;DTYPE=M

NODE=M022M4;DTYPE=M

NODE=M022W1;DTYPE=G

NODE=M022W4;DTYPE=G

$K_2^*(1430)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$K\pi$	(49.9±1.2) %		619
$K^*(892)\pi$	(24.7±1.5) %		419
$K^*(892)\pi\pi$	(13.4±2.2) %		372
$K\rho$	(8.7±0.8) %	S=1.2	318
$K\omega$	(2.9±0.8) %		311
$K^+\gamma$	(2.4±0.5) $\times 10^{-3}$	S=1.1	627
$K\eta$	(1.5 $^{+3.4}_{-1.0}$) $\times 10^{-3}$	S=1.3	486
$K\omega\pi$	< 7.2 $\times 10^{-4}$	CL=95%	100
$K^0\gamma$	< 9 $\times 10^{-4}$	CL=90%	626

NODE=M022215;DESIG=1

DESIG=2

DESIG=6

DESIG=3

DESIG=4

DESIG=8

DESIG=5

DESIG=7

DESIG=10;OUR EVAL;
→ NOT CHECKED ← **$K^*(1680)$**

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

Mass $m = 1717 \pm 27$ MeV (S = 1.4)Full width $\Gamma = 322 \pm 110$ MeV (S = 4.2)

NODE=M095

NODE=M095M;DTYPE=M

NODE=M095W;DTYPE=G

$K^*(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(38.7±2.5) %	781
$K\rho$	(31.4 $^{+5.0}_{-2.1}$) %	570
$K^*(892)\pi$	(29.9 $^{+2.2}_{-5.0}$) %	618

NODE=M095215;DESIG=1

DESIG=3

DESIG=2

 $K_2(1770)^{[\rho]}$

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

Mass $m = 1773 \pm 8$ MeVFull width $\Gamma = 186 \pm 14$ MeV

NODE=M023

NODE=M023M;DTYPE=M

NODE=M023W;DTYPE=G

$K_2(1770)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi\pi$		794
$K_2^*(1430)\pi$	dominant	288
$K^*(892)\pi$	seen	654
$Kf_2(1270)$	seen	55
$K\phi$	seen	441
$K\omega$	seen	607

NODE=M023215;DESIG=1;OUR EST;

→ NOT CHECKED ←

DESIG=2;OUR EST;→ NOT CHECKED ←

DESIG=4;OUR EST;→ NOT CHECKED ←

DESIG=9;OUR EST;→ NOT CHECKED ←

DESIG=10

DESIG=8

 $K_3^*(1780)$

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

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

NODE=M060

NODE=M060M;DTYPE=M

NODE=M060W;DTYPE=G

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

NODE=M060215;DESIG=3
DESIG=2
DESIG=1
DESIG=6
DESIG=4

$K_2(1820)^{[q]}$

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

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

NODE=M146
NODE=M146M;DTYPE=M
NODE=M146W;DTYPE=G

$K_2(1820)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K_2^*(1430)\pi$	seen	327
$K^*(892)\pi$	seen	681
$K f_2(1270)$	seen	186
$K\omega$	seen	638

NODE=M146215;DESIG=1;OUR EVAL;
→ NOT CHECKED ←
DESIG=2;OUR EVAL;→ NOT CHECKED ←
DESIG=3;OUR EVAL;→ NOT CHECKED ←
DESIG=6;OUR EVAL;→ NOT CHECKED ←

$K_4^*(2045)$

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

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

NODE=M035
NODE=M035M;DTYPE=M
NODE=M035W;DTYPE=G

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

NODE=M035215;DESIG=1
DESIG=2
DESIG=5
DESIG=3
DESIG=4
DESIG=6
DESIG=7

CHARMED MESONS ($C = \pm 1$)

$D^+ = c\bar{d}$, $D^0 = c\bar{u}$, $\bar{D}^0 = \bar{c}u$, $D^- = \bar{c}d$, similarly for D^{*} 's

NODE=MXXX035

$D^*(2007)^0$

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

I, J, P need confirmation.

Mass $m = 2006.98 \pm 0.15$ MeV
 $m_{D^{*0}} - m_{D^0} = 142.12 \pm 0.07$ MeV
Full width $\Gamma < 2.1$ MeV, CL = 90%

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

NODE=M061
NODE=M061M;DTYPE=M
NODE=M061DM;DTYPE=D
NODE=M061W;DTYPE=G
NODE=M061220;NODE=M061

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

DESIG=1
DESIG=2

$D^*(2010)^\pm$

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

I, J, P need confirmation.

Mass $m = 2010.28 \pm 0.13$ MeV
 $m_{D^*(2010)^+} - m_{D^+} = 140.66 \pm 0.10$ MeV ($S = 1.1$)
 $m_{D^*(2010)^+} - m_{D^0} = 145.421 \pm 0.010$ MeV ($S = 1.1$)
Full width $\Gamma = 96 \pm 22$ keV

NODE=M062
NODE=M062M;DTYPE=M
NODE=M062MD;DTYPE=D
NODE=M062DM;DTYPE=D
NODE=M062W;DTYPE=G

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

NODE=M062225;NODE=M062

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

DESIG=1
DESIG=3
DESIG=2

$D_0^*(2400)^0$

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

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

NODE=M178

NODE=M178M;DTYPE=M
NODE=M178W;DTYPE=G

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

NODE=M178215;DESIG=1;OUR EVAL;
→ NOT CHECKED ←

$D_1(2420)^0$

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

I needs confirmation.

Mass $m = 2421.3 \pm 0.6$ MeV ($S = 1.2$)
 $m_{D_1^0} - m_{D^{*+}} = 411.0 \pm 0.6$ ($S = 1.2$)
Full width $\Gamma = 27.1 \pm 2.7$ MeV ($S = 2.4$)

NODE=M097

NODE=M097M;DTYPE=M

NODE=M097DM;DTYPE=D
NODE=M097W;DTYPE=G

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

NODE=M097215;NODE=M097

$D_1(2420)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+\pi^-$	seen	354
$D^0\pi^+\pi^-$	seen	425
$D^+\pi^-$	not seen	473
$D^{*0}\pi^+\pi^-$	not seen	279

DESIG=1
DESIG=3;OUR EST;→ NOT CHECKED ←
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=7;OUR EST;→ NOT CHECKED ←

$D_2^*(2460)^0$

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

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

Mass $m = 2462.6 \pm 0.7$ MeV ($S = 1.3$)
 $m_{D_2^{*0}} - m_{D^+} = 593.0 \pm 0.7$ MeV ($S = 1.3$)
 $m_{D_2^{*0}} - m_{D^{*+}} = 452.3 \pm 0.7$ MeV ($S = 1.3$)
Full width $\Gamma = 49.0 \pm 1.4$ MeV ($S = 1.7$)

NODE=M119

NODE=M119M;DTYPE=M

NODE=M119DM;DTYPE=D

NODE=M119DM2;DTYPE=D
NODE=M119W;DTYPE=G

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

NODE=M119215;NODE=M119

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

CLUMP=A;DESIG=1
DESIG=2
DESIG=3;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←

$D_2^*(2460)^\pm$

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

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

Mass $m = 2464.4 \pm 1.9$ MeV ($S = 1.9$)
 $m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV
Full width $\Gamma = 37 \pm 6$ MeV ($S = 1.4$)

NODE=M150

NODE=M150M;DTYPE=M

NODE=M150DM;DTYPE=D
NODE=M150W;DTYPE=G

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

NODE=M150215;NODE=M150

$D_2^*(2460)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 \pi^+$	seen	512
$D^{*0} \pi^+$	seen	395
$D^+ \pi^+ \pi^-$	not seen	461
$D^{*+} \pi^+ \pi^-$	not seen	325

DESIG=1

DESIG=2;OUR EST;→ NOT CHECKED ←

DESIG=3;OUR EST;→ NOT CHECKED ←

DESIG=4;OUR EST;→ NOT CHECKED ←

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

$$D_s^+ = c\bar{s}, D_s^- = \bar{c}s, \text{ similarly for } D_s^{*\prime}s$$

NODE=MXXX040

$D_s^{*\pm}$

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

J^P is natural, width and decay modes consistent with 1^- .

$$\text{Mass } m = 2112.3 \pm 0.5 \text{ MeV } (S = 1.1)$$

$$m_{D_s^{*\pm}} - m_{D_s^\pm} = 143.8 \pm 0.4 \text{ MeV}$$

$$\text{Full width } \Gamma < 1.9 \text{ MeV, CL} = 90\%$$

D_s^{*-} modes are charge conjugates of the modes below.

NODE=S074

NODE=S074M;DTYPE=M

NODE=S074DM;DTYPE=D

NODE=S074W;DTYPE=G

NODE=S074215;NODE=S074

D_s^{*+} DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D_s^+ \gamma$	$(94.2 \pm 0.7) \%$	139
$D_s^+ \pi^0$	$(5.8 \pm 0.7) \%$	48

DESIG=1

DESIG=2

$D_{s0}^*(2317)^\pm$

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

J, P need confirmation.

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

$$\text{Mass } m = 2317.8 \pm 0.6 \text{ MeV } (S = 1.1)$$

$$m_{D_{s0}^*(2317)^\pm} - m_{D_s^\pm} = 349.3 \pm 0.6 \text{ MeV } (S = 1.1)$$

$$\text{Full width } \Gamma < 3.8 \text{ MeV, CL} = 95\%$$

$D_{s0}^*(2317)^-$ modes are charge conjugates of modes below.

NODE=M172

NODE=M172M;DTYPE=M

NODE=M172DM;DTYPE=D

NODE=M172W;DTYPE=G

NODE=M172215;NODE=M172

$D_{s0}^*(2317)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D_s^+ \pi^0$	seen	298
$D_s^+ \pi^0 \pi^0$	not seen	205

DESIG=1

DESIG=7;OUR EVAL;→ NOT CHECKED ←

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

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

$$\text{Mass } m = 2459.6 \pm 0.6 \text{ MeV } (S = 1.1)$$

$$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}} = 347.2 \pm 0.7 \text{ MeV } (S = 1.2)$$

$$m_{D_{s1}(2460)^\pm} - m_{D_s^\pm} = 491.1 \pm 0.7 \text{ MeV } (S = 1.1)$$

$$\text{Full width } \Gamma < 3.5 \text{ MeV, CL} = 95\%$$

NODE=M173

NODE=M173M;DTYPE=M

NODE=M173MD;DTYPE=D

NODE=M173DM;DTYPE=D

NODE=M173W;DTYPE=G

$D_{s1}(2460)^-$ modes are charge conjugates of the modes below.

$D_{s1}(2460)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D_s^{*+} \pi^0$	(48 $\pm$ 11) %		297
$D_s^+ \gamma$	(18 $\pm$ 4) %		442
$D_s^+ \pi^+ \pi^-$	(4.3 $\pm$ 1.3) %	S=1.1	363
$D_s^{*+} \gamma$	< 8 %	CL=90%	323
$D_{s0}^*(2317)^+ \gamma$	(3.7 $\pm$ 5.0) % (2.4)		138

$D_{s1}(2536)^\pm$

$I(J^P) = 0(1^+)$
J, P need confirmation.

Mass $m = 2535.12 \pm 0.13$ MeV

Full width $\Gamma = 0.92 \pm 0.05$ MeV

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

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

$D_{s2}^*(2573)$

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

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

Mass $m = 2571.9 \pm 0.8$ MeV

Full width $\Gamma = 17 \pm 4$ MeV (S = 1.3)

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

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

$c\bar{c}$ MESONS

$\eta_c(1S)$

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

Mass $m = 2981.0 \pm 1.1$ MeV (S = 1.7)

Full width $\Gamma = 29.6 \pm 1.0$ MeV

NODE=M173215;NODE=M173

DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

NODE=M121

NODE=M121M;DTYPE=M

NODE=M121W;DTYPE=G

NODE=M121215;NODE=M121

DESIG=1;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

DESIG=4;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

DESIG=2;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

DESIG=5;OUR EST; $\rightarrow$ NOT CHECKED $\leftarrow$

DESIG=3

DESIG=6

NODE=M148

NODE=M148M;DTYPE=M

NODE=M148W;DTYPE=G

NODE=M148215;NODE=M148

DESIG=1

DESIG=2;OUR EVAL; $\rightarrow$ NOT CHECKED $\leftarrow$

NODE=MXXX025

NODE=M026

NODE=M026M;DTYPE=M

NODE=M026W;DTYPE=G

$\eta_c(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
Decays involving hadronic resonances				NODE=M026215;NODE=M026;CLUMP=A
$\eta'(958)\pi\pi$	$(4.1 \pm 1.7) \%$		1322	DESIG=24
$\rho\rho$	$(2.0 \pm 0.7) \%$		1273	DESIG=19
$K^*(892)^0 K^- \pi^+ + \text{c.c.}$	$(2.0 \pm 0.7) \%$		1276	DESIG=26
$K^*(892) \bar{K}^*(892)$	$(9.2 \pm 3.4) \times 10^{-3}$		1194	DESIG=18
$K^{*0} \bar{K}^{*0} \pi^+ \pi^-$	$(1.1 \pm 0.5) \%$		1071	DESIG=57
$\phi K^+ K^-$	$(2.9 \pm 1.4) \times 10^{-3}$		1102	DESIG=28
$\phi\phi$	$(2.7 \pm 0.9) \times 10^{-3}$		1087	DESIG=17
$\phi 2(\pi^+ \pi^-)$	$< 3.5 \times 10^{-3}$	90%	1249	DESIG=58
$a_0(980)\pi$	$< 2 \%$	90%	1326	DESIG=21
$a_2(1320)\pi$	$< 2 \%$	90%	1194	DESIG=22
$K^*(892) \bar{K} + \text{c.c.}$	$< 1.28 \%$	90%	1308	DESIG=40
$f_2(1270)\eta$	$< 1.1 \%$	90%	1144	DESIG=23
$\omega\omega$	$< 3.1 \times 10^{-3}$	90%	1268	DESIG=20
$\omega\phi$	$< 1.7 \times 10^{-3}$	90%	1184	DESIG=47
$f_2(1270) f_2(1270)$	$(7.6^{+3.0}_{-3.4}) \times 10^{-3}$		772	DESIG=46
$f_2(1270) f'_2(1525)$	$(9.5 \pm 3.2) \times 10^{-3}$		509	DESIG=59
Decays into stable hadrons				NODE=M026;CLUMP=B
$K \bar{K} \pi$	$(7.0 \pm 1.2) \%$		1379	DESIG=14
$\eta \pi^+ \pi^-$	$(4.9 \pm 1.8) \%$		1426	DESIG=16
$K^+ K^- \pi^+ \pi^-$	$(1.5 \pm 0.6) \%$		1343	DESIG=15
$K^+ K^- \pi^+ \pi^- \pi^0$	$(3.3 \pm 0.8) \%$		1303	DESIG=60
$K^+ K^- 2(\pi^+ \pi^-)$	$(7.1 \pm 2.9) \times 10^{-3}$		1252	DESIG=55
$2(K^+ K^-)$	$(1.36 \pm 0.30) \times 10^{-3}$		1054	DESIG=27
$2(\pi^+ \pi^-)$	$(1.20 \pm 0.30) \%$		1458	DESIG=11
$3(\pi^+ \pi^-)$	$(1.5 \pm 0.5) \%$		1405	DESIG=56
$p \bar{p}$	$(1.3 \pm 0.4) \times 10^{-3}$		1158	DESIG=12
$\Lambda \bar{\Lambda}$	$(9 \pm 4) \times 10^{-4}$		988	DESIG=45
$K \bar{K} \eta$	$< 3.1 \%$	90%	1264	DESIG=25
$\pi^+ \pi^- p \bar{p}$	$< 1.2 \%$	90%	1025	DESIG=13
Radiative decays				NODE=M026;CLUMP=C
$\gamma\gamma$	$(1.75 \pm 0.16) \times 10^{-4}$		1490	DESIG=31
Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes				NODE=M026;CLUMP=D
$\pi^+ \pi^-$	$P, CP < 1.1 \times 10^{-4}$	90%	1484	DESIG=51
$\pi^0 \pi^0$	$P, CP < 3.5 \times 10^{-5}$	90%	1484	DESIG=52
$K^+ K^-$	$P, CP < 6 \times 10^{-4}$	90%	1406	DESIG=53
$K_S^0 K_S^0$	$P, CP < 3.1 \times 10^{-4}$	90%	1405	DESIG=54

$J/\psi(1S)$

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

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

NODE=M070

NODE=M070M;DTYPE=M

NODE=M070W;DTYPE=G

NODE=M070W1;DTYPE=E;OUR EVAL;
→ NOT CHECKED ←

$J/\psi(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
hadrons	(87.7 $\pm$ 0.5) %	—	—	NODE=M070215;DESIG=3
virtual $\gamma \rightarrow$ hadrons	(13.50 $\pm$ 0.30) %	—	—	DESIG=4
$g g g$	(64.1 $\pm$ 1.0) %	—	—	DESIG=249
$\gamma g g$	(8.8 $\pm$ 0.5) %	—	—	DESIG=250
$e^+ e^-$	(5.94 $\pm$ 0.06) %	1548	1548	DESIG=1
$e^+ e^- \gamma$	[r] (8.8 $\pm$ 1.4) $\times 10^{-3}$	1548	1548	DESIG=5
$\mu^+ \mu^-$	(5.93 $\pm$ 0.06) %	1545	1545	DESIG=2
Decays involving hadronic resonances				NODE=M070;CLUMP=A
$\rho \pi$	(1.69 $\pm$ 0.15) %	S=2.4	1448	DESIG=20
$\rho^0 \pi^0$	(5.6 $\pm$ 0.7) $\times 10^{-3}$		1448	DESIG=21
$a_2(1320) \rho$	(1.09 $\pm$ 0.22) %		1123	DESIG=43
$\omega \pi^+ \pi^+ \pi^- \pi^-$	(8.5 $\pm$ 3.4) $\times 10^{-3}$		1392	DESIG=26
$\omega \pi^+ \pi^- \pi^0$	(4.0 $\pm$ 0.7) $\times 10^{-3}$		1418	DESIG=211
$\omega \pi^+ \pi^-$	(8.6 $\pm$ 0.7) $\times 10^{-3}$	S=1.1	1435	DESIG=24
$\omega f_2(1270)$	(4.3 $\pm$ 0.6) $\times 10^{-3}$		1142	DESIG=28
$K^*(892)^0 \bar{K}^*(892)^0$	(2.3 $\pm$ 0.7) $\times 10^{-4}$		1266	DESIG=46
$K^*(892)^\pm \bar{K}^*(892)^\mp$	(1.00 $\pm$ 0.22 $\pm$ 0.40) $\times 10^{-3}$		1266	DESIG=256
$K^*(892)^\pm \bar{K}^*(800)^\mp$	(1.1 $\pm$ 1.0 $\pm$ 0.6) $\times 10^{-3}$		—	DESIG=257
$\eta K^*(892)^0 \bar{K}^*(892)^0$	(1.15 $\pm$ 0.26) $\times 10^{-3}$		1003	DESIG=252
$K^*(892)^0 \bar{K}_2^*(1430)^0 + \text{c.c.}$	(6.0 $\pm$ 0.6) $\times 10^{-3}$		1012	DESIG=48
$K^*(892)^0 \bar{K}_2^*(1770)^0 + \text{c.c.} \rightarrow$ $K^*(892)^0 K^- \pi^+ + \text{c.c.}$	(6.9 $\pm$ 0.9) $\times 10^{-4}$		—	DESIG=235
$\omega K^*(892) \bar{K} + \text{c.c.}$	(6.1 $\pm$ 0.9) $\times 10^{-3}$		1097	DESIG=102
$K^+ \bar{K}^*(892)^- + \text{c.c.}$	(5.12 $\pm$ 0.30) $\times 10^{-3}$		1373	DESIG=121
$K^+ \bar{K}^*(892)^- + \text{c.c.} \rightarrow$ $K^+ K^- \pi^0$	(1.97 $\pm$ 0.20) $\times 10^{-3}$		—	DESIG=231
$K^+ \bar{K}^*(892)^- + \text{c.c.} \rightarrow$ $K^0 K^\pm \pi^\mp$	(3.0 $\pm$ 0.4) $\times 10^{-3}$		—	DESIG=232
$K^0 \bar{K}^*(892)^0 + \text{c.c.}$	(4.39 $\pm$ 0.31) $\times 10^{-3}$		1373	DESIG=122
$K^0 \bar{K}^*(892)^0 + \text{c.c.} \rightarrow$ $K^0 K^\pm \pi^\mp$	(3.2 $\pm$ 0.4) $\times 10^{-3}$		—	DESIG=233
$K_1(1400)^\pm K^\mp$	(3.8 $\pm$ 1.4) $\times 10^{-3}$		1170	DESIG=132
$\bar{K}^*(892)^0 K^+ \pi^- + \text{c.c.}$	seen		1343	DESIG=214
$\omega \pi^0 \pi^0$	(3.4 $\pm$ 0.8) $\times 10^{-3}$		1436	DESIG=140
$b_1(1235)^\pm \pi^\mp$	[s] (3.0 $\pm$ 0.5) $\times 10^{-3}$		1300	DESIG=49
$\omega K^\pm K_S^0 \pi^\mp$	[s] (3.4 $\pm$ 0.5) $\times 10^{-3}$		1210	DESIG=101
$b_1(1235)^0 \pi^0$	(2.3 $\pm$ 0.6) $\times 10^{-3}$		1300	DESIG=160
$\eta K^\pm K_S^0 \pi^\mp$	[s] (2.2 $\pm$ 0.4) $\times 10^{-3}$		1278	DESIG=230
$\phi K^*(892) \bar{K} + \text{c.c.}$	(2.18 $\pm$ 0.23) $\times 10^{-3}$		969	DESIG=104
$\omega K \bar{K}$	(1.70 $\pm$ 0.32) $\times 10^{-3}$		1268	DESIG=27
$\omega f_0(1710) \rightarrow \omega K \bar{K}$	(4.8 $\pm$ 1.1) $\times 10^{-4}$		878	DESIG=130
$\phi 2(\pi^+ \pi^-)$	(1.66 $\pm$ 0.23) $\times 10^{-3}$		1318	DESIG=35
$\Delta(1232)^{++} \bar{p} \pi^-$	(1.6 $\pm$ 0.5) $\times 10^{-3}$		1030	DESIG=70
$\omega \eta$	(1.74 $\pm$ 0.20) $\times 10^{-3}$	S=1.6	1394	DESIG=30
$\phi K \bar{K}$	(1.83 $\pm$ 0.24) $\times 10^{-3}$	S=1.5	1179	DESIG=36
$\phi f_0(1710) \rightarrow \phi K \bar{K}$	(3.6 $\pm$ 0.6) $\times 10^{-4}$		875	DESIG=129
$\phi f_2(1270)$	(7.2 $\pm$ 1.3) $\times 10^{-4}$		1036	DESIG=39
$\Delta(1232)^{++} \bar{\Delta}(1232)^{--}$	(1.10 $\pm$ 0.29) $\times 10^{-3}$		938	DESIG=66
$\Sigma(1385)^- \bar{\Sigma}(1385)^+ (\text{or c.c.})$	[s] (1.03 $\pm$ 0.13) $\times 10^{-3}$		697	DESIG=67
$\phi f_2'(1525)$	(8 $\pm$ 4) $\times 10^{-4}$	S=2.7	871	DESIG=40
$\phi \pi^+ \pi^-$	(8.7 $\pm$ 0.8) $\times 10^{-4}$		1365	DESIG=34
$\phi \pi^0 \pi^0$	(5.6 $\pm$ 1.6) $\times 10^{-4}$		1366	DESIG=76
$\phi K^\pm K_S^0 \pi^\mp$	[s] (7.2 $\pm$ 0.8) $\times 10^{-4}$		1114	DESIG=103
$\omega f_1(1420)$	(6.8 $\pm$ 2.4) $\times 10^{-4}$		1062	DESIG=105
$\phi \eta$	(7.5 $\pm$ 0.8) $\times 10^{-4}$	S=1.5	1320	DESIG=37

$\Xi^0 \Xi^0$	(1.20 ± 0.24) × 10 ⁻³	818	DESIG=248
$\Xi(1530)^- \Xi^+$	(5.9 ± 1.5) × 10 ⁻⁴	600	DESIG=107
$p K^- \bar{\Sigma}(1385)^0$	(5.1 ± 3.2) × 10 ⁻⁴	646	DESIG=74
$\omega \pi^0$	(4.5 ± 0.5) × 10 ⁻⁴	S=1.4 1446	DESIG=32
$\phi \eta'(958)$	(4.0 ± 0.7) × 10 ⁻⁴	S=2.1 1192	DESIG=38
$\phi f_0(980)$	(3.2 ± 0.9) × 10 ⁻⁴	S=1.9 1182	DESIG=41
$\phi f_0(980) \rightarrow \phi \pi^+ \pi^-$	(2.2 ± 0.4) × 10 ⁻⁴	—	DESIG=236
$\phi f_0(980) \rightarrow \phi \pi^0 \pi^0$	(1.7 ± 0.7) × 10 ⁻⁴	—	DESIG=237
$\eta \phi f_0(980) \rightarrow \eta \phi \pi^+ \pi^-$	(3.2 ± 1.0) × 10 ⁻⁴	—	DESIG=229
$\phi a_0(980)^0 \rightarrow \phi \eta \pi^0$	(5 ± 4) × 10 ⁻⁶	—	DESIG=258
$\Xi(1530)^0 \Xi^0$	(3.2 ± 1.4) × 10 ⁻⁴	608	DESIG=108
$\Sigma(1385)^- \bar{\Sigma}^+ \text{ (or c.c.)}$	[s] (3.1 ± 0.5) × 10 ⁻⁴	855	DESIG=68
$\phi f_1(1285)$	(2.6 ± 0.5) × 10 ⁻⁴	S=1.1 1032	DESIG=106
$\eta \pi^+ \pi^-$	(4.0 ± 1.7) × 10 ⁻⁴	1487	DESIG=239
$\rho \eta$	(1.93 ± 0.23) × 10 ⁻⁴	1396	DESIG=22
$\omega \eta'(958)$	(1.82 ± 0.21) × 10 ⁻⁴	1279	DESIG=31
$\omega f_0(980)$	(1.4 ± 0.5) × 10 ⁻⁴	1271	DESIG=150
$\rho \eta'(958)$	(1.05 ± 0.18) × 10 ⁻⁴	1281	DESIG=23
$a_2(1320)^{\pm} \pi^{\mp}$	[s] < 4.3 × 10 ⁻³	CL=90% 1263	DESIG=42
$K \bar{K}_2^*(1430) + \text{c.c.}$	< 4.0 × 10 ⁻³	CL=90% 1159	DESIG=45
$K_1(1270)^{\pm} K^{\mp}$	< 3.0 × 10 ⁻³	CL=90% 1231	DESIG=131
$K_2^*(1430)^0 \bar{K}_2^*(1430)^0$	< 2.9 × 10 ⁻³	CL=90% 604	DESIG=47
$\phi \pi^0$	< 6.4 × 10 ⁻⁶	CL=90% 1377	DESIG=33
$\phi \eta(1405) \rightarrow \phi \eta \pi \pi$	< 2.5 × 10 ⁻⁴	CL=90% 946	DESIG=128
$\omega f_2'(1525)$	< 2.2 × 10 ⁻⁴	CL=90% 1003	DESIG=29
$\eta \phi(2170) \rightarrow$	< 2.52 × 10 ⁻⁴	CL=90% —	DESIG=253
$\eta K^*(892)^0 \bar{K}^*(892)^0$			
$\Sigma(1385)^0 \bar{\Lambda}$	< 2 × 10 ⁻⁴	CL=90% 912	DESIG=111
$\Delta(1232)^+ \bar{p}$	< 1 × 10 ⁻⁴	CL=90% 1100	DESIG=112
$\Theta(1540) \bar{\Theta}(1540) \rightarrow$	< 1.1 × 10 ⁻⁵	CL=90% —	DESIG=205
$K_S^0 p K^- \bar{n} + \text{c.c.}$			
$\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$	< 2.1 × 10 ⁻⁵	CL=90% —	DESIG=206
$\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n$	< 1.6 × 10 ⁻⁵	CL=90% —	DESIG=207
$\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n$	< 5.6 × 10 ⁻⁵	CL=90% —	DESIG=208
$\bar{\Theta}(1540) K_S^0 p \rightarrow K_S^0 p K^- \bar{n}$	< 1.1 × 10 ⁻⁵	CL=90% —	DESIG=209
$\Sigma^0 \bar{\Lambda}$	< 9 × 10 ⁻⁵	CL=90% 1032	DESIG=110

Decays into stable hadrons

NODE=M070;CLUMP=B

$2(\pi^+ \pi^-) \pi^0$	(5.5 ± 0.4) %	1496	DESIG=9
$3(\pi^+ \pi^-) \pi^0$	(2.9 ± 0.6) %	1433	DESIG=11
$\pi^+ \pi^- \pi^0$	(2.07 ± 0.12) %	S=1.6 1533	DESIG=7
$\pi^+ \pi^- \pi^0 K^+ K^-$	(1.94 ± 0.15) %	1368	DESIG=18
$4(\pi^+ \pi^-) \pi^0$	(9.0 ± 3.0) × 10 ⁻³	1345	DESIG=12
$\pi^+ \pi^- K^+ K^-$	(6.6 ± 0.5) × 10 ⁻³	1407	DESIG=16
$\pi^+ \pi^- K^+ K^- \eta$	(1.84 ± 0.28) × 10 ⁻³	1221	DESIG=238
$\pi^0 \pi^0 K^+ K^-$	(2.45 ± 0.31) × 10 ⁻³	1410	DESIG=234
$K \bar{K} \pi$	(6.1 ± 1.0) × 10 ⁻³	1442	DESIG=15
$2(\pi^+ \pi^-)$	(3.55 ± 0.23) × 10 ⁻³	1517	DESIG=8
$3(\pi^+ \pi^-)$	(4.3 ± 0.4) × 10 ⁻³	1466	DESIG=10
$2(\pi^+ \pi^- \pi^0)$	(1.61 ± 0.21) %	1468	DESIG=210
$2(\pi^+ \pi^-) \eta$	(2.29 ± 0.24) × 10 ⁻³	1446	DESIG=201
$3(\pi^+ \pi^-) \eta$	(7.2 ± 1.5) × 10 ⁻⁴	1379	DESIG=202
$p \bar{p}$	(2.17 ± 0.07) × 10 ⁻³	1232	DESIG=50
$p \bar{p} \pi^0$	(1.19 ± 0.08) × 10 ⁻³	S=1.1 1176	DESIG=52
$p \bar{p} \pi^+ \pi^-$	(6.0 ± 0.5) × 10 ⁻³	S=1.3 1107	DESIG=54
$p \bar{p} \pi^+ \pi^- \pi^0$	[t] (2.3 ± 0.9) × 10 ⁻³	S=1.9 1033	DESIG=55
$p \bar{p} \eta$	(2.00 ± 0.12) × 10 ⁻³	948	DESIG=56
$p \bar{p} \rho$	< 3.1 × 10 ⁻⁴	CL=90% 774	DESIG=57
$p \bar{p} \omega$	(1.10 ± 0.15) × 10 ⁻³	S=1.3 768	DESIG=58
$p \bar{p} \eta'(958)$	(2.1 ± 0.4) × 10 ⁻⁴	596	DESIG=59

$p\bar{p}\phi$	(4.5 ± 1.5) × 10 ⁻⁵	527	DESIG=127
$n\bar{n}$	(2.2 ± 0.4) × 10 ⁻³	1231	DESIG=64
$n\bar{n}\pi^+\pi^-$	(4 ± 4) × 10 ⁻³	1106	DESIG=65
$\Sigma^+\bar{\Sigma}^-$	(1.50 ± 0.24) × 10 ⁻³	992	DESIG=247
$\Sigma^0\bar{\Sigma}^0$	(1.29 ± 0.09) × 10 ⁻³	988	DESIG=63
$2(\pi^+\pi^-)K^+K^-$	(5.0 ± 0.5) × 10 ⁻³	1320	DESIG=17
$p\bar{n}\pi^-$	(2.12 ± 0.09) × 10 ⁻³	1174	DESIG=53
$nN(1440)$	seen	978	DESIG=215; OUR EST; NOT CHECKED ←
$nN(1520)$	seen	924	DESIG=216; OUR EST; NOT CHECKED ←
$nN(1535)$	seen	914	DESIG=217; OUR EST; NOT CHECKED ←
$\Xi^-\bar{\Xi}^+$	(8.5 ± 1.6) × 10 ⁻⁴	807	DESIG=62
$\Lambda\bar{\Lambda}$	(1.61 ± 0.15) × 10 ⁻³	1074	DESIG=60
$\Lambda\bar{\Sigma}^-\pi^+$ (or c.c.)	[s] (8.3 ± 0.7) × 10 ⁻⁴	950	DESIG=71
$pK^-\bar{\Lambda}$	(8.9 ± 1.6) × 10 ⁻⁴	876	DESIG=72
$2(K^+K^-)$	(7.6 ± 0.9) × 10 ⁻⁴	1131	DESIG=19
$pK^-\bar{\Sigma}^0$	(2.9 ± 0.8) × 10 ⁻⁴	819	DESIG=73
K^+K^-	(2.37 ± 0.31) × 10 ⁻⁴	1468	DESIG=13
$K_S^0K_L^0$	(1.46 ± 0.26) × 10 ⁻⁴	1466	DESIG=75
$\Lambda\bar{\Lambda}\eta$	(2.6 ± 0.7) × 10 ⁻⁴	672	DESIG=228
$\Lambda\bar{\Lambda}\pi^0$	< 6.4 × 10 ⁻⁵	998	DESIG=109
$\Lambda nK_S^0 + \text{c.c.}$	(6.5 ± 1.1) × 10 ⁻⁴	872	DESIG=225
$\pi^+\pi^-$	(1.47 ± 0.23) × 10 ⁻⁴	1542	DESIG=6
$\Lambda\bar{\Sigma} + \text{c.c.}$	< 1.5 × 10 ⁻⁴	1034	DESIG=61
$K_S^0K_S^0$	< 1 × 10 ⁻⁶	1466	DESIG=14

Radiative decays

3γ	(1.2 ± 0.4) × 10 ⁻⁵	1548	DESIG=81
4γ	< 9 × 10 ⁻⁶	1548	DESIG=244
5γ	< 1.5 × 10 ⁻⁵	1548	DESIG=245
$\gamma\eta_c(1S)$	(1.7 ± 0.4) %	114	DESIG=85
$\gamma\eta_c(1S) \rightarrow 3\gamma$	(1.2 ^{+2.7} / _{-1.1}) × 10 ⁻⁶	—	DESIG=246
$\gamma\pi^+\pi^-2\pi^0$	(8.3 ± 3.1) × 10 ⁻³	1518	DESIG=99
$\gamma\eta\pi\pi$	(6.1 ± 1.0) × 10 ⁻³	1487	DESIG=96
$\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-$	(6.2 ± 2.4) × 10 ⁻⁴	—	DESIG=142
$\gamma\eta(1405/1475) \rightarrow \gamma K\bar{K}\pi$	[i] (2.8 ± 0.6) × 10 ⁻³	1223	DESIG=89
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$	(7.8 ± 2.0) × 10 ⁻⁵	1223	DESIG=171
$\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$	(3.0 ± 0.5) × 10 ⁻⁴	—	DESIG=170
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi$	< 8.2 × 10 ⁻⁵	—	DESIG=212
$\gamma\rho\rho$	(4.5 ± 0.8) × 10 ⁻³	1340	DESIG=94
$\gamma\rho\omega$	< 5.4 × 10 ⁻⁴	1338	DESIG=226
$\gamma\rho\phi$	< 8.8 × 10 ⁻⁵	1258	DESIG=227
$\gamma\eta'(958)$	(5.16 ± 0.15) × 10 ⁻³	1400	DESIG=84
$\gamma 2\pi^+2\pi^-$	(2.8 ± 0.5) × 10 ⁻³	1517	DESIG=95
$\gamma f_2(1270)f_2(1270)$	(9.5 ± 1.7) × 10 ⁻⁴	879	DESIG=203
$\gamma f_2(1270)f_2(1270)$ (non resonant)	(8.2 ± 1.9) × 10 ⁻⁴	—	DESIG=204
$\gamma K^+K^-\pi^+\pi^-$	(2.1 ± 0.6) × 10 ⁻³	1407	DESIG=143
$\gamma f_4(2050)$	(2.7 ± 0.7) × 10 ⁻³	891	DESIG=100
$\gamma\omega\omega$	(1.61 ± 0.33) × 10 ⁻³	1336	DESIG=97
$\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$	(1.7 ± 0.4) × 10 ⁻³	1223	DESIG=124
$\gamma f_2(1270)$	(1.43 ± 0.11) × 10 ⁻³	1286	DESIG=86
$\gamma f_0(1710) \rightarrow \gamma K\bar{K}$	(8.5 ^{+1.2} / _{-0.9}) × 10 ⁻⁴	1075	DESIG=91
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	(4.0 ± 1.0) × 10 ⁻⁴	—	DESIG=135
$\gamma f_0(1710) \rightarrow \gamma\omega\omega$	(3.1 ± 1.0) × 10 ⁻⁴	—	DESIG=221
$\gamma\eta$	(1.104 ± 0.034) × 10 ⁻³	1500	DESIG=83
$\gamma f_1(1420) \rightarrow \gamma K\bar{K}\pi$	(7.9 ± 1.3) × 10 ⁻⁴	1220	DESIG=175
$\gamma f_1(1285)$	(6.1 ± 0.8) × 10 ⁻⁴	1283	DESIG=88

NODE=M070;CLUMP=C

$\gamma f_1(1510) \rightarrow \gamma \eta \pi^+ \pi^-$	$(4.5 \pm 1.2) \times 10^{-4}$	—	DESIG=141
$\gamma f'_2(1525)$	$(4.5^{+0.7}_{-0.4}) \times 10^{-4}$	1173	DESIG=87
$\gamma f_2(1640) \rightarrow \gamma \omega \omega$	$(2.8 \pm 1.8) \times 10^{-4}$	—	DESIG=222
$\gamma f_2(1910) \rightarrow \gamma \omega \omega$	$(2.0 \pm 1.4) \times 10^{-4}$	—	DESIG=223
$\gamma f_2(1950) \rightarrow$	$(7.0 \pm 2.2) \times 10^{-4}$	—	DESIG=144
$\gamma K^*(892) \bar{K}^*(892)$			
$\gamma K^*(892) \bar{K}^*(892)$	$(4.0 \pm 1.3) \times 10^{-3}$	1266	DESIG=145
$\gamma \phi \phi$	$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1 1166	DESIG=98
$\gamma p \bar{p}$	$(3.8 \pm 1.0) \times 10^{-4}$	1232	DESIG=90
$\gamma \eta(2225)$	$(3.3 \pm 0.5) \times 10^{-4}$	749	DESIG=126
$\gamma \eta(1760) \rightarrow \gamma \rho^0 \rho^0$	$(1.3 \pm 0.9) \times 10^{-4}$	1048	DESIG=125
$\gamma \eta(1760) \rightarrow \gamma \omega \omega$	$(1.98 \pm 0.33) \times 10^{-3}$	—	DESIG=224
$\gamma X(1835) \rightarrow \gamma \pi^+ \pi^- \eta'$	$(2.6 \pm 0.4) \times 10^{-4}$	1006	DESIG=213
$\gamma X(1835) \rightarrow \gamma p \bar{p}$	$(7.5^{+1.9}_{-0.9}) \times 10^{-5}$	—	DESIG=254
$\gamma (K \bar{K} \pi) [J^{PC} = 0^- +]$	$(7 \pm 4) \times 10^{-4}$	S=2.1 1442	DESIG=176
$\gamma \pi^0$	$(3.49^{+0.33}_{-0.30}) \times 10^{-5}$	1546	DESIG=82
$\gamma p \bar{p} \pi^+ \pi^-$	$< 7.9 \times 10^{-4}$	CL=90% 1107	DESIG=93
$\gamma \Lambda \bar{\Lambda}$	$< 1.3 \times 10^{-4}$	CL=90% 1074	DESIG=200
$\gamma f_J(2220)$	$> 2.50 \times 10^{-3}$	CL=99.9% 745	DESIG=92
$\gamma f_J(2220) \rightarrow \gamma \pi \pi$	$(8 \pm 4) \times 10^{-5}$	—	DESIG=136
$\gamma f_J(2220) \rightarrow \gamma K \bar{K}$	$< 3.6 \times 10^{-5}$	—	DESIG=137
$\gamma f_J(2220) \rightarrow \gamma p \bar{p}$	$(1.5 \pm 0.8) \times 10^{-5}$	—	DESIG=138
$\gamma f_0(1500)$	$(1.01 \pm 0.32) \times 10^{-4}$	1183	DESIG=172
$\gamma A \rightarrow \gamma \text{invisible}$	$[u] < 6.3 \times 10^{-6}$	CL=90% —	DESIG=251

Weak decays

$D^- e^+ \nu_e + \text{c.c.}$	$< 1.2 \times 10^{-5}$	CL=90% 984	DESIG=218
$\bar{D}^0 e^+ e^- + \text{c.c.}$	$< 1.1 \times 10^{-5}$	CL=90% 987	DESIG=219
$D_s^- e^+ \nu_e + \text{c.c.}$	$< 3.6 \times 10^{-5}$	CL=90% 923	DESIG=220
$D^- \pi^+ + \text{c.c.}$	$< 7.5 \times 10^{-5}$	CL=90% 977	DESIG=241
$\bar{D}^0 \bar{K}^0 + \text{c.c.}$	$< 1.7 \times 10^{-4}$	CL=90% 898	DESIG=242
$D_s^- \pi^+ + \text{c.c.}$	$< 1.3 \times 10^{-4}$	CL=90% 915	DESIG=243

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

$\gamma \gamma$	C	$< 5 \times 10^{-6}$	CL=90% 1548	DESIG=80
$e^\pm \mu^\mp$	LF	$< 1.1 \times 10^{-6}$	CL=90% 1547	DESIG=177
$e^\pm \tau^\mp$	LF	$< 8.3 \times 10^{-6}$	CL=90% 1039	DESIG=178
$\mu^\pm \tau^\mp$	LF	$< 2.0 \times 10^{-6}$	CL=90% 1035	DESIG=179

Other decays

invisible	$< 7 \times 10^{-4}$	CL=90% —	DESIG=240
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 $\chi_{c0}(1P)$

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

Mass $m = 3414.75 \pm 0.31$ MeVFull width $\Gamma = 10.4 \pm 0.6$ MeV

NODE=M056

NODE=M056M;DTYPE=M

NODE=M056W;DTYPE=G

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
Hadronic decays				NODE=M056215;NODE=M056;CLUMP=A
$2(\pi^+\pi^-)$	$(2.26 \pm 0.19) \%$		1679	DESIG=3
$\rho^0 \pi^+\pi^-$	$(8.8 \pm 2.8) \times 10^{-3}$		1607	DESIG=9
$f_0(980)f_0(980)$	$(6.7 \pm 2.1) \times 10^{-4}$		1391	DESIG=20
$\pi^+\pi^-\pi^0\pi^0$	$(3.4 \pm 0.4) \%$		1680	DESIG=61
$\rho^+\pi^-\pi^0 + \text{c.c.}$	$(2.9 \pm 0.4) \%$		1607	DESIG=62
$4\pi^0$	$(3.3 \pm 0.4) \times 10^{-3}$		1681	DESIG=70
$\pi^+\pi^-K^+K^-$	$(1.79 \pm 0.15) \%$		1580	DESIG=5
$K_0^*(1430)^0 \bar{K}_0^*(1430)^0 \rightarrow \pi^+\pi^-K^+K^-$	$(9.9 \pm_{-2.9}^{+4.0}) \times 10^{-4}$		—	DESIG=31
$K_0^*(1430)^0 \bar{K}_2^*(1430)^0 + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$(8.1 \pm_{-2.4}^{+2.0}) \times 10^{-4}$		—	DESIG=32
$K_1(1270)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$(6.3 \pm 1.9) \times 10^{-3}$		—	DESIG=33
$K_1(1400)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$< 2.7 \times 10^{-3}$	CL=90%	—	DESIG=34
$f_0(980)f_0(980)$	$(1.6 \pm_{-0.9}^{+1.1}) \times 10^{-4}$		1391	DESIG=23
$f_0(980)f_0(2200)$	$(8.0 \pm_{-2.5}^{+2.0}) \times 10^{-4}$		584	DESIG=24
$f_0(1370)f_0(1370)$	$< 2.8 \times 10^{-4}$	CL=90%	1019	DESIG=25
$f_0(1370)f_0(1500)$	$< 1.7 \times 10^{-4}$	CL=90%	920	DESIG=26
$f_0(1370)f_0(1710)$	$(6.8 \pm_{-2.4}^{+4.0}) \times 10^{-4}$		723	DESIG=27
$f_0(1500)f_0(1370)$	$< 1.3 \times 10^{-4}$	CL=90%	920	DESIG=28
$f_0(1500)f_0(1500)$	$< 5 \times 10^{-5}$	CL=90%	805	DESIG=29
$f_0(1500)f_0(1710)$	$< 7 \times 10^{-5}$	CL=90%	559	DESIG=30
$K^+K^-\pi^+\pi^-\pi^0$	$(1.13 \pm 0.27) \%$		1545	DESIG=75
$K^+K^-\pi^0\pi^0$	$(5.6 \pm 0.9) \times 10^{-3}$		1582	DESIG=63
$K^+\pi^-K^0\pi^0 + \text{c.c.}$	$(2.52 \pm 0.34) \%$		1581	DESIG=65
$\rho^+K^-K^0 + \text{c.c.}$	$(1.22 \pm 0.21) \%$		1458	DESIG=66
$K^*(892)^-K^+\pi^0 \rightarrow K^+\pi^-K^0\pi^0 + \text{c.c.}$	$(4.7 \pm 1.2) \times 10^{-3}$		—	DESIG=67
$K_S^0 K_S^0 \pi^+\pi^-$	$(5.8 \pm 1.1) \times 10^{-3}$		1579	DESIG=41
$K^+K^-\eta\pi^0$	$(3.0 \pm 0.7) \times 10^{-3}$		1468	DESIG=68
$3(\pi^+\pi^-)$	$(1.20 \pm 0.18) \%$		1633	DESIG=4
$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	$(7.3 \pm 1.6) \times 10^{-3}$		1523	DESIG=10
$K^*(892)^0 \bar{K}^*(892)^0$	$(1.7 \pm 0.6) \times 10^{-3}$		1456	DESIG=21
$\pi\pi$	$(8.5 \pm 0.4) \times 10^{-3}$		1702	DESIG=18
$\pi^0\eta$	$< 1.8 \times 10^{-4}$		1661	DESIG=35
$\pi^0\eta'$	$< 1.1 \times 10^{-3}$		1570	DESIG=36
$\eta\eta$	$(3.03 \pm 0.21) \times 10^{-3}$		1617	DESIG=13
$\eta\eta'$	$< 2.4 \times 10^{-4}$	CL=90%	1521	DESIG=37
$\eta'\eta'$	$(2.02 \pm 0.22) \times 10^{-3}$		1413	DESIG=46
$\omega\omega$	$(9.8 \pm 1.1) \times 10^{-4}$		1517	DESIG=22
$\omega\phi$	$(1.19 \pm 0.22) \times 10^{-4}$		1447	DESIG=76
K^+K^-	$(6.06 \pm 0.35) \times 10^{-3}$		1634	DESIG=2
$K_S^0 K_S^0$	$(3.14 \pm 0.18) \times 10^{-3}$		1633	DESIG=15
$\pi^+\pi^-\eta$	$< 2.0 \times 10^{-4}$	CL=90%	1651	DESIG=50
$\pi^+\pi^-\eta'$	$< 4 \times 10^{-4}$	CL=90%	1560	DESIG=53
$\bar{K}^0 K^+\pi^- + \text{c.c.}$	$< 1.0 \times 10^{-4}$	CL=90%	1610	DESIG=17
$K^+K^-\pi^0$	$< 6 \times 10^{-5}$	CL=90%	1611	DESIG=47
$K^+K^-\eta$	$< 2.3 \times 10^{-4}$	CL=90%	1512	DESIG=51
$K^+K^-K_S^0 K_S^0$	$(1.4 \pm 0.5) \times 10^{-3}$		1331	DESIG=42
$K^+K^-K^+K^-$	$(2.79 \pm 0.29) \times 10^{-3}$		1333	DESIG=14
$K^+K^-\phi$	$(9.8 \pm 2.5) \times 10^{-4}$		1381	DESIG=44
$\phi\phi$	$(8.1 \pm 0.8) \times 10^{-4}$		1370	DESIG=16

$p\bar{p}$	$(2.23 \pm 0.13) \times 10^{-4}$		1426	DESIG=11
$p\bar{p}\pi^0$	$(7.0 \pm 0.7) \times 10^{-4}$	S=1.2	1379	DESIG=48
$p\bar{p}\eta$	$(3.6 \pm 0.4) \times 10^{-4}$		1187	DESIG=52
$p\bar{p}\omega$	$(5.3 \pm 0.6) \times 10^{-4}$		1043	DESIG=69
$p\bar{p}\phi$	$(6.1 \pm 1.5) \times 10^{-5}$		876	DESIG=74
$p\bar{p}\pi^+\pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4	1320	DESIG=8
$p\bar{p}\pi^0\pi^0$	$(1.05 \pm 0.28) \times 10^{-3}$		1324	DESIG=64
$p\bar{p}K^+K^-$ (non-resonant)	$(1.23 \pm 0.27) \times 10^{-4}$		890	DESIG=71
$p\bar{p}K_S^0\bar{K}_S^0$	$< 8.8 \times 10^{-4}$	CL=90%	884	DESIG=40
$p\bar{n}\pi^-$	$(1.14 \pm 0.31) \times 10^{-3}$		1376	DESIG=43
$\Lambda\bar{\Lambda}$	$(3.3 \pm 0.4) \times 10^{-4}$		1292	DESIG=19
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 4.0 \times 10^{-3}$	CL=90%	1153	DESIG=38
$K^+\bar{p}\Lambda + \text{c.c.}$	$(1.02 \pm 0.19) \times 10^{-3}$		1132	DESIG=49
$K^+p\Lambda(1520) + \text{c.c.}$	$(3.0 \pm 0.8) \times 10^{-4}$		858	DESIG=72
$\Lambda(1520)\bar{\Lambda}(1520)$	$(3.2 \pm 1.2) \times 10^{-4}$		779	DESIG=73
$\Sigma^0\bar{\Sigma}^0$	$(4.2 \pm 0.7) \times 10^{-4}$		1222	DESIG=58
$\Sigma^+\bar{\Sigma}^-$	$(3.1 \pm 0.7) \times 10^{-4}$		1225	DESIG=59
$\Xi^0\bar{\Xi}^0$	$(3.2 \pm 0.8) \times 10^{-4}$		1089	DESIG=60
$\Xi^-\bar{\Xi}^+$	$(4.9 \pm 0.7) \times 10^{-4}$		1081	DESIG=39

Radiative decays

$\gamma J/\psi(1S)$	$(1.17 \pm 0.08) \%$		303	NODE=M056;CLUMP=B DESIG=6
$\gamma\rho^0$	$< 9 \times 10^{-6}$	CL=90%	1619	DESIG=55
$\gamma\omega$	$< 8 \times 10^{-6}$	CL=90%	1618	DESIG=56
$\gamma\phi$	$< 6 \times 10^{-6}$	CL=90%	1555	DESIG=57
$\gamma\gamma$	$(2.23 \pm 0.17) \times 10^{-4}$		1707	DESIG=7

 $\chi_{c1}(1P)$

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

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

NODE=M055

NODE=M055M;DTYPE=M

NODE=M055W;DTYPE=G

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

$3(\pi^+\pi^-)$	$(5.8 \pm 1.4) \times 10^{-3}$	S=1.2	1683	NODE=M055215;NODE=M055;CLUMP=A DESIG=6
$2(\pi^+\pi^-)$	$(7.6 \pm 2.6) \times 10^{-3}$		1728	DESIG=5
$\pi^+\pi^-\pi^0\pi^0$	$(1.26 \pm 0.17) \%$		1729	DESIG=51
$\rho^+\pi^-\pi^0 + \text{c.c.}$	$(1.53 \pm 0.26) \%$		1658	DESIG=52
$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$		1657	DESIG=9
$4\pi^0$	$(5.7 \pm 0.8) \times 10^{-4}$		1729	DESIG=60
$\pi^+\pi^-K^+K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		1632	DESIG=7
$K^+K^-\pi^0\pi^0$	$(1.18 \pm 0.29) \times 10^{-3}$		1634	DESIG=53
$K^+\pi^-K^0\pi^0 + \text{c.c.}$	$(9.0 \pm 1.5) \times 10^{-3}$		1632	DESIG=55
$\rho^+K^-K^0 + \text{c.c.}$	$(5.3 \pm 1.3) \times 10^{-3}$		1514	DESIG=56
$K^*(892)^0K^0\pi^0 \rightarrow$ $K^+\pi^-K^0\pi^0 + \text{c.c.}$	$(2.5 \pm 0.7) \times 10^{-3}$		—	DESIG=57
$K^+K^-\eta\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$		1523	DESIG=58
$\pi^+\pi^-K_S^0\bar{K}_S^0$	$(7.2 \pm 3.1) \times 10^{-4}$		1630	DESIG=28
$K^+K^-\eta$	$(3.3 \pm 1.0) \times 10^{-4}$		1566	DESIG=42
$K^0K^+\pi^- + \text{c.c.}$	$(7.3 \pm 0.6) \times 10^{-3}$		1661	DESIG=17
$K^*(892)^0\bar{K}^0 + \text{c.c.}$	$(1.0 \pm 0.4) \times 10^{-3}$		1602	DESIG=32
$K^*(892)^+K^- + \text{c.c.}$	$(1.5 \pm 0.7) \times 10^{-3}$		1602	DESIG=33
$K_J^*(1430)^0\bar{K}^0 + \text{c.c.} \rightarrow$ $K_S^0K^+\pi^- + \text{c.c.}$	$< 8 \times 10^{-4}$	CL=90%	—	DESIG=34
$K_J^*(1430)^+K^- + \text{c.c.} \rightarrow$ $K_S^0K^+\pi^- + \text{c.c.}$	$< 2.3 \times 10^{-3}$	CL=90%	—	DESIG=35
$K^+K^-\pi^0$	$(1.91 \pm 0.26) \times 10^{-3}$		1662	DESIG=38
$\eta\pi^+\pi^-$	$(5.0 \pm 0.5) \times 10^{-3}$		1701	DESIG=31
$a_0(980)^+\pi^- + \text{c.c.} \rightarrow \eta\pi^+\pi^-$	$(1.9 \pm 0.7) \times 10^{-3}$		—	DESIG=36

$f_2(1270)\eta$	$(2.8 \pm 0.8) \times 10^{-3}$	1468	DESIG=37
$\pi^+\pi^-\eta'$	$(2.4 \pm 0.5) \times 10^{-3}$	1612	DESIG=44
$\pi^0 f_0(980) \rightarrow \pi^0 \pi^+ \pi^-$	$< 6.0 \times 10^{-7}$	CL=90%	DESIG=61
$K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	$(3.2 \pm 2.1) \times 10^{-3}$	1577	DESIG=10
$K^*(892)^0 \bar{K}^*(892)^0$	$(1.5 \pm 0.4) \times 10^{-3}$	1512	DESIG=21
$K^+ K^- K_S^0 K_S^0$	$< 5 \times 10^{-4}$	CL=90%	DESIG=29
$K^+ K^- K^+ K^-$	$(5.6 \pm 1.2) \times 10^{-4}$	1393	DESIG=14
$K^+ K^- \phi$	$(4.3 \pm 1.6) \times 10^{-4}$	1440	DESIG=30
$\omega\omega$	$(6.0 \pm 0.7) \times 10^{-4}$	1571	DESIG=66
$\omega\phi$	$(2.2 \pm 0.6) \times 10^{-5}$	1503	DESIG=67
$\phi\phi$	$(4.4 \pm 0.6) \times 10^{-4}$	1429	DESIG=68
$p\bar{p}$	$(7.3 \pm 0.4) \times 10^{-5}$	1484	DESIG=11
$p\bar{p}\pi^0$	$(1.64 \pm 0.20) \times 10^{-4}$	1438	DESIG=39
$p\bar{p}\eta$	$(1.53 \pm 0.26) \times 10^{-4}$	1254	DESIG=43
$p\bar{p}\omega$	$(2.24 \pm 0.33) \times 10^{-4}$	1117	DESIG=59
$p\bar{p}\phi$	$< 1.8 \times 10^{-5}$	CL=90%	DESIG=65
$p\bar{p}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$	1381	DESIG=8
$p\bar{p}K^+K^-$ (non-resonant)	$(1.34 \pm 0.24) \times 10^{-4}$	974	DESIG=62
$p\bar{p}K_S^0 K_S^0$	$< 4.5 \times 10^{-4}$	CL=90%	DESIG=25
$\Lambda\bar{\Lambda}$	$(1.18 \pm 0.19) \times 10^{-4}$	1355	DESIG=19
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 1.5 \times 10^{-3}$	CL=90%	DESIG=24
$K^+ \bar{p}\Lambda$	$(3.2 \pm 1.0) \times 10^{-4}$	1203	DESIG=40
$K^+ p\Lambda(1520) + \text{c.c.}$	$(1.8 \pm 0.5) \times 10^{-4}$	950	DESIG=63
$\Lambda(1520)\bar{\Lambda}(1520)$	$< 1.0 \times 10^{-4}$	CL=90%	DESIG=64
$\Sigma^0 \bar{\Sigma}^0$	$< 4 \times 10^{-5}$	CL=90%	DESIG=48
$\Sigma^+ \bar{\Sigma}^-$	$< 6 \times 10^{-5}$	CL=90%	DESIG=49
$\Xi^0 \bar{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%	DESIG=50
$\Xi^- \bar{\Xi}^+$	$(8.4 \pm 2.3) \times 10^{-5}$	1155	DESIG=26
$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$	—	DESIG=23
$K_S^0 K_S^0$	$< 6 \times 10^{-5}$	CL=90%	DESIG=27

Radiative decays

$\gamma J/\psi(1S)$	$(34.4 \pm 1.5) \%$	389	NODE=M055;CLUMP=B DESIG=1
$\gamma\rho^0$	$(2.28 \pm 0.19) \times 10^{-4}$	1670	DESIG=45
$\gamma\omega$	$(7.1 \pm 0.9) \times 10^{-5}$	1668	DESIG=46
$\gamma\phi$	$(2.6 \pm 0.6) \times 10^{-5}$	1607	DESIG=47

 $h_c(1P)$

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

NODE=M144

Mass $m = 3525.41 \pm 0.16$ MeV (S = 1.2)Full width $\Gamma < 1$ MeVNODE=M144M;DTYPE=M
NODE=M144W;DTYPE=G

$h_c(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi(1S)\pi\pi$	not seen	312
$\eta_c(1S)\gamma$	$(53 \pm 7) \%$	503
$\pi^+\pi^-\pi^0$	$< 2.3 \times 10^{-3}$	1749
$2\pi^+2\pi^-\pi^0$	$(2.2^{+0.9}_{-0.8}) \%$	1716
$3\pi^+3\pi^-\pi^0$	$< 3.0 \%$	1661

NODE=M144215;DESIG=2;OUR EST;
→ NOT CHECKED ←

DESIG=5

DESIG=6

DESIG=7

 $\chi_{c2}(1P)$

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

NODE=M057

Mass $m = 3556.20 \pm 0.09$ MeVFull width $\Gamma = 1.98 \pm 0.11$ MeVNODE=M057M;DTYPE=M
NODE=M057W;DTYPE=G

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
Hadronic decays				NODE=M057215;NODE=M057;CLUMP=A
$2(\pi^+\pi^-)$	(1.10±0.11) %		1751	DESIG=3
$\pi^+\pi^-\pi^0\pi^0$	(2.00±0.26) %		1752	DESIG=50
$\rho^+\pi^-\pi^0 + \text{c.c.}$	(2.4 ±0.4) %		1682	DESIG=51
$4\pi^0$	(1.21±0.17) $\times 10^{-3}$		1752	DESIG=62
$K^+K^-\pi^0\pi^0$	(2.2 ±0.5) $\times 10^{-3}$		1658	DESIG=52
$K^+\pi^-K^0\pi^0 + \text{c.c.}$	(1.51±0.22) %		1657	DESIG=54
$\rho^+K^-K^0 + \text{c.c.}$	(4.5 ±1.4) $\times 10^{-3}$		1540	DESIG=55
$K^*(892)^0K^+\pi^- \rightarrow$	(3.2 ±0.9) $\times 10^{-3}$		—	DESIG=60
$K^+\pi^-K^0\pi^0 + \text{c.c.}$				
$K^*(892)^0K^0\pi^0 \rightarrow$	(4.2 ±0.9) $\times 10^{-3}$		—	DESIG=56
$K^+\pi^-K^0\pi^0 + \text{c.c.}$				
$K^*(892)^-K^+\pi^0 \rightarrow$	(4.1 ±0.9) $\times 10^{-3}$		—	DESIG=57
$K^+\pi^-K^0\pi^0 + \text{c.c.}$				
$K^*(892)^+K^0\pi^- \rightarrow$	(3.2 ±0.9) $\times 10^{-3}$		—	DESIG=58
$K^+\pi^-K^0\pi^0 + \text{c.c.}$				
$K^+K^-\eta\pi^0$	(1.4 ±0.5) $\times 10^{-3}$		1549	DESIG=59
$K^+K^-\pi^+\pi^-$	(9.1 ±1.1) $\times 10^{-3}$		1656	DESIG=5
$K^+K^-\pi^+\pi^-\pi^0$	(1.3 ±0.4) %		1623	DESIG=67
$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	(2.3 ±1.2) $\times 10^{-3}$		1602	DESIG=10
$K^*(892)^0\bar{K}^*(892)^0$	(2.5 ±0.5) $\times 10^{-3}$		1538	DESIG=21
$3(\pi^+\pi^-)$	(8.6 ±1.8) $\times 10^{-3}$		1707	DESIG=4
$\phi\phi$	(1.14±0.12) $\times 10^{-3}$		1457	DESIG=16
$\omega\omega$	(1.10±0.12) $\times 10^{-3}$		1597	DESIG=25
$\pi\pi$	(2.43±0.13) $\times 10^{-3}$		1773	DESIG=22
$\rho^0\pi^+\pi^-$	(4.0 ±1.7) $\times 10^{-3}$		1681	DESIG=9
$\pi^+\pi^-\eta$	(5.2 ±1.4) $\times 10^{-4}$		1724	DESIG=39
$\pi^+\pi^-\eta'$	(5.5 ±2.0) $\times 10^{-4}$		1636	DESIG=42
$\eta\eta$	(5.9 ±0.5) $\times 10^{-4}$		1692	DESIG=14
K^+K^-	(1.09±0.08) $\times 10^{-3}$		1708	DESIG=2
$K_S^0K_S^0$	(5.8 ±0.5) $\times 10^{-4}$		1707	DESIG=15
$\bar{K}^0K^+\pi^- + \text{c.c.}$	(1.40±0.20) $\times 10^{-3}$		1685	DESIG=17
$K^+K^-\pi^0$	(3.3 ±0.8) $\times 10^{-4}$		1686	DESIG=36
$K^+K^-\eta$	< 3.5 $\times 10^{-4}$	90%	1592	DESIG=40
$\eta\eta'$	< 6 $\times 10^{-5}$	90%	1600	DESIG=34
$\eta'\eta'$	< 1.1 $\times 10^{-4}$	90%	1498	DESIG=35
$\pi^+\pi^-K_S^0K_S^0$	(2.4 ±0.6) $\times 10^{-3}$		1655	DESIG=29
$K^+K^-K_S^0K_S^0$	< 4 $\times 10^{-4}$	90%	1418	DESIG=30
$K^+K^-K^+K^-$	(1.78±0.22) $\times 10^{-3}$		1421	DESIG=24
$K^+K^-\phi$	(1.55±0.33) $\times 10^{-3}$		1468	DESIG=32
$p\bar{p}$	(7.2 ±0.4) $\times 10^{-5}$		1510	DESIG=11
$p\bar{p}\pi^0$	(5.1 ±0.5) $\times 10^{-4}$		1465	DESIG=37
$p\bar{p}\eta$	(1.90±0.28) $\times 10^{-4}$		1285	DESIG=41
$p\bar{p}\omega$	(3.9 ±0.5) $\times 10^{-4}$		1152	DESIG=61
$p\bar{p}\phi$	(3.0 ±1.0) $\times 10^{-5}$		1002	DESIG=66
$p\bar{p}\pi^+\pi^-$	(1.32±0.34) $\times 10^{-3}$		1410	DESIG=8
$p\bar{p}\pi^0\pi^0$	(8.6 ±2.6) $\times 10^{-4}$		1414	DESIG=53
$p\bar{p}K^+K^- (\text{non-resonant})$	(2.1 ±0.4) $\times 10^{-4}$		1013	DESIG=63
$p\bar{p}K_S^0K_S^0$	< 7.9 $\times 10^{-4}$	90%	1007	DESIG=28
$p\bar{n}\pi^-$	(1.1 ±0.4) $\times 10^{-3}$		1463	DESIG=31
$\Lambda\bar{\Lambda}$	(1.86±0.27) $\times 10^{-4}$		1385	DESIG=19
$\Lambda\bar{\Lambda}\pi^+\pi^-$	< 3.5 $\times 10^{-3}$	90%	1255	DESIG=27
$K^+\bar{p}\Lambda + \text{c.c.}$	(9.1 ±1.8) $\times 10^{-4}$		1236	DESIG=38
$K^+p\Lambda(1520) + \text{c.c.}$	(3.1 ±0.7) $\times 10^{-4}$		992	DESIG=64
$\Lambda(1520)\bar{\Lambda}(1520)$	(5.1 ±1.6) $\times 10^{-4}$		923	DESIG=65
$\Sigma^0\bar{\Sigma}^0$	< 8 $\times 10^{-5}$	90%	1319	DESIG=47
$\Sigma^+\bar{\Sigma}^-$	< 7 $\times 10^{-5}$	90%	1322	DESIG=48
$\Xi^0\bar{\Xi}^0$	< 1.1 $\times 10^{-4}$	90%	1197	DESIG=49
$\Xi^-\bar{\Xi}^+$	(1.55±0.35) $\times 10^{-4}$		1189	DESIG=26
$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	90%	185	DESIG=12

Radiative decays

$\gamma J/\psi(1S)$	$(19.5 \pm 0.8) \%$		430
$\gamma \rho^0$	$< 2.1 \times 10^{-5}$	90%	1694
$\gamma \omega$	$< 7 \times 10^{-6}$	90%	1692
$\gamma \phi$	$< 8 \times 10^{-6}$	90%	1632
$\gamma \gamma$	$(2.59 \pm 0.16) \times 10^{-4}$		1778

NODE=M057;CLUMP=B
 DESIG=6
 DESIG=44
 DESIG=45
 DESIG=46
 DESIG=7

 $\eta_c(2S)$

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

NODE=M059

Quantum numbers are quark model predictions.

Mass $m = 3638.9 \pm 1.3$ MeVFull width $\Gamma = 10 \pm 4$ MeV

NODE=M059M;DTYPE=M

NODE=M059W;DTYPE=G

$\eta_c(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	$\frac{p}{(\text{MeV}/c)}$
hadrons	not seen		—
$K \bar{K} \pi$	$(1.9 \pm 1.2) \%$		1730
$2\pi^+ 2\pi^-$	not seen		1793
$\rho^0 \rho^0$	not seen		1646
$3\pi^+ 3\pi^-$	not seen		1750
$K^+ K^- \pi^+ \pi^-$	not seen		1701
$K^{*0} \bar{K}^{*0}$	not seen		1586
$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.4 \pm 1.0) \%$		1668
$K^+ K^- 2\pi^+ 2\pi^-$	not seen		1628
$K_S^0 K^- 2\pi^+ \pi^- + \text{c.c.}$	not seen		1666
$2K^+ 2K^-$	not seen		1471
$\phi \phi$	not seen		1507
$\gamma \gamma$	$< 5 \times 10^{-4}$	90%	1819
$\pi^+ \pi^- \eta$	not seen		1767
$\pi^+ \pi^- \eta'$	not seen		1681
$K^+ K^- \eta$	not seen		1638
$\pi^+ \pi^- \eta_c(1S)$	not seen		541

NODE=M059215;DESIG=1

DESIG=4

DESIG=5

DESIG=16

DESIG=8;OUR EVAL;→ NOT CHECKED ←

DESIG=6

DESIG=17

DESIG=9

DESIG=10;OUR EVAL;

→ NOT CHECKED ←

DESIG=11;OUR EVAL;

→ NOT CHECKED ←

DESIG=7

DESIG=18

DESIG=2

DESIG=12;OUR EVAL;

→ NOT CHECKED ←

DESIG=13;OUR EVAL;

→ NOT CHECKED ←

DESIG=14;OUR EVAL;

→ NOT CHECKED ←

DESIG=15;OUR EVAL;

→ NOT CHECKED ←

 $\psi(2S)$

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

NODE=M071

Mass $m = 3686.109^{+0.011}_{-0.014}$ MeVFull width $\Gamma = 304 \pm 9$ keV $\Gamma_{ee} = 2.35 \pm 0.04$ keV

NODE=M071M;DTYPE=M

NODE=M071W;DTYPE=G

NODE=M071W1;DTYPE=E

$\psi(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
hadrons	(97.85 $\pm$ 0.13) %		—	NODE=M071220;DESIG=3
virtual $\gamma \rightarrow$ hadrons	(1.73 $\pm$ 0.14) %	S=1.5	—	DESIG=4
$g g g$	(10.6 $\pm$ 1.6) %		—	DESIG=255
$\gamma g g$	(1.03 $\pm$ 0.29) %		—	DESIG=256
light hadrons	(15.4 $\pm$ 1.5) %		—	DESIG=226
$e^+ e^-$	(7.73 $\pm$ 0.17) $\times 10^{-3}$		1843	DESIG=1
$\mu^+ \mu^-$	(7.7 $\pm$ 0.8) $\times 10^{-3}$		1840	DESIG=2
$\tau^+ \tau^-$	(3.0 $\pm$ 0.4) $\times 10^{-3}$		490	DESIG=68
Decays into $J/\psi(1S)$ and anything				
$J/\psi(1S)$ anything	(59.5 $\pm$ 0.8) %		—	NODE=M071;CLUMP=A
$J/\psi(1S)$ neutrals	(24.6 $\pm$ 0.4) %		—	DESIG=12
$J/\psi(1S) \pi^+ \pi^-$	(33.6 $\pm$ 0.4) %		477	DESIG=13
$J/\psi(1S) \pi^0 \pi^0$	(17.75 $\pm$ 0.34) %		481	DESIG=14
$J/\psi(1S) \eta$	(3.28 $\pm$ 0.07) %		199	DESIG=15
$J/\psi(1S) \pi^0$	(1.30 $\pm$ 0.10) $\times 10^{-3}$	S=1.4	528	DESIG=18
Hadronic decays				
$\pi^0 h_c(1P)$	(8.6 $\pm$ 1.3) $\times 10^{-4}$		85	NODE=M071;CLUMP=B
$3(\pi^+ \pi^-) \pi^0$	(3.5 $\pm$ 1.6) $\times 10^{-3}$		1746	DESIG=254
$2(\pi^+ \pi^-) \pi^0$	(2.9 $\pm$ 1.0) $\times 10^{-3}$	S=4.6	1799	DESIG=37
$\rho a_2(1320)$	(2.6 $\pm$ 0.9) $\times 10^{-4}$		1500	DESIG=25
$p \bar{p}$	(2.76 $\pm$ 0.12) $\times 10^{-4}$		1586	DESIG=65
$\Delta^{++} \bar{\Delta}^{--}$	(1.28 $\pm$ 0.35) $\times 10^{-4}$		1371	DESIG=27
$\Lambda \bar{\Lambda} \pi^0$	< 1.2 $\times 10^{-4}$	CL=90%	1412	DESIG=70
$\Lambda \bar{\Lambda} \eta$	< 4.9 $\times 10^{-5}$	CL=90%	1197	DESIG=238
$\Lambda \bar{p} K^+$	(1.00 $\pm$ 0.14) $\times 10^{-4}$		1327	DESIG=239
$\Lambda \bar{p} K^+ \pi^+ \pi^-$	(1.8 $\pm$ 0.4) $\times 10^{-4}$		1167	DESIG=214
$\Lambda \bar{\Lambda} \pi^+ \pi^-$	(2.8 $\pm$ 0.6) $\times 10^{-4}$		1346	DESIG=215
$\Lambda \bar{\Lambda}$	(2.8 $\pm$ 0.5) $\times 10^{-4}$	S=2.6	1467	DESIG=213
$\Sigma^+ \bar{\Sigma}^-$	(2.6 $\pm$ 0.8) $\times 10^{-4}$		1408	DESIG=28
$\Sigma^0 \bar{\Sigma}^0$	(2.2 $\pm$ 0.4) $\times 10^{-4}$	S=1.5	1405	DESIG=223
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	(1.1 $\pm$ 0.4) $\times 10^{-4}$		1218	DESIG=71
$\Xi^- \bar{\Xi}^+$	(1.8 $\pm$ 0.6) $\times 10^{-4}$	S=2.8	1284	DESIG=72
$\Xi^0 \bar{\Xi}^0$	(2.8 $\pm$ 0.9) $\times 10^{-4}$		1292	DESIG=29
$\Xi(1530)^0 \bar{\Xi}(1530)^0$	< 8.1 $\times 10^{-5}$	CL=90%	1025	DESIG=224
$\Omega^- \bar{\Omega}^+$	< 7.3 $\times 10^{-5}$	CL=90%	774	DESIG=73
$\pi^0 p \bar{p}$	(1.50 $\pm$ 0.08) $\times 10^{-4}$	S=1.1	1543	DESIG=74
$N^*(1440) \bar{p} \rightarrow \pi^0 p \bar{p}$	(8.1 $\pm$ 0.8) $\times 10^{-5}$		—	DESIG=35
$\pi^0 f_0(2100) \rightarrow \pi^0 p \bar{p}$	(1.1 $\pm$ 0.4) $\times 10^{-5}$		—	DESIG=261
$\eta p \bar{p}$	(5.7 $\pm$ 0.6) $\times 10^{-5}$		1373	DESIG=262
$\eta f_0(2100) \rightarrow \eta p \bar{p}$	(1.2 $\pm$ 0.4) $\times 10^{-5}$		—	DESIG=200
$N^*(1535) \bar{p} \rightarrow \eta p \bar{p}$	(4.4 $\pm$ 0.7) $\times 10^{-5}$		—	DESIG=263
$\omega p \bar{p}$	(6.9 $\pm$ 2.1) $\times 10^{-5}$		1247	DESIG=264
$\phi p \bar{p}$	< 2.4 $\times 10^{-5}$	CL=90%	1109	DESIG=77
$\pi^+ \pi^- p \bar{p}$	(6.0 $\pm$ 0.4) $\times 10^{-4}$		1491	DESIG=80
$p \bar{n} \pi^-$ or c.c.	(2.48 $\pm$ 0.17) $\times 10^{-4}$		—	DESIG=31
$p \bar{n} \pi^- \pi^0$	(3.2 $\pm$ 0.7) $\times 10^{-4}$		1492	DESIG=227
$2(\pi^+ \pi^- \pi^0)$	(4.8 $\pm$ 1.5) $\times 10^{-3}$		1776	DESIG=228
$\eta \pi^+ \pi^-$	< 1.6 $\times 10^{-4}$	CL=90%	1791	DESIG=221
$\eta \pi^+ \pi^- \pi^0$	(9.5 $\pm$ 1.7) $\times 10^{-4}$		1778	DESIG=202
$2(\pi^+ \pi^-) \eta$	(1.2 $\pm$ 0.6) $\times 10^{-3}$		1758	DESIG=203
$\eta' \pi^+ \pi^- \pi^0$	(4.5 $\pm$ 2.1) $\times 10^{-4}$		1692	DESIG=251
$\omega \pi^+ \pi^-$	(7.3 $\pm$ 1.2) $\times 10^{-4}$	S=2.1	1748	DESIG=204
$b_1^\pm \pi^\mp$	(4.0 $\pm$ 0.6) $\times 10^{-4}$	S=1.1	1635	DESIG=75
$b_1^0 \pi^0$	(2.4 $\pm$ 0.6) $\times 10^{-4}$		—	DESIG=40
$\omega f_2(1270)$	(2.2 $\pm$ 0.4) $\times 10^{-4}$		1515	DESIG=193
$\pi^+ \pi^- K^+ K^-$	(7.5 $\pm$ 0.9) $\times 10^{-4}$	S=1.9	1726	DESIG=64
$\rho^0 K^+ K^-$	(2.2 $\pm$ 0.4) $\times 10^{-4}$		1616	DESIG=26

$K^*(892)^0 \bar{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		1418	DESIG=66
$K^+ K^- \pi^+ \pi^- \eta$	$(1.3 \pm 0.7) \times 10^{-3}$		1574	DESIG=252
$K^+ K^- 2(\pi^+ \pi^-) \pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$		1611	DESIG=240
$K^+ K^- 2(\pi^+ \pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$		1654	DESIG=222
$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$		1581	DESIG=41
$K_S^0 K_S^0 \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$		1724	DESIG=225
$\rho^0 p \bar{p}$	$(5.0 \pm 2.2) \times 10^{-5}$		1251	DESIG=210
$K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	$(6.7 \pm 2.5) \times 10^{-4}$		1674	DESIG=34
$2(\pi^+ \pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2	1817	DESIG=24
$\rho^0 \pi^+ \pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4	1750	DESIG=33
$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$		1694	DESIG=206
$\omega f_0(1710) \rightarrow \omega K^+ K^-$	$(5.9 \pm 2.2) \times 10^{-5}$		—	DESIG=216
$K^*(892)^0 K^- \pi^+ \pi^0 + \text{c.c.}$	$(8.6 \pm 2.2) \times 10^{-4}$		—	DESIG=217
$K^*(892)^+ K^- \pi^+ \pi^- + \text{c.c.}$	$(9.6 \pm 2.8) \times 10^{-4}$		—	DESIG=218
$K^*(892)^+ K^- \rho^0 + \text{c.c.}$	$(7.3 \pm 2.6) \times 10^{-4}$		—	DESIG=219
$K^*(892)^0 K^- \rho^+ + \text{c.c.}$	$(6.1 \pm 1.8) \times 10^{-4}$		—	DESIG=220
$\eta K^+ K^-$	$< 1.3 \times 10^{-4}$	CL=90%	1664	DESIG=207
$\omega K^+ K^-$	$(1.85 \pm 0.25) \times 10^{-4}$	S=1.1	1614	DESIG=76
$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8	1774	DESIG=32
$p \bar{p} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$		1435	DESIG=211
$K^+ K^-$	$(6.3 \pm 0.7) \times 10^{-5}$		1776	DESIG=23
$K_S^0 K_L^0$	$(5.4 \pm 0.5) \times 10^{-5}$		1775	DESIG=85
$\pi^+ \pi^- \pi^0$	$(1.68 \pm 0.26) \times 10^{-4}$	S=1.4	1830	DESIG=36
$\rho(2150) \pi \rightarrow \pi^+ \pi^- \pi^0$	$(1.9 \pm_{-0.4}^{+1.2}) \times 10^{-4}$		—	DESIG=201
$\rho(770) \pi \rightarrow \pi^+ \pi^- \pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8	—	DESIG=22
$\pi^+ \pi^-$	$(8 \pm 5) \times 10^{-5}$		1838	DESIG=21
$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%	1532	DESIG=42
$K^+ K^- \pi^0$	$< 2.96 \times 10^{-5}$	CL=90%	1754	DESIG=38
$K^+ \bar{K}^*(892)^- + \text{c.c.}$	$(1.7 \pm_{-0.7}^{+0.8}) \times 10^{-5}$		1698	DESIG=39
$K^*(892)^0 \bar{K}^0 + \text{c.c.}$	$(1.09 \pm 0.20) \times 10^{-4}$		1697	DESIG=194
$\phi \pi^+ \pi^-$	$(1.17 \pm 0.29) \times 10^{-4}$	S=1.7	1690	DESIG=78
$\phi f_0(980) \rightarrow \pi^+ \pi^-$	$(6.8 \pm 2.5) \times 10^{-5}$	S=1.1	—	DESIG=81
$2(K^+ K^-)$	$(6.0 \pm 1.4) \times 10^{-5}$		1499	DESIG=208
$\phi K^+ K^-$	$(7.0 \pm 1.6) \times 10^{-5}$		1546	DESIG=79
$2(K^+ K^-) \pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$		1440	DESIG=209
$\phi \eta$	$(2.8 \pm_{-0.8}^{+1.0}) \times 10^{-5}$		1654	DESIG=89
$\phi \eta'$	$(3.1 \pm 1.6) \times 10^{-5}$		1555	DESIG=90
$\omega \eta'$	$(3.2 \pm_{-2.1}^{+2.5}) \times 10^{-5}$		1623	DESIG=91
$\omega \pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$		1757	DESIG=92
$\rho \eta'$	$(1.9 \pm_{-1.2}^{+1.7}) \times 10^{-5}$		1625	DESIG=93
$\rho \eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1	1717	DESIG=94
$\omega \eta$	$< 1.1 \times 10^{-5}$	CL=90%	1715	DESIG=95
$\phi \pi^0$	$< 4 \times 10^{-6}$	CL=90%	1699	DESIG=96
$\eta_c \pi^+ \pi^- \pi^0$	$< 1.0 \times 10^{-3}$	CL=90%	—	DESIG=229
$p \bar{p} K^+ K^-$	$(2.7 \pm 0.7) \times 10^{-5}$		1118	DESIG=212
$\bar{\Lambda} n K_S^0 + \text{c.c.}$	$(8.1 \pm 1.8) \times 10^{-5}$		1324	DESIG=237
$\phi f_2'(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$		1321	DESIG=67
$\Theta(1540) \bar{\Theta}(1540) \rightarrow$	$< 8.8 \times 10^{-6}$	CL=90%	—	DESIG=195
$K_S^0 p K^- \bar{n} + \text{c.c.}$				
$\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$	$< 1.0 \times 10^{-5}$	CL=90%	—	DESIG=196
$\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n$	$< 7.0 \times 10^{-6}$	CL=90%	—	DESIG=197
$\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n$	$< 2.6 \times 10^{-5}$	CL=90%	—	DESIG=198
$\bar{\Theta}(1540) K_S^0 p \rightarrow K_S^0 p K^- \bar{n}$	$< 6.0 \times 10^{-6}$	CL=90%	—	DESIG=199
$K_S^0 K_S^0$	$< 4.6 \times 10^{-6}$		1775	DESIG=86

Radiative decays

$\gamma\chi_{c0}(1P)$	(9.68 $\pm$ 0.31) %		261	DESIG=56
$\gamma\chi_{c1}(1P)$	(9.2 $\pm$ 0.4) %		171	DESIG=58
$\gamma\chi_{c2}(1P)$	(8.72 $\pm$ 0.34) %		128	DESIG=59
$\gamma\eta_c(1S)$	(3.4 $\pm$ 0.5) $\times 10^{-3}$	S=1.3	638	DESIG=61
$\gamma\eta_c(2S)$	< 8 $\times 10^{-4}$	CL=90%	47	DESIG=63
$\gamma\pi_0$	(1.6 $\pm$ 0.4) $\times 10^{-6}$		1841	DESIG=52
$\gamma\eta'(958)$	(1.23 $\pm$ 0.06) $\times 10^{-4}$		1719	DESIG=54
$\gamma f_2(1270)$	(2.1 $\pm$ 0.4) $\times 10^{-4}$		1623	DESIG=82
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	(3.0 $\pm$ 1.3) $\times 10^{-5}$		—	DESIG=83
$\gamma f_0(1710) \rightarrow \gamma K\bar{K}$	(6.0 $\pm$ 1.6) $\times 10^{-5}$		—	DESIG=84
$\gamma\gamma$	< 1.4 $\times 10^{-4}$	CL=90%	1843	DESIG=51
$\gamma\eta$	(1.4 $\pm$ 0.5) $\times 10^{-6}$		1802	DESIG=53
$\gamma\eta\pi^+\pi^-$	(8.7 $\pm$ 2.1) $\times 10^{-4}$		1791	DESIG=230
$\gamma\eta(1405) \rightarrow \gamma K\bar{K}\pi$	< 9 $\times 10^{-5}$	CL=90%	1569	DESIG=62
$\gamma\eta(1405) \rightarrow \eta\pi^+\pi^-$	(3.6 $\pm$ 2.5) $\times 10^{-5}$		—	DESIG=232
$\gamma\eta(1475) \rightarrow K\bar{K}\pi$	< 1.4 $\times 10^{-4}$	CL=90%	—	DESIG=234
$\gamma\eta(1475) \rightarrow \eta\pi^+\pi^-$	< 8.8 $\times 10^{-5}$	CL=90%	—	DESIG=235
$\gamma 2(\pi^+\pi^-)$	(4.0 $\pm$ 0.6) $\times 10^{-4}$		1817	DESIG=241
$\gamma K^{*0} K^+\pi^- + c.c.$	(3.7 $\pm$ 0.9) $\times 10^{-4}$		1674	DESIG=242
$\gamma K^{*0} \bar{K}^{*0}$	(2.4 $\pm$ 0.7) $\times 10^{-4}$		1613	DESIG=243
$\gamma K_S^0 K^+\pi^- + c.c.$	(2.6 $\pm$ 0.5) $\times 10^{-4}$		1753	DESIG=244
$\gamma K^+ K^-\pi^+\pi^-$	(1.9 $\pm$ 0.5) $\times 10^{-4}$		1726	DESIG=245
$\gamma p\bar{p}$	(3.9 $\pm$ 0.5) $\times 10^{-5}$	S=2.0	1586	DESIG=246
$\gamma f_2(1950) \rightarrow \gamma p\bar{p}$	(1.20 $\pm$ 0.22) $\times 10^{-5}$		—	DESIG=257
$\gamma f_2(2150) \rightarrow \gamma p\bar{p}$	(7.2 $\pm$ 1.8) $\times 10^{-6}$		—	DESIG=258
$\gamma X(1835) \rightarrow \gamma p\bar{p}$	< 1.6 $\times 10^{-6}$	CL=90%	—	DESIG=259
$\gamma X \rightarrow \gamma p\bar{p}$	[ν] < 2 $\times 10^{-6}$	CL=90%	—	DESIG=260
$\gamma\pi^+\pi^-p\bar{p}$	(2.8 $\pm$ 1.4) $\times 10^{-5}$		1491	DESIG=247
$\gamma 2(\pi^+\pi^-) K^+ K^-$	< 2.2 $\times 10^{-4}$	CL=90%	1654	DESIG=248
$\gamma 3(\pi^+\pi^-)$	< 1.7 $\times 10^{-4}$	CL=90%	1774	DESIG=249
$\gamma K^+ K^- K^+ K^-$	< 4 $\times 10^{-5}$	CL=90%	1499	DESIG=250

 $\psi(3770)$

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

Mass $m = 3773.11 \pm 0.32$ MeVFull width $\Gamma = 27.2 \pm 1.0$ MeV $\Gamma_{ee} = 0.262 \pm 0.018$ keV (S = 1.4)

NODE=M053

NODE=M053M;DTYPE=M

NODE=M053W;DTYPE=G

NODE=M053W1;DTYPE=E

In addition to the dominant decay mode to $D\bar{D}$, $\psi(3770)$ 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).

NODE=M053220;NODE=M053

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$D\bar{D}$	(93 $^{+8}_{-9}$) %	S=2.0	285	DESIG=2
$D^0\bar{D}^0$	(52 ± 5) %	S=2.0	285	DESIG=5
D^+D^-	(41 ± 4) %	S=2.0	252	DESIG=6
$J/\psi\pi^+\pi^-$	(1.93 $\pm$ 0.28) $\times 10^{-3}$		560	DESIG=4
$J/\psi\pi^0\pi^0$	(8.0 $\pm$ 3.0) $\times 10^{-4}$		564	DESIG=46
$J/\psi\eta$	(9 ± 4) $\times 10^{-4}$		360	DESIG=47
$J/\psi\pi^0$	< 2.8 $\times 10^{-4}$	CL=90%	603	DESIG=48
e^+e^-	(9.6 $\pm$ 0.7) $\times 10^{-6}$	S=1.3	1887	DESIG=1
Decays to light hadrons				
$b_1(1235)\pi$	< 1.4 $\times 10^{-5}$	CL=90%	1683	DESIG=20
$\phi\eta'$	< 7 $\times 10^{-4}$	CL=90%	1607	DESIG=17
$\omega\eta'$	< 4 $\times 10^{-4}$	CL=90%	1672	DESIG=16
$\rho^0\eta'$	< 6 $\times 10^{-4}$	CL=90%	1674	DESIG=15
$\phi\eta$	(3.1 $\pm$ 0.7) $\times 10^{-4}$		1703	DESIG=8
$\omega\eta$	< 1.4 $\times 10^{-5}$	CL=90%	1762	DESIG=14
$\rho^0\eta$	< 5 $\times 10^{-4}$	CL=90%	1763	DESIG=13
$\phi\pi^0$	< 3 $\times 10^{-5}$	CL=90%	1746	DESIG=12
$\omega\pi^0$	< 6 $\times 10^{-4}$	CL=90%	1803	DESIG=11
$\pi^+\pi^-\pi^0$	< 5 $\times 10^{-6}$	CL=90%	1874	DESIG=9
$\rho\pi$	< 5 $\times 10^{-6}$	CL=90%	1804	DESIG=10
$K^*(892)^+K^- + \text{c.c.}$	< 1.4 $\times 10^{-5}$	CL=90%	1745	DESIG=19
$K^*(892)^0\bar{K}^0 + \text{c.c.}$	< 1.2 $\times 10^{-3}$	CL=90%	1744	DESIG=18
$K_S^0 K_L^0$	< 1.2 $\times 10^{-5}$	CL=90%	1820	DESIG=3
$2(\pi^+\pi^-)$	< 1.12 $\times 10^{-3}$	CL=90%	1861	DESIG=21
$2(\pi^+\pi^-)\pi^0$	< 1.06 $\times 10^{-3}$	CL=90%	1843	DESIG=22
$2(\pi^+\pi^-\pi^0)$	< 5.85 %	CL=90%	1821	DESIG=208
$\omega\pi^+\pi^-$	< 6.0 $\times 10^{-4}$	CL=90%	1794	DESIG=24
$3(\pi^+\pi^-)$	< 9.1 $\times 10^{-3}$		1819	DESIG=52
$3(\pi^+\pi^-)\pi^0$	< 1.37 %		1792	DESIG=55
$3(\pi^+\pi^-)2\pi^0$	< 11.74 %	CL=90%	1759	DESIG=210
$\eta\pi^+\pi^-$	< 1.24 $\times 10^{-3}$	CL=90%	1836	DESIG=23
$\pi^+\pi^-2\pi^0$	< 8.9 $\times 10^{-3}$	CL=90%	1862	DESIG=206
$\rho^0\pi^+\pi^-$	< 6.9 $\times 10^{-3}$	CL=90%	1796	DESIG=64
$\eta 3\pi$	< 1.34 $\times 10^{-3}$	CL=90%	1824	DESIG=25
$\eta 2(\pi^+\pi^-)$	< 2.43 %		1804	DESIG=53
$\eta\rho^0\pi^+\pi^-$	< 1.45 %	CL=90%	1708	DESIG=221
$\eta' 3\pi$	< 2.44 $\times 10^{-3}$	CL=90%	1740	DESIG=26
$K^+K^-\pi^+\pi^-$	< 9.0 $\times 10^{-4}$	CL=90%	1772	DESIG=27
$\phi\pi^+\pi^-$	< 4.1 $\times 10^{-4}$	CL=90%	1737	DESIG=28
$K^+K^-2\pi^0$	< 4.2 $\times 10^{-3}$	CL=90%	1774	DESIG=207
$4(\pi^+\pi^-)$	< 1.67 %	CL=90%	1757	DESIG=62
$4(\pi^+\pi^-)\pi^0$	< 3.06 %	CL=90%	1720	DESIG=63
$\phi f_0(980)$	< 4.5 $\times 10^{-4}$	CL=90%	1597	DESIG=29
$K^+K^-\pi^+\pi^-\pi^0$	< 2.36 $\times 10^{-3}$	CL=90%	1741	DESIG=30
$K^+K^-\rho^0\pi^0$	< 8 $\times 10^{-4}$	CL=90%	1624	DESIG=67
$K^+K^-\rho^+\pi^-$	< 1.46 %	CL=90%	1622	DESIG=68
ωK^+K^-	< 3.4 $\times 10^{-4}$	CL=90%	1664	DESIG=32
$\phi\pi^+\pi^-\pi^0$	< 3.8 $\times 10^{-3}$	CL=90%	1722	DESIG=69
$K^{*0}K^-\pi^+\pi^0 + \text{c.c.}$	< 1.62 %	CL=90%	1693	DESIG=70
$K^{*+}K^-\pi^+\pi^- + \text{c.c.}$	< 3.23 %	CL=90%	1692	DESIG=71
$K^+K^-\pi^+\pi^-2\pi^0$	< 2.67 %	CL=90%	1705	DESIG=209

NODE=M053;CLUMP=H

$K^+ K^- 2(\pi^+ \pi^-)$	< 1.03	%	CL=90%	1702	DESIG=57
$K^+ K^- 2(\pi^+ \pi^-) \pi^0$	< 3.60	%	CL=90%	1660	DESIG=58
$\eta K^+ K^-$	< 4.1	$\times 10^{-4}$	CL=90%	1712	DESIG=31
$\eta K^+ K^- \pi^+ \pi^-$	< 1.24	%	CL=90%	1624	DESIG=222
$\rho^0 K^+ K^-$	< 5.0	$\times 10^{-3}$	CL=90%	1665	DESIG=65
$2(K^+ K^-)$	< 6.0	$\times 10^{-4}$	CL=90%	1552	DESIG=33
$\phi K^+ K^-$	< 7.5	$\times 10^{-4}$	CL=90%	1598	DESIG=34
$2(K^+ K^-) \pi^0$	< 2.9	$\times 10^{-4}$	CL=90%	1493	DESIG=35
$2(K^+ K^-) \pi^+ \pi^-$	< 3.2	$\times 10^{-3}$	CL=90%	1425	DESIG=59
$K_S^0 K^- \pi^+$	< 3.2	$\times 10^{-3}$	CL=90%	1799	DESIG=200
$K_S^0 K^- \pi^+ \pi^0$	< 1.33	%	CL=90%	1773	DESIG=201
$K_S^0 K^- \rho^+$	< 6.6	$\times 10^{-3}$	CL=90%	1664	DESIG=214
$K_S^0 K^- 2\pi^+ \pi^-$	< 8.7	$\times 10^{-3}$	CL=90%	1739	DESIG=202
$K_S^0 K^- \pi^+ \rho^0$	< 1.6	%	CL=90%	1621	DESIG=215
$K_S^0 K^- \pi^+ \eta$	< 1.3	%	CL=90%	1669	DESIG=216
$K_S^0 K^- 2\pi^+ \pi^- \pi^0$	< 4.18	%	CL=90%	1703	DESIG=203
$K_S^0 K^- 2\pi^+ \pi^- \eta$	< 4.8	%	CL=90%	1570	DESIG=217
$K_S^0 K^- \pi^+ 2(\pi^+ \pi^-)$	< 1.22	%	CL=90%	1658	DESIG=204
$K_S^0 K^- \pi^+ 2\pi^0$	< 2.65	%	CL=90%	1742	DESIG=205
$K_S^0 K^- K^+ K^- \pi^+$	< 4.9	$\times 10^{-3}$	CL=90%	1490	DESIG=218
$K_S^0 K^- K^+ K^- \pi^+ \pi^0$	< 3.0	%	CL=90%	1427	DESIG=219
$K_S^0 K^- K^+ K^- \pi^+ \eta$	< 2.2	%	CL=90%	1214	DESIG=220
$K^{*0} K^- \pi^+ + c.c.$	< 9.7	$\times 10^{-3}$	CL=90%	1722	DESIG=60
$p \bar{p} \pi^0$	< 1.2	$\times 10^{-3}$		1595	DESIG=54
$p \bar{p} \pi^+ \pi^-$	< 5.8	$\times 10^{-4}$	CL=90%	1544	DESIG=36
$\Lambda \bar{\Lambda}$	< 1.2	$\times 10^{-4}$	CL=90%	1521	DESIG=42
$p \bar{p} \pi^+ \pi^- \pi^0$	< 1.85	$\times 10^{-3}$	CL=90%	1490	DESIG=37
$\omega p \bar{p}$	< 2.9	$\times 10^{-4}$	CL=90%	1309	DESIG=39
$\Lambda \bar{\Lambda} \pi^0$	< 1.2	$\times 10^{-3}$	CL=90%	1468	DESIG=72
$p \bar{p} 2(\pi^+ \pi^-)$	< 2.6	$\times 10^{-3}$	CL=90%	1425	DESIG=61
$\eta p \bar{p}$	< 5.4	$\times 10^{-4}$	CL=90%	1430	DESIG=38
$\eta p \bar{p} \pi^+ \pi^-$	< 3.3	$\times 10^{-3}$	CL=90%	1284	DESIG=223
$\rho^0 p \bar{p}$	< 1.7	$\times 10^{-3}$	CL=90%	1313	DESIG=66
$p \bar{p} K^+ K^-$	< 3.2	$\times 10^{-4}$	CL=90%	1185	DESIG=40
$\eta p \bar{p} K^+ K^-$	< 6.9	$\times 10^{-3}$	CL=90%	736	DESIG=224
$\pi^0 p \bar{p} K^+ K^-$	< 1.2	$\times 10^{-3}$	CL=90%	1093	DESIG=225
$\phi p \bar{p}$	< 1.3	$\times 10^{-4}$	CL=90%	1178	DESIG=41
$\Lambda \bar{\Lambda} \pi^+ \pi^-$	< 2.5	$\times 10^{-4}$	CL=90%	1404	DESIG=43
$\Lambda \bar{p} K^+$	< 2.8	$\times 10^{-4}$	CL=90%	1387	DESIG=44
$\Lambda \bar{p} K^+ \pi^+ \pi^-$	< 6.3	$\times 10^{-4}$	CL=90%	1234	DESIG=45

Radiative decays

$\gamma \chi_{c2}$	< 9	$\times 10^{-4}$	CL=90%	211	DESIG=51
$\gamma \chi_{c1}$	(2.9 $\pm$ 0.6)	$\times 10^{-3}$		253	DESIG=50
$\gamma \chi_{c0}$	(7.3 $\pm$ 0.9)	$\times 10^{-3}$		341	DESIG=49
$\gamma \eta'$	< 1.8	$\times 10^{-4}$	CL=90%	1765	DESIG=213
$\gamma \eta$	< 1.5	$\times 10^{-4}$	CL=90%	1847	DESIG=212
$\gamma \pi^0$	< 2	$\times 10^{-4}$	CL=90%	1884	DESIG=211

X(3872)

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

NODE=M176

Quantum numbers not established.

$$\text{Mass } m = 3871.68 \pm 0.17 \text{ MeV}$$

NODE=M176M;DTYPE=M

$$m_{X(3872)} - m_{J/\psi} = 775 \pm 4 \text{ MeV}$$

NODE=M176DM;DTYPE=D

$$m_{X(3872)} - m_{\psi(2S)}$$

NODE=M176DM2;DTYPE=D

$$\text{Full width } \Gamma < 1.2 \text{ MeV, CL} = 90\%$$

NODE=M176W;DTYPE=G

X(3872) DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^-J/\psi(1S)$	$>2.6\%$	650
$\omega J/\psi(1S)$	$>1.9\%$	†
$D^0\bar{D}^0\pi^0$	$>3.2 \times 10^{-3}$	116
$\bar{D}^{*0}D^0$	$>5 \times 10^{-3}$	†
$\gamma J/\psi$	$>9 \times 10^{-3}$	697
$\gamma\psi(2S)$	$>3.0\%$	181

NODE=M176215;DESIG=2
DESIG=13
DESIG=8
DESIG=12
DESIG=9
DESIG=11

 $\chi_{c2}(2P)$

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

Mass $m = 3927.2 \pm 2.6$ MeV

Full width $\Gamma = 24 \pm 6$ MeV

NODE=M050
NODE=M050M;DTYPE=M
NODE=M050W;DTYPE=G

 $\psi(4040)$ [w]

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

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 $c\bar{c}$ 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.

NODE=M072
NODE=M072M;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M072W;DTYPE=G;OUR EST;
→ NOT CHECKED ←
NODE=M072W5;DTYPE=E;OUR EST;
→ NOT CHECKED ←
NODE=M072215;NODE=M072

 $\psi(4040)$ DECAY MODES

	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
e^+e^-	$(1.07 \pm 0.16) \times 10^{-5}$		2019
$D\bar{D}$	seen		775
$D^0\bar{D}^0$	seen		775
D^+D^-	seen		763
$D^*\bar{D} + \text{c.c.}$	seen		569
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		575
$D^*(2010)^+D^- + \text{c.c.}$	seen		561
$D^*\bar{D}^*$	seen		193
$D^*(2007)^0\bar{D}^*(2007)^0$	seen		225
$D^*(2010)^+\bar{D}^*(2010)^-$	seen		193
$D^0D^-\pi^+ + \text{c.c. (excl. } D^*(2007)^0\bar{D}^0 + \text{c.c., } D^*(2010)^+D^- + \text{c.c.})$	not seen		—
$D\bar{D}^*\pi$ (excl. $D^*\bar{D}^*$)	not seen		—
$D^0\bar{D}^{*-}\pi^+ + \text{c.c. (excl. } D^*(2010)^+D^*(2010)^-)$	seen		—
$D_s^+D_s^-$	seen		451
$J/\psi\pi^+\pi^-$	$< 4 \times 10^{-3}$	90%	794
$J/\psi\pi^0\pi^0$	$< 2 \times 10^{-3}$	90%	797
$J/\psi\eta$	$< 7 \times 10^{-3}$	90%	675
$J/\psi\pi^0$	$< 2 \times 10^{-3}$	90%	823
$J/\psi\pi^+\pi^-\pi^0$	$< 2 \times 10^{-3}$	90%	746
$\chi_{c1}\gamma$	$< 1.1\%$	90%	494
$\chi_{c2}\gamma$	$< 1.7\%$	90%	454
$\chi_{c1}\pi^+\pi^-\pi^0$	$< 1.1\%$	90%	306
$\chi_{c2}\pi^+\pi^-\pi^0$	$< 3.2\%$	90%	233
$h_c(1P)\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%	403
$\phi\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%	1880

DESIG=5
DESIG=17;OUR EST;→ NOT CHECKED ←
DESIG=1
DESIG=18
DESIG=19;OUR EST;→ NOT CHECKED ←
DESIG=2
DESIG=20
DESIG=21;OUR EST;→ NOT CHECKED ←
DESIG=3
DESIG=22
DESIG=24
DESIG=25
DESIG=26
DESIG=27
DESIG=7
DESIG=8
DESIG=9
DESIG=10
DESIG=11
DESIG=12
DESIG=13
DESIG=14
DESIG=15
DESIG=28
DESIG=16

 $\psi(4160)$ [w]

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

Mass $m = 4153 \pm 3$ MeV

Full width $\Gamma = 103 \pm 8$ MeV

$\Gamma_{ee} = 0.83 \pm 0.07$ keV

NODE=M025
NODE=M025M;DTYPE=M;OUR EST;
→ NOT CHECKED ←
NODE=M025W;DTYPE=G;OUR EST;
→ NOT CHECKED ←
NODE=M025W1;DTYPE=E;OUR EST;
→ NOT CHECKED ←

Due to the complexity of the $c\bar{c}$ 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.

NODE=M025215;NODE=M025

$\psi(4160)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
e^+e^-	$(8.1 \pm 0.9) \times 10^{-6}$		2076	DESIG=1
$D\bar{D}$	seen		913	DESIG=15;OUR EVAL; DESIG=16 NOT CHECKED ←
$D^0\bar{D}^0$	seen		913	
D^+D^-	seen		904	DESIG=17
$D^*\bar{D}^* + \text{c.c.}$	seen		746	DESIG=18;OUR EVAL; DESIG=19 NOT CHECKED ←
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		751	
$D^*(2010)^+D^- + \text{c.c.}$	seen		740	DESIG=20
$D^*\bar{D}^*$	seen		520	DESIG=21;OUR EVAL; DESIG=22 NOT CHECKED ←
$D^*(2007)^0\bar{D}^*(2007)^0$	seen		533	
$D^*(2010)^+D^*(2010)^-$	seen		520	DESIG=23
$D^0D^-\pi^+ + \text{c.c.}$ (excl. $D^*(2007)^0\bar{D}^0 + \text{c.c.},$ $D^*(2010)^+D^- + \text{c.c.}$)	not seen		—	DESIG=24
$D\bar{D}^*\pi + \text{c.c.}$ (excl. $D^*\bar{D}^*$)	seen		—	DESIG=25
$D^0D^{*-}\pi^+ + \text{c.c.}$ (excl. $D^*(2010)^+D^*(2010)^-$)	not seen		—	DESIG=26
$D_s^+D_s^-$	not seen		661	DESIG=27
$D_s^{*+}D_s^- + \text{c.c.}$	seen		385	DESIG=28
$J/\psi\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%	888	DESIG=2
$J/\psi\pi^0\pi^0$	$< 3 \times 10^{-3}$	90%	891	DESIG=3
$J/\psi K^+K^-$	$< 2 \times 10^{-3}$	90%	324	DESIG=4
$J/\psi\eta$	$< 8 \times 10^{-3}$	90%	786	DESIG=5
$J/\psi\pi^0$	$< 1 \times 10^{-3}$	90%	914	DESIG=6
$J/\psi\eta'$	$< 5 \times 10^{-3}$	90%	385	DESIG=7
$J/\psi\pi^+\pi^-\pi^0$	$< 1 \times 10^{-3}$	90%	847	DESIG=8
$\psi(2S)\pi^+\pi^-$	$< 4 \times 10^{-3}$	90%	353	DESIG=9
$\chi_{c1}\gamma$	$< 7 \times 10^{-3}$	90%	593	DESIG=10
$\chi_{c2}\gamma$	$< 1.3 \%$	90%	554	DESIG=11
$\chi_{c1}\pi^+\pi^-\pi^0$	$< 2 \times 10^{-3}$	90%	452	DESIG=12
$\chi_{c2}\pi^+\pi^-\pi^0$	$< 8 \times 10^{-3}$	90%	398	DESIG=13
$h_c(1P)\pi^+\pi^-$	$< 5 \times 10^{-3}$	90%	519	DESIG=29
$h_c(1P)\pi^0\pi^0$	$< 2 \times 10^{-3}$	90%	523	DESIG=30
$h_c(1P)\eta$	$< 2 \times 10^{-3}$	90%	282	DESIG=31
$h_c(1P)\pi^0$	$< 4 \times 10^{-4}$	90%	567	DESIG=32
$\phi\pi^+\pi^-$	$< 2 \times 10^{-3}$	90%	1941	DESIG=14

X(4260)

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

NODE=M074

Mass $m = 4263^{+8}_{-9}$ MeV (S = 1.1)Full width $\Gamma = 95 \pm 14$ MeVNODE=M074M;DTYPE=M
NODE=M074W;DTYPE=G

Due to the complexity of the $c\bar{c}$ 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.

NODE=M074215;NODE=M074

X(4260) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$J/\psi \pi^+ \pi^-$	seen	976	DESIG=2;OUR EVAL;→ NOT CHECKED ←
$J/\psi \pi^0 \pi^0$	seen	978	DESIG=4;OUR EVAL;→ NOT CHECKED ←
$J/\psi K^+ K^-$	seen	530	DESIG=5;OUR EVAL;→ NOT CHECKED ←
$J/\psi \eta$	not seen	886	DESIG=6;OUR EVAL;→ NOT CHECKED ←
$J/\psi \pi^0$	not seen	999	DESIG=7;OUR EVAL;→ NOT CHECKED ←
$J/\psi \eta'$	not seen	569	DESIG=8;OUR EVAL;→ NOT CHECKED ←
$J/\psi \pi^+ \pi^- \pi^0$	not seen	939	DESIG=9;OUR EVAL;→ NOT CHECKED ←
$J/\psi \eta \eta$	not seen	339	DESIG=10;OUR EVAL;
$\psi(2S) \pi^+ \pi^-$	not seen	470	→ NOT CHECKED ←
$\psi(2S) \eta$	not seen	167	DESIG=11;OUR EVAL;
$\chi_{c0} \omega$	not seen	292	→ NOT CHECKED ←
$\chi_{c1} \gamma$	not seen	686	DESIG=12;OUR EVAL;
$\chi_{c2} \gamma$	not seen	648	→ NOT CHECKED ←
$\chi_{c1} \pi^+ \pi^- \pi^0$	not seen	571	DESIG=13;OUR EVAL;
$\chi_{c2} \pi^+ \pi^- \pi^0$	not seen	524	→ NOT CHECKED ←
$h_c(1P) \pi^+ \pi^-$	not seen	623	DESIG=14;OUR EVAL;
$\phi \pi^+ \pi^-$	not seen	1999	→ NOT CHECKED ←
$\phi f_0(980) \rightarrow \phi \pi^+ \pi^-$	not seen	—	DESIG=15;OUR EVAL;
$D \bar{D}$	not seen	1032	→ NOT CHECKED ←
$D^0 \bar{D}^0$	seen	1032	DESIG=16;OUR EVAL;
$D^+ D^-$	seen	1023	→ NOT CHECKED ←
$D^* \bar{D} + c.c.$	seen	887	DESIG=17;OUR EVAL;
$D^*(2007)^0 \bar{D}^0 + c.c.$	seen	—	→ NOT CHECKED ←
$D^*(2010)^+ D^- + c.c.$	seen	—	DESIG=18;OUR EVAL;
$D^* \bar{D}^*$	not seen	708	→ NOT CHECKED ←
$D^*(2007)^0 \bar{D}^*(2007)^0$	seen	717	DESIG=19;OUR EVAL;
$D^*(2010)^+ D^*(2010)^-$	seen	708	→ NOT CHECKED ←
$D^0 D^- \pi^+ + c.c. (excl.$	not seen	—	DESIG=20;OUR EVAL;
$D^*(2007)^0 \bar{D}^{*0} + c.c.,$			→ NOT CHECKED ←
$D^*(2010)^+ D^- + c.c.)$			DESIG=21;OUR EVAL;
$D \bar{D}^* \pi + c.c. (excl. D^* \bar{D}^*)$	seen	723	→ NOT CHECKED ←
$D^0 D^{*-} \pi^+ + c.c. (excl.$	not seen	—	DESIG=22;OUR EVAL;
$D^*(2010)^+ D^*(2010)^-$			→ NOT CHECKED ←
$D^0 D^*(2010)^- \pi^+ + c.c.$	not seen	716	DESIG=23;OUR EVAL;
$D^* \bar{D}^* \pi$	seen	475	→ NOT CHECKED ←
$D_s^+ D_s^-$	seen	817	DESIG=24;OUR EVAL;
$D_s^{*+} D_s^- + c.c.$	seen	615	→ NOT CHECKED ←
$D_s^{*+} D_s^{*-}$	seen	284	DESIG=25
$p \bar{p}$	not seen	1914	DESIG=26
$K_S^0 K^\pm \pi^\mp$	not seen	2054	DESIG=27
$K^+ K^- \pi^0$	not seen	2055	DESIG=28
			DESIG=29
			DESIG=30;OUR EVAL;
			→ NOT CHECKED ←
			DESIG=31
			DESIG=32
			DESIG=23;OUR EVAL;
			→ NOT CHECKED ←
			DESIG=33
			DESIG=34
			DESIG=24;OUR EVAL;
			→ NOT CHECKED ←
			DESIG=35
			DESIG=36
			DESIG=38
			DESIG=25
			DESIG=39
			DESIG=30;OUR EVAL;
			→ NOT CHECKED ←
			DESIG=26
			DESIG=27
			DESIG=28
			DESIG=29
			DESIG=3;OUR EVAL;→ NOT CHECKED ←
			DESIG=20;OUR EVAL;
			→ NOT CHECKED ←
			DESIG=21;OUR EVAL;
			→ NOT CHECKED ←

$\psi(4415)$ ^[w]

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

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

NODE=M073

NODE=M073M:DTYPE=M;OUR EST;
 → NOT CHECKED ←
 NODE=M073W:DTYPE=G;OUR EST;
 → NOT CHECKED ←
 NODE=M073W1:DTYPE=E;OUR EST;
 → NOT CHECKED ←

Due to the complexity of the $c\bar{c}$ 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.

NODE=M073215;NODE=M073

$\psi(4415)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
$D\bar{D}$	not seen		1187
$D^0\bar{D}^0$	seen		1187
D^+D^-	seen		1179
$D^*\bar{D} + \text{c.c.}$	not seen		1064
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		1067
$D^*(2010)^+D^- + \text{c.c.}$	seen		1059
$D^*\bar{D}^*$	not seen		919
$D^*(2007)^0\bar{D}^*(2007)^0 + \text{c.c.}$	seen		927
$D^*(2010)^+D^*(2010)^- + \text{c.c.}$	seen		919
$D^0D^-\pi^+$ (excl. $D^*(2007)^0\bar{D}^0$ +c.c., $D^*(2010)^+D^- + \text{c.c.}$)	$< 2.3 \quad \%$	90%	—
$D\bar{D}_2^*(2460) \rightarrow D^0D^-\pi^+ + \text{c.c.}$	$(10 \pm 4) \quad \%$		—
$D^0\bar{D}^{*-}\pi^+ + \text{c.c.}$	$< 11 \quad \%$	90%	926
$D_s^+D_s^-$	not seen		1006
$D_s^{*+}D_s^{*-} + \text{c.c.}$	seen		—
$D_s^{*+}D_s^{*-}$	not seen		652
e^+e^-	$(9.4 \pm 3.2) \times 10^{-6}$		2210

DESIG=7;OUR EVAL;→ NOT CHECKED ←

DESIG=8

DESIG=9

DESIG=10;OUR EVAL;
→ NOT CHECKED ←

DESIG=11

DESIG=12

DESIG=13;OUR EVAL;
→ NOT CHECKED ←

DESIG=14

DESIG=15

DESIG=4

DESIG=5

DESIG=6

DESIG=16

DESIG=17

DESIG=18

DESIG=1

$b\bar{b}$ MESONS

NODE=MXXX030

$\tau(1S)$

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

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

NODE=M049

NODE=M049M;DTYPE=M

NODE=M049W;DTYPE=G;OUR EVAL;
→ NOT CHECKED ←
NODE=M049W2;DTYPE=E;OUR EVAL;
→ NOT CHECKED ←

$\tau(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
$\tau^+\tau^-$	$(2.50 \pm 0.07) \quad \%$		4384
e^+e^-	$(2.48 \pm 0.07) \quad \%$		4730
$\mu^+\mu^-$	$(2.48 \pm 0.05) \quad \%$		4729

NODE=M049215;DESIG=3

DESIG=2

DESIG=1

Hadronic decays

ggg	$(81.7 \pm 0.7) \quad \%$		—
γgg	$(2.21 \pm 0.22) \quad \%$		—
$\eta'(958)$ anything	$(2.94 \pm 0.24) \quad \%$		—
$J/\psi(1S)$ anything	$(6.5 \pm 0.7) \times 10^{-4}$		4223
χ_{c0} anything	$< 5 \times 10^{-3}$	90%	—
χ_{c1} anything	$(2.3 \pm 0.7) \times 10^{-4}$		—
χ_{c2} anything	$(3.4 \pm 1.0) \times 10^{-4}$		—
$\psi(2S)$ anything	$(2.7 \pm 0.9) \times 10^{-4}$		—
$\rho\pi$	$< 2 \times 10^{-4}$	90%	4697
$\pi^+\pi^-$	$< 5 \times 10^{-4}$	90%	4728
K^+K^-	$< 5 \times 10^{-4}$	90%	4704
$p\bar{p}$	$< 5 \times 10^{-4}$	90%	4636
$\pi^0\pi^+\pi^-$	$< 1.84 \times 10^{-5}$	90%	4725
$D^*(2010)^\pm$ anything	$(2.52 \pm 0.20) \quad \%$		—
$\bar{d}$ anything	$(2.86 \pm 0.28) \times 10^{-5}$		—

NODE=M049;CLUMP=A

DESIG=117

DESIG=118

DESIG=73

DESIG=12

DESIG=5

DESIG=6

DESIG=7

DESIG=8

DESIG=11

DESIG=23

DESIG=24

DESIG=25

DESIG=72

DESIG=30

DESIG=107

Radiative decays				NODE=M049;CLUMP=B
$\gamma\pi^+\pi^-$	$(6.3 \pm 1.8) \times 10^{-5}$		4728	DESIG=70
$\gamma\pi^0\pi^0$	$(1.7 \pm 0.7) \times 10^{-5}$		4728	DESIG=71
$\gamma\pi^0\eta$	$< 2.4 \times 10^{-6}$	90%	4713	DESIG=111
$\gamma K^+ K^-$	[x] $(1.14 \pm 0.13) \times 10^{-5}$		4704	DESIG=102
$\gamma p\bar{p}$	[y] $< 6 \times 10^{-6}$	90%	4636	DESIG=103
$\gamma 2h^+ 2h^-$	$(7.0 \pm 1.5) \times 10^{-4}$		4720	DESIG=20
$\gamma 3h^+ 3h^-$	$(5.4 \pm 2.0) \times 10^{-4}$		4703	DESIG=21
$\gamma 4h^+ 4h^-$	$(7.4 \pm 3.5) \times 10^{-4}$		4679	DESIG=22
$\gamma\pi^+\pi^- K^+ K^-$	$(2.9 \pm 0.9) \times 10^{-4}$		4686	DESIG=14
$\gamma 2\pi^+ 2\pi^-$	$(2.5 \pm 0.9) \times 10^{-4}$		4720	DESIG=13
$\gamma 3\pi^+ 3\pi^-$	$(2.5 \pm 1.2) \times 10^{-4}$		4703	DESIG=17
$\gamma 2\pi^+ 2\pi^- K^+ K^-$	$(2.4 \pm 1.2) \times 10^{-4}$		4658	DESIG=18
$\gamma\pi^+\pi^- p\bar{p}$	$(1.5 \pm 0.6) \times 10^{-4}$		4604	DESIG=15
$\gamma 2\pi^+ 2\pi^- p\bar{p}$	$(4 \pm 6) \times 10^{-5}$		4563	DESIG=19
$\gamma 2K^+ 2K^-$	$(2.0 \pm 2.0) \times 10^{-5}$		4601	DESIG=16
$\gamma\eta'(958)$	$< 1.9 \times 10^{-6}$	90%	4682	DESIG=55
$\gamma\eta$	$< 1.0 \times 10^{-6}$	90%	4714	DESIG=54
$\gamma f_0(980)$	$< 3 \times 10^{-5}$	90%	4679	DESIG=105
$\gamma f_2'(1525)$	$(3.8 \pm 0.9) \times 10^{-5}$		4607	DESIG=52
$\gamma f_2(1270)$	$(1.01 \pm 0.09) \times 10^{-4}$		4644	DESIG=51
$\gamma\eta(1405)$	$< 8.2 \times 10^{-5}$	90%	4625	DESIG=65
$\gamma f_0(1500)$	$< 1.5 \times 10^{-5}$	90%	4610	DESIG=108
$\gamma f_0(1710)$	$< 2.6 \times 10^{-4}$	90%	4574	DESIG=53
$\gamma f_0(1710) \rightarrow \gamma K^+ K^-$	$< 7 \times 10^{-6}$	90%	—	DESIG=112
$\gamma f_0(1710) \rightarrow \gamma\pi^0\pi^0$	$< 1.4 \times 10^{-6}$	90%	—	DESIG=109
$\gamma f_0(1710) \rightarrow \gamma\eta\eta$	$< 1.8 \times 10^{-6}$	90%	—	DESIG=110
$\gamma f_4(2050)$	$< 5.3 \times 10^{-5}$	90%	4515	DESIG=104
$\gamma f_0(2200) \rightarrow \gamma K^+ K^-$	$< 2 \times 10^{-4}$	90%	4475	DESIG=69
$\gamma f_J(2220) \rightarrow \gamma K^+ K^-$	$< 8 \times 10^{-7}$	90%	4469	DESIG=60
$\gamma f_J(2220) \rightarrow \gamma\pi^+\pi^-$	$< 6 \times 10^{-7}$	90%	—	DESIG=61
$\gamma f_J(2220) \rightarrow \gamma p\bar{p}$	$< 1.1 \times 10^{-6}$	90%	—	DESIG=62
$\gamma\eta(2225) \rightarrow \gamma\phi\phi$	$< 3 \times 10^{-3}$	90%	4469	DESIG=68
$\gamma\eta_c(1S)$	$< 5.7 \times 10^{-5}$	90%	4261	DESIG=119
$\gamma\chi_{c0}$	$< 6.5 \times 10^{-4}$	90%	4114	DESIG=120
$\gamma\chi_{c1}$	$< 2.3 \times 10^{-5}$	90%	4079	DESIG=121
$\gamma\chi_{c2}$	$< 7.6 \times 10^{-6}$	90%	4062	DESIG=122
$\gamma X(3872) \rightarrow \pi^+\pi^- J/\psi$	$< 1.6 \times 10^{-6}$	90%	—	DESIG=123
$\gamma X(3872) \rightarrow \pi^+\pi^-\pi^0 J/\psi$	$< 2.8 \times 10^{-6}$	90%	—	DESIG=124
$\gamma X(3915) \rightarrow \omega J/\psi$	$< 3.0 \times 10^{-6}$	90%	—	DESIG=125
$\gamma X(4140) \rightarrow \phi J/\psi$	$< 2.2 \times 10^{-6}$	90%	—	DESIG=126
γX	[z] $< 4.5 \times 10^{-6}$	90%	—	DESIG=66
$\gamma X\bar{X}(m_X < 3.1 \text{ GeV})$	[aa] $< 1 \times 10^{-3}$	90%	—	DESIG=67
$\gamma X\bar{X}(m_X < 4.5 \text{ GeV})$	[bb] $< 2.4 \times 10^{-4}$	90%	—	DESIG=127
$\gamma X \rightarrow \gamma + \geq 4 \text{ prongs}$	[cc] $< 1.78 \times 10^{-4}$	95%	—	DESIG=113
$\gamma a_1^0 \rightarrow \gamma\mu^+\mu^-$	[dd] $< 9 \times 10^{-6}$	90%	—	DESIG=114
$\gamma a_1^0 \rightarrow \gamma\tau^+\tau^-$	[x] $< 5.0 \times 10^{-5}$	90%	—	DESIG=115

Lepton Family number (LF) violating modes

$\mu^\pm \tau^\mp$	LF	$< 6.0 \times 10^{-6}$	95%	4563	NODE=M049;CLUMP=C DESIG=116
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Other decays

invisible	$< 3.0 \times 10^{-4}$	90%	—	NODE=M049;CLUMP=D DESIG=106
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$\chi_{b0}(1P)$ [ee]

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

J needs confirmation.

NODE=M076

$$\text{Mass } m = 9859.44 \pm 0.42 \pm 0.31 \text{ MeV}$$

NODE=M076M;DTYPE=M;OUR EVAL;
→ NOT CHECKED ←

$\chi_{b0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \Upsilon(1S)$	(1.76 $\pm$ 0.35) %		391
$D^0 X$	< 10.4 %	90%	—
$\pi^+ \pi^- K^+ K^- \pi^0$	< 1.6 $\times 10^{-4}$	90%	4875
$2\pi^+ \pi^- K^- K_S^0$	< 5 $\times 10^{-5}$	90%	4875
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	< 5 $\times 10^{-4}$	90%	4846
$2\pi^+ 2\pi^- 2\pi^0$	< 2.1 $\times 10^{-4}$	90%	4905
$2\pi^+ 2\pi^- K^+ K^-$	(1.1 $\pm$ 0.6) $\times 10^{-4}$		4861
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.7 $\times 10^{-4}$	90%	4846
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 5 $\times 10^{-4}$	90%	4828
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	< 1.6 $\times 10^{-4}$	90%	4827
$3\pi^+ 3\pi^-$	< 8 $\times 10^{-5}$	90%	4904
$3\pi^+ 3\pi^- 2\pi^0$	< 6 $\times 10^{-4}$	90%	4881
$3\pi^+ 3\pi^- K^+ K^-$	(2.4 $\pm$ 1.2) $\times 10^{-4}$		4827
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 1.0 $\times 10^{-3}$	90%	4808
$4\pi^+ 4\pi^-$	< 8 $\times 10^{-5}$	90%	4880
$4\pi^+ 4\pi^- 2\pi^0$	< 2.1 $\times 10^{-3}$	90%	4850

NODE=M076215;DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

DESIG=6

DESIG=7

DESIG=8

DESIG=9

DESIG=10

DESIG=11

DESIG=12

DESIG=13

DESIG=14

DESIG=15

DESIG=16

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

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

J needs confirmation.

NODE=M077

$$\text{Mass } m = 9892.78 \pm 0.26 \pm 0.31 \text{ MeV}$$

NODE=M077M;DTYPE=M;OUR EVAL;
→ NOT CHECKED ←

$\chi_{b1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \Upsilon(1S)$	(33.9 $\pm$ 2.2) %		423
$D^0 X$	(12.6 $\pm$ 2.2) %		—
$\pi^+ \pi^- K^+ K^- \pi^0$	(2.0 $\pm$ 0.6) $\times 10^{-4}$		4892
$2\pi^+ \pi^- K^- K_S^0$	(1.3 $\pm$ 0.5) $\times 10^{-4}$		4892
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	< 6 $\times 10^{-4}$	90%	4863
$2\pi^+ 2\pi^- 2\pi^0$	(8.0 $\pm$ 2.5) $\times 10^{-4}$		4921
$2\pi^+ 2\pi^- K^+ K^-$	(1.5 $\pm$ 0.5) $\times 10^{-4}$		4878
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	(3.5 $\pm$ 1.2) $\times 10^{-4}$		4863
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	(8.6 $\pm$ 3.2) $\times 10^{-4}$		4845
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	(9.3 $\pm$ 3.3) $\times 10^{-4}$		4844
$3\pi^+ 3\pi^-$	(1.9 $\pm$ 0.6) $\times 10^{-4}$		4921
$3\pi^+ 3\pi^- 2\pi^0$	(1.7 $\pm$ 0.5) $\times 10^{-3}$		4898
$3\pi^+ 3\pi^- K^+ K^-$	(2.6 $\pm$ 0.8) $\times 10^{-4}$		4844
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	(7.5 $\pm$ 2.6) $\times 10^{-4}$		4825
$4\pi^+ 4\pi^-$	(2.6 $\pm$ 0.9) $\times 10^{-4}$		4897
$4\pi^+ 4\pi^- 2\pi^0$	(1.4 $\pm$ 0.6) $\times 10^{-3}$		4867

NODE=M077215;DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

DESIG=6

DESIG=7

DESIG=8

DESIG=9

DESIG=10

DESIG=11

DESIG=12

DESIG=13

DESIG=14

DESIG=15

DESIG=16

 $h_b(1P)$

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

$$\text{Mass } m = 9898.7 \pm 1.4 \text{ MeV}$$

NODE=M204

NODE=M204M;DTYPE=M

$h_b(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta_b(1S)\gamma$	seen	495

NODE=M204215;DESIG=1

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

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

J needs confirmation.

NODE=M078

$$\text{Mass } m = 9912.21 \pm 0.26 \pm 0.31 \text{ MeV}$$

NODE=M078M;DTYPE=M;OUR EVAL;
→ NOT CHECKED ←

$\chi_{b2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\gamma \Upsilon(1S)$	$(19.1 \pm 1.2) \%$		442	NODE=M078215;DESIG=1
$D^0 X$	$< 7.9 \%$	90%	—	DESIG=2
$\pi^+ \pi^- K^+ K^- \pi^0$	$(8 \pm 5) \times 10^{-5}$		4902	DESIG=3
$2\pi^+ \pi^- K^- K_S^0$	$< 1.0 \times 10^{-4}$	90%	4901	DESIG=4
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	$(5.3 \pm 2.4) \times 10^{-4}$		4873	DESIG=5
$2\pi^+ 2\pi^- 2\pi^0$	$(3.5 \pm 1.4) \times 10^{-4}$		4931	DESIG=6
$2\pi^+ 2\pi^- K^+ K^-$	$(1.1 \pm 0.4) \times 10^{-4}$		4888	DESIG=7
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(2.1 \pm 0.9) \times 10^{-4}$		4872	DESIG=8
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(3.9 \pm 1.8) \times 10^{-4}$		4855	DESIG=9
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	$< 5 \times 10^{-4}$	90%	4854	DESIG=10
$3\pi^+ 3\pi^-$	$(7.0 \pm 3.1) \times 10^{-5}$		4931	DESIG=11
$3\pi^+ 3\pi^- 2\pi^0$	$(1.0 \pm 0.4) \times 10^{-3}$		4908	DESIG=12
$3\pi^+ 3\pi^- K^+ K^-$	$< 8 \times 10^{-5}$	90%	4854	DESIG=13
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(3.6 \pm 1.5) \times 10^{-4}$		4835	DESIG=14
$4\pi^+ 4\pi^-$	$(8 \pm 4) \times 10^{-5}$		4907	DESIG=15
$4\pi^+ 4\pi^- 2\pi^0$	$(1.8 \pm 0.7) \times 10^{-3}$		4877	DESIG=16

 $\Upsilon(2S)$

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

Mass $m = 10.02326 \pm 0.00031$ GeV $m_{\Upsilon(3S)} - m_{\Upsilon(2S)} = 331.50 \pm 0.13$ MeVFull width $\Gamma = 31.98 \pm 2.63$ keV $\Gamma_{ee} = 0.612 \pm 0.011$ keV

NODE=M052

NODE=M052M;DTYPE=M

NODE=M052DM3;DTYPE=D

NODE=M052W;DTYPE=G;OUR EVAL;

→ NOT CHECKED ←

NODE=M052W2;DTYPE=E;OUR EVAL;

→ NOT CHECKED ←

$\Upsilon(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$\Upsilon(1S) \pi^+ \pi^-$	$(17.92 \pm 0.26) \%$		475	NODE=M052215;DESIG=4
$\Upsilon(1S) \pi^0 \pi^0$	$(8.6 \pm 0.4) \%$		480	DESIG=5
$\tau^+ \tau^-$	$(2.00 \pm 0.21) \%$		4686	DESIG=3
$\mu^+ \mu^-$	$(1.93 \pm 0.17) \%$	S=2.2	5011	DESIG=1
$e^+ e^-$	$(1.91 \pm 0.16) \%$		5012	DESIG=2
$\Upsilon(1S) \pi^0$	$< 1.8 \times 10^{-4}$	CL=90%	531	DESIG=10
$\Upsilon(1S) \eta$	$(2.34 \pm 0.31) \times 10^{-4}$		126	DESIG=6
$J/\psi(1S)$ anything	$< 6 \times 10^{-3}$	CL=90%	4533	DESIG=20
$\bar{d}$ anything	$(3.4 \pm 0.6) \times 10^{-5}$		—	DESIG=16
hadrons	$(94 \pm 11) \%$		—	DESIG=101
ggg	$(58.8 \pm 1.2) \%$		—	DESIG=105
$\gamma g g$	$(8.8 \pm 1.1) \%$		—	DESIG=106

Radiative decays

$\gamma \chi_{b1}(1P)$	$(6.9 \pm 0.4) \%$		130	NODE=M052;CLUMP=A
$\gamma \chi_{b2}(1P)$	$(7.15 \pm 0.35) \%$		110	DESIG=8
$\gamma \chi_{b0}(1P)$	$(3.8 \pm 0.4) \%$		162	DESIG=7
$\gamma f_0(1710)$	$< 5.9 \times 10^{-4}$	CL=90%	4864	DESIG=9
$\gamma f_2'(1525)$	$< 5.3 \times 10^{-4}$	CL=90%	4896	DESIG=13
$\gamma f_2(1270)$	$< 2.41 \times 10^{-4}$	CL=90%	4931	DESIG=12
$\gamma \eta_c(1S)$	$< 2.7 \times 10^{-5}$	CL=90%	4568	DESIG=11
$\gamma \chi_{c0}$	$< 1.0 \times 10^{-4}$	CL=90%	4430	DESIG=111
$\gamma \chi_{c1}$	$< 3.6 \times 10^{-6}$	CL=90%	4397	DESIG=112
$\gamma \chi_{c2}$	$< 1.5 \times 10^{-5}$	CL=90%	4381	DESIG=113
$\gamma X(3872) \rightarrow \pi^+ \pi^- J/\psi$	$< 8 \times 10^{-7}$	CL=90%	—	DESIG=114
$\gamma X(3872) \rightarrow \pi^+ \pi^- \pi^0 J/\psi$	$< 2.4 \times 10^{-6}$	CL=90%	—	DESIG=115
$\gamma X(3915) \rightarrow \omega J/\psi$	$< 2.8 \times 10^{-6}$	CL=90%	—	DESIG=116
$\gamma X(4140) \rightarrow \phi J/\psi$	$< 1.2 \times 10^{-6}$	CL=90%	—	DESIG=117
$\gamma X(4350) \rightarrow \phi J/\psi$	$< 1.3 \times 10^{-6}$	CL=90%	—	DESIG=118
$\gamma \eta_b(1S)$	$(3.9 \pm 1.5) \times 10^{-4}$		612	DESIG=119
$\gamma X \rightarrow \gamma + \geq 4$ prongs	$[ff] < 1.95 \times 10^{-4}$	CL=95%	—	DESIG=102
$\gamma A^0 \rightarrow \gamma$ hadrons	$< 8 \times 10^{-5}$	CL=90%	—	DESIG=103
				DESIG=108

Lepton Family number (LF) violating modes

$e^\pm \tau^\mp$	LF	< 3.2	$\times 10^{-6}$	CL=90%	4854
$\mu^\pm \tau^\mp$	LF	< 3.3	$\times 10^{-6}$	CL=90%	4854

NODE=M052;CLUMP=B

DESIG=107

DESIG=104

 $\tau(1D)$

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

$$\text{Mass } m = 10163.7 \pm 1.4 \text{ MeV} \quad (S = 1.7)$$

NODE=M177

NODE=M177M;DTYPE=M

 $\tau(1D)$ DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma \tau(1S)$	seen	679

NODE=M177215;DESIG=1;OUR EVAL;
→ NOT CHECKED ← **$\chi_{b0}(2P)$ [ee]**

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

 J needs confirmation.

$$\text{Mass } m = 10.2325 \pm 0.0004 \pm 0.0005 \text{ GeV}$$

NODE=M079

NODE=M079M;DTYPE=M;OUR EVAL;
→ NOT CHECKED ←

$\chi_{b0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \tau(2S)$	$(4.6 \pm 2.1) \%$		207
$\gamma \tau(1S)$	$(9 \pm 6) \times 10^{-3}$		743
$D^0 X$	< 8.2 %	90%	—
$\pi^+ \pi^- K^+ K^- \pi^0$	< 3.4 $\times 10^{-5}$	90%	5064
$2\pi^+ \pi^- K^- K_S^0$	< 5 $\times 10^{-5}$	90%	5063
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	< 2.2 $\times 10^{-4}$	90%	5036
$2\pi^+ 2\pi^- 2\pi^0$	< 2.4 $\times 10^{-4}$	90%	5092
$2\pi^+ 2\pi^- K^+ K^-$	< 1.5 $\times 10^{-4}$	90%	5050
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.2 $\times 10^{-4}$	90%	5035
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 1.1 $\times 10^{-3}$	90%	5019
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	< 7 $\times 10^{-4}$	90%	5018
$3\pi^+ 3\pi^-$	< 7 $\times 10^{-5}$	90%	5091
$3\pi^+ 3\pi^- 2\pi^0$	< 1.2 $\times 10^{-3}$	90%	5070
$3\pi^+ 3\pi^- K^+ K^-$	< 1.5 $\times 10^{-4}$	90%	5017
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 7 $\times 10^{-4}$	90%	4999
$4\pi^+ 4\pi^-$	< 1.7 $\times 10^{-4}$	90%	5069
$4\pi^+ 4\pi^- 2\pi^0$	< 6 $\times 10^{-4}$	90%	5039

NODE=M079215;DESIG=2

DESIG=1

DESIG=3

DESIG=4

DESIG=5

DESIG=6

DESIG=7

DESIG=8

DESIG=9

DESIG=10

DESIG=11

DESIG=12

DESIG=13

DESIG=14

DESIG=15

DESIG=16

DESIG=17

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

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

 J needs confirmation.

$$\text{Mass } m = 10.25546 \pm 0.00022 \pm 0.00050 \text{ GeV}$$

$$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)} = 23.5 \pm 1.0 \text{ MeV}$$

NODE=M080

NODE=M080M;DTYPE=M;OUR EVAL;
→ NOT CHECKED ←

NODE=M080M2;DTYPE=D

$\chi_{b1}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\omega \mathcal{T}(1S)$	$(1.63^{+0.40}_{-0.34})\%$		135
$\gamma \mathcal{T}(2S)$	$(19.9 \pm 1.9)\%$		230
$\gamma \mathcal{T}(1S)$	$(9.2 \pm 0.8)\%$	1.1	764
$\pi\pi\chi_{b1}(1P)$	$(9.1 \pm 1.3) \times 10^{-3}$		238
$D^0 X$	$(8.8 \pm 1.7)\%$		—
$\pi^+\pi^-K^+K^-\pi^0$	$(3.1 \pm 1.0) \times 10^{-4}$		5075
$2\pi^+\pi^-K^-K_S^0$	$(1.1 \pm 0.5) \times 10^{-4}$		5075
$2\pi^+\pi^-K^-K_S^0 2\pi^0$	$(7.7 \pm 3.2) \times 10^{-4}$		5047
$2\pi^+2\pi^-2\pi^0$	$(5.9 \pm 2.0) \times 10^{-4}$		5104
$2\pi^+2\pi^-K^+K^-$	$(10 \pm 4) \times 10^{-5}$		5062
$2\pi^+2\pi^-K^+K^-\pi^0$	$(5.5 \pm 1.8) \times 10^{-4}$		5047
$2\pi^+2\pi^-K^+K^-2\pi^0$	$(10 \pm 4) \times 10^{-4}$		5030
$3\pi^+2\pi^-K^-K_S^0\pi^0$	$(6.7 \pm 2.6) \times 10^{-4}$		5029
$3\pi^+3\pi^-$	$(1.2 \pm 0.4) \times 10^{-4}$		5103
$3\pi^+3\pi^-2\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$		5081
$3\pi^+3\pi^-K^+K^-$	$(2.0 \pm 0.8) \times 10^{-4}$		5029
$3\pi^+3\pi^-K^+K^-\pi^0$	$(6.1 \pm 2.2) \times 10^{-4}$		5011
$4\pi^+4\pi^-$	$(1.7 \pm 0.6) \times 10^{-4}$		5080
$4\pi^+4\pi^-2\pi^0$	$(1.9 \pm 0.7) \times 10^{-3}$		5051

NODE=M080215;DESIG=3

DESIG=2

DESIG=1

DESIG=4

DESIG=5

DESIG=6

DESIG=7

DESIG=8

DESIG=9

DESIG=10

DESIG=11

DESIG=12

DESIG=13

DESIG=14

DESIG=15

DESIG=16

DESIG=17

DESIG=18

DESIG=19

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

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

 J needs confirmation.

NODE=M081

$$\text{Mass } m = 10.26865 \pm 0.00022 \pm 0.00050 \text{ GeV}$$

$$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)} = 13.5 \pm 0.6 \text{ MeV}$$

NODE=M081M;DTYPE=M;OUR EVAL;

→ NOT CHECKED ←

NODE=M081M2;DTYPE=D

$\chi_{b2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\omega \mathcal{T}(1S)$	$(1.10^{+0.34}_{-0.30})\%$		194
$\gamma \mathcal{T}(2S)$	$(10.6 \pm 2.6)\%$	S=2.0	242
$\gamma \mathcal{T}(1S)$	$(7.0 \pm 0.7)\%$		777
$\pi\pi\chi_{b2}(1P)$	$(5.1 \pm 0.9) \times 10^{-3}$		229
$D^0 X$	$< 2.4\%$	CL=90%	—
$\pi^+\pi^-K^+K^-\pi^0$	$< 1.1 \times 10^{-4}$	CL=90%	5082
$2\pi^+\pi^-K^-K_S^0$	$< 9 \times 10^{-5}$	CL=90%	5082
$2\pi^+\pi^-K^-K_S^0 2\pi^0$	$< 7 \times 10^{-4}$	CL=90%	5054
$2\pi^+2\pi^-2\pi^0$	$(3.9 \pm 1.6) \times 10^{-4}$		5110
$2\pi^+2\pi^-K^+K^-$	$(9 \pm 4) \times 10^{-5}$		5068
$2\pi^+2\pi^-K^+K^-\pi^0$	$(2.4 \pm 1.1) \times 10^{-4}$		5054
$2\pi^+2\pi^-K^+K^-2\pi^0$	$(4.7 \pm 2.3) \times 10^{-4}$		5037
$3\pi^+2\pi^-K^-K_S^0\pi^0$	$< 4 \times 10^{-4}$	CL=90%	5036
$3\pi^+3\pi^-$	$(9 \pm 4) \times 10^{-5}$		5110
$3\pi^+3\pi^-2\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$		5088
$3\pi^+3\pi^-K^+K^-$	$(1.4 \pm 0.7) \times 10^{-4}$		5036
$3\pi^+3\pi^-K^+K^-\pi^0$	$(4.2 \pm 1.7) \times 10^{-4}$		5017
$4\pi^+4\pi^-$	$(9 \pm 5) \times 10^{-5}$		5087
$4\pi^+4\pi^-2\pi^0$	$(1.3 \pm 0.5) \times 10^{-3}$		5058

NODE=M081215;DESIG=3

DESIG=2

DESIG=1

DESIG=4

DESIG=5

DESIG=6

DESIG=7

DESIG=8

DESIG=9

DESIG=10

DESIG=11

DESIG=12

DESIG=13

DESIG=14

DESIG=15

DESIG=16

DESIG=17

DESIG=18

DESIG=19

 $\mathcal{T}(3S)$

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

NODE=M048

$$\text{Mass } m = 10.3552 \pm 0.0005 \text{ GeV}$$

NODE=M048M;DTYPE=M

$$m_{\mathcal{T}(3S)} - m_{\mathcal{T}(2S)} = 331.50 \pm 0.13 \text{ MeV}$$

$$\text{Full width } \Gamma = 20.32 \pm 1.85 \text{ keV}$$

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

NODE=M048DM2;DTYPE=D

NODE=M048W;DTYPE=G;OUR EVAL;

→ NOT CHECKED ←

NODE=M048W2;DTYPE=E;OUR EVAL;

→ NOT CHECKED ←

$\Upsilon(3S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$\Upsilon(2S)$ anything	(10.6 $\pm$ 0.8) %		296	NODE=M048215;DESIG=8
$\Upsilon(2S)\pi^+\pi^-$	(2.82 $\pm$ 0.18) %	S=1.6	177	DESIG=4
$\Upsilon(2S)\pi^0\pi^0$	(1.85 $\pm$ 0.14) %		190	DESIG=10
$\Upsilon(2S)\gamma\gamma$	(5.0 $\pm$ 0.7) %		327	DESIG=12
$\Upsilon(2S)\pi^0$	< 5.1 $\times 10^{-4}$	CL=90%	298	DESIG=107
$\Upsilon(1S)\pi^+\pi^-$	(4.37 $\pm$ 0.08) %		813	DESIG=3
$\Upsilon(1S)\pi^0\pi^0$	(2.20 $\pm$ 0.13) %		816	DESIG=11
$\Upsilon(1S)\eta$	< 1 $\times 10^{-4}$	CL=90%	677	DESIG=9
$\Upsilon(1S)\pi^0$	< 7 $\times 10^{-5}$	CL=90%	846	DESIG=106
$h_b(1P)\pi^0$	< 1.2 $\times 10^{-3}$	CL=90%	426	DESIG=112
$h_b(1P)\pi^0 \rightarrow \gamma\eta_b(1S)\pi^0$	(4.3 $\pm$ 1.4) $\times 10^{-4}$		—	DESIG=113
$h_b(1P)\pi^+\pi^-$	< 1.2 $\times 10^{-4}$	CL=90%	353	DESIG=114
$\tau^+\tau^-$	(2.29 $\pm$ 0.30) %		4863	DESIG=16
$\mu^+\mu^-$	(2.18 $\pm$ 0.21) %	S=2.1	5177	DESIG=1
e^+e^-	seen		5178	DESIG=2;OUR EVAL; $\rightarrow$ NOT CHECKED $\leftarrow$
ggg	(35.7 $\pm$ 2.6) %		—	DESIG=109
γgg	(9.7 $\pm$ 1.8) $\times 10^{-3}$		—	DESIG=110
Radiative decays				NODE=M048;CLUMP=B
$\gamma\chi_{b2}(2P)$	(13.1 $\pm$ 1.6) %	S=3.4	86	DESIG=5
$\gamma\chi_{b1}(2P)$	(12.6 $\pm$ 1.2) %	S=2.4	99	DESIG=6
$\gamma\chi_{b0}(2P)$	(5.9 $\pm$ 0.6) %	S=1.4	122	DESIG=7
$\gamma\chi_{b2}(1P)$	(7.6 $\pm$ 1.4) $\times 10^{-3}$		434	DESIG=103
$\gamma A^0 \rightarrow \gamma$ hadrons	< 8 $\times 10^{-5}$	CL=90%	—	DESIG=115
$\gamma\chi_{b1}(1P)$	(1.6 $\pm$ 0.5) $\times 10^{-3}$		452	DESIG=104
$\gamma\chi_{b0}(1P)$	(3.0 $\pm$ 1.1) $\times 10^{-3}$		484	DESIG=13
$\gamma\eta_b(2S)$	< 6.2 $\times 10^{-4}$	CL=90%	—	DESIG=14
$\gamma\eta_b(1S)$	(5.1 $\pm$ 0.7) $\times 10^{-4}$		919	DESIG=15
$\gamma X \rightarrow \gamma + \geq 4$ prongs	[gg] < 2.2 $\times 10^{-4}$	CL=95%	—	DESIG=102
$\gamma a_1^0 \rightarrow \gamma\tau^+\tau^-$	[hh] < 1.6 $\times 10^{-4}$	CL=90%	—	DESIG=108
Lepton Family number (LF) violating modes				NODE=M048;CLUMP=C
$e^\pm\tau^\mp$	LF < 4.2 $\times 10^{-6}$	CL=90%	5025	DESIG=111
$\mu^\pm\tau^\mp$	LF < 3.1 $\times 10^{-6}$	CL=90%	5025	DESIG=105

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

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

Mass $m = 10.5794 \pm 0.0012$ GeV
 Full width $\Gamma = 20.5 \pm 2.5$ MeV
 $\Gamma_{ee} = 0.272 \pm 0.029$ keV (S = 1.5)

NODE=M047
 NODE=M047M;DTYPE=M
 NODE=M047W;DTYPE=G
 NODE=M047W1;DTYPE=E

$\Upsilon(4S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\bar{B}$	> 96 %	95%	327
$B^+ B^-$	(51.6 $\pm$ 0.6) %		332
D_s^+ anything + c.c.	(17.8 $\pm$ 2.6) %		—
$B^0 \bar{B}^0$	(48.4 $\pm$ 0.6) %		327
$J/\psi K_S^0 (J/\psi, \eta_c) K_S^0$	< 4 $\times 10^{-7}$	90%	—
non- $B\bar{B}$	< 4 %	95%	—
$e^+ e^-$	(1.57 $\pm$ 0.08) $\times 10^{-5}$		5290
$\rho^+ \rho^-$	< 5.7 $\times 10^{-6}$	90%	5233
$J/\psi(1S)$ anything	< 1.9 $\times 10^{-4}$	95%	—
D^{*+} anything + c.c.	< 7.4 %	90%	5099
ϕ anything	(7.1 $\pm$ 0.6) %		5240
$\phi\eta$	< 1.8 $\times 10^{-6}$	90%	5226
$\phi\eta'$	< 4.3 $\times 10^{-6}$	90%	5196
$\rho\eta$	< 1.3 $\times 10^{-6}$	90%	5247
$\rho\eta'$	< 2.5 $\times 10^{-6}$	90%	5217
$\Upsilon(1S)$ anything	< 4 $\times 10^{-3}$	90%	1053
$\Upsilon(1S)\pi^+\pi^-$	(8.1 $\pm$ 0.6) $\times 10^{-5}$		1026
$\Upsilon(1S)\eta$	(1.96 $\pm$ 0.11) $\times 10^{-4}$		924
$\Upsilon(2S)\pi^+\pi^-$	(8.6 $\pm$ 1.3) $\times 10^{-5}$		468
$h_b(1P)\pi^+\pi^-$	not seen		601
$\bar{d}$ anything	< 1.3 $\times 10^{-5}$	90%	—

NODE=M047215;DESIG=8;OUR EST;
DESIG=10 NOT CHECKED ←

DESIG=12

DESIG=11

DESIG=15

DESIG=6

DESIG=1

DESIG=16

DESIG=2

DESIG=3

DESIG=4

DESIG=13

DESIG=18

DESIG=19

DESIG=20

DESIG=5

DESIG=7

DESIG=17

DESIG=9

DESIG=21

DESIG=14

$\Upsilon(10860)$

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

Mass $m = 10876 \pm 11$ MeV

Full width $\Gamma = 55 \pm 28$ MeV

$\Gamma_{ee} = 0.31 \pm 0.07$ keV ($S = 1.3$)

NODE=M092

NODE=M092M;DTYPE=M;OUR EVAL;

→ NOT CHECKED ←

NODE=M092W;DTYPE=G;OUR EVAL;

→ NOT CHECKED ←

NODE=M092W1;DTYPE=E

$\Upsilon(10860)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$e^+ e^-$	(5.6 $\pm$ 3.1) $\times 10^{-6}$		5438
$B\bar{B}X$	(71 $\pm$ 6) %		—
$B\bar{B}$	(5.5 $\pm$ 1.0) %		1303
$B\bar{B}^* + \text{c.c.}$	(13.7 $\pm$ 1.6) %		—
$B^* \bar{B}^*$	(38.1 $\pm$ 3.4) %		1102
$B\bar{B}^{(*)}\pi$	< 19.7 %	90%	990
$B\bar{B}\pi$	(0.0 $\pm$ 1.2) %		990
$B^* \bar{B}\pi + B\bar{B}^* \pi$	(7.3 $\pm$ 2.3) %		—
$B^* \bar{B}^* \pi$	(1.0 $\pm$ 1.4) %		701
$B\bar{B}\pi\pi$	< 8.9 %	90%	504
$B_s^{(*)} \bar{B}_s^{(*)}$	(19.3 $\pm$ 2.9) %		877
$B_s \bar{B}_s$	(5 $\pm$ 5) $\times 10^{-3}$		877
$B_s \bar{B}_s^* + \text{c.c.}$	(1.4 $\pm$ 0.6) %		—
$B_s^* \bar{B}_s^*$	(17.4 $\pm$ 2.7) %		496
$\Upsilon(1S)\pi^+\pi^-$	(5.3 $\pm$ 0.6) $\times 10^{-3}$		1297
$\Upsilon(2S)\pi^+\pi^-$	(7.8 $\pm$ 1.3) $\times 10^{-3}$		774
$\Upsilon(3S)\pi^+\pi^-$	(4.8 $\pm$ 1.9) $\times 10^{-3}$		429
$\Upsilon(1S)K^+K^-$	(6.1 $\pm$ 1.8) $\times 10^{-4}$		947
$h_b(1P)\pi^+\pi^-$	(3.5 $\pm$ 1.0) $\times 10^{-3}$		895
$h_b(2P)\pi^+\pi^-$	(6.0 $\pm$ 2.1) $\times 10^{-3}$		534

NODE=M092215;DESIG=1

DESIG=9

DESIG=2

DESIG=3

DESIG=4

DESIG=10

DESIG=23

DESIG=24

DESIG=25

DESIG=11

DESIG=16

DESIG=5

DESIG=7

DESIG=8

DESIG=17

DESIG=18

DESIG=19

DESIG=20

DESIG=26

DESIG=27

Inclusive Decays.

These decay modes are submodes of one or more of the decay modes above.

ϕ anything	(13.8 $\pm$ 2.4 $$ 1.7) %	—
D^0 anything + c.c.	(108 $\pm$ 8) %	—
D_s anything + c.c.	(46 $\pm$ 6) %	—
J/ψ anything	(2.06 $\pm$ 0.21) %	—
B^0 anything + c.c.	(77 $\pm$ 8) %	—
B^+ anything + c.c.	(72 $\pm$ 6) %	—

NODE=M092;CLUMP=I

NODE=M092

DESIG=12

DESIG=13

DESIG=6

DESIG=14

DESIG=21

DESIG=22

 $\Upsilon(11020)$

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

Mass $m = 11.019 \pm 0.008$ GeVFull width $\Gamma = 79 \pm 16$ MeV $\Gamma_{ee} = 0.130 \pm 0.030$ keV

NODE=M093

NODE=M093M;DTYPE=M

NODE=M093W;DTYPE=G

NODE=M093W1;DTYPE=E

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

NODE=M093215;DESIG=1

NOTES

[a] See the “Note on scalar mesons” in the $f_0(1370)$ Particle Listings . The interpretation of this entry as a particle is controversial.

LINKAGE=NS2

[b] See the “Note on $\rho(770)$ ” in the $\rho(770)$ Particle Listings .

LINKAGE=NRH

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

LINKAGE=MD2

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

LINKAGE=CS

[e] See the “Note on scalar mesons” in the $f_0(1370)$ Particle Listings .

LINKAGE=NSM

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

LINKAGE=NA1

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

LINKAGE=MS

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

LINKAGE=NQQ

[i] See the “Note on the $\eta(1405)$ ” in the $\eta(1405)$ Particle Listings.

LINKAGE=MG

[j] See the “Note on the $f_1(1420)$ ” in the $\eta(1405)$ Particle Listings.

LINKAGE=MDA

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

LINKAGE=MDE

[l] See the “Note on the $\rho(1450)$ and the $\rho(1700)$ ” in the $\rho(1700)$ Particle Listings.

LINKAGE=MDC

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

LINKAGE=MDF

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

LINKAGE=NFJ

[o] See the “Note on $f_0(1370)$ ” in the $f_0(1370)$ Particle Listings and in the 1994 edition.

LINKAGE=NF0

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

LINKAGE=MDB

[q] See the “Note on $K_2(1770)$ and the $K_2(1820)$ ” in the $K_2(1770)$ Particle Listings .

LINKAGE=MBD

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

LINKAGE=EGM

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

LINKAGE=SG

[t] Includes $p\bar{p}\pi^+\pi^-\gamma$ and excludes $p\bar{p}\eta$, $p\bar{p}\omega$, $p\bar{p}\eta'$.	LINKAGE=MF
[u] For a narrow state A with mass less than 960 MeV.	LINKAGE=NSA
[v] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.	LINKAGE=NMR
[w] 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.	LINKAGE=MPD
[x] $2m_\tau < M(\tau^+\tau^-) < 7500$ MeV	LINKAGE=E49
[y] $2 < m_{K^+K^-} < 3$ GeV	LINKAGE=G49
[z] X = scalar with $m < 8.0$ GeV	LINKAGE=A49
[aa] $X\bar{X}$ = vectors with $m < 3.1$ GeV	LINKAGE=B49
[bb] X and $\bar{X}$ = zero spin with $m < 4.5$ GeV	LINKAGE=F49
[cc] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$	LINKAGE=C49
[dd] $201 < M(\mu^+\mu^-) < 3565$ MeV	LINKAGE=D49
[ee] Spectroscopic labeling for these states is theoretical, pending experimental information.	LINKAGE=MJ
[ff] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$	LINKAGE=C52
[gg] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$	LINKAGE=C48
[hh] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV.	LINKAGE=MRG