

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 $I = 0$ ($\eta, \eta', h, h', \omega, \phi, f, f'$): $c_1(u\bar{u} + d\bar{d}) + c_2(s\bar{s})$

$f_0(500)$ or σ ^[a]
was **$f_0(600)$**

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

Mass $m = (400-550)$ MeV

Full width $\Gamma = (400-700)$ 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 $m = 775.26 \pm 0.25$ 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)
$\pi\pi$	~ 100 %		363
$\rho(770)^\pm$ decays			
$\pi^\pm\gamma$	(4.5 ± 0.5) $\times 10^{-4}$	S=2.2	375
$\pi^\pm\eta$	< 6 $\times 10^{-3}$	CL=84%	152
$\pi^\pm\pi^+\pi^-\pi^0$	< 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;
→ UNCHECKED ←
NODE=M014W;DTYPE=G;OUR EST;
→ UNCHECKED ←

NODE=M014215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←

NODE=M009

NODE=M009M0;DTYPE=M

NODE=M009W5;DTYPE=G

NODE=M009W4;DTYPE=E

NODE=M009225;DESIG=1;OUR EVAL;
→ UNCHECKED ←

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;→ UNCHECKED ←

DESIG=22
DESIG=30
DESIG=9

NODE=M001

NODE=M001M;DTYPE=M

NODE=M001W;DTYPE=G

NODE=M001W7;DTYPE=E;OUR EVAL;
→ UNCHECKED ←

$\omega(782)$ 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

 $\eta'(958)$

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

Mass $m = 957.78 \pm 0.06$ MeVFull width $\Gamma = 0.198 \pm 0.009$ MeV

NODE=M002

NODE=M002M;DTYPE=M

NODE=M002W;DTYPE=G

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\pi^+\pi^-\eta$	(42.9 $\pm$ 0.7) %		232	NODE=M002215;DESIG=1
$\rho^0\gamma$ (including non-resonant)	(29.1 $\pm$ 0.5) %		165	DESIG=9
$\pi^+\pi^-\gamma$				
$\pi^0\pi^0\eta$	(22.2 $\pm$ 0.8) %		239	DESIG=2
$\omega\gamma$	(2.75 $\pm$ 0.23) %		159	DESIG=7
$\gamma\gamma$	(2.20 $\pm$ 0.08) %		479	DESIG=6
$3\pi^0$	(2.14 $\pm$ 0.20) $\times 10^{-3}$		430	DESIG=8
$\mu^+\mu^-\gamma$	(1.08 $\pm$ 0.27) $\times 10^{-4}$		467	DESIG=20
$\pi^+\pi^-\mu^+\mu^-$	< 2.9 $\times 10^{-5}$	90%	401	DESIG=201
$\pi^+\pi^-\pi^0$	(3.8 $\pm$ 0.4) $\times 10^{-3}$		428	DESIG=121
$\pi^0\rho^0$	< 4 %	90%	111	DESIG=18
$2(\pi^+\pi^-)$	< 2.4 $\times 10^{-4}$	90%	372	DESIG=131
$\pi^+\pi^-2\pi^0$	< 2.5 $\times 10^{-3}$	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
$3(\pi^+\pi^-)$	< 3.1 $\times 10^{-5}$	90%	189	DESIG=203
$\pi^+\pi^-e^+e^-$	(2.4 $^{+1.3}_{-1.0}$) $\times 10^{-3}$		458	DESIG=10
$\pi^+e^-\nu_e + \text{c.c.}$	< 2.1 $\times 10^{-4}$	90%	469	DESIG=204
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	< 5 $\times 10^{-4}$	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;
→ UNCHECKED ←
NODE=M003W1;DTYPE=G;OUR EST;
→ UNCHECKED ←

$f_0(980)$ 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;
→ UNCHECKED ←
DESIG=1;OUR EVAL;→ UNCHECKED ←
DESIG=5;OUR EVAL;→ UNCHECKED ←

 $a_0(980)$ [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;
→ UNCHECKED ←
NODE=M036W1;DTYPE=G;OUR EST;
→ UNCHECKED ←

$a_0(980)$ 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;
→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←

 $\phi(1020)$

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

Mass $m = 1019.461 \pm 0.019$ MeV ($S = 1.1$)Full width $\Gamma = 4.266 \pm 0.031$ MeV ($S = 1.2$)

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; $\rightarrow$ UNCHECKED $\leftarrow$
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) $\times 10^{-5}$		172	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	29	DESIG=20
$\pi^0\pi^0\gamma$	(1.13 $\pm$ 0.06) $\times 10^{-4}$		492	DESIG=19
$\pi^+\pi^-\pi^+\pi^-$	(4.0 $^{+2.8}_{-2.2}$) $\times 10^{-6}$		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
$\eta U \rightarrow \eta e^+e^-$	< 1 $\times 10^{-6}$	CL=90%	—	DESIG=259
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;

 $\rightarrow$ UNCHECKED $\leftarrow$

NODE=M030W;DTYPE=G;OUR EST;

 $\rightarrow$ UNCHECKED $\leftarrow$

$h_1(1170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	308

NODE=M030215;DESIG=1;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$ **$b_1(1235)$**

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

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;
→ UNCHECKED ←

DESIG=9

DESIG=8;OUR EST;→ UNCHECKED ←

DESIG=2;OUR EST;→ UNCHECKED ←

DESIG=74

DESIG=71;OUR EST;→ UNCHECKED ←

DESIG=73;OUR EST;→ UNCHECKED ←

DESIG=72;OUR EST;→ UNCHECKED ←

DESIG=5;OUR EST;→ UNCHECKED ←

$a_1(1260)$ [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;

→ UNCHECKED ←

NODE=M010W;DTYPE=G;OUR EST;

→ UNCHECKED ←

$a_1(1260)$ 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	179
$f_0(1370)\pi$	seen	†
$f_2(1270)\pi$	seen	†
$K\bar{K}^*(892)^+ \text{ c.c.}$	seen	†
$\pi\gamma$	seen	608

NODE=M010215;DESIG=7;OUR EST;

→ UNCHECKED ←

DESIG=8;OUR EST;→ UNCHECKED ←

DESIG=9;OUR EST;→ UNCHECKED ←

DESIG=10;OUR EST;→ UNCHECKED ←

DESIG=16;OUR EST;→ UNCHECKED ←

DESIG=11;OUR EST;→ UNCHECKED ←

DESIG=12;OUR EST;→ UNCHECKED ←

DESIG=13;OUR EST;→ UNCHECKED ←

DESIG=14;OUR EST;→ UNCHECKED ←

DESIG=4;OUR EST;→ UNCHECKED ←

$f_2(1270)$

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

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
$\pi^+\pi^-2\pi^0$	($7.1^{+1.4}_{-2.7}$) %	$S=1.3$	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 $m = 1281.9 \pm 0.5$ MeV ($S = 1.8$)

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;→ UNCHECKED ←
$4\pi^0$	$< 7 \times 10^{-4}$	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;
→ UNCHECKED ←
DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←

 $\pi(1300)$

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

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

NODE=M058

NODE=M058M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=M058W;DTYPE=G;OUR EST;
→ UNCHECKED ←

$\pi(1300)$ 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;
→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←

 $a_2(1320)$

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

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;
→ UNCHECKED ←

$a_2(1320)$ 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 MeV
Full width $\Gamma = 200$ to 500 MeV

NODE=M147

NODE=M147M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=M147W;DTYPE=G;OUR EST;
→ UNCHECKED ←

$f_0(1370)$ 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;
→ UNCHECKED ←
DESIG=10;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=6;OUR EST;→ UNCHECKED ←
DESIG=14;OUR EST;→ UNCHECKED ←
DESIG=15;OUR EST;→ UNCHECKED ←
DESIG=16;OUR EVAL;→ UNCHECKED ←
DESIG=17;OUR EVAL;→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=11;OUR EST;→ UNCHECKED ←
DESIG=18;OUR EVAL;→ UNCHECKED ←
DESIG=19;OUR EVAL;→ UNCHECKED ←
DESIG=20;OUR EVAL;→ UNCHECKED ←
DESIG=12;OUR EST;→ UNCHECKED ←
DESIG=13;OUR EST;→ UNCHECKED ←

$\pi_1(1400)$ ^[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;
→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←

$\eta(1405)$ ^[i]

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

Mass $m = 1408.8 \pm 1.8$ MeV ^[g] ($S = 2.1$)
Full width $\Gamma = 51.0 \pm 2.9$ MeV ^[g] ($S = 1.8$)

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;
→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=9;OUR EST;→ UNCHECKED ←
DESIG=10;OUR EST;→ UNCHECKED ←
DESIG=6;OUR EST;→ UNCHECKED ←
DESIG=12
DESIG=8;OUR EST;→ UNCHECKED ←
DESIG=11;OUR EST;→ UNCHECKED ←

$f_1(1420)$ [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;
→ UNCHECKED ←
DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=9;OUR EST;→ UNCHECKED ←

$\omega(1420)$ [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;
→ UNCHECKED ←
NODE=M125W;DTYPE=G;OUR EST;
→ UNCHECKED ←

$\omega(1420)$ 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;
→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←

$a_0(1450)$ [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;
→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
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;
→ UNCHECKED ←
NODE=M105W0;DTYPE=G;OUR EST;
→ UNCHECKED ←

$\rho(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	720
4π	seen	669
e^+e^-	seen	732
$\eta\rho$	possibly seen	311
$a_2(1320)\pi$	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	398
$f_0(1370)\gamma$	not seen	92
$f_2(1270)\gamma$	not seen	178

NODE=M105215;DESIG=1;OUR EST;
 → UNCHECKED ←
 DESIG=2;OUR EST;→ UNCHECKED ←
 DESIG=4;OUR EST;→ UNCHECKED ←
 DESIG=3;OUR EVAL;→ UNCHECKED ←
 DESIG=8;OUR EST;→ UNCHECKED ←
 DESIG=7;OUR EVAL;→ UNCHECKED ←
 DESIG=15;OUR EST;→ UNCHECKED ←
 DESIG=9;OUR EST;→ UNCHECKED ←
 DESIG=16;OUR EST;→ UNCHECKED ←
 DESIG=17;OUR EST;→ UNCHECKED ←
 DESIG=18;OUR EST;→ UNCHECKED ←
 DESIG=19;OUR EST;→ UNCHECKED ←

$\eta(1475)$ ^[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;
 → UNCHECKED ←
 DESIG=1;OUR EST;→ UNCHECKED ←
 DESIG=4;OUR EST;→ UNCHECKED ←
 DESIG=7;OUR EST;→ UNCHECKED ←

$f_0(1500)$ ^[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;→ UNCHECKED ←
 DESIG=7
 DESIG=5;OUR EST;→ UNCHECKED ←
 DESIG=6;OUR EST;→ UNCHECKED ←
 DESIG=11;OUR EST;→ UNCHECKED ←
 DESIG=12;OUR EST;→ UNCHECKED ←
 DESIG=13;OUR EST;→ UNCHECKED ←
 DESIG=14;OUR EST;→ UNCHECKED ←
 DESIG=1
 DESIG=2
 DESIG=4
 DESIG=10;OUR EST;→ UNCHECKED ←

$f'_2(1525)$

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

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

NODE=M013

NODE=M013MX;DTYPE=M;OUR EST;
 → UNCHECKED ←
 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
$\gamma\gamma$	$(1.10 \pm 0.14) \times 10^{-6}$	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;
→ UNCHECKED ←
DESIG=2
DESIG=4
DESIG=5
DESIG=3
DESIG=6;OUR EST;→ UNCHECKED ←

$\eta_2(1645)$

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

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;
→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=6;OUR EST;→ UNCHECKED ←

$\omega(1650)^{[n]}$

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

Mass $m = 1670 \pm 30$ MeV

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

NODE=M126

NODE=M126M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=M126W;DTYPE=G;OUR EST;
→ UNCHECKED ←

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	647
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835

NODE=M126215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←

$\omega_3(1670)$

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

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;
 UNCHECKED
 DESIG=2;OUR EST;→ UNCHECKED ←
 DESIG=3;OUR EST;→ UNCHECKED ←

 $\pi_2(1670)$

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

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

 $\phi(1680)$

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

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

NODE=M067

NODE=M067M1;DTYPE=M;OUR EST;

→ UNCHECKED ←

NODE=M067W1;DTYPE=G;OUR EST;

→ UNCHECKED ←

$\phi(1680)$ 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;

→ UNCHECKED ←

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=6;OUR EST;→ UNCHECKED ←

DESIG=1;OUR EST;→ UNCHECKED ←

DESIG=12;OUR EVAL;→ UNCHECKED ←

 $\rho_3(1690)$

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

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		335

NODE=M015215;DESIG=2

DESIG=11

DESIG=7

DESIG=1

DESIG=3

DESIG=4

DESIG=13

DESIG=14;OUR EST;→ UNCHECKED ←

DESIG=5;OUR EST;→ UNCHECKED ←

DESIG=6;OUR EST;→ UNCHECKED ←

DESIG=8;OUR EST;→ UNCHECKED ←

 $\rho(1700)$ [^I]

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

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;

→ UNCHECKED ←

NODE=M065W0;DTYPE=G;OUR EST;

→ UNCHECKED ←

$\rho(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$2(\pi^+\pi^-)$	large	803
$\rho\pi\pi$	dominant	653
$\rho^0\pi^+\pi^-$	large	651
$\rho^\pm\pi^\mp\pi^0$	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;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=12;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=1;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=9;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=15;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=16;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=17;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=18;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=13;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=10;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=11;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=14;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=8;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=6;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$

$f_0(1710)$ [o]

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

Mass $m = 1722^{+6}_{-5}$ MeV (S = 1.6)
Full width $\Gamma = 135 \pm 7$ 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	705
$\eta\eta$	seen	664
$\pi\pi$	seen	850
$\omega\omega$	seen	358

NODE=M068215;DESIG=2;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=1;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4

$\pi(1800)$

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

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	625
$f_0(1370)\pi^-$	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;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=11;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=3;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=1
DESIG=12
DESIG=2
DESIG=7;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=13
DESIG=14
DESIG=15
DESIG=6;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=8;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4
DESIG=9

$\phi_3(1850)$

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

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;
 → UNCHECKED ←
 DESIG=2;OUR EST;→ UNCHECKED ←

$\pi_2(1880)$

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

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;→ UNCHECKED ←
 DESIG=10;OUR EST;→ UNCHECKED ←
 DESIG=7;OUR EST;→ UNCHECKED ←
 DESIG=6;OUR EST;→ UNCHECKED ←
 DESIG=8;OUR EST;→ UNCHECKED ←
 DESIG=9;OUR EST;→ UNCHECKED ←
 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;
 → UNCHECKED ←
 DESIG=2

$a_4(2040)$

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

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;→ UNCHECKED ←
 DESIG=6;OUR EST;→ UNCHECKED ←
 DESIG=7;OUR EST;→ UNCHECKED ←
 DESIG=8
 DESIG=3
 DESIG=4;OUR EST;→ UNCHECKED ←

$f_4(2050)$

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

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	416
$K^+K^-f_0(980) \rightarrow$ $K^+K^-\pi^+\pi^-$	seen	—
$K^+K^-f_0(980) \rightarrow K^+K^-\pi^0\pi^0$	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

 $K^*(892)$

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

$K^*(892)^\pm$ hadroproduced mass $m = 891.66 \pm 0.26$ MeV
 $K^*(892)^\pm$ in τ decays mass $m = 895.5 \pm 0.8$ MeV
 $K^*(892)^0$ mass $m = 895.81 \pm 0.19$ MeV ($S = 1.4$)
 $K^*(892)^\pm$ hadroproduced full width $\Gamma = 50.8 \pm 0.9$ MeV
 $K^*(892)^\pm$ in τ decays full width $\Gamma = 46.2 \pm 1.3$ MeV
 $K^*(892)^0$ full width $\Gamma = 47.4 \pm 0.6$ MeV ($S = 2.2$)

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
$K^0\gamma$	$(2.46 \pm 0.21) \times 10^{-3}$		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;
 $\rightarrow$ UNCHECKED $\leftarrow$
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;
 $\rightarrow$ UNCHECKED $\leftarrow$

$K_1(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\rho$	$(42 \pm 6) \%$	46
$K_0^*(1430)\pi$	$(28 \pm 4) \%$	$\dagger$
$K^*(892)\pi$	$(16 \pm 5) \%$	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; $\rightarrow$ UNCHECKED $\leftarrow$

$K_1(1400)$

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

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
$K\rho$	$(3.0 \pm 3.0) \%$	293
$Kf_0(1370)$	$(2.0 \pm 2.0) \%$	$\dagger$
$K\omega$	$(1.0 \pm 1.0) \%$	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; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=9;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$

$K^*(1410)$

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

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;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=1
DESIG=3;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$

$K_0^*(1430)$ [ρ]

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

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

NODE=M019
NODE=M019M;DTYPE=M;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
NODE=M019W;DTYPE=G;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$

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

NODE=M019215;DESIG=1

 $K_2^*(1430)$

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

 $K_2^*(1430)^\pm$ 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=M022

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)
$K\pi$	$(49.9 \pm 1.2) \%$		619
$K^*(892)\pi$	$(24.7 \pm 1.5) \%$		419
$K^*(892)\pi\pi$	$(13.4 \pm 2.2) \%$		372
$K\rho$	$(8.7 \pm 0.8) \%$	$S=1.2$	318
$K\omega$	$(2.9 \pm 0.8) \%$		311
$K^+\gamma$	$(2.4 \pm 0.5) \times 10^{-3}$	$S=1.1$	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;→ UNCHECKED ←

 $K^*(1680)$

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

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)
$K\pi$	$(38.7 \pm 2.5) \%$	781
$K\rho$	$(31.4^{+5.0}_{-2.1}) \%$	571
$K^*(892)\pi$	$(29.9^{+2.2}_{-5.0}) \%$	618

NODE=M095215;DESIG=1

DESIG=3

DESIG=2

 $K_2(1770)^{[q]}$

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

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;

→ UNCHECKED ←

DESIG=2;OUR EST;→ UNCHECKED ←

DESIG=4;OUR EST;→ UNCHECKED ←

DESIG=9;OUR EST;→ UNCHECKED ←

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

$K_2(1820)$ ^[r]

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

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;
DESIG=2;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=3;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=6;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$

$K_4^*(2045)$

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

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 $m = 2006.96 \pm 0.10$ 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 $m = 2010.26 \pm 0.07$ MeV ($S = 1.1$)
 $m_{D^*(2010)^+} - m_{D^+} = 140.66 \pm 0.08$ MeV
 $m_{D^*(2010)^+} - m_{D^0} = 145.4257 \pm 0.0017$ MeV
Full width $\Gamma = 83.4 \pm 1.8$ 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.

$D^*(2010)^\pm$ 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

$D_0^*(2400)^0$

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

Mass $m = 2318 \pm 29$ MeV ($S = 1.7$)

Full width $\Gamma = 267 \pm 40$ MeV

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

$D_1(2420)^0$

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

I needs confirmation.

Mass $m = 2421.4 \pm 0.6$ MeV ($S = 1.2$)

$m_{D_1^0} - m_{D^{*+}} = 411.1 \pm 0.6$ MeV ($S = 1.2$)

Full width $\Gamma = 27.4 \pm 2.5$ MeV ($S = 2.3$)

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

$D_1(2420)^0$ 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	280

$D_2^*(2460)^0$

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

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

Mass $m = 2462.6 \pm 0.6$ MeV ($S = 1.2$)

$m_{D_2^{*0}} - m_{D^+} = 593.0 \pm 0.6$ MeV ($S = 1.2$)

$m_{D_2^{*0}} - m_{D^{*+}} = 452.3 \pm 0.6$ MeV ($S = 1.2$)

Full width $\Gamma = 49.0 \pm 1.3$ MeV ($S = 1.5$)

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

$D_2^*(2460)^0$ 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

$D_2^*(2460)^\pm$

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

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

Mass $m = 2464.3 \pm 1.6$ MeV ($S = 1.7$)

$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV

Full width $\Gamma = 37 \pm 6$ MeV ($S = 1.4$)

NODE=M062225;NODE=M062

DESIG=1

DESIG=3

DESIG=2

NODE=M178

NODE=M178M;DTYPE=M

NODE=M178W;DTYPE=G

NODE=M178215;DESIG=1;OUR EVAL;
→ UNCHECKED ←

NODE=M097

NODE=M097M;DTYPE=M

NODE=M097DM;DTYPE=D

NODE=M097W;DTYPE=G

NODE=M097215;NODE=M097

DESIG=1

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=2;OUR EST;→ UNCHECKED ←

DESIG=7;OUR EST;→ UNCHECKED ←

NODE=M119

NODE=M119M;DTYPE=M

NODE=M119DM;DTYPE=D

NODE=M119DM2;DTYPE=D

NODE=M119W;DTYPE=G

NODE=M119215;NODE=M119

CLUMP=A;DESIG=1

DESIG=2

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=4;OUR EST;→ UNCHECKED ←

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	324

DESIG=1
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←

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

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

NODE=MXXX040

$D_s^{*\pm}$

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

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

$$\text{Mass } m = 2112.1 \pm 0.4 \text{ MeV}$$

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

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

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^+ .

$$\text{Mass } m = 2317.7 \pm 0.6 \text{ MeV } (S = 1.1)$$

$$m_{D_{s0}^*(2317)^\pm} - m_{D_s^\pm} = 349.4 \pm 0.6 \text{ MeV } (S = 1.1)$$

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

$D_{s0}^*(2317)^-$ 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;→ UNCHECKED ←

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

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

$$\text{Mass } m = 2459.5 \pm 0.6 \text{ MeV } (S = 1.1)$$

$$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}} = 347.3 \pm 0.7 \text{ MeV } (S = 1.2)$$

$$m_{D_{s1}(2460)^\pm} - m_{D_s^\pm} = 491.2 \pm 0.6 \text{ MeV } (S = 1.1)$$

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

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

NODE=M173215;NODE=M173

DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

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

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

Mass $m = 2535.10 \pm 0.08$ MeV (S = 1.1)

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

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

NODE=M121

NODE=M121M;DTYPE=M

NODE=M121W;DTYPE=G

NODE=M121215;NODE=M121

$D_{s1}(2536)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D^*(2010)^+ K^0$	0.85 $\pm$ 0.12		149
$(D^*(2010)^+ K^0)_{S-wave}$	0.61 $\pm$ 0.09		149
$D^+ \pi^- K^+$	0.028 $\pm$ 0.005		176
$D^*(2007)^0 K^+$	DEFINED AS 1		167
$D^+ K^0$	<0.34	90%	381
$D^0 K^+$	<0.12	90%	391
$D_s^{*+} \gamma$	possibly seen		388
$D_s^+ \pi^+ \pi^-$	seen		437

DESIG=1

DESIG=7

DESIG=8

DESIG=4

DESIG=2

DESIG=5

DESIG=3

DESIG=6

$D_{s2}^*(2573)$

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

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.

NODE=M148

NODE=M148M;DTYPE=M

NODE=M148W;DTYPE=G

NODE=M148215;NODE=M148

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

DESIG=1

DESIG=2;OUR EVAL;→ UNCHECKED ←

$D_{s1}^*(2700)^\pm$

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

Mass $m = 2709 \pm 4$ MeV

Full width $\Gamma = 117 \pm 13$ MeV

NODE=M182

NODE=M182M;DTYPE=M

NODE=M182W;DTYPE=G

$c\bar{c}$ MESONS

NODE=MXXX025

$\eta_c(1S)$

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

Mass $m = 2983.6 \pm 0.7$ MeV (S = 1.3)

Full width $\Gamma = 32.2 \pm 0.9$ MeV

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) %		1323	DESIG=24
$\rho\rho$	(1.8 $\pm$ 0.5) %		1275	DESIG=19
$K^*(892)^0 K^- \pi^+ + \text{c.c.}$	(2.0 $\pm$ 0.7) %		1277	DESIG=26
$K^*(892) \bar{K}^*(892)$	(7.0 $\pm$ 1.3) $\times 10^{-3}$		1196	DESIG=18
$K^{*0} \bar{K}^{*0} \pi^+ \pi^-$	(1.1 $\pm$ 0.5) %		1073	DESIG=57
$\phi K^+ K^-$	(2.9 $\pm$ 1.4) $\times 10^{-3}$		1104	DESIG=28
$\phi\phi$	(1.76 $\pm$ 0.20) $\times 10^{-3}$		1089	DESIG=17
$\phi 2(\pi^+ \pi^-)$	< 4 $\times 10^{-3}$	90%	1251	DESIG=58
$a_0(980)\pi$	< 2 %	90%	1327	DESIG=21
$a_2(1320)\pi$	< 2 %	90%	1196	DESIG=22
$K^*(892) \bar{K} + \text{c.c.}$	< 1.28 %	90%	1309	DESIG=40
$f_2(1270)\eta$	< 1.1 %	90%	1145	DESIG=23
$\omega\omega$	< 3.1 $\times 10^{-3}$	90%	1270	DESIG=20
$\omega\phi$	< 1.7 $\times 10^{-3}$	90%	1185	DESIG=47
$f_2(1270) f_2(1270)$	(9.8 $\pm$ 2.5) $\times 10^{-3}$		774	DESIG=46
$f_2(1270) f_2'(1525)$	(9.7 $\pm$ 3.2) $\times 10^{-3}$		513	DESIG=59
Decays into stable hadrons				NODE=M026;CLUMP=B
$K \bar{K} \pi$	(7.3 $\pm$ 0.5) %		1381	DESIG=14
$\eta \pi^+ \pi^-$	(1.7 $\pm$ 0.5) %		1428	DESIG=16
$\eta 2(\pi^+ \pi^-)$	(4.4 $\pm$ 1.3) %		1385	DESIG=61
$K^+ K^- \pi^+ \pi^-$	(6.9 $\pm$ 1.1) $\times 10^{-3}$		1345	DESIG=15
$K^+ K^- \pi^+ \pi^- \pi^0$	(3.5 $\pm$ 0.6) %		1304	DESIG=60
$K^0 K^- \pi^+ \pi^- \pi^+ + \text{c.c.}$	(5.6 $\pm$ 1.5) %		—	DESIG=62
$K^+ K^- 2(\pi^+ \pi^-)$	(7.5 $\pm$ 2.4) $\times 10^{-3}$		1253	DESIG=55
$2(K^+ K^-)$	(1.47 $\pm$ 0.31) $\times 10^{-3}$		1055	DESIG=27
$\pi^+ \pi^- \pi^0 \pi^0$	(4.7 $\pm$ 1.0) %		1460	DESIG=63
$2(\pi^+ \pi^-)$	(9.7 $\pm$ 1.2) $\times 10^{-3}$		1459	DESIG=11
$2(\pi^+ \pi^- \pi^0)$	(17.4 $\pm$ 3.3) %		1409	DESIG=64
$3(\pi^+ \pi^-)$	(1.8 $\pm$ 0.4) %		1407	DESIG=56
$p \bar{p}$	(1.52 $\pm$ 0.16) $\times 10^{-3}$		1160	DESIG=12
$p \bar{p} \pi^0$	(3.6 $\pm$ 1.3) $\times 10^{-3}$		1101	DESIG=65
$\Lambda \bar{\Lambda}$	(1.09 $\pm$ 0.24) $\times 10^{-3}$		990	DESIG=45
$\Sigma^+ \bar{\Sigma}^-$	(2.1 $\pm$ 0.6) $\times 10^{-3}$		901	DESIG=66
$\Xi^- \bar{\Xi}^+$	(8.9 $\pm$ 2.7) $\times 10^{-4}$		692	DESIG=67
$K \bar{K} \eta$	(10 $\pm$ 5) $\times 10^{-3}$		1265	DESIG=25
$\pi^+ \pi^- p \bar{p}$	(5.3 $\pm$ 1.8) $\times 10^{-3}$		1027	DESIG=13
Radiative decays				NODE=M026;CLUMP=C
$\gamma\gamma$	(1.57 $\pm$ 0.12) $\times 10^{-4}$		1492	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%	1485	DESIG=51
$\pi^0 \pi^0$	P, CP < 3.5 $\times 10^{-5}$	90%	1486	DESIG=52
$K^+ K^-$	P, CP < 6 $\times 10^{-4}$	90%	1408	DESIG=53
$K_S^0 K_S^0$	P, CP < 3.1 $\times 10^{-4}$	90%	1406	DESIG=54

J/ψ(1S)

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

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;
→ UNCHECKED ←

$J/\psi(1S)$ 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
ggg	(64.1 $\pm$ 1.0) %	—	—	DESIG=249
γgg	(8.8 $\pm$ 1.1) %	—	—	DESIG=250
$e^+ e^-$	(5.971 $\pm$ 0.032) %	1548	—	DESIG=1
$e^+ e^- \gamma$	[s] (8.8 $\pm$ 1.4) $\times 10^{-3}$	1548	—	DESIG=5
$\mu^+ \mu^-$	(5.961 $\pm$ 0.033) %	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
$K^*(892)^\pm K^*(892)^\mp$	(1.00 $\pm$ 0.22 $\pm$ 0.40) $\times 10^{-3}$	—	1266	DESIG=256
$K^*(892)^\pm K^*(800)^\mp$	(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
$K^+ K^*(892)^- + \text{c.c.}$	(5.12 $\pm$ 0.30) $\times 10^{-3}$	—	1373	DESIG=121
$K^+ K^*(892)^- + \text{c.c.} \rightarrow$ $K^+ K^- \pi^0$	(1.97 $\pm$ 0.20) $\times 10^{-3}$	—	—	DESIG=231
$K^+ K^*(892)^- + \text{c.c.} \rightarrow$ $K^0 K^\pm \pi^\mp + \text{c.c.}$	(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
$K^0 \bar{K}^*(892)^0 + \text{c.c.} \rightarrow$ $K^0 K^\pm \pi^\mp + \text{c.c.}$	(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
$b_1(1235)^\pm \pi^\mp$	[t] (3.0 $\pm$ 0.5) $\times 10^{-3}$	—	1300	DESIG=49
$\omega K^\pm K_S^0 \pi^\mp$	[t] (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
$\eta K^\pm K_S^0 \pi^\mp$	[t] (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
$\Sigma(1385)^- \bar{\Sigma}(1385)^+ (\text{or c.c.})$	[t] (1.10 $\pm$ 0.12) $\times 10^{-3}$	—	697	DESIG=67
$\phi f_2'(1525)$	(8 $\pm$ 4) $\times 10^{-4}$	S=2.7	871	DESIG=40
$\phi \pi^+ \pi^-$	(9.4 $\pm$ 0.9) $\times 10^{-4}$	S=1.2	1365	DESIG=34
$\phi \pi^0 \pi^0$	(5.6 $\pm$ 1.6) $\times 10^{-4}$	—	1366	DESIG=76
$\phi K^\pm K_S^0 \pi^\mp$	[t] (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

$\Xi^0 \Xi^0$	$(1.20 \pm 0.24) \times 10^{-3}$		818	DESIG=248
$\Xi(1530)^- \Xi^+$	$(5.9 \pm 1.5) \times 10^{-4}$		600	DESIG=107
$p K^- \bar{\Sigma}(1385)^0$	$(5.1 \pm 3.2) \times 10^{-4}$		646	DESIG=74
$\omega \pi^0$	$(4.5 \pm 0.5) \times 10^{-4}$	S=1.4	1446	DESIG=32
$\phi \eta'(958)$	$(4.0 \pm 0.7) \times 10^{-4}$	S=2.1	1192	DESIG=38
$\phi f_0(980)$	$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9	1178	DESIG=41
$\phi f_0(980) \rightarrow \phi \pi^+ \pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$		—	DESIG=236
$\phi f_0(980) \rightarrow \phi \pi^0 \pi^0$	$(1.7 \pm 0.7) \times 10^{-4}$		—	DESIG=237
$\eta \phi f_0(980) \rightarrow \eta \phi \pi^+ \pi^-$	$(3.2 \pm 1.0) \times 10^{-4}$		—	DESIG=229
$\phi a_0(980)^0 \rightarrow \phi \eta \pi^0$	$(5 \pm 4) \times 10^{-6}$		—	DESIG=258
$\Xi(1530)^0 \Xi^0$	$(3.2 \pm 1.4) \times 10^{-4}$		608	DESIG=108
$\Sigma(1385)^- \bar{\Sigma}^+ \text{ (or c.c.)}$	[t] $(3.1 \pm 0.5) \times 10^{-4}$		855	DESIG=68
$\phi f_1(1285)$	$(2.6 \pm 0.5) \times 10^{-4}$	S=1.1	1032	DESIG=106
$\eta \pi^+ \pi^-$	$(4.0 \pm 1.7) \times 10^{-4}$		1487	DESIG=239
$\rho \eta$	$(1.93 \pm 0.23) \times 10^{-4}$		1396	DESIG=22
$\omega \eta'(958)$	$(1.82 \pm 0.21) \times 10^{-4}$		1279	DESIG=31
$\omega f_0(980)$	$(1.4 \pm 0.5) \times 10^{-4}$		1267	DESIG=150
$\rho \eta'(958)$	$(1.05 \pm 0.18) \times 10^{-4}$		1281	DESIG=23
$a_2(1320)^\pm \pi^\mp$	[t] $< 4.3 \times 10^{-3}$	CL=90%	1263	DESIG=42
$K \bar{K}_2^*(1430) + \text{c.c.}$	$< 4.0 \times 10^{-3}$	CL=90%	1159	DESIG=45
$K_1(1270)^\pm K^\mp$	$< 3.0 \times 10^{-3}$	CL=90%	1231	DESIG=131
$K_2^*(1430)^0 \bar{K}_2^*(1430)^0$	$< 2.9 \times 10^{-3}$	CL=90%	604	DESIG=47
$\phi \pi^0$	$< 6.4 \times 10^{-6}$	CL=90%	1377	DESIG=33
$\phi \eta(1405) \rightarrow \phi \eta \pi \pi$	$< 2.5 \times 10^{-4}$	CL=90%	946	DESIG=128
$\omega f_2'(1525)$	$< 2.2 \times 10^{-4}$	CL=90%	1003	DESIG=29
$\omega X(1835) \rightarrow \omega p \bar{p}$	$< 3.9 \times 10^{-6}$	CL=95%	—	DESIG=263
$\eta \phi(2170) \rightarrow$	$< 2.52 \times 10^{-4}$	CL=90%	—	DESIG=253
$\eta K^*(892)^0 \bar{K}^*(892)^0$				
$\Sigma(1385)^0 \bar{\Lambda} + \text{c.c.}$	$< 8.2 \times 10^{-6}$	CL=90%	912	DESIG=111
$\Delta(1232)^+ \bar{p}$	$< 1 \times 10^{-4}$	CL=90%	1100	DESIG=112
$\Lambda(1520) \bar{\Lambda} + \text{c.c.} \rightarrow \gamma \Lambda \bar{\Lambda}$	$< 4.1 \times 10^{-6}$	CL=90%	—	DESIG=260
$\Theta(1540) \bar{\Theta}(1540) \rightarrow$	$< 1.1 \times 10^{-5}$	CL=90%	—	DESIG=205
$K_S^0 p K^- \bar{n} + \text{c.c.}$				
$\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$	$< 2.1 \times 10^{-5}$	CL=90%	—	DESIG=206
$\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n$	$< 1.6 \times 10^{-5}$	CL=90%	—	DESIG=207
$\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n$	$< 5.6 \times 10^{-5}$	CL=90%	—	DESIG=208
$\bar{\Theta}(1540) K_S^0 p \rightarrow K_S^0 p K^- \bar{n}$	$< 1.1 \times 10^{-5}$	CL=90%	—	DESIG=209
$\Sigma^0 \bar{\Lambda}$	$< 9 \times 10^{-5}$	CL=90%	1032	DESIG=110

Decays into stable hadrons

$2(\pi^+ \pi^-) \pi^0$	$(4.1 \pm 0.5) \%$	S=2.4	1496	DESIG=9
$3(\pi^+ \pi^-) \pi^0$	$(2.9 \pm 0.6) \%$		1433	DESIG=11
$\pi^+ \pi^- \pi^0$	$(2.11 \pm 0.07) \%$	S=1.5	1533	DESIG=7
$\pi^+ \pi^- \pi^0 K^+ K^-$	$(1.79 \pm 0.29) \%$	S=2.2	1368	DESIG=18
$4(\pi^+ \pi^-) \pi^0$	$(9.0 \pm 3.0) \times 10^{-3}$		1345	DESIG=12
$\pi^+ \pi^- K^+ K^-$	$(6.6 \pm 0.5) \times 10^{-3}$		1407	DESIG=16
$\pi^+ \pi^- K^+ K^- \eta$	$(1.84 \pm 0.28) \times 10^{-3}$		1221	DESIG=238
$\pi^0 \pi^0 K^+ K^-$	$(2.45 \pm 0.31) \times 10^{-3}$		1410	DESIG=234
$K \bar{K} \pi$	$(6.1 \pm 1.0) \times 10^{-3}$		1442	DESIG=15
$2(\pi^+ \pi^-)$	$(3.57 \pm 0.30) \times 10^{-3}$		1517	DESIG=8
$3(\pi^+ \pi^-)$	$(4.3 \pm 0.4) \times 10^{-3}$		1466	DESIG=10
$2(\pi^+ \pi^- \pi^0)$	$(1.62 \pm 0.21) \%$		1468	DESIG=210
$2(\pi^+ \pi^-) \eta$	$(2.29 \pm 0.24) \times 10^{-3}$		1446	DESIG=201
$3(\pi^+ \pi^-) \eta$	$(7.2 \pm 1.5) \times 10^{-4}$		1379	DESIG=202
$p \bar{p}$	$(2.120 \pm 0.029) \times 10^{-3}$		1232	DESIG=50
$p \bar{p} \pi^0$	$(1.19 \pm 0.08) \times 10^{-3}$	S=1.1	1176	DESIG=52
$p \bar{p} \pi^+ \pi^-$	$(6.0 \pm 0.5) \times 10^{-3}$	S=1.3	1107	DESIG=54
$p \bar{p} \pi^+ \pi^- \pi^0$	[u] $(2.3 \pm 0.9) \times 10^{-3}$	S=1.9	1033	DESIG=55
$p \bar{p} \eta$	$(2.00 \pm 0.12) \times 10^{-3}$		948	DESIG=56
$p \bar{p} \rho$	$< 3.1 \times 10^{-4}$	CL=90%	774	DESIG=57
$p \bar{p} \omega$	$(9.8 \pm 1.0) \times 10^{-4}$	S=1.3	768	DESIG=58

NODE=M070;CLUMP=B

$p\bar{p}\eta'(958)$	$(2.1 \pm 0.4) \times 10^{-4}$		596	DESIG=59
$p\bar{p}\phi$	$(4.5 \pm 1.5) \times 10^{-5}$		527	DESIG=127
$n\bar{n}$	$(2.09 \pm 0.16) \times 10^{-3}$		1231	DESIG=64
$n\bar{n}\pi^+\pi^-$	$(4 \pm 4) \times 10^{-3}$		1106	DESIG=65
$\Sigma^+\bar{\Sigma}^-$	$(1.50 \pm 0.24) \times 10^{-3}$		992	DESIG=247
$\Sigma^0\bar{\Sigma}^0$	$(1.29 \pm 0.09) \times 10^{-3}$		988	DESIG=63
$2(\pi^+\pi^-)K^+K^-$	$(4.7 \pm 0.7) \times 10^{-3}$	S=1.3	1320	DESIG=17
$p\bar{n}\pi^-$	$(2.12 \pm 0.09) \times 10^{-3}$		1174	DESIG=53
$nN(1440)$	seen		984	DESIG=215;OUR EST;→ UNCHECKED ←
$nN(1520)$	seen		928	DESIG=216;OUR EST;→ UNCHECKED ←
$nN(1535)$	seen		914	DESIG=217;OUR EST;→ UNCHECKED ←
$\Xi^-\bar{\Xi}^+$	$(8.6 \pm 1.1) \times 10^{-4}$	S=1.2	807	DESIG=62
$\Lambda\bar{\Lambda}$	$(1.61 \pm 0.15) \times 10^{-3}$	S=1.9	1074	DESIG=60
$\Lambda\bar{\Sigma}^-\pi^+$ (or c.c.)	[t] $(8.3 \pm 0.7) \times 10^{-4}$	S=1.2	950	DESIG=71
$pK^-\bar{\Lambda}$	$(8.9 \pm 1.6) \times 10^{-4}$		876	DESIG=72
$2(K^+K^-)$	$(7.6 \pm 0.9) \times 10^{-4}$		1131	DESIG=19
$pK^-\bar{\Sigma}^0$	$(2.9 \pm 0.8) \times 10^{-4}$		819	DESIG=73
K^+K^-	$(2.70 \pm 0.17) \times 10^{-4}$		1468	DESIG=13
$K_S^0 K_L^0$	$(2.1 \pm 0.4) \times 10^{-4}$	S=3.2	1466	DESIG=75
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$(4.3 \pm 1.0) \times 10^{-3}$		903	DESIG=261
$\Lambda\bar{\Lambda}\eta$	$(1.62 \pm 0.17) \times 10^{-4}$		672	DESIG=228
$\Lambda\bar{\Lambda}\pi^0$	$(3.8 \pm 0.4) \times 10^{-5}$		998	DESIG=109
$\bar{\Lambda}nK_S^0 + \text{c.c.}$	$(6.5 \pm 1.1) \times 10^{-4}$		872	DESIG=225
$\pi^+\pi^-$	$(1.47 \pm 0.14) \times 10^{-4}$		1542	DESIG=6
$\Lambda\bar{\Sigma} + \text{c.c.}$	$(2.83 \pm 0.23) \times 10^{-5}$		1034	DESIG=61
$K_S^0 K_S^0$	< 1 $\times 10^{-6}$	CL=95%	1466	DESIG=14

Radiative decays

3γ	$(1.16 \pm 0.22) \times 10^{-5}$		1548	DESIG=81
4γ	< 9 $\times 10^{-6}$	CL=90%	1548	DESIG=244
5γ	< 1.5 $\times 10^{-5}$	CL=90%	1548	DESIG=245
$\gamma\eta_c(1S)$	$(1.7 \pm 0.4) \%$	S=1.6	111	DESIG=85
$\gamma\eta_c(1S) \rightarrow 3\gamma$	$(3.8 \pm 1.3 \pm 1.0) \times 10^{-6}$	S=1.1	—	DESIG=246
$\gamma\pi^+\pi^-2\pi^0$	$(8.3 \pm 3.1) \times 10^{-3}$		1518	DESIG=99
$\gamma\eta\pi\pi$	$(6.1 \pm 1.0) \times 10^{-3}$		1487	DESIG=96
$\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-$	$(6.2 \pm 2.4) \times 10^{-4}$		—	DESIG=142
$\gamma\eta(1405/1475) \rightarrow \gamma K\bar{K}\pi$	[i] $(2.8 \pm 0.6) \times 10^{-3}$	S=1.6	1223	DESIG=89
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$	$(7.8 \pm 2.0) \times 10^{-5}$	S=1.8	1223	DESIG=171
$\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$	$(3.0 \pm 0.5) \times 10^{-4}$		—	DESIG=170
$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi$	< 8.2 $\times 10^{-5}$	CL=95%	—	DESIG=212
$\gamma\rho\rho$	$(4.5 \pm 0.8) \times 10^{-3}$		1340	DESIG=94
$\gamma\rho\omega$	< 5.4 $\times 10^{-4}$	CL=90%	1338	DESIG=226
$\gamma\rho\phi$	< 8.8 $\times 10^{-5}$	CL=90%	1258	DESIG=227
$\gamma\eta'(958)$	$(5.15 \pm 0.16) \times 10^{-3}$	S=1.2	1400	DESIG=84
$\gamma 2\pi^+ 2\pi^-$	$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9	1517	DESIG=95
$\gamma f_2(1270) f_2(1270)$	$(9.5 \pm 1.7) \times 10^{-4}$		879	DESIG=203
$\gamma f_2(1270) f_2(1270)$ (non resonant)	$(8.2 \pm 1.9) \times 10^{-4}$		—	DESIG=204
$\gamma K^+ K^- \pi^+ \pi^-$	$(2.1 \pm 0.6) \times 10^{-3}$		1407	DESIG=143
$\gamma f_4(2050)$	$(2.7 \pm 0.7) \times 10^{-3}$		891	DESIG=100
$\gamma\omega\omega$	$(1.61 \pm 0.33) \times 10^{-3}$		1336	DESIG=97
$\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$	$(1.7 \pm 0.4) \times 10^{-3}$	S=1.3	1223	DESIG=124
$\gamma f_2(1270)$	$(1.43 \pm 0.11) \times 10^{-3}$		1286	DESIG=86
$\gamma f_0(1710) \rightarrow \gamma K\bar{K}$	$(8.5 \pm 1.2 \pm 0.9) \times 10^{-4}$	S=1.2	1075	DESIG=91
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	$(4.0 \pm 1.0) \times 10^{-4}$		—	DESIG=135
$\gamma f_0(1710) \rightarrow \gamma\omega\omega$	$(3.1 \pm 1.0) \times 10^{-4}$		—	DESIG=221
$\gamma\eta$	$(1.104 \pm 0.034) \times 10^{-3}$		1500	DESIG=83

NODE=M070;CLUMP=C

$\gamma f_1(1420) \rightarrow \gamma K \bar{K} \pi$	$(7.9 \pm 1.3) \times 10^{-4}$		1220	DESIG=175
$\gamma f_1(1285)$	$(6.1 \pm 0.8) \times 10^{-4}$		1283	DESIG=88
$\gamma f_1(1510) \rightarrow \gamma \eta \pi^+ \pi^-$	$(4.5 \pm 1.2) \times 10^{-4}$		—	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
$\gamma f_0(1800) \rightarrow \gamma \omega \phi$	$(2.5 \pm 0.6) \times 10^{-4}$		—	DESIG=262
$\gamma f_2(1950) \rightarrow$	$(7.0 \pm 2.2) \times 10^{-4}$		—	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
$\gamma X(1835) \rightarrow \gamma p \bar{p}$	$(7.7^{+1.5}_{-0.9}) \times 10^{-5}$		—	DESIG=254
$\gamma X(1840) \rightarrow \gamma 3(\pi^+ \pi^-)$	$(2.4^{+0.7}_{-0.8}) \times 10^{-5}$		—	DESIG=264
$\gamma (K \bar{K} \pi) [J^{PC} = 0^{-+}]$	$(7 \pm 4) \times 10^{-4}$	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
$\gamma A \rightarrow \gamma \text{invisible}$	$[v] < 6.3 \times 10^{-6}$	CL=90%	—	DESIG=251
$\gamma A^0 \rightarrow \gamma \mu^+ \mu^-$	$[x] < 2.1 \times 10^{-5}$	CL=90%	—	DESIG=259

Weak decays

$D^- e^+ \nu_e + \text{c.c.}$	$< 1.2 \times 10^{-5}$	CL=90%	984	NODE=M070;CLUMP=E DESIG=218
$D^0 e^+ e^- + \text{c.c.}$	$< 1.1 \times 10^{-5}$	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
$D^0 \bar{K}^0 + \text{c.c.}$	$< 1.7 \times 10^{-4}$	CL=90%	898	DESIG=242
$D_s^- \pi^+ + \text{c.c.}$	$< 1.3 \times 10^{-4}$	CL=90%	916	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	$< 1.6 \times 10^{-7}$	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%	—	NODE=M070;CLUMP=F DESIG=240
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 $\chi_{c0}(1P)$

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

Mass $m = 3414.75 \pm 0.31$ MeVFull width $\Gamma = 10.5 \pm 0.6$ 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
$2(\pi^+\pi^-)$	$(2.24 \pm 0.18) \%$		1679	DESIG=3
$\rho^0 \pi^+\pi^-$	$(8.7 \pm 2.8) \times 10^{-3}$		1607	DESIG=9
$f_0(980) f_0(980)$	$(6.5 \pm 2.1) \times 10^{-4}$		1391	DESIG=20
$\pi^+\pi^-\pi^0\pi^0$	$(3.3 \pm 0.4) \%$		1680	DESIG=61
$\rho^+\pi^-\pi^0 + \text{c.c.}$	$(2.8 \pm 0.4) \%$		1607	DESIG=62
$4\pi^0$	$(3.2 \pm 0.4) \times 10^{-3}$		1681	DESIG=70
$\pi^+\pi^-K^+K^-$	$(1.75 \pm 0.14) \%$		1580	DESIG=5
$K_0^*(1430)^0 \bar{K}_0^*(1430)^0 \rightarrow \pi^+\pi^-K^+K^-$	$(9.6 \pm_{-2.8}^{+3.5}) \times 10^{-4}$		—	DESIG=31
$K_0^*(1430)^0 \bar{K}_2^*(1430)^0 + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$(7.8 \pm_{-2.4}^{+1.9}) \times 10^{-4}$		—	DESIG=32
$K_1(1270)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$(6.1 \pm 1.9) \times 10^{-3}$		—	DESIG=33
$K_1(1400)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$< 2.6 \times 10^{-3}$	CL=90%	—	DESIG=34
$f_0(980) f_0(980)$	$(1.6 \pm_{-0.9}^{+1.0}) \times 10^{-4}$		1391	DESIG=23
$f_0(980) f_0(2200)$	$(7.8 \pm_{-2.5}^{+2.0}) \times 10^{-4}$		584	DESIG=24
$f_0(1370) f_0(1370)$	$< 2.7 \times 10^{-4}$	CL=90%	1019	DESIG=25
$f_0(1370) f_0(1500)$	$< 1.7 \times 10^{-4}$	CL=90%	920	DESIG=26
$f_0(1370) f_0(1710)$	$(6.6 \pm_{-2.3}^{+3.5}) \times 10^{-4}$		721	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%	557	DESIG=30
$K^+K^-\pi^+\pi^-\pi^0$	$(1.11 \pm 0.26) \%$		1545	DESIG=75
$K^+K^-\pi^0\pi^0$	$(5.4 \pm 0.9) \times 10^{-3}$		1582	DESIG=63
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$	$(2.44 \pm 0.33) \%$		1581	DESIG=65
$\rho^+K^-K^0 + \text{c.c.}$	$(1.18 \pm 0.21) \%$		1458	DESIG=66
$K^*(892)^-K^+\pi^0 \rightarrow K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$	$(4.5 \pm 1.1) \times 10^{-3}$		—	DESIG=67
$K_S^0 K_S^0 \pi^+\pi^-$	$(5.6 \pm 1.0) \times 10^{-3}$		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
$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	$(7.2 \pm 1.6) \times 10^{-3}$		1523	DESIG=10
$K^*(892)^0 \bar{K}^*(892)^0$	$(1.7 \pm 0.6) \times 10^{-3}$		1456	DESIG=21
$\pi\pi$	$(8.33 \pm 0.35) \times 10^{-3}$		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
$\eta\eta$	$(2.95 \pm 0.19) \times 10^{-3}$		1617	DESIG=13
$\eta\eta'$	$< 2.3 \times 10^{-4}$	CL=90%	1521	DESIG=37
$\eta'\eta'$	$(1.96 \pm 0.21) \times 10^{-3}$		1413	DESIG=46
$\omega\omega$	$(9.5 \pm 1.1) \times 10^{-4}$		1517	DESIG=22
$\omega\phi$	$(1.16 \pm 0.21) \times 10^{-4}$		1447	DESIG=76
K^+K^-	$(5.91 \pm 0.32) \times 10^{-3}$		1634	DESIG=2
$K_S^0 K_S^0$	$(3.10 \pm 0.18) \times 10^{-3}$		1633	DESIG=15
$\pi^+\pi^-\eta$	$< 1.9 \times 10^{-4}$	CL=90%	1651	DESIG=50
$\pi^+\pi^-\eta'$	$< 3.5 \times 10^{-4}$	CL=90%	1560	DESIG=53
$\bar{K}^0 K^+\pi^- + \text{c.c.}$	$< 9 \times 10^{-5}$	CL=90%	1610	DESIG=17
$K^+K^-\pi^0$	$< 6 \times 10^{-5}$	CL=90%	1611	DESIG=47
$K^+K^-\eta$	$< 2.2 \times 10^{-4}$	CL=90%	1512	DESIG=51
$K^+K^-K_S^0 K_S^0$	$(1.4 \pm 0.5) \times 10^{-3}$		1331	DESIG=42
$K^+K^-K^+K^-$	$(2.75 \pm 0.28) \times 10^{-3}$		1333	DESIG=14
$K^+K^-\phi$	$(9.5 \pm 2.4) \times 10^{-4}$		1381	DESIG=44
$\phi\phi$	$(7.7 \pm 0.7) \times 10^{-4}$		1370	DESIG=16

$p\bar{p}$	$(2.25 \pm 0.09) \times 10^{-4}$		1426	DESIG=11
$p\bar{p}\pi^0$	$(6.8 \pm 0.7) \times 10^{-4}$	S=1.3	1379	DESIG=48
$p\bar{p}\eta$	$(3.5 \pm 0.4) \times 10^{-4}$		1187	DESIG=52
$p\bar{p}\omega$	$(5.1 \pm 0.6) \times 10^{-4}$		1043	DESIG=69
$p\bar{p}\phi$	$(5.9 \pm 1.4) \times 10^{-5}$		876	DESIG=74
$p\bar{p}\pi^+\pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4	1320	DESIG=8
$p\bar{p}\pi^0\pi^0$	$(1.02 \pm 0.27) \times 10^{-3}$		1324	DESIG=64
$p\bar{p}K^+K^-$ (non-resonant)	$(1.19 \pm 0.26) \times 10^{-4}$		890	DESIG=71
$p\bar{p}K_S^0 K_S^0$	$< 8.8 \times 10^{-4}$	CL=90%	884	DESIG=40
$p\bar{n}\pi^-$	$(1.24 \pm 0.11) \times 10^{-3}$		1376	DESIG=43
$\bar{p}n\pi^+$	$(1.34 \pm 0.12) \times 10^{-3}$		1376	DESIG=82
$p\bar{n}\pi^-\pi^0$	$(2.29 \pm 0.21) \times 10^{-3}$		1321	DESIG=83
$\bar{p}n\pi^+\pi^0$	$(2.16 \pm 0.18) \times 10^{-3}$		1321	DESIG=84
$\Lambda\bar{\Lambda}$	$(3.21 \pm 0.25) \times 10^{-4}$		1292	DESIG=19
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$(1.15 \pm 0.13) \times 10^{-3}$		1153	DESIG=38
$\Lambda\bar{\Lambda}\pi^+\pi^-$ (non-resonant)	$< 5 \times 10^{-4}$	CL=90%	1153	DESIG=77
$\Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.}$	$< 5 \times 10^{-4}$	CL=90%	1083	DESIG=78
$\Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.}$	$< 5 \times 10^{-4}$	CL=90%	1083	DESIG=79
$K^+\bar{p}\Lambda + \text{c.c.}$	$(1.22 \pm 0.12) \times 10^{-3}$	S=1.3	1132	DESIG=49
$K^+\bar{p}\Lambda(1520) + \text{c.c.}$	$(2.9 \pm 0.7) \times 10^{-4}$		858	DESIG=72
$\Lambda(1520)\bar{\Lambda}(1520)$	$(3.1 \pm 1.2) \times 10^{-4}$		779	DESIG=73
$\Sigma^0\bar{\Sigma}^0$	$(4.4 \pm 0.4) \times 10^{-4}$		1222	DESIG=58
$\Sigma^+\bar{\Sigma}^-$	$(3.9 \pm 0.7) \times 10^{-4}$	S=1.7	1225	DESIG=59
$\Sigma(1385)^+\bar{\Sigma}(1385)^-$	$(1.6 \pm 0.6) \times 10^{-4}$		1001	DESIG=80
$\Sigma(1385)^-\bar{\Sigma}(1385)^+$	$(2.3 \pm 0.6) \times 10^{-4}$		1001	DESIG=81
$\Xi^0\bar{\Xi}^0$	$(3.1 \pm 0.8) \times 10^{-4}$		1089	DESIG=60
$\Xi^-\bar{\Xi}^+$	$(4.7 \pm 0.7) \times 10^{-4}$		1081	DESIG=39

Radiative decays

$\gamma J/\psi(1S)$	$(1.27 \pm 0.06) \%$		303	NODE=M056;CLUMP=B
$\gamma\rho^0$	$< 9 \times 10^{-6}$	CL=90%	1619	DESIG=6
$\gamma\omega$	$< 8 \times 10^{-6}$	CL=90%	1618	DESIG=55
$\gamma\phi$	$< 6 \times 10^{-6}$	CL=90%	1555	DESIG=56
$\gamma\gamma$	$(2.23 \pm 0.13) \times 10^{-4}$		1707	DESIG=57

 $\chi_{c1}(1P)$

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

NODE=M055

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

NODE=M055M;DTYPE=M

NODE=M055W;DTYPE=G

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
Hadronic decays				NODE=M055215;NODE=M055;CLUMP=A
$3(\pi^+\pi^-)$	$(5.8 \pm 1.4) \times 10^{-3}$	S=1.2	1683	DESIG=6
$2(\pi^+\pi^-)$	$(7.6 \pm 2.6) \times 10^{-3}$		1728	DESIG=5
$\pi^+\pi^-\pi^0\pi^0$	$(1.22 \pm 0.16) \%$		1729	DESIG=51
$\rho^+\pi^-\pi^0 + \text{c.c.}$	$(1.48 \pm 0.25) \%$		1658	DESIG=52
$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$		1657	DESIG=9
$4\pi^0$	$(5.5 \pm 0.8) \times 10^{-4}$		1729	DESIG=60
$\pi^+\pi^-K^+K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		1632	DESIG=7
$K^+K^-\pi^0\pi^0$	$(1.14 \pm 0.28) \times 10^{-3}$		1634	DESIG=53
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$	$(8.7 \pm 1.4) \times 10^{-3}$		1632	DESIG=55
$\rho^-K^+\bar{K}^0 + \text{c.c.}$	$(5.1 \pm 1.2) \times 10^{-3}$		1514	DESIG=56
$K^*(892)^0\bar{K}^0\pi^0 \rightarrow$ $K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$	$(2.4 \pm 0.7) \times 10^{-3}$		—	DESIG=57
$K^+K^-\eta\pi^0$	$(1.14 \pm 0.35) \times 10^{-3}$		1523	DESIG=58
$\pi^+\pi^-K_S^0K_S^0$	$(7.0 \pm 3.0) \times 10^{-4}$		1630	DESIG=28
$K^+K^-\eta$	$(3.2 \pm 1.0) \times 10^{-4}$		1566	DESIG=42
$\bar{K}^0K^+\pi^- + \text{c.c.}$	$(7.1 \pm 0.6) \times 10^{-3}$		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
$K_J^*(1430)^+K^- + \text{c.c.} \rightarrow$ $K_S^0K^+\pi^- + \text{c.c.}$	$< 2.2 \times 10^{-3}$	CL=90%	—	DESIG=35
$K^+K^-\pi^0$	$(1.85 \pm 0.25) \times 10^{-3}$		1662	DESIG=38
$\eta\pi^+\pi^-$	$(4.9 \pm 0.5) \times 10^{-3}$		1701	DESIG=31
$a_0(980)^+\pi^- + \text{c.c.} \rightarrow \eta\pi^+\pi^-$	$(1.8 \pm 0.6) \times 10^{-3}$		—	DESIG=36
$f_2(1270)\eta$	$(2.7 \pm 0.8) \times 10^{-3}$		1468	DESIG=37
$\pi^+\pi^-\eta'$	$(2.3 \pm 0.5) \times 10^{-3}$		1612	DESIG=44
$\pi^0f_0(980) \rightarrow \pi^0\pi^+\pi^-$	$< 6 \times 10^{-6}$	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
$K^+K^-K_S^0K_S^0$	$< 4 \times 10^{-4}$	CL=90%	1390	DESIG=29
$K^+K^-K^+K^-$	$(5.5 \pm 1.1) \times 10^{-4}$		1393	DESIG=14
$K^+K^-\phi$	$(4.2 \pm 1.6) \times 10^{-4}$		1440	DESIG=30
$\omega\omega$	$(5.8 \pm 0.7) \times 10^{-4}$		1571	DESIG=66
$\omega\phi$	$(2.1 \pm 0.6) \times 10^{-5}$		1503	DESIG=67
$\phi\phi$	$(4.2 \pm 0.5) \times 10^{-4}$		1429	DESIG=68
$p\bar{p}$	$(7.72 \pm 0.35) \times 10^{-5}$		1484	DESIG=11
$p\bar{p}\pi^0$	$(1.59 \pm 0.19) \times 10^{-4}$		1438	DESIG=39
$p\bar{p}\eta$	$(1.48 \pm 0.25) \times 10^{-4}$		1254	DESIG=43
$p\bar{p}\omega$	$(2.16 \pm 0.31) \times 10^{-4}$		1117	DESIG=59
$p\bar{p}\phi$	$< 1.8 \times 10^{-5}$	CL=90%	962	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)	$(1.30 \pm 0.23) \times 10^{-4}$		974	DESIG=62
$p\bar{p}K_S^0K_S^0$	$< 4.5 \times 10^{-4}$	CL=90%	968	DESIG=25
$p\bar{n}\pi^-$	$(3.9 \pm 0.5) \times 10^{-4}$		1435	DESIG=74
$\bar{p}n\pi^+$	$(4.0 \pm 0.5) \times 10^{-4}$		1435	DESIG=75
$p\bar{n}\pi^-\pi^0$	$(1.05 \pm 0.12) \times 10^{-3}$		1383	DESIG=76
$\bar{p}n\pi^+\pi^0$	$(1.03 \pm 0.12) \times 10^{-3}$		1383	DESIG=77
$\Lambda\bar{\Lambda}$	$(1.16 \pm 0.12) \times 10^{-4}$		1355	DESIG=19
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$(3.0 \pm 0.5) \times 10^{-4}$		1223	DESIG=24
$\Lambda\bar{\Lambda}\pi^+\pi^-$ (non-resonant)	$(2.5 \pm 0.6) \times 10^{-4}$		1223	DESIG=69
$\Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.}$	$< 1.3 \times 10^{-4}$	CL=90%	1157	DESIG=70
$\Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.}$	$< 1.3 \times 10^{-4}$	CL=90%	1157	DESIG=71
$K^+\bar{p}\Lambda$	$(4.2 \pm 0.4) \times 10^{-4}$	S=1.1	1203	DESIG=40

$K^+ \bar{p} \Lambda(1520) + \text{c.c.}$	$(1.7 \pm 0.5) \times 10^{-4}$		950	DESIG=63
$\Lambda(1520) \bar{\Lambda}(1520)$	$< 1.0 \times 10^{-4}$	CL=90%	879	DESIG=64
$\Sigma^0 \bar{\Sigma}^0$	$< 4 \times 10^{-5}$	CL=90%	1288	DESIG=48
$\Sigma^+ \bar{\Sigma}^-$	$< 6 \times 10^{-5}$	CL=90%	1291	DESIG=49
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	$< 1.0 \times 10^{-4}$	CL=90%	1081	DESIG=72
$\Sigma(1385)^- \bar{\Sigma}(1385)^+$	$< 5 \times 10^{-5}$	CL=90%	1081	DESIG=73
$\Xi^0 \bar{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%	1163	DESIG=50
$\Xi^- \bar{\Xi}^+$	$(8.2 \pm 2.2) \times 10^{-5}$		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%	1683	DESIG=27

Radiative decays

$\gamma J/\psi(1S)$	$(33.9 \pm 1.2) \%$		389	NODE=M055;CLUMP=B DESIG=1
$\gamma \rho^0$	$(2.20 \pm 0.18) \times 10^{-4}$		1670	DESIG=45
$\gamma \omega$	$(6.9 \pm 0.8) \times 10^{-5}$		1668	DESIG=46
$\gamma \phi$	$(2.5 \pm 0.5) \times 10^{-5}$		1607	DESIG=47

 $h_c(1P)$

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

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

NODE=M144

NODE=M144M;DTYPE=M

NODE=M144W;DTYPE=G

$h_c(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
$J/\psi(1S) \pi \pi$	not seen		312
$p \bar{p}$	$< 1.5 \times 10^{-4}$	90%	1492
$\eta_c(1S) \gamma$	$(51 \pm 6) \%$		500
$\pi^+ \pi^- \pi^0$	$< 2.2 \times 10^{-3}$		1749
$2\pi^+ 2\pi^- \pi^0$	$(2.2^{+0.8}_{-0.7}) \%$		1716
$3\pi^+ 3\pi^- \pi^0$	$< 2.9 \%$		1661

NODE=M144215;DESIG=2;OUR EST;
→ UNCHECKED ←

DESIG=3

DESIG=4

DESIG=5

DESIG=6

DESIG=7

 $\chi_{c2}(1P)$

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

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

NODE=M057

NODE=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
$2(\pi^+\pi^-)$	(1.07±0.10) %		1751	DESIG=3
$\pi^+\pi^-\pi^0\pi^0$	(1.92±0.25) %		1752	DESIG=50
$\rho^+\pi^-\pi^0 + \text{c.c.}$	(2.3 ±0.4) %		1682	DESIG=51
$4\pi^0$	(1.16±0.16) × 10 ⁻³		1752	DESIG=62
$K^+K^-\pi^0\pi^0$	(2.2 ±0.4) × 10 ⁻³		1658	DESIG=52
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$	(1.44±0.21) %		1657	DESIG=54
$\rho^-K^+\bar{K}^0 + \text{c.c.}$	(4.3 ±1.3) × 10 ⁻³		1540	DESIG=55
$K^*(892)^0K^-\pi^+ \rightarrow$	(3.1 ±0.8) × 10 ⁻³		—	DESIG=60
$K^-\pi^+K^0\pi^0 + \text{c.c.}$				
$K^*(892)^0\bar{K}^0\pi^0 \rightarrow$	(4.0 ±0.9) × 10 ⁻³		—	DESIG=56
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$				
$K^*(892)^-K^+\pi^0 \rightarrow$	(3.9 ±0.9) × 10 ⁻³		—	DESIG=57
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$				
$K^*(892)^+\bar{K}^0\pi^- \rightarrow$	(3.1 ±0.8) × 10 ⁻³		—	DESIG=58
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$				
$K^+K^-\eta\pi^0$	(1.3 ±0.5) × 10 ⁻³		1549	DESIG=59
$K^+K^-\pi^+\pi^-$	(8.8 ±1.0) × 10 ⁻³		1656	DESIG=5
$K^+K^-\pi^+\pi^-\pi^0$	(1.23±0.34) %		1623	DESIG=67
$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	(2.2 ±1.1) × 10 ⁻³		1602	DESIG=10
$K^*(892)^0\bar{K}^*(892)^0$	(2.4 ±0.5) × 10 ⁻³		1538	DESIG=21
$3(\pi^+\pi^-)$	(8.6 ±1.8) × 10 ⁻³		1707	DESIG=4
$\phi\phi$	(1.12±0.10) × 10 ⁻³		1457	DESIG=16
$\omega\omega$	(8.8 ±1.1) × 10 ⁻⁴		1597	DESIG=25
$\pi\pi$	(2.33±0.12) × 10 ⁻³		1773	DESIG=22
$\rho^0\pi^+\pi^-$	(3.8 ±1.6) × 10 ⁻³		1682	DESIG=9
$\pi^+\pi^-\eta$	(5.0 ±1.3) × 10 ⁻⁴		1724	DESIG=39
$\pi^+\pi^-\eta'$	(5.2 ±1.9) × 10 ⁻⁴		1636	DESIG=42
$\eta\eta$	(5.7 ±0.5) × 10 ⁻⁴		1692	DESIG=14
K^+K^-	(1.05±0.07) × 10 ⁻³		1708	DESIG=2
$K_S^0K_S^0$	(5.5 ±0.4) × 10 ⁻⁴		1707	DESIG=15
$\bar{K}^0K^+\pi^- + \text{c.c.}$	(1.34±0.19) × 10 ⁻³		1685	DESIG=17
$K^+K^-\pi^0$	(3.2 ±0.8) × 10 ⁻⁴		1686	DESIG=36
$K^+K^-\eta$	< 3.4 × 10 ⁻⁴	90%	1592	DESIG=40
$\eta\eta'$	< 6 × 10 ⁻⁵	90%	1600	DESIG=34
$\eta'\eta'$	< 1.0 × 10 ⁻⁴	90%	1498	DESIG=35
$\pi^+\pi^-K_S^0K_S^0$	(2.3 ±0.6) × 10 ⁻³		1655	DESIG=29
$K^+K^-K_S^0K_S^0$	< 4 × 10 ⁻⁴	90%	1418	DESIG=30
$K^+K^-K^+K^-$	(1.73±0.21) × 10 ⁻³		1421	DESIG=24
$K^+K^-\phi$	(1.48±0.31) × 10 ⁻³		1468	DESIG=32
$p\bar{p}$	(7.5 ±0.4) × 10 ⁻⁵		1510	DESIG=11
$p\bar{p}\pi^0$	(4.9 ±0.4) × 10 ⁻⁴		1465	DESIG=37
$p\bar{p}\eta$	(1.82±0.26) × 10 ⁻⁴		1285	DESIG=41
$p\bar{p}\omega$	(3.8 ±0.5) × 10 ⁻⁴		1152	DESIG=61
$p\bar{p}\phi$	(2.9 ±0.9) × 10 ⁻⁵		1002	DESIG=66
$p\bar{p}\pi^+\pi^-$	(1.32±0.34) × 10 ⁻³		1410	DESIG=8
$p\bar{p}\pi^0\pi^0$	(8.2 ±2.5) × 10 ⁻⁴		1414	DESIG=53
$p\bar{p}K^+K^-$ (non-resonant)	(2.00±0.34) × 10 ⁻⁴		1013	DESIG=63
$p\bar{p}K_S^0K_S^0$	< 7.9 × 10 ⁻⁴	90%	1007	DESIG=28
$p\bar{n}\pi^-$	(8.9 ±1.0) × 10 ⁻⁴		1463	DESIG=31
$\bar{p}n\pi^+$	(9.3 ±0.9) × 10 ⁻⁴		1463	DESIG=75
$p\bar{n}\pi^-\pi^0$	(2.27±0.19) × 10 ⁻³		1411	DESIG=76
$\bar{p}n\pi^+\pi^0$	(2.21±0.20) × 10 ⁻³		1411	DESIG=77
$\Lambda\bar{\Lambda}$	(1.92±0.16) × 10 ⁻⁴		1385	DESIG=19
$\Lambda\bar{\Lambda}\pi^+\pi^-$	(1.31±0.17) × 10 ⁻³		1255	DESIG=27
$\Lambda\bar{\Lambda}\pi^+\pi^-$ (non-resonant)	(6.9 ±1.6) × 10 ⁻⁴		1255	DESIG=70

$\Sigma(1385)^+ \bar{\Lambda} \pi^- + \text{c.c.}$	< 4	$\times 10^{-4}$	90%	1192	DESIG=71
$\Sigma(1385)^- \bar{\Lambda} \pi^+ + \text{c.c.}$	< 6	$\times 10^{-4}$	90%	1192	DESIG=72
$K^+ \bar{p} \Lambda + \text{c.c.}$	(8.1 ± 0.6)	$\times 10^{-4}$		1236	DESIG=38
$K^+ \bar{p} \Lambda(1520) + \text{c.c.}$	(2.9 ± 0.7)	$\times 10^{-4}$		992	DESIG=64
$\Lambda(1520) \bar{\Lambda}(1520)$	(4.8 ± 1.5)	$\times 10^{-4}$		923	DESIG=65
$\Sigma^0 \bar{\Sigma}^0$	< 6	$\times 10^{-5}$	90%	1319	DESIG=47
$\Sigma^+ \bar{\Sigma}^-$	< 7	$\times 10^{-5}$	90%	1322	DESIG=48
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	< 1.6	$\times 10^{-4}$	90%	1118	DESIG=73
$\Sigma(1385)^- \bar{\Sigma}(1385)^+$	< 8	$\times 10^{-5}$	90%	1118	DESIG=74
$\Xi^0 \bar{\Xi}^0$	< 1.1	$\times 10^{-4}$	90%	1197	DESIG=49
$\Xi^- \bar{\Xi}^+$	(1.48 ± 0.33)	$\times 10^{-4}$		1189	DESIG=26
$J/\psi(1S) \pi^+ \pi^- \pi^0$	< 1.5	%	90%	185	DESIG=12
$\eta_c(1S) \pi^+ \pi^-$	< 2.2	%	90%	459	DESIG=69

Radiative decays

$\gamma J/\psi(1S)$	(19.2 ± 0.7)	%		430	NODE=M057;CLUMP=B DESIG=6
$\gamma \rho^0$	< 2.0	$\times 10^{-5}$	90%	1694	DESIG=44
$\gamma \omega$	< 6	$\times 10^{-6}$	90%	1692	DESIG=45
$\gamma \phi$	< 8	$\times 10^{-6}$	90%	1632	DESIG=46
$\gamma \gamma$	(2.74 ± 0.14)	$\times 10^{-4}$		1778	DESIG=7

 $\eta_c(2S)$

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

NODE=M059

Quantum numbers are quark model predictions.

$$\text{Mass } m = 3639.4 \pm 1.3 \text{ MeV} \quad (S = 1.2)$$

$$\text{Full width } \Gamma = 11.3^{+3.2}_{-2.9} \text{ MeV}$$

NODE=M059M;DTYPE=M

NODE=M059W;DTYPE=G

$\eta_c(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
hadrons	not seen		—
$K \bar{K} \pi$	(1.9 ± 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 ± 1.0) %		1668
$K^+ K^- 2\pi^+ 2\pi^-$	not seen		1628
$K_S^0 K^- 2\pi^+ \pi^- + \text{c.c.}$	seen		1667
$2K^+ 2K^-$	not seen		1471
$\phi \phi$	not seen		1507
$p \bar{p}$	< 2.0	$\times 10^{-3}$	90% 1559
$\gamma \gamma$	(1.9 ± 1.3)	$\times 10^{-4}$	1820
$\pi^+ \pi^- \eta$	not seen		1767
$\pi^+ \pi^- \eta'$	not seen		1681
$K^+ K^- \eta$	not seen		1638
$\pi^+ \pi^- \eta_c(1S)$	< 25	%	90% 539

 $\psi(2S)$

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

NODE=M071

$$\text{Mass } m = 3686.109^{+0.012}_{-0.014} \text{ MeV}$$

$$\text{Full width } \Gamma = 299 \pm 8 \text{ keV}$$

$$\Gamma_{ee} = 2.36 \pm 0.04 \text{ keV}$$

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
$e^+ e^-$	(7.89 $\pm$ 0.17) $\times 10^{-3}$		1843	DESIG=1
$\mu^+ \mu^-$	(7.9 $\pm$ 0.9) $\times 10^{-3}$		1840	DESIG=2
$\tau^+ \tau^-$	(3.1 $\pm$ 0.4) $\times 10^{-3}$		490	DESIG=68
Decays into $J/\psi(1S)$ and anything				NODE=M071;CLUMP=A
$J/\psi(1S)$ anything	(60.9 $\pm$ 0.6) %		—	DESIG=11
$J/\psi(1S)$ neutrals	(25.10 $\pm$ 0.33) %		—	DESIG=12
$J/\psi(1S) \pi^+ \pi^-$	(34.45 $\pm$ 0.30) %		477	DESIG=13
$J/\psi(1S) \pi^0 \pi^0$	(18.13 $\pm$ 0.31) %		481	DESIG=14
$J/\psi(1S) \eta$	(3.36 $\pm$ 0.05) %		199	DESIG=15
$J/\psi(1S) \pi^0$	(1.268 $\pm$ 0.032) $\times 10^{-3}$		528	DESIG=18
Hadronic decays				NODE=M071;CLUMP=B
$\pi^0 h_c(1P)$	(8.6 $\pm$ 1.3) $\times 10^{-4}$		85	DESIG=254
$3(\pi^+ \pi^-) \pi^0$	(3.5 $\pm$ 1.6) $\times 10^{-3}$		1746	DESIG=37
$2(\pi^+ \pi^-) \pi^0$	(2.9 $\pm$ 1.0) $\times 10^{-3}$	S=4.7	1799	DESIG=25
$\rho a_2(1320)$	(2.6 $\pm$ 0.9) $\times 10^{-4}$		1500	DESIG=65
$p \bar{p}$	(2.80 $\pm$ 0.11) $\times 10^{-4}$		1586	DESIG=27
$\Delta^{++} \bar{\Delta}^{--}$	(1.28 $\pm$ 0.35) $\times 10^{-4}$		1371	DESIG=70
$\Lambda \bar{\Lambda} \pi^0$	< 2.9 $\times 10^{-6}$	CL=90%	1412	DESIG=238
$\Lambda \bar{\Lambda} \eta$	(2.5 $\pm$ 0.4) $\times 10^{-5}$		1197	DESIG=239
$\Lambda \bar{p} K^+$	(1.00 $\pm$ 0.14) $\times 10^{-4}$		1327	DESIG=214
$\Lambda \bar{p} K^+ \pi^+ \pi^-$	(1.8 $\pm$ 0.4) $\times 10^{-4}$		1167	DESIG=215
$\Lambda \bar{\Lambda} \pi^+ \pi^-$	(2.8 $\pm$ 0.6) $\times 10^{-4}$		1346	DESIG=213
$\Lambda \bar{\Lambda}$	(2.8 $\pm$ 0.5) $\times 10^{-4}$	S=2.6	1467	DESIG=28
$\Lambda \bar{\Sigma}^+ \pi^- + \text{c.c.}$	(1.40 $\pm$ 0.13) $\times 10^{-4}$		1376	DESIG=280
$\Lambda \bar{\Sigma}^- \pi^+ + \text{c.c.}$	(1.54 $\pm$ 0.14) $\times 10^{-4}$		1379	DESIG=281
$\Sigma^0 \bar{p} K^+ + \text{c.c.}$	(1.67 $\pm$ 0.18) $\times 10^{-5}$		1291	DESIG=274
$\Sigma^+ \bar{\Sigma}^-$	(2.6 $\pm$ 0.8) $\times 10^{-4}$		1408	DESIG=223
$\Sigma^0 \bar{\Sigma}^0$	(2.2 $\pm$ 0.4) $\times 10^{-4}$	S=1.5	1405	DESIG=71
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	(1.1 $\pm$ 0.4) $\times 10^{-4}$		1218	DESIG=72
$\Xi^- \bar{\Xi}^+$	(1.8 $\pm$ 0.6) $\times 10^{-4}$	S=2.8	1284	DESIG=29
$\Xi^0 \bar{\Xi}^0$	(2.8 $\pm$ 0.9) $\times 10^{-4}$		1292	DESIG=224
$\Xi(1530)^0 \bar{\Xi}(1530)^0$	(5.2 $\pm$ 3.2 $\pm$ 1.2) $\times 10^{-5}$		1025	DESIG=73
$\Omega^- \bar{\Omega}^+$	< 7.3 $\times 10^{-5}$	CL=90%	774	DESIG=74
$\pi^0 p \bar{p}$	(1.53 $\pm$ 0.07) $\times 10^{-4}$		1543	DESIG=35
$N(940) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(6.4 $\pm$ 1.8 $\pm$ 1.3) $\times 10^{-5}$		—	DESIG=267
$N(1440) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(7.3 $\pm$ 1.7 $\pm$ 1.5) $\times 10^{-5}$	S=2.5	—	DESIG=261
$N(1520) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(6.4 $\pm$ 2.3 $\pm$ 1.8) $\times 10^{-6}$		—	DESIG=268
$N(1535) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(2.5 $\pm$ 1.0) $\times 10^{-5}$		—	DESIG=269
$N(1650) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(3.8 $\pm$ 1.4 $\pm$ 1.7) $\times 10^{-5}$		—	DESIG=270
$N(1720) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(1.79 $\pm$ 0.26 $\pm$ 0.70) $\times 10^{-5}$		—	DESIG=271
$N(2300) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(2.6 $\pm$ 1.2 $\pm$ 0.7) $\times 10^{-5}$		—	DESIG=272
$N(2570) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	(2.13 $\pm$ 0.40 $\pm$ 0.31) $\times 10^{-5}$		—	DESIG=273
$\pi^0 f_0(2100) \rightarrow \pi^0 p \bar{p}$	(1.1 $\pm$ 0.4) $\times 10^{-5}$		—	DESIG=262
$\eta p \bar{p}$	(6.0 $\pm$ 0.4) $\times 10^{-5}$		1373	DESIG=200
$\eta f_0(2100) \rightarrow \eta p \bar{p}$	(1.2 $\pm$ 0.4) $\times 10^{-5}$		—	DESIG=263
$N(1535) \bar{p} \rightarrow \eta p \bar{p}$	(4.4 $\pm$ 0.7) $\times 10^{-5}$		—	DESIG=264
$\omega p \bar{p}$	(6.9 $\pm$ 2.1) $\times 10^{-5}$		1247	DESIG=77

$\phi p \bar{p}$	$< 2.4 \times 10^{-5}$	CL=90%	1109	DESIG=80
$\pi^+ \pi^- p \bar{p}$	$(6.0 \pm 0.4) \times 10^{-4}$		1491	DESIG=31
$p \bar{n} \pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$		—	DESIG=227
$p \bar{n} \pi^- \pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$		1492	DESIG=228
$2(\pi^+ \pi^- \pi^0)$	$(4.7 \pm 1.5) \times 10^{-3}$		1776	DESIG=221
$\eta \pi^+ \pi^-$	$< 1.6 \times 10^{-4}$	CL=90%	1791	DESIG=202
$\eta \pi^+ \pi^- \pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$		1778	DESIG=203
$2(\pi^+ \pi^-) \eta$	$(1.2 \pm 0.6) \times 10^{-3}$		1758	DESIG=251
$\eta' \pi^+ \pi^- \pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$		1692	DESIG=204
$\omega \pi^+ \pi^-$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1	1748	DESIG=75
$b_1^\pm \pi^\mp$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1	1635	DESIG=40
$b_1^0 \pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$		—	DESIG=193
$\omega f_2(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$		1515	DESIG=64
$\pi^+ \pi^- K^+ K^-$	$(7.5 \pm 0.9) \times 10^{-4}$	S=1.9	1726	DESIG=26
$\rho^0 K^+ K^-$	$(2.2 \pm 0.4) \times 10^{-4}$		1616	DESIG=205
$K^*(892)^0 \bar{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		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
$\rho^0 p \bar{p}$	$(5.0 \pm 2.2) \times 10^{-5}$		1252	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
$\eta K^+ K^-$, no $\eta \phi$	$(3.1 \pm 0.4) \times 10^{-5}$		1664	DESIG=207
$\omega K^+ K^-$	$(1.85 \pm 0.25) \times 10^{-4}$	S=1.1	1614	DESIG=76
$\omega K^*(892)^+ K^- + \text{c.c.}$	$(2.07 \pm 0.26) \times 10^{-4}$		1482	DESIG=276
$\omega K_2^*(1430)^+ K^- + \text{c.c.}$	$(6.1 \pm 1.2) \times 10^{-5}$		1253	DESIG=277
$\omega \bar{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$		1481	DESIG=278
$\omega \bar{K}_2^*(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$		1251	DESIG=279
$\omega X(1440) \rightarrow \omega K_S^0 K^- \pi^+ + \text{c.c.}$	$(1.6 \pm 0.4) \times 10^{-5}$		—	DESIG=282
$\omega X(1440) \rightarrow \omega K^+ K^- \pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$		—	DESIG=283
$\omega f_1(1285) \rightarrow \omega K_S^0 K^- \pi^+ + \text{c.c.}$	$(3.0 \pm 1.0) \times 10^{-6}$		—	DESIG=284
$\omega f_1(1285) \rightarrow \omega K^+ K^- \pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$		—	DESIG=285
$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8	1774	DESIG=32
$p \bar{p} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$		1435	DESIG=211
$K^+ K^-$	$(7.1 \pm 0.5) \times 10^{-5}$	S=1.5	1776	DESIG=23
$K_S^0 K_L^0$	$(5.34 \pm 0.33) \times 10^{-5}$		1775	DESIG=85
$\pi^+ \pi^- \pi^0$	$(2.01 \pm 0.17) \times 10^{-4}$	S=1.7	1830	DESIG=36
$\rho(2150) \pi \rightarrow \pi^+ \pi^- \pi^0$	$(1.9 \pm 1.2 \pm 0.4) \times 10^{-4}$		—	DESIG=201
$\rho(770) \pi \rightarrow \pi^+ \pi^- \pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8	—	DESIG=22
$\pi^+ \pi^-$	$(7.8 \pm 2.6) \times 10^{-6}$		1838	DESIG=21
$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%	1532	DESIG=42
$K_2^*(1430)^\pm K^\mp$	$(7.1 \pm 1.3 \pm 0.9) \times 10^{-5}$		—	DESIG=265
$K^+ K^- \pi^0$	$(4.07 \pm 0.31) \times 10^{-5}$		1754	DESIG=38
$K^+ K^*(892)^- + \text{c.c.}$	$(2.9 \pm 0.4) \times 10^{-5}$	S=1.2	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

$\phi f_0(980) \rightarrow \pi^+ \pi^-$	$(6.8 \pm 2.4) \times 10^{-5}$	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
$\phi \eta$	$(3.10 \pm 0.31) \times 10^{-5}$		1654	DESIG=89
$\phi \eta'$	$(3.1 \pm 1.6) \times 10^{-5}$		1555	DESIG=90
$\omega \eta'$	$(3.2 \pm 2.5 \pm 2.1) \times 10^{-5}$		1623	DESIG=91
$\omega \pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$		1757	DESIG=92
$\rho \eta'$	$(1.9 \pm 1.7 \pm 1.2) \times 10^{-5}$		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
$\phi \pi^0$	$< 4 \times 10^{-7}$	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
$\Lambda n K_S^0 + \text{c.c.}$	$(8.1 \pm 1.8) \times 10^{-5}$		1324	DESIG=237
$\phi f'_2(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$		1321	DESIG=67
$\Theta(1540) \bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.}$	$< 8.8 \times 10^{-6}$	CL=90%	—	DESIG=195
$\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$	$< 1.0 \times 10^{-5}$	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

NODE=M071;CLUMP=C

$\gamma \chi_{c0}(1P)$	$(9.99 \pm 0.27) \%$		261	DESIG=56
$\gamma \chi_{c1}(1P)$	$(9.55 \pm 0.31) \%$		171	DESIG=58
$\gamma \chi_{c2}(1P)$	$(9.11 \pm 0.31) \%$		128	DESIG=59
$\gamma \eta_c(1S)$	$(3.4 \pm 0.5) \times 10^{-3}$	S=1.3	636	DESIG=61
$\gamma \eta_c(2S)$	$(7 \pm 5) \times 10^{-4}$		46	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
$\gamma K^{*0} K^+ \pi^- + \text{c.c.}$	$(3.7 \pm 0.9) \times 10^{-4}$		1674	DESIG=242
$\gamma K^{*0} \bar{K}^{*0}$	$(2.4 \pm 0.7) \times 10^{-4}$		1613	DESIG=243
$\gamma K_S^0 K^+ \pi^- + \text{c.c.}$	$(2.6 \pm 0.5) \times 10^{-4}$		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
$\gamma X(1835) \rightarrow \gamma p \bar{p}$	$(4.6 \pm 1.8 \pm 4.0) \times 10^{-6}$		—	DESIG=259
$\gamma X \rightarrow \gamma p \bar{p}$	$[\gamma] < 2 \times 10^{-6}$	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
$\gamma \gamma J/\psi$	$(3.1 \pm 1.0 \pm 1.2) \times 10^{-4}$		542	DESIG=266

Other decays

invisible

< 1.6

%

CL=90%

—

NODE=M071;CLUMP=D
DESIG=275

 $\psi(3770)$

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

Mass $m = 3773.15 \pm 0.33$ MeVFull width $\Gamma = 27.2 \pm 1.0$ MeV $\Gamma_{ee} = 0.262 \pm 0.018$ keV (S = 1.4)

In addition to the dominant decay mode to $D\bar{D}$, $\psi(3770)$ 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=M053

NODE=M053M;DTYPE=M

NODE=M053W;DTYPE=G

NODE=M053W1;DTYPE=E

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	286
$D^0\bar{D}^0$	(52 ± 5) %	S=2.0	286
D^+D^-	(41 ± 4) %	S=2.0	252
$J/\psi\pi^+\pi^-$	(1.93 ± 0.28) $\times 10^{-3}$		560
$J/\psi\pi^0\pi^0$	(8.0 ± 3.0) $\times 10^{-4}$		564
$J/\psi\eta$	(9 ± 4) $\times 10^{-4}$		360
$J/\psi\pi^0$	< 2.8 $\times 10^{-4}$	CL=90%	603
e^+e^-	(9.6 ± 0.7) $\times 10^{-6}$	S=1.3	1887

DESIG=2

DESIG=5

DESIG=6

DESIG=4

DESIG=46

DESIG=47

DESIG=48

DESIG=1

Decays to light hadrons

$b_1(1235)\pi$	< 1.4	$\times 10^{-5}$	CL=90%	1683	NODE=M053;CLUMP=H
$\phi\eta'$	< 7	$\times 10^{-4}$	CL=90%	1607	DESIG=20
$\omega\eta'$	< 4	$\times 10^{-4}$	CL=90%	1672	DESIG=17
$\rho^0\eta'$	< 6	$\times 10^{-4}$	CL=90%	1674	DESIG=16
$\phi\eta$	(3.1 ± 0.7) $\times 10^{-4}$			1703	DESIG=15
$\omega\eta$	< 1.4	$\times 10^{-5}$	CL=90%	1762	DESIG=8
$\rho^0\eta$	< 5	$\times 10^{-4}$	CL=90%	1764	DESIG=14
$\phi\pi^0$	< 3	$\times 10^{-5}$	CL=90%	1746	DESIG=13
$\omega\pi^0$	< 6	$\times 10^{-4}$	CL=90%	1803	DESIG=12
$\pi^+\pi^-\pi^0$	< 5	$\times 10^{-6}$	CL=90%	1874	DESIG=11
$\rho\pi$	< 5	$\times 10^{-6}$	CL=90%	1804	DESIG=9
$K^*(892)^+K^- + \text{c.c.}$	< 1.4	$\times 10^{-5}$	CL=90%	1745	DESIG=10
$K^*(892)^0\bar{K}^0 + \text{c.c.}$	< 1.2	$\times 10^{-3}$	CL=90%	1744	DESIG=19
$K_S^0 K_L^0$	< 1.2	$\times 10^{-5}$	CL=90%	1820	DESIG=18
$2(\pi^+\pi^-)$	< 1.12	$\times 10^{-3}$	CL=90%	1861	DESIG=3
$2(\pi^+\pi^-)\pi^0$	< 1.06	$\times 10^{-3}$	CL=90%	1843	DESIG=21
$2(\pi^+\pi^-\pi^0)$	< 5.85	%	CL=90%	1821	DESIG=22
$\omega\pi^+\pi^-$	< 6.0	$\times 10^{-4}$	CL=90%	1794	DESIG=208
$3(\pi^+\pi^-)$	< 9.1	$\times 10^{-3}$		1819	DESIG=24
$3(\pi^+\pi^-)\pi^0$	< 1.37	%		1792	DESIG=52
$3(\pi^+\pi^-)2\pi^0$	< 11.74	%	CL=90%	1760	DESIG=55
$\eta\pi^+\pi^-$	< 1.24	$\times 10^{-3}$	CL=90%	1836	DESIG=210
$\pi^+\pi^-2\pi^0$	< 8.9	$\times 10^{-3}$	CL=90%	1862	DESIG=23
$\rho^0\pi^+\pi^-$	< 6.9	$\times 10^{-3}$	CL=90%	1796	DESIG=206
$\eta 3\pi$	< 1.34	$\times 10^{-3}$	CL=90%	1824	DESIG=64
$\eta 2(\pi^+\pi^-)$	< 2.43	%		1804	DESIG=25
$\eta\rho^0\pi^+\pi^-$	< 1.45	%	CL=90%	1708	DESIG=53
$\eta' 3\pi$	< 2.44	$\times 10^{-3}$	CL=90%	1740	DESIG=221
$K^+K^-\pi^+\pi^-$	< 9.0	$\times 10^{-4}$	CL=90%	1772	DESIG=26
$\phi\pi^+\pi^-$	< 4.1	$\times 10^{-4}$	CL=90%	1737	DESIG=27
$K^+K^-2\pi^0$	< 4.2	$\times 10^{-3}$	CL=90%	1774	DESIG=28
$4(\pi^+\pi^-)$	< 1.67	%	CL=90%	1757	DESIG=207
$4(\pi^+\pi^-)\pi^0$	< 3.06	%	CL=90%	1720	DESIG=62
$\phi f_0(980)$	< 4.5	$\times 10^{-4}$	CL=90%	1597	DESIG=63
$K^+K^-\pi^+\pi^-\pi^0$	< 2.36	$\times 10^{-3}$	CL=90%	1741	DESIG=29
					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
$\omega K^+ K^-$	< 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
$K^+ K^- 2(\pi^+ \pi^-)$	< 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
$K^{*0} K^- \pi^+ + \text{c.c.}$	< 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
$\Lambda \bar{\Lambda} \pi^0$	< 7	$\times 10^{-5}$	CL=90%	1469	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%	1405	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
$\Lambda \bar{\Lambda} \eta$	< 1.9	$\times 10^{-4}$	CL=90%	1262	DESIG=226
$\Sigma^+ \bar{\Sigma}^-$	< 1.0	$\times 10^{-4}$	CL=90%	1464	DESIG=227
$\Sigma^0 \bar{\Sigma}^0$	< 4	$\times 10^{-5}$	CL=90%	1462	DESIG=228
$\Xi^+ \bar{\Xi}^-$	< 1.5	$\times 10^{-4}$	CL=90%	—	DESIG=229
$\Xi^0 \bar{\Xi}^0$	< 1.4	$\times 10^{-4}$	CL=90%	1353	DESIG=230

Radiative decays

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

NODE=M053;CLUMP=R

DESIG=51

DESIG=50

DESIG=49

DESIG=213

DESIG=212

DESIG=211

X(3872)

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

Mass $m = 3871.69 \pm 0.17$ MeV $m_{X(3872)} - m_{J/\psi} = 775 \pm 4$ MeV $m_{X(3872)} - m_{\psi(2S)}$ Full width $\Gamma < 1.2$ MeV, CL = 90%

NODE=M176

NODE=M176M;DTYPE=M

NODE=M176DM;DTYPE=D

NODE=M176DM2;DTYPE=D

NODE=M176W;DTYPE=G

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

NODE=M176215;DESIG=2

DESIG=13

DESIG=8

DESIG=12

DESIG=9

DESIG=11

DESIG=14;OUR EVAL;→ UNCHECKED ←

DESIG=16;OUR EVAL;→ UNCHECKED ←

X(3900)[±]

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

Mass $m = 3888.7 \pm 3.4$ MeV ($S = 1.3$)Full width $\Gamma = 35 \pm 7$ MeV

NODE=M210

NODE=M210M;DTYPE=M

NODE=M210W;DTYPE=G

X(3900)[±] DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\pi^\pm$	seen	700
$h_c\pi^\pm$	not seen	—
$(D\bar{D}^*)^\pm$	seen	—

NODE=M210215;DESIG=1

DESIG=2

DESIG=3;OUR EVAL;→ UNCHECKED ←

 **$\chi_{c0}(2P)$
was X(3915)**

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

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

NODE=M159

NODE=M159M;DTYPE=M

NODE=M159W;DTYPE=G

$\chi_{c0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega J/\psi$	seen	222
$\pi^+\pi^-\eta_c(1S)$	not seen	785
$K\bar{K}$	not seen	—
$\gamma\gamma$	seen	1959

NODE=M159215;DESIG=1;OUR EST;

→ UNCHECKED ←
DESIG=4;OUR EVAL;→ UNCHECKED ←

DESIG=5;OUR EVAL;→ UNCHECKED ←

DESIG=2

 $\chi_{c2}(2P)$

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

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

NODE=M050

NODE=M050M;DTYPE=M

NODE=M050W;DTYPE=G

$\chi_{c2}(2P)$ DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma$	seen	1964
$D\bar{D}$	seen	615
D^+D^-	seen	600
$D^0\bar{D}^0$	seen	615
$\pi^+\pi^-\eta_c(1S)$	not seen	792
$K\bar{K}$	not seen	1901

NODE=M050215;DESIG=1;OUR EVAL;
 → UNCHECKED ←
 DESIG=2;OUR EVAL;→ UNCHECKED ←
 DESIG=3;OUR EVAL;→ UNCHECKED ←
 DESIG=4;OUR EVAL;→ UNCHECKED ←
 DESIG=7;OUR EVAL;→ UNCHECKED ←
 DESIG=8;OUR EVAL;→ UNCHECKED ←

 $\psi(4040)$ [aa]

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

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;
 → UNCHECKED ←
 NODE=M072W;DTYPE=G;OUR EST;
 → UNCHECKED ←
 NODE=M072W5;DTYPE=E;OUR EST;
 → UNCHECKED ←
 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		764
$D^*\bar{D} + c.c.$	seen		569
$D^*(2007)^0\bar{D}^0 + c.c.$	seen		575
$D^*(2010)^+D^- + c.c.$	seen		561
$D^*\bar{D}^*$	seen		193
$D^*(2007)^0\bar{D}^*(2007)^0$	seen		225
$D^*(2010)^+D^*(2010)^-$	seen		193
$D^0D^-\pi^+ + c.c. (excl.$	not seen		—
$D^*(2007)^0\bar{D}^0 + c.c.,$			
$D^*(2010)^+D^- + c.c.)$			
$D\bar{D}^*\pi (excl. D^*\bar{D}^*)$	not seen		—
$D^0\bar{D}^{*-}\pi^+ + c.c. (excl.$	seen		—
$D^*(2010)^+D^*(2010)^-)$			
$D_s^+D_s^-$	seen		452
$J/\psi\pi^+\pi^-$	$< 4 \times 10^{-3}$	90%	794
$J/\psi\pi^0\pi^0$	$< 2 \times 10^{-3}$	90%	797
$J/\psi\eta$	$(5.2 \pm 0.7) \times 10^{-3}$		675
$J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	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
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 2.9 \times 10^{-4}$	90%	1578
$\Lambda\bar{\Lambda}\pi^0$	$< 9 \times 10^{-5}$	90%	1636
$\Lambda\bar{\Lambda}\eta$	$< 3.0 \times 10^{-4}$	90%	1452
$\Sigma^+\Sigma^-$	$< 1.3 \times 10^{-4}$	90%	1632
$\Sigma^0\bar{\Sigma}^0$	$< 7 \times 10^{-5}$	90%	1630
$\Xi^+\Xi^-$	$< 1.6 \times 10^{-4}$	90%	—
$\Xi^0\bar{\Xi}^0$	$< 1.8 \times 10^{-4}$	90%	1533

DESIG=5

DESIG=17;OUR EST;→ UNCHECKED ←

DESIG=1

DESIG=18

DESIG=19;OUR EST;→ UNCHECKED ←

DESIG=2

DESIG=20

DESIG=21;OUR EST;→ UNCHECKED ←

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

DESIG=29

DESIG=30

DESIG=31

DESIG=32

DESIG=33

DESIG=34

DESIG=35

 $\psi(4160)$ [aa]

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

Mass $m = 4191 \pm 5$ MeV

Full width $\Gamma = 70 \pm 10$ MeV

$\Gamma_{ee} = 0.48 \pm 0.22$ keV

NODE=M025

NODE=M025M;DTYPE=M

NODE=M025W;DTYPE=G

NODE=M025W1;DTYPE=E

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)	
$e^+ e^-$	$(6.9 \pm 3.3) \times 10^{-6}$		2096	DESIG=1
$\mu^+ \mu^-$	seen		2093	DESIG=33
$D\bar{D}$	seen		956	DESIG=15;OUR EVAL;→ UNCHECKED ←
$D^0\bar{D}^0$	seen		956	DESIG=16
$D^+ D^-$	seen		947	DESIG=17
$D^*\bar{D} + \text{c.c.}$	seen		798	DESIG=18;OUR EVAL;→ UNCHECKED ←
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		802	DESIG=19
$D^*(2010)^+ D^- + \text{c.c.}$	seen		792	DESIG=20
$D^*\bar{D}^*$	seen		592	DESIG=21;OUR EVAL;→ UNCHECKED ←
$D^*(2007)^0\bar{D}^*(2007)^0$	seen		603	DESIG=22
$D^*(2010)^+ D^*(2010)^-$	seen		592	DESIG=23
$D^0 D^- \pi^+ + \text{c.c.}$ (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
$D^0 D^{*-} \pi^+ + \text{c.c.}$ (excl. $D^*(2010)^+ D^*(2010)^-$)	not seen		—	DESIG=26
$D_s^+ D_s^-$	not seen		720	DESIG=27
$D_s^{*+} D_s^- + \text{c.c.}$	seen		385	DESIG=28
$J/\psi \pi^+ \pi^-$	$< 3 \times 10^{-3}$	90%	919	DESIG=2
$J/\psi \pi^0 \pi^0$	$< 3 \times 10^{-3}$	90%	922	DESIG=3
$J/\psi K^+ K^-$	$< 2 \times 10^{-3}$	90%	407	DESIG=4
$J/\psi \eta$	$< 8 \times 10^{-3}$	90%	821	DESIG=5
$J/\psi \pi^0$	$< 1 \times 10^{-3}$	90%	944	DESIG=6
$J/\psi \eta'$	$< 5 \times 10^{-3}$	90%	457	DESIG=7
$J/\psi \pi^+ \pi^- \pi^0$	$< 1 \times 10^{-3}$	90%	879	DESIG=8
$\psi(2S) \pi^+ \pi^-$	$< 4 \times 10^{-3}$	90%	396	DESIG=9
$\chi_{c1} \gamma$	$< 7 \times 10^{-3}$	90%	625	DESIG=10
$\chi_{c2} \gamma$	$< 1.3 \%$	90%	587	DESIG=11
$\chi_{c1} \pi^+ \pi^- \pi^0$	$< 2 \times 10^{-3}$	90%	496	DESIG=12
$\chi_{c2} \pi^+ \pi^- \pi^0$	$< 8 \times 10^{-3}$	90%	445	DESIG=13
$h_c(1P) \pi^+ \pi^-$	$< 5 \times 10^{-3}$	90%	556	DESIG=29
$h_c(1P) \pi^0 \pi^0$	$< 2 \times 10^{-3}$	90%	560	DESIG=30
$h_c(1P) \eta$	$< 2 \times 10^{-3}$	90%	348	DESIG=31
$h_c(1P) \pi^0$	$< 4 \times 10^{-4}$	90%	600	DESIG=32
$\phi \pi^+ \pi^-$	$< 2 \times 10^{-3}$	90%	1961	DESIG=14

X(4260)

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

NODE=M074

Mass $m = 4251 \pm 9$ MeV (S = 1.6)

Full width $\Gamma = 120 \pm 12$ MeV (S = 1.1)

NODE=M074M;DTYPE=M

NODE=M074W;DTYPE=G

X(4260) DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi \pi^+ \pi^-$	seen	967
$J/\psi f_0(980), f_0(980) \rightarrow \pi^+ \pi^-$	seen	—
$X(3900)^\pm \pi^\mp, X^\pm \rightarrow J/\psi \pi^\pm$	seen	—
$J/\psi \pi^0 \pi^0$	seen	969
$J/\psi K^+ K^-$	seen	512
$X(3872)\gamma$	seen	363
$J/\psi \eta$	not seen	876
$J/\psi \pi^0$	not seen	991
$J/\psi \eta'$	not seen	552
$J/\psi \pi^+ \pi^- \pi^0$	not seen	930
$J/\psi \eta \eta$	not seen	311
$\psi(2S) \pi^+ \pi^-$	not seen	459
$\psi(2S) \eta$	not seen	129
$\chi_{c0} \omega$	not seen	265
$\chi_{c1} \gamma$	not seen	676
$\chi_{c2} \gamma$	not seen	638
$\chi_{c1} \pi^+ \pi^- \pi^0$	not seen	560
$\chi_{c2} \pi^+ \pi^- \pi^0$	not seen	512
$h_c(1P) \pi^+ \pi^-$	not seen	613
$\phi \pi^+ \pi^-$	not seen	1993
$\phi f_0(980) \rightarrow \phi \pi^+ \pi^-$	not seen	—
$D \bar{D}$	not seen	1020
$D^0 \bar{D}^0$	not seen	1020
$D^+ D^-$	not seen	1011
$D^* \bar{D} + c.c.$	not seen	887
$D^*(2007)^0 \bar{D}^0 + c.c.$	not seen	—
$D^*(2010)^+ D^- + c.c.$	not seen	—
$D^* \bar{D}^*$	not seen	691
$D^*(2007)^0 \bar{D}^*(2007)^0$	not seen	700
$D^*(2010)^+ D^*(2010)^-$	not seen	691
$D^0 D^- \pi^+ + c.c. (excl. D^*(2007)^0 \bar{D}^{*0} + c.c., D^*(2010)^+ D^- + c.c.)$	not seen	—
$D \bar{D}^* \pi + c.c. (excl. D^* \bar{D}^*)$	not seen	723
$D^0 D^{*-} \pi^+ + c.c. (excl. D^*(2010)^+ D^*(2010)^-)$	not seen	—
$D^0 D^*(2010)^- \pi^+ + c.c.$	not seen	716
$D^* \bar{D}^* \pi$	not seen	449
$D_s^+ D_s^-$	not seen	803
$D_s^{*+} D_s^- + c.c.$	not seen	615
$D_s^{*+} D_s^{*-}$	not seen	239
$p \bar{p}$	not seen	1907
$K_S^0 K^\pm \pi^\mp$	not seen	2048
$K^+ K^- \pi^0$	not seen	2049

NODE=M074215;DESIG=2;OUR EVAL;
 UNCHECKED
 DESIG=41;OUR EVAL;→ UNCHECKED ←
 DESIG=43;OUR EVAL;→ UNCHECKED ←
 DESIG=4;OUR EVAL;→ UNCHECKED ←
 DESIG=5;OUR EVAL;→ UNCHECKED ←
 DESIG=42
 DESIG=6;OUR EVAL;→ UNCHECKED ←
 DESIG=7;OUR EVAL;→ UNCHECKED ←
 DESIG=8;OUR EVAL;→ UNCHECKED ←
 DESIG=9;OUR EVAL;→ UNCHECKED ←
 DESIG=10;OUR EVAL;→ UNCHECKED ←
 DESIG=11;OUR EVAL;→ UNCHECKED ←
 DESIG=12;OUR EVAL;→ UNCHECKED ←
 DESIG=13;OUR EVAL;→ UNCHECKED ←
 DESIG=14;OUR EVAL;→ UNCHECKED ←
 DESIG=15;OUR EVAL;→ UNCHECKED ←
 DESIG=16;OUR EVAL;→ UNCHECKED ←
 DESIG=17;OUR EVAL;→ UNCHECKED ←
 DESIG=40;OUR EVAL;→ UNCHECKED ←
 DESIG=18;OUR EVAL;→ UNCHECKED ←
 DESIG=22;OUR EVAL;→ UNCHECKED ←
 DESIG=19;OUR EVAL;→ UNCHECKED ←
 DESIG=31
 DESIG=32
 DESIG=23;OUR EVAL;→ UNCHECKED ←
 DESIG=33
 DESIG=34
 DESIG=24;OUR EVAL;→ UNCHECKED ←
 DESIG=35
 DESIG=36
 DESIG=38
 DESIG=25
 DESIG=39
 DESIG=30;OUR EVAL;→ UNCHECKED ←
 DESIG=26
 DESIG=27
 DESIG=28
 DESIG=29
 DESIG=3;OUR EVAL;→ UNCHECKED ←
 DESIG=20;OUR EVAL;→ UNCHECKED ←
 DESIG=21;OUR EVAL;→ UNCHECKED ←

X(4360)

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

X(4360) MASS = 4361 ± 13 MeV

X(4360) WIDTH = 74 ± 18 MeV

NODE=M181

NODE=M181M;DTYPE=M

NODE=M181W;DTYPE=G

X(4360) DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S) \pi^+ \pi^-$	seen	567

NODE=M181215;DESIG=2;OUR EVAL;
 → UNCHECKED ←

 $\psi(4415)$ ^[aa]

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

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;

→ UNCHECKED ←

NODE=M073W;DTYPE=G;OUR EST;

→ UNCHECKED ←

NODE=M073W1;DTYPE=E;OUR EST;

→ UNCHECKED ←

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		1063
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		1066
$D^*(2010)^+D^- + \text{c.c.}$	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. $D^*(2007)^0\bar{D}^0 + \text{c.c.}, D^*(2010)^+D^- + \text{c.c.}$)	$< 2.3 \%$	90%	—
$D\bar{D}_2^*(2460) \rightarrow D^0D^-\pi^+ + \text{c.c.}$	$(10 \pm 4) \%$		—
$D^0D^{*-}\pi^+ + \text{c.c.}$	$< 11 \%$	90%	926
$D_s^+D_s^-$	not seen		1006
$D_s^{*+}D_s^- + \text{c.c.}$	seen		—
$D_s^{*+}D_s^{*-}$	not seen		652
$J/\psi\eta$	$< 6 \times 10^{-3}$	90%	1022
e^+e^-	$(9.4 \pm 3.2) \times 10^{-6}$		2210

DESIG=7;OUR EVAL;→ UNCHECKED ←
 DESIG=8
 DESIG=9
 DESIG=10;OUR EVAL;→ UNCHECKED ←
 DESIG=11
 DESIG=12
 DESIG=13;OUR EVAL;→ UNCHECKED ←
 DESIG=14
 DESIG=15
 DESIG=4

 DESIG=5
 DESIG=6
 DESIG=16
 DESIG=17
 DESIG=18
 DESIG=19
 DESIG=1

X(4660)

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

X(4660) MASS = 4664 ± 12 MeVX(4660) WIDTH = 48 ± 15 MeV

NODE=M189

NODE=M189M;DTYPE=M

NODE=M189W;DTYPE=G

$X(4660)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S)\pi^+\pi^-$	seen	838

NODE=M189215;DESIG=2;OUR EVAL;
 → UNCHECKED ←

$b\bar{b}$ MESONS

NODE=MXXX030

 $\tau(1S)$

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

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;
 → UNCHECKED ←
 NODE=M049W2;DTYPE=E;OUR EVAL;
 → UNCHECKED ←

$\Upsilon(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
$\tau^+ \tau^-$	(2.60 $\pm$ 0.10) %		4384	NODE=M049215;DESIG=3
$e^+ e^-$	(2.38 $\pm$ 0.11) %		4730	DESIG=2
$\mu^+ \mu^-$	(2.48 $\pm$ 0.05) %		4729	DESIG=1
Hadronic decays				NODE=M049;CLUMP=A
$g g g$	(81.7 $\pm$ 0.7) %		—	DESIG=117
$\gamma g g$	(2.2 $\pm$ 0.6) %		—	DESIG=118
$\eta'(958)$ anything	(2.94 $\pm$ 0.24) %		—	DESIG=73
$J/\psi(1S)$ anything	(6.5 $\pm$ 0.7) $\times 10^{-4}$		4223	DESIG=12
χ_{c0} anything	< 5 $\times 10^{-3}$	90%	—	DESIG=5
χ_{c1} anything	(2.3 $\pm$ 0.7) $\times 10^{-4}$		—	DESIG=6
χ_{c2} anything	(3.4 $\pm$ 1.0) $\times 10^{-4}$		—	DESIG=7
$\psi(2S)$ anything	(2.7 $\pm$ 0.9) $\times 10^{-4}$		—	DESIG=8
$\rho \pi$	< 3.68 $\times 10^{-6}$	90%	4697	DESIG=11
$\omega \pi^0$	< 3.90 $\times 10^{-6}$	90%	4697	DESIG=131
$\pi^+ \pi^-$	< 5 $\times 10^{-4}$	90%	4728	DESIG=23
$K^+ K^-$	< 5 $\times 10^{-4}$	90%	4704	DESIG=24
$p \bar{p}$	< 5 $\times 10^{-4}$	90%	4636	DESIG=25
$\pi^+ \pi^- \pi^0$	(2.1 $\pm$ 0.8) $\times 10^{-6}$		4725	DESIG=72
$\phi K^+ K^-$	(2.4 $\pm$ 0.5) $\times 10^{-6}$		4622	DESIG=136
$\omega \pi^+ \pi^-$	(4.5 $\pm$ 1.0) $\times 10^{-6}$		4694	DESIG=137
$K^{*}(892)^0 K^- \pi^+ + \text{c.c.}$	(4.4 $\pm$ 0.8) $\times 10^{-6}$		4667	DESIG=138
$\phi f_2'(1525)$	< 1.63 $\times 10^{-6}$	90%	4549	DESIG=139
$\omega f_2(1270)$	< 1.79 $\times 10^{-6}$	90%	4611	DESIG=140
$\rho(770) a_2(1320)$	< 2.24 $\times 10^{-6}$	90%	4605	DESIG=141
$K^{*}(892)^0 \bar{K}_2^{*}(1430)^0 + \text{c.c.}$	(3.0 $\pm$ 0.8) $\times 10^{-6}$		4579	DESIG=142
$K_1(1270)^{\pm} K^{\mp}$	< 2.41 $\times 10^{-6}$	90%	4631	DESIG=143
$K_1(1400)^{\pm} K^{\mp}$	(1.0 $\pm$ 0.4) $\times 10^{-6}$		4613	DESIG=144
$b_1(1235)^{\pm} \pi^{\mp}$	< 1.25 $\times 10^{-6}$	90%	4649	DESIG=145
$\pi^+ \pi^- \pi^0 \pi^0$	(1.28 $\pm$ 0.30) $\times 10^{-5}$		4720	DESIG=132
$K_S^0 K^+ \pi^- + \text{c.c.}$	(1.6 $\pm$ 0.4) $\times 10^{-6}$		4696	DESIG=133
$K^{*}(892)^0 \bar{K}^0 + \text{c.c.}$	(2.9 $\pm$ 0.9) $\times 10^{-6}$		4675	DESIG=134
$K^{*}(892)^- K^+ + \text{c.c.}$	< 1.11 $\times 10^{-6}$	90%	4675	DESIG=135
$D^{*}(2010)^{\pm}$ anything	(2.52 $\pm$ 0.20) %		—	DESIG=30
$\bar{d}$ anything	(2.86 $\pm$ 0.28) $\times 10^{-5}$		—	DESIG=107
Sum of 100 exclusive modes	(1.200 $\pm$ 0.017) %		—	DESIG=128
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
$\gamma K^+ K^-$	[bb] (1.14 $\pm$ 0.13) $\times 10^{-5}$		4704	DESIG=102
$\gamma p \bar{p}$	[cc] < 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%	4678	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%	4573	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%	4260	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
$\gamma \chi_{c0}(2P) \rightarrow \omega J/\psi$	< 3.0	$\times 10^{-6}$	90%	—	DESIG=125
$\gamma X(4140) \rightarrow \phi J/\psi$	< 2.2	$\times 10^{-6}$	90%	—	DESIG=126
γX	$[dd] < 4.5$	$\times 10^{-6}$	90%	—	DESIG=66
$\gamma X \bar{X}(m_X < 3.1 \text{ GeV})$	$[ee] < 1$	$\times 10^{-3}$	90%	—	DESIG=67
$\gamma X \bar{X}(m_X < 4.5 \text{ GeV})$	$[ff] < 2.4$	$\times 10^{-4}$	90%	—	DESIG=127
$\gamma X \rightarrow \gamma + \geq 4 \text{ prongs}$	$[gg] < 1.78$	$\times 10^{-4}$	95%	—	DESIG=113
$\gamma a_1^0 \rightarrow \gamma \mu^+ \mu^-$	$[hh] < 9$	$\times 10^{-6}$	90%	—	DESIG=114
$\gamma a_1^0 \rightarrow \gamma \tau^+ \tau^-$	$[bb] < 1.30$	$\times 10^{-4}$	90%	—	DESIG=115
$\gamma a_1^0 \rightarrow \gamma g g$	$[ii] < 1$	%	90%	—	DESIG=129
$\gamma a_1^0 \rightarrow \gamma s \bar{s}$	$[ii] < 1$	$\times 10^{-3}$	90%	—	DESIG=130

Lepton Family number (LF) violating modes

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

Other decays

invisible	< 3.0	$\times 10^{-4}$	90%	—
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NODE=M049;CLUMP=D
DESIG=106

 $\chi_{b0}(1P)$ $[ij]$

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

NODE=M076

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

NODE=M076M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←

$\chi_{b0}(1P)$ 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%
$2\pi^+ \pi^- K^- K_S^0$	< 5	$\times 10^{-5}$	90%
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	< 5	$\times 10^{-4}$	90%
$2\pi^+ 2\pi^- 2\pi^0$	< 2.1	$\times 10^{-4}$	90%
$2\pi^+ 2\pi^- K^+ K^-$	$(1.1 \pm 0.6) \times 10^{-4}$		4861
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.7	$\times 10^{-4}$	90%
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 5	$\times 10^{-4}$	90%
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	< 1.6	$\times 10^{-4}$	90%
$3\pi^+ 3\pi^-$	< 8	$\times 10^{-5}$	90%
$3\pi^+ 3\pi^- 2\pi^0$	< 6	$\times 10^{-4}$	90%
$3\pi^+ 3\pi^- K^+ K^-$	$(2.4 \pm 1.2) \times 10^{-4}$		4827
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 1.0	$\times 10^{-3}$	90%
$4\pi^+ 4\pi^-$	< 8	$\times 10^{-5}$	90%
$4\pi^+ 4\pi^- 2\pi^0$	< 2.1	$\times 10^{-3}$	90%
$J/\psi J/\psi$	< 7	$\times 10^{-5}$	90%
$J/\psi \psi(2S)$	< 1.2	$\times 10^{-4}$	90%
$\psi(2S) \psi(2S)$	< 3.1	$\times 10^{-5}$	90%

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

DESIG=17

DESIG=18

DESIG=19

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

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

NODE=M077

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

NODE=M077M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←

$\chi_{b1}(1P)$ 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
$J/\psi J/\psi$	$< 2.7 \times 10^{-5}$	90%	3857
$J/\psi \psi(2S)$	$< 1.7 \times 10^{-5}$	90%	3594
$\psi(2S) \psi(2S)$	$< 6 \times 10^{-5}$	90%	3298

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
DESIG=17
DESIG=18
DESIG=19

$h_b(1P)$

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

Mass $m = 9899.3 \pm 1.0$ MeV

NODE=M204

NODE=M204M;DTYPE=M

$h_b(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta_b(1S) \gamma$	$(49^{+8}_{-7}) \%$	489

NODE=M204215;DESIG=1

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

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

J needs confirmation.

Mass $m = 9912.21 \pm 0.26 \pm 0.31$ MeV

NODE=M078

NODE=M078M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←

$\chi_{b2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \Upsilon(1S)$	$(19.1 \pm 1.2) \%$		442
$D^0 X$	$< 7.9 \%$	90%	—
$\pi^+ \pi^- K^+ K^- \pi^0$	$(8 \pm 5) \times 10^{-5}$		4902
$2\pi^+ \pi^- K^- K_S^0$	$< 1.0 \times 10^{-4}$	90%	4901
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	$(5.3 \pm 2.4) \times 10^{-4}$		4873
$2\pi^+ 2\pi^- 2\pi^0$	$(3.5 \pm 1.4) \times 10^{-4}$		4931
$2\pi^+ 2\pi^- K^+ K^-$	$(1.1 \pm 0.4) \times 10^{-4}$		4888
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(2.1 \pm 0.9) \times 10^{-4}$		4872
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(3.9 \pm 1.8) \times 10^{-4}$		4855
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	$< 5 \times 10^{-4}$	90%	4854
$3\pi^+ 3\pi^-$	$(7.0 \pm 3.1) \times 10^{-5}$		4931
$3\pi^+ 3\pi^- 2\pi^0$	$(1.0 \pm 0.4) \times 10^{-3}$		4908
$3\pi^+ 3\pi^- K^+ K^-$	$< 8 \times 10^{-5}$	90%	4854
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(3.6 \pm 1.5) \times 10^{-4}$		4835
$4\pi^+ 4\pi^-$	$(8 \pm 4) \times 10^{-5}$		4907
$4\pi^+ 4\pi^- 2\pi^0$	$(1.8 \pm 0.7) \times 10^{-3}$		4877
$J/\psi J/\psi$	$< 4 \times 10^{-5}$	90%	3869
$J/\psi \psi(2S)$	$< 5 \times 10^{-5}$	90%	3608
$\psi(2S) \psi(2S)$	$< 1.6 \times 10^{-5}$	90%	3313

NODE=M078215;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
DESIG=17
DESIG=18
DESIG=19

$\Upsilon(2S)$

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

Mass $m = 10023.26 \pm 0.31$ MeV

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

Full 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;
→ UNCHECKED ←
NODE=M052W2;DTYPE=E;OUR EVAL;
→ UNCHECKED ←

$\Upsilon(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$\Upsilon(1S)\pi^+\pi^-$	(17.85 $\pm$ 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
$\Upsilon(1S)\pi^0$	< 4 $\times 10^{-5}$	CL=90%	531	DESIG=10
$\Upsilon(1S)\eta$	(2.9 $\pm$ 0.4) $\times 10^{-4}$	S=2.0	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
γgg	(8.8 $\pm$ 1.1) %		—	DESIG=106
ϕK^+K^-	(1.6 $\pm$ 0.4) $\times 10^{-6}$		4910	DESIG=133
$\omega\pi^+\pi^-$	< 2.58 $\times 10^{-6}$	CL=90%	4977	DESIG=134
$K^*(892)^0 K^- \pi^+ + c.c.$	(2.3 $\pm$ 0.7) $\times 10^{-6}$		4952	DESIG=135
$\phi f_2'(1525)$	< 1.33 $\times 10^{-6}$	CL=90%	4841	DESIG=136
$\omega f_2(1270)$	< 5.7 $\times 10^{-7}$	CL=90%	4899	DESIG=137
$\rho(770) a_2(1320)$	< 8.8 $\times 10^{-7}$	CL=90%	4894	DESIG=138
$K^*(892)^0 \bar{K}_2^*(1430)^0 + c.c.$	(1.5 $\pm$ 0.6) $\times 10^{-6}$		4869	DESIG=139
$K_1(1270)^\pm K^\mp$	< 3.22 $\times 10^{-6}$	CL=90%	4918	DESIG=140
$K_1(1400)^\pm K^\mp$	< 8.3 $\times 10^{-7}$	CL=90%	4901	DESIG=141
$b_1(1235)^\pm \pi^\mp$	< 4.0 $\times 10^{-7}$	CL=90%	4935	DESIG=142
$\rho\pi$	< 1.16 $\times 10^{-6}$	CL=90%	4981	DESIG=126
$\pi^+\pi^-\pi^0$	< 8.0 $\times 10^{-7}$	CL=90%	5007	DESIG=127
$\omega\pi^0$	< 1.63 $\times 10^{-6}$	CL=90%	4980	DESIG=128
$\pi^+\pi^-\pi^0\pi^0$	(1.30 $\pm$ 0.28) $\times 10^{-5}$		5002	DESIG=129
$K_S^0 K^+\pi^- + c.c.$	(1.14 $\pm$ 0.33) $\times 10^{-6}$		4979	DESIG=130
$K^*(892)^0 \bar{K}^0 + c.c.$	< 4.22 $\times 10^{-6}$	CL=90%	4959	DESIG=131
$K^*(892)^- K^+ + c.c.$	< 1.45 $\times 10^{-6}$	CL=90%	4960	DESIG=132
Sum of 100 exclusive modes	(2.90 $\pm$ 0.30) $\times 10^{-3}$		—	DESIG=121
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
$\gamma\chi_{c0}(2P) \rightarrow \omega J/\psi$	< 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) $\times 10^{-4}$		606	DESIG=119
$\gamma\eta_b(1S) \rightarrow \gamma$ Sum of 26 exclu-	< 3.7 $\times 10^{-6}$	CL=90%	—	DESIG=102
sive modes				DESIG=124
$\gamma X_{b\bar{b}} \rightarrow \gamma$ Sum of 26 exclusive	< 4.9 $\times 10^{-6}$	CL=90%	—	DESIG=125
modes				
$\gamma X \rightarrow \gamma + \geq 4$ prongs	[kk] < 1.95 $\times 10^{-4}$	CL=95%	—	DESIG=103
$\gamma A^0 \rightarrow \gamma$ hadrons	< 8 $\times 10^{-5}$	CL=90%	—	DESIG=107
$\gamma a_1^0 \rightarrow \gamma\mu^+\mu^-$	< 8.3 $\times 10^{-6}$	CL=90%	—	DESIG=108
Lepton Family number (LF) violating modes				
$e^\pm\tau^\mp$	LF < 3.2 $\times 10^{-6}$	CL=90%	4854	NODE=M052;CLUMP=B
$\mu^\pm\tau^\mp$	LF < 3.3 $\times 10^{-6}$	CL=90%	4854	DESIG=104

 $\Upsilon(1D)$

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

NODE=M177

Mass $m = 10163.7 \pm 1.4$ MeV (S = 1.7)

NODE=M177M;DTYPE=M

$\Upsilon(1D)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma \Upsilon(1S)$	seen	679
$\gamma \chi_{bJ}(1P)$	seen	300
$\eta \Upsilon(1S)$	not seen	426
$\pi^+ \pi^- \Upsilon(1S)$	$(6.6 \pm 1.6) \times 10^{-3}$	623

NODE=M177215;DESIG=1;OUR EVAL;
→ UNCHECKED ←
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=3;OUR EVAL;→ UNCHECKED ←
DESIG=4

$\chi_{b0}(2P)$ [ij]

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

J needs confirmation.

NODE=M079

$$\text{Mass } m = 10232.5 \pm 0.4 \pm 0.5 \text{ MeV}$$

NODE=M079M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←

$\chi_{b0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \Upsilon(2S)$	$(4.6 \pm 2.1) \%$		207
$\gamma \Upsilon(1S)$	$(9 \pm 6) \times 10^{-3}$		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

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

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

J needs confirmation.

NODE=M080

$$\text{Mass } m = 10255.46 \pm 0.22 \pm 0.50 \text{ MeV}$$

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

NODE=M080M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←
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

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

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

J needs confirmation.

NODE=M081

$$\text{Mass } m = 10268.65 \pm 0.22 \pm 0.50 \text{ MeV}$$

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

NODE=M081M;DTYPE=M;OUR EVAL;

→ UNCHECKED ←

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

 $\mathcal{T}(3S)$

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

NODE=M048

$$\text{Mass } m = 10355.2 \pm 0.5 \text{ MeV}$$

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;

→ UNCHECKED ←

NODE=M048W2;DTYPE=E;OUR EVAL;

→ UNCHECKED ←

$\Upsilon(3S)$ 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; $\rightarrow$ UNCHECKED $\leftarrow$
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
$\gamma\chi_{b2}(1P)$	(9.9 $\pm$ 1.3) $\times 10^{-3}$	S=2.0	434	DESIG=103
$\gamma A^0 \rightarrow \gamma$ hadrons	< 8 $\times 10^{-5}$	CL=90%	—	DESIG=115
$\gamma\chi_{b1}(1P)$	(9 $\pm$ 5) $\times 10^{-4}$	S=1.9	452	DESIG=104
$\gamma\chi_{b0}(1P)$	(2.7 $\pm$ 0.4) $\times 10^{-3}$		484	DESIG=13
$\gamma\eta_b(2S)$	< 6.2 $\times 10^{-4}$	CL=90%	350	DESIG=14
$\gamma\eta_b(1S)$	(5.1 $\pm$ 0.7) $\times 10^{-4}$		913	DESIG=15
$\gamma X \rightarrow \gamma + \geq 4$ prongs	[//] < 2.2 $\times 10^{-4}$	CL=95%	—	DESIG=102
$\gamma a_1^0 \rightarrow \gamma\mu^+\mu^-$	< 5.5 $\times 10^{-6}$	CL=90%	—	DESIG=116
$\gamma a_1^0 \rightarrow \gamma\tau^+\tau^-$	[nn] < 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

 $\chi_b(3P)$

$$J^{PC} = ?^?(?^?+)$$

NODE=M206

Mass $m = 10534 \pm 9$ MeV

NODE=M206M;DTYPE=M

$\chi_b(3P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\gamma$	seen	1019
$\Upsilon(2S)\gamma$	seen	498

NODE=M206215;DESIG=1
DESIG=2 **$\Upsilon(4S)$
or $\Upsilon(10580)$**

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

NODE=M047

Mass $m = 10579.4 \pm 1.2$ MeV

NODE=M047M;DTYPE=M

Full width $\Gamma = 20.5 \pm 2.5$ MeV

NODE=M047W;DTYPE=G

 $\Gamma_{ee} = 0.272 \pm 0.029$ keV (S = 1.5)

NODE=M047W1;DTYPE=E

$\Upsilon(4S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\bar{B}$	> 96 %	95%	327
$B^+ B^-$	(51.4 $\pm$ 0.6) %		332
D_s^+ anything + c.c.	(17.8 $\pm$ 2.6) %		—
$B^0 \bar{B}^0$	(48.6 $\pm$ 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
$K^*(892)^0 \bar{K}^0$	< 2.0 $\times 10^{-6}$	90%	5240
$J/\psi(1S)$ 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 $\pm$ 0.28) $\times 10^{-4}$		924
$\Upsilon(2S) \pi^+ \pi^-$	(8.6 $\pm$ 1.3) $\times 10^{-5}$		468
$h_b(1P) \pi^+ \pi^-$	not seen		600
$\bar{d}$ anything	< 1.3 $\times 10^{-5}$	90%	—

NODE=M047215;DESIG=8;OUR EST;
 → UNCHECKED ←
 DESIG=10

DESIG=12

DESIG=11

DESIG=15

DESIG=6

DESIG=1

DESIG=16

DESIG=22

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

$\Upsilon(10860)$

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

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;
 → UNCHECKED ←

NODE=M092W;DTYPE=G;OUR EVAL;
 → UNCHECKED ←

NODE=M092W1;DTYPE=E

$\Upsilon(10860)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\bar{B}X$	(76.2 $^{+2.7}_{-4.0}$) %		—
$B\bar{B}$	(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
$B^{(*)} \bar{B}^{(*)}$	(20.1 $\pm$ 3.1) %		877
$B_s \bar{B}_s$	(5 $\pm$ 5) $\times 10^{-3}$		877
$B_s \bar{B}_s^* + \text{c.c.}$	(1.35 $\pm$ 0.32) %		—
$B_s^* \bar{B}_s^*$	(17.6 $\pm$ 2.7) %		495
no open-bottom	(3.8 $^{+5.0}_{-0.5}$) %		—
$e^+ e^-$	(5.6 $\pm$ 3.1) $\times 10^{-6}$		5438
$K^*(892)^0 \bar{K}^0$	< 1.0 $\times 10^{-5}$	90%	5390
$\Upsilon(1S) \pi^+ \pi^-$	(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 $^{+1.9}_{-1.7}$) $\times 10^{-3}$		429
$\Upsilon(1S) K^+ K^-$	(6.1 $\pm$ 1.8) $\times 10^{-4}$		947
$h_b(1P) \pi^+ \pi^-$	(3.5 $^{+1.0}_{-1.3}$) $\times 10^{-3}$		894
$h_b(2P) \pi^+ \pi^-$	(6.0 $^{+2.1}_{-1.8}$) $\times 10^{-3}$		534

NODE=M092215;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=28

DESIG=1

DESIG=29

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 $^{+2.4}_{-1.7}$) %	—
D^0 anything + c.c.	(108 ± 8) %	—
D_s anything + c.c.	(46 ± 6) %	—
J/ψ anything	(2.06 ± 0.21) %	—
B^0 anything + c.c.	(77 ± 8) %	—
B^+ anything + c.c.	(72 ± 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 $m = 11019 \pm 8$ MeVFull 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 $f_0(500)$ 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 $f_0(500)$ 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 (generic for all A,B,E,G) **G33** 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 (generic for all A,B,E,G) **G33** 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

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

LINKAGE=MDF

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

LINKAGE=NFJ

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

LINKAGE=NF0

[q] 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

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

LINKAGE=MBD

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

LINKAGE=EGM

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

LINKAGE=SG

[u] Includes $p\bar{p}\pi^+\pi^-\gamma$ and excludes $p\bar{p}\eta$, $p\bar{p}\omega$, $p\bar{p}\eta'$.	LINKAGE=MF
[v] For a narrow state A with mass less than 960 MeV.	LINKAGE=NSA
[x] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV.	LINKAGE=NA0
[y] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.	LINKAGE=NMR
[z] BHARDWAJ 11 does not observe this decay and presents a stronger 90% CL limit than this value. See measurements listings for details.	LINKAGE=BBL
[aa] 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
[bb] $2m_\tau < M(\tau^+\tau^-) < 9.2$ GeV	LINKAGE=E49
[cc] $2 \text{ GeV} < m_{K^+K^-} < 3 \text{ GeV}$	LINKAGE=G49
[dd] $X = \text{scalar with } m < 8.0 \text{ GeV}$	LINKAGE=A49
[ee] $X\bar{X} = \text{vectors with } m < 3.1 \text{ GeV}$	LINKAGE=B49
[ff] $X \text{ and } \bar{X} = \text{zero spin with } m < 4.5 \text{ GeV}$	LINKAGE=F49
[gg] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$	LINKAGE=C49
[hh] $201 \text{ MeV} < M(\mu^+\mu^-) < 3565 \text{ MeV}$	LINKAGE=D49
[ii] $0.5 \text{ GeV} < m_X < 9.0 \text{ GeV}$, where m_X is the invariant mass of the hadronic final state.	LINKAGE=I49
[jj] Spectroscopic labeling for these states is theoretical, pending experimental information.	LINKAGE=MJ
[kk] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$	LINKAGE=C52
[ll] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$	LINKAGE=C48
[nn] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV.	LINKAGE=MRG