

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

$f_0(500)$

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

also known as σ ; was $f_0(600)$

See the review on "Scalar Mesons below 2 GeV."

Mass (T-Matrix Pole $\sqrt{s}$) = (400–550)– i (200–350) MeV

Mass (Breit-Wigner) = (400–550) MeV

Full width (Breit-Wigner) = (400–700) MeV

$f_0(500)$ DECAY MODES

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

$\rho(770)$

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

See the note in $\rho(770)$ Particle Listings.

Mass $m = 775.26 \pm 0.23$ MeV

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

$\rho(770)$ 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
$\pi^0\gamma$	(4.7 ± 0.8) $\times 10^{-4}$	S=1.7	376
$\eta\gamma$	(3.00 ± 0.21) $\times 10^{-4}$		194
$\pi^0\pi^0\gamma$	(4.5 ± 0.8) $\times 10^{-5}$		363
$\mu^+\mu^-$	[a] (4.55 ± 0.28) $\times 10^{-5}$		373
e^+e^-	[a] (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 $m = 782.66 \pm 0.13$ MeV ($S = 2.0$)

Full width $\Gamma = 8.68 \pm 0.13$ MeV

NODE=MXXX005

NODE=M014

NODE=M014PP;DTYPE=M;OUR EST;
→ UNCHECKED ←
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=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

$\omega(782)$ 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
$\pi^0\gamma$	(8.34 $\pm$ 0.26) %	S=2.1	380	DESIG=3
$\pi^+\pi^-$	(1.53 $^{+0.11}_{-0.13}$) %	S=1.2	366	DESIG=2
neutrals (excluding $\pi^0\gamma$)	(7 $^{+7}_{-5}$) $\times 10^{-3}$	S=1.1	—	DESIG=13
$\eta\gamma$	(4.5 $\pm$ 0.4) $\times 10^{-4}$	S=1.1	200	DESIG=6
$\pi^0 e^+ e^-$	(7.7 $\pm$ 0.6) $\times 10^{-4}$		380	DESIG=14
$\pi^0 \mu^+ \mu^-$	(1.34 $\pm$ 0.18) $\times 10^{-4}$	S=1.5	349	DESIG=11
$e^+ e^-$	(7.39 $\pm$ 0.19) $\times 10^{-5}$	S=1.7	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
$\pi^0\pi^0\gamma$	(6.7 $\pm$ 1.1) $\times 10^{-5}$		367	DESIG=5
$\eta\pi^0\gamma$	< 3.3 $\times 10^{-5}$	CL=90%	162	DESIG=17
$\mu^+\mu^-$	(7.4 $\pm$ 1.8) $\times 10^{-5}$		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
$2\pi^0$	C < 2.2 $\times 10^{-4}$	CL=90%	367	DESIG=9
$3\pi^0$	C < 2.3 $\times 10^{-4}$	CL=90%	330	DESIG=16
invisible	< 7 $\times 10^{-5}$	CL=90%	—	DESIG=194

 $\eta'(958)$

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

Mass $m = 957.78 \pm 0.06$ MeVFull width $\Gamma = 0.188 \pm 0.006$ MeV

NODE=M002

NODE=M002M;DTYPE=M

NODE=M002W;DTYPE=G

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\pi^+\pi^-\eta$	(42.5 $\pm$ 0.5) %		232	NODE=M002215;DESIG=1
$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.5 $\pm$ 0.4) %		165	DESIG=9
$\pi^0\pi^0\eta$	(22.4 $\pm$ 0.5) %		239	DESIG=2
$\omega\gamma$	(2.52 $\pm$ 0.07) %		159	DESIG=7
$\omega e^+ e^-$	(2.0 $\pm$ 0.4) $\times 10^{-4}$		159	DESIG=205
$\gamma\gamma$	(2.307 $\pm$ 0.033) %		479	DESIG=6
$3\pi^0$	(2.50 $\pm$ 0.17) $\times 10^{-3}$		430	DESIG=8
$\mu^+\mu^-\gamma$	(1.13 $\pm$ 0.28) $\times 10^{-4}$		467	DESIG=20
$\pi^+\pi^-\mu^+\mu^-$	< 2.9 $\times 10^{-5}$	90%	401	DESIG=201
$\pi^+\pi^-\pi^0$	(3.61 $\pm$ 0.17) $\times 10^{-3}$		428	DESIG=121
$(\pi^+\pi^-\pi^0)$ S-wave	(3.8 $\pm$ 0.5) $\times 10^{-3}$		428	DESIG=211
$\pi^\mp\rho^\pm$	(7.4 $\pm$ 2.3) $\times 10^{-4}$		106	DESIG=210
$\pi^0\rho^0$	< 4 %	90%	111	DESIG=18
$2(\pi^+\pi^-)$	(8.4 $\pm$ 0.9) $\times 10^{-5}$		372	DESIG=131
$\pi^+\pi^-2\pi^0$	(1.8 $\pm$ 0.4) $\times 10^{-4}$		376	DESIG=202
$2(\pi^+\pi^-)$ neutrals	< 1 %	95%	—	DESIG=132
$2(\pi^+\pi^-)\pi^0$	< 1.8 $\times 10^{-3}$	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
$K^\pm\pi^\mp$	< 4 $\times 10^{-5}$	90%	334	DESIG=207
$\pi^+\pi^-e^+e^-$	(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
$\gamma e^+ e^-$	(4.91 $\pm$ 0.27) $\times 10^{-4}$		479	DESIG=28
$\pi^0\gamma\gamma$	(3.20 $\pm$ 0.24) $\times 10^{-3}$		469	DESIG=24
$\pi^0\gamma\gamma$ (non resonant)	(6.2 $\pm$ 0.9) $\times 10^{-4}$		—	DESIG=212
$\eta\gamma\gamma$	< 1.33 $\times 10^{-4}$	90%	322	DESIG=214
$4\pi^0$	< 4.94 $\times 10^{-5}$	90%	380	DESIG=26
$e^+ e^-$	< 5.6 $\times 10^{-9}$	90%	479	DESIG=150
invisible	< 6 $\times 10^{-4}$	90%	—	DESIG=200

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

$\pi^+ \pi^-$	P, CP	< 1.8	$\times 10^{-5}$	90%	458
$\pi^0 \pi^0$	P, CP	< 4	$\times 10^{-4}$	90%	459
$\pi^0 e^+ e^-$	C	$[b] < 1.4$	$\times 10^{-3}$	90%	469
$\eta e^+ e^-$	C	$[b] < 2.4$	$\times 10^{-3}$	90%	322
3γ	C	< 1.0	$\times 10^{-4}$	90%	479
$\mu^+ \mu^- \pi^0$	C	$[b] < 6.0$	$\times 10^{-5}$	90%	445
$\mu^+ \mu^- \eta$	C	$[b] < 1.5$	$\times 10^{-5}$	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

 $f_0(980)$

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

NODE=M003

See the review on "Scalar Mesons below 2 GeV."

Mass $m = 990 \pm 20$ MeVFull width $\Gamma = 10$ to 100 MeV

NODE=M003M1;DTYPE=M;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
 NODE=M003W1;DTYPE=G;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$

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

NODE=M003215;DESIG=2;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=1;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=5;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$

 $a_0(980)$

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

NODE=M036

See the review on "Scalar Mesons below 2 GeV."

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

NODE=M036MX;DTYPE=M;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
 NODE=M036W1;DTYPE=G;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$

$a_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta \pi$	seen	319
$K \bar{K}$	seen	$\dagger$
$\eta' \pi$	seen	$\dagger$
$\rho \pi$	not seen	137
$\gamma \gamma$	seen	490

NODE=M036215;DESIG=1;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=3;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=8
 DESIG=2;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=5;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$

 $\phi(1020)$

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

NODE=M004

Mass $m = 1019.461 \pm 0.016$ MeVFull width $\Gamma = 4.249 \pm 0.013$ MeV ($S = 1.1$)

NODE=M004M;DTYPE=M

NODE=M004W;DTYPE=G

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$K^+ K^-$	(49.2 $\pm$ 0.5) %	S=1.3	127	NODE=M004215;DESIG=1
$K_L^0 K_S^0$	(34.0 $\pm$ 0.4) %	S=1.3	110	DESIG=2
$\rho\pi^+ + \pi^+\pi^-\pi^0$	(15.24 $\pm$ 0.33) %	S=1.2	—	DESIG=24
$\eta\gamma$	(1.303 $\pm$ 0.025) %	S=1.2	363	DESIG=4
$\pi^0\gamma$	(1.32 $\pm$ 0.06) $\times 10^{-3}$		501	DESIG=7
$\ell^+\ell^-$	—		510	DESIG=256;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
e^+e^-	(2.974 $\pm$ 0.034) $\times 10^{-4}$	S=1.3	510	DESIG=5
$\mu^+\mu^-$	(2.86 $\pm$ 0.19) $\times 10^{-4}$		499	DESIG=6
ηe^+e^-	(1.08 $\pm$ 0.04) $\times 10^{-4}$		363	DESIG=17
$\pi^+\pi^-$	(7.3 $\pm$ 1.3) $\times 10^{-5}$		490	DESIG=8
$\omega\pi^0$	(4.7 $\pm$ 0.5) $\times 10^{-5}$		171	DESIG=25
$\omega\gamma$	< 5 %	CL=84%	209	DESIG=10
$\rho\gamma$	< 1.2 $\times 10^{-5}$	CL=90%	215	DESIG=12
$\pi^+\pi^-\gamma$	(4.1 $\pm$ 1.3) $\times 10^{-5}$		490	DESIG=9
$f_0(980)\gamma$	(3.22 $\pm$ 0.19) $\times 10^{-4}$	S=1.1	29	DESIG=20
$\pi^0\pi^0\gamma$	(1.12 $\pm$ 0.06) $\times 10^{-4}$		492	DESIG=19
$\pi^+\pi^-\pi^+\pi^-$	(3.9 $\pm$ 2.8 $\pm$ 2.2) $\times 10^{-6}$		410	DESIG=15
$\pi^+\pi^+\pi^-\pi^-\pi^0$	< 4.6 $\times 10^{-6}$	CL=90%	342	DESIG=14
$\pi^0 e^+ e^-$	(1.33 $\pm$ 0.07 $\pm$ 0.10) $\times 10^{-5}$		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
$\eta'(958)\gamma$	(6.22 $\pm$ 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
invisible	< 1.7 $\times 10^{-4}$	CL=90%	—	DESIG=260

Lepton Family number (LF) violating modes

$e^\pm\mu^\mp$	LF	< 2	$\times 10^{-6}$	CL=90%	504
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NODE=M004;CLUMP=A
DESIG=258

$h_1(1170)$

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

Mass $m = 1166 \pm 6$ MeV

Full width $\Gamma = 375 \pm 35$ MeV

NODE=M030

NODE=M030M;DTYPE=M

NODE=M030W;DTYPE=G

$h_1(1170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	305

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)
$\omega\pi$	seen		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 ←

$a_1(1260)$ [c]

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

Mass $m = 1230 \pm 40$ MeV [d]
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)
3π	seen	577
$(\rho\pi)_{S\text{-wave}}, \rho \rightarrow \pi\pi$	seen	353
$(\rho\pi)_{D\text{-wave}}, \rho \rightarrow \pi\pi$	seen	353
$(\rho(1450)\pi)_{S\text{-wave}}, \rho \rightarrow \pi\pi$	seen	†
$(\rho(1450)\pi)_{D\text{-wave}}, \rho \rightarrow \pi\pi$	seen	†
$f_0(500)\pi, f_0 \rightarrow \pi\pi$	seen	—
$f_0(980)\pi, f_0 \rightarrow \pi\pi$	not seen	179
$f_0(1370)\pi, f_0 \rightarrow \pi\pi$	seen	†
$f_2(1270)\pi, f_2 \rightarrow \pi\pi$	seen	†
$\pi^+\pi^-\pi^0$	seen	576
$\pi^0\pi^0\pi^0$	not seen	577
$KK\pi$	seen	250
$K^*(892)K$	seen	†
$\pi\gamma$	seen	608

NODE=M010215;DESIG=17;OUR EST;
→ UNCHECKED ←
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=22
DESIG=23;OUR EST;→ UNCHECKED ←
DESIG=18;OUR EST;→ UNCHECKED ←
DESIG=14;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←

$f_2(1270)$

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

Mass $m = 1275.5 \pm 0.8$ MeV
Full width $\Gamma = 186.7^{+2.2}_{-2.5}$ MeV ($S = 1.4$)

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)
$\pi\pi$	($84.2^{+2.9}_{-0.9}$) %	$S=1.1$	623
$\pi^+\pi^-\pi^0$	($7.7^{+1.1}_{-3.2}$) %	$S=1.2$	563
$K\bar{K}$	($4.6^{+0.5}_{-0.4}$) %	$S=2.7$	404
$2\pi^+2\pi^-$	(2.8 ± 0.4) %	$S=1.2$	560
$\eta\eta$	(4.0 ± 0.8) $\times 10^{-3}$	$S=2.1$	326
$4\pi^0$	(3.0 ± 1.0) $\times 10^{-3}$		565
$\gamma\gamma$	(1.42 ± 0.24) $\times 10^{-5}$	$S=1.4$	638
$\eta\pi\pi$	< 8 $\times 10^{-3}$	CL=95%	478
$K^0 K^- \pi^+ + \text{c.c.}$	< 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

$f_1(1285)$

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

Mass $m = 1281.9 \pm 0.5$ MeV ($S = 1.8$)
Full width $\Gamma = 22.7 \pm 1.1$ MeV ($S = 1.5$)

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	$(32.7 \pm 1.9) \%$	S=1.2	568	NODE=M008215;DESIG=21
$\pi^0 \pi^0 \pi^+ \pi^-$	$(21.8 \pm 1.3) \%$	S=1.2	566	DESIG=22
$2\pi^+ 2\pi^-$	$(10.9 \pm 0.6) \%$	S=1.2	563	DESIG=20
$\rho^0 \pi^+ \pi^-$	$(10.9 \pm 0.6) \%$	S=1.2	336	DESIG=191
$\rho^0 \rho^0$	seen		†	DESIG=23
$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	568	DESIG=7
$\eta \pi^+ \pi^-$	$(35 \pm 15) \%$		479	DESIG=198
$\eta \pi \pi$	$(52.2 \pm 2.0) \%$	S=1.2	482	DESIG=3
$a_0(980) \pi$ [ignoring $a_0(980) \rightarrow K \bar{K}$]	$(38 \pm 4) \%$		238	DESIG=4
$\eta \pi \pi$ [excluding $a_0(980) \pi$]	$(14 \pm 4) \%$		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
$\gamma \rho^0$	$(6.1 \pm 1.0) \%$	S=1.7	406	DESIG=13
$\phi \gamma$	$(7.4 \pm 2.6) \times 10^{-4}$		236	DESIG=10
$e^+ e^-$	$< 9.4 \times 10^{-9}$	CL=90%	641	DESIG=200

 $\eta(1295)$

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

NODE=M037

See the review on "Pseudoscalar and pseudovector mesons in the 1400 MeV region."

Mass $m = 1294 \pm 4$ MeV (S = 1.6)

Full width $\Gamma = 55 \pm 5$ MeV

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
$\eta(\pi\pi)S$ -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 [^d]

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
$\pi(\pi\pi)S$ -wave	seen	—

NODE=M058215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←

 $a_2(1320)$

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

Mass $m = 1318.2 \pm 0.6$ MeV (S = 1.2)

Full width $\Gamma = 107 \pm 5$ MeV [^d]

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	623
$\eta\pi$	(14.5 $\pm$ 1.2) %		535
$\omega\pi\pi$	(10.6 $\pm$ 3.2) %	S=1.3	364
$K\bar{K}$	(4.9 $\pm$ 0.8) %		436
$\eta'(958)\pi$	(5.5 $\pm$ 0.9) $\times 10^{-3}$		287
$\pi^\pm\gamma$	(2.91 $\pm$ 0.27) $\times 10^{-3}$		651
$\gamma\gamma$	(9.4 $\pm$ 0.7) $\times 10^{-6}$		658
e^+e^-	< 5 $\times 10^{-9}$	CL=90%	658

NODE=M012215;DESIG=1
DESIG=3
DESIG=4
DESIG=2
DESIG=8
DESIG=7
DESIG=9
DESIG=10

$f_0(1370)$

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

NODE=M147

See the review on "Scalar Mesons below 2 GeV."

Mass $m = 1200$ to 1500 MeV

Full width $\Gamma = 200$ to 500 MeV

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
$\rho\rho$	seen	†
$2(\pi\pi)$ s-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 ←

$\pi_1(1400)$

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

NODE=M111

See the review on "Non- $q\bar{q}$ Mesons." See also $\pi_1(1600)$.

Mass $m = 1354 \pm 25$ MeV ($S = 1.8$)

Full width $\Gamma = 330 \pm 35$ MeV

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
$\rho(770)\pi$	not seen	442

NODE=M111215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5

$\eta(1405)$

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

NODE=M027

See the review on "Pseudoscalar and Pseudovector Mesons in the 1400 MeV Region." See also $\eta(1475)$.

Mass $m = 1408.8 \pm 2.0$ MeV ($S = 2.2$)

Full width $\Gamma = 50.1 \pm 2.6$ MeV ($S = 1.7$)

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-wave	seen		—
$f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0$	not 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=15
DESIG=10;OUR EST;→ UNCHECKED ←
DESIG=6;OUR EST;→ UNCHECKED ←
DESIG=12
DESIG=8;OUR EST;→ UNCHECKED ←
DESIG=11;OUR EST;→ UNCHECKED ←

$h_1(1415)$

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

was $h_1(1380)$

Mass $m = 1416 \pm 8$ MeV (S = 1.5)

Full width $\Gamma = 90 \pm 15$ MeV

NODE=M109

NODE=M109M;DTYPE=M
NODE=M109W;DTYPE=G

$f_1(1420)$

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

See the review on "Pseudoscalar and Pseudovector Mesons in the 1400 MeV Region."

Mass $m = 1426.3 \pm 0.9$ MeV (S = 1.1)

Full width $\Gamma = 54.5 \pm 2.6$ MeV

NODE=M006

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

$f_1(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\bar{K}\pi$	seen	438
$K\bar{K}^*(892) + \text{c.c.}$	seen	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 ←

$\omega(1420)$ [e]

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

Mass $m = 1410 \pm 60$ MeV [d]

Full width $\Gamma = 290 \pm 190$ MeV [d]

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)
$\rho\pi$	seen	480
$\omega\pi\pi$	seen	437
$b_1(1235)\pi$	seen	112
e^+e^-	seen	705

NODE=M125215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←

$a_0(1450)$

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

See the review on "Scalar Mesons below 2 GeV."

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)
$\pi\eta$	0.093 ± 0.020	627
$\pi\eta'(958)$	0.033 ± 0.017	410
$K\bar{K}$	0.082 ± 0.028	547
$\omega\pi\pi$	DEFINED AS 1	484
$a_0(980)\pi\pi$	seen	342
$\gamma\gamma$	seen	737

NODE=M149215;DESIG=1
DESIG=2
DESIG=3
DESIG=4
DESIG=5
DESIG=6

$\rho(1450)$

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

NODE=M105

See the note in $\rho(1450)$ Particle Listings.

Mass $m = 1465 \pm 25$ MeV ^[d]

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

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
$\pi^+\pi^-$	seen	719
4π	seen	669
e^+e^-	seen	732
$\eta\rho$	seen	311
$a_2(1320)\pi$	not seen	58
$K\bar{K}$	seen	541
K^+K^-	seen	541
$K\bar{K}^*(892) + \text{c.c.}$	possibly seen	229
$\eta\gamma$	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	177

NODE=M105215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=20;OUR EVAL;→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=3
DESIG=8;OUR EST;→ UNCHECKED ←
DESIG=7;OUR EVAL;→ UNCHECKED ←
DESIG=21;OUR EVAL;→ UNCHECKED ←
DESIG=15;OUR EST;→ UNCHECKED ←
DESIG=9
DESIG=16;OUR EST;→ UNCHECKED ←
DESIG=17;OUR EST;→ UNCHECKED ←
DESIG=18;OUR EST;→ UNCHECKED ←
DESIG=19;OUR EST;→ UNCHECKED ←

$\eta(1475)$

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

NODE=M175

See the review on "Pseudoscalar and Pseudovector Mesons in the 1400 MeV Region." See also $\eta(1405)$.

Mass $m = 1475 \pm 4$ MeV (S = 1.4)

Full width $\Gamma = 90 \pm 9$ MeV (S = 1.6)

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

$\eta(1475)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\bar{K}\pi$	seen	477
$K\bar{K}^*(892) + \text{c.c.}$	seen	244
$a_0(980)\pi$	seen	396
$\gamma\gamma$	seen	738
$K_S^0 K_S^0 \eta$	possibly seen	†
$\gamma\phi(1020)$	possibly seen	385

NODE=M175215;DESIG=2;OUR EST;
→ UNCHECKED ←
DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=7;OUR EST;→ UNCHECKED ←
DESIG=8;OUR EVAL;→ UNCHECKED ←
DESIG=9

$f_0(1500)$

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

NODE=M152

See the reviews on "Scalar Mesons below 2 GeV" and on "Non- $q\bar{q}$ Mesons".

Mass $m = 1506 \pm 6$ MeV (S = 1.4)

Full width $\Gamma = 112 \pm 9$ MeV

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

$f_0(1500)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\pi\pi$	$(34.5 \pm 2.2) \%$	1.2	741
$\pi^+\pi^-$	seen		740
$2\pi^0$	seen		741
4π	$(48.9 \pm 3.3) \%$	1.2	692
$4\pi^0$	seen		692
$2\pi^+2\pi^-$	seen		687
$2(\pi\pi)_{S\text{-wave}}$	seen		—
$\rho\rho$	seen		†
$\pi(1300)\pi$	seen		145
$a_1(1260)\pi$	seen		219
$\eta\eta$	$(6.0 \pm 0.9) \%$	1.1	517
$\eta\eta'(958)$	$(2.2 \pm 0.8) \%$	1.4	20
$K\bar{K}$	$(8.5 \pm 1.0) \%$	1.1	569
$\gamma\gamma$	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 $m = 1517.4 \pm 2.5$ MeV ($S = 2.8$)
 Full width $\Gamma = 86 \pm 5$ MeV ($S = 2.2$)

NODE=M013
 NODE=M013MX;DTYPE=M
 NODE=M013WX;DTYPE=G

$f'_2(1525)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$K\bar{K}$	$(87.6 \pm 2.2) \%$	1.1	576
$\eta\eta$	$(11.6 \pm 2.2) \%$	1.1	525
$\pi\pi$	$(8.3 \pm 1.6) \times 10^{-3}$		747
$\gamma\gamma$	$(9.5 \pm 1.1) \times 10^{-7}$	1.1	759

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

$\pi_1(1600)$

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

See the review on "Non- $q\bar{q}$ Mesons" and a note in PDG 06, Journal of Physics **G33** 1 (2006). See also $\pi_1(1400)$.

Mass $m = 1661^{+15}_{-11}$ MeV ($S = 1.2$)
 Full width $\Gamma = 240 \pm 50$ MeV ($S = 1.7$)

NODE=M164

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

$\pi_1(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	seen	802
$\rho^0\pi^-$	seen	640
$f_2(1270)\pi^-$	not seen	316
$b_1(1235)\pi$	seen	355
$\eta'(958)\pi^-$	seen	542
$f_1(1285)\pi$	seen	312

NODE=M164215;DESIG=1;OUR EST;
 → UNCHECKED ←
 DESIG=2
 DESIG=4
 DESIG=5
 DESIG=3
 DESIG=6;OUR EST;→ UNCHECKED ←

$a_1(1640)$

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

Mass $m = 1655 \pm 16$ MeV ($S = 1.2$)
 Full width $\Gamma = 254 \pm 40$ MeV ($S = 1.8$)

NODE=M161

NODE=M161M;DTYPE=M
 NODE=M161W;DTYPE=G

$a_1(1640)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	seen	800
$f_2(1270)\pi$	seen	314
$\sigma\pi$	seen	—
$\rho\pi$ <i>S-wave</i>	seen	638
$\rho\pi$ <i>D-wave</i>	seen	638
$\omega\pi\pi$	seen	607
$f_1(1285)\pi$	seen	309
$a_1(1260)\eta$	not seen	†

NODE=M161215;DESIG=3;OUR EST;
→ UNCHECKED ←
DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=7;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=6;OUR EST;→ UNCHECKED ←
DESIG=8

$\eta_2(1645)$

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

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	243
$K\bar{K}\pi$	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 ←

$\omega(1650)$ ^[f]

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

Mass $m = 1670 \pm 30$ MeV ^[d]

Full width $\Gamma = 315 \pm 35$ MeV ^[d]

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
$\rho(1450)\pi$	seen	145
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835
$\pi^0\gamma$	not seen	830

NODE=M126215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=6
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=5

$\omega_3(1670)$

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

Mass $m = 1667 \pm 4$ MeV

Full width $\Gamma = 168 \pm 10$ MeV

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 $m = 1670.6^{+2.9}_{-1.2}$ MeV ($S = 1.3$)

Full width $\Gamma = 258^{+8}_{-9}$ MeV ($S = 1.2$)

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	$(95.8 \pm 1.4) \%$		808	NODE=M034215;DESIG=20
$f_2(1270)\pi$	$(56.3 \pm 3.2) \%$		327	DESIG=8
$\rho\pi$	$(31 \pm 4) \%$		647	DESIG=2
$\sigma\pi$	$(10 \pm 4) \%$		—	DESIG=13
$\pi(\pi\pi)_{S\text{-wave}}$	$(8.7 \pm 3.4) \%$		—	DESIG=11
$\pi^\pm\pi^+\pi^-$	$(53 \pm 4) \%$		806	DESIG=10
$K\bar{K}^*(892) + \text{c.c.}$	$(4.2 \pm 1.4) \%$		453	DESIG=5
$\omega\rho$	$(2.7 \pm 1.1) \%$		302	DESIG=14
$\pi^\pm\gamma$	$(7.0 \pm 1.2) \times 10^{-4}$		829	DESIG=27
$\gamma\gamma$	$< 2.8 \times 10^{-7}$	90%	835	DESIG=12
$\eta\pi$	$< 5 \%$		739	DESIG=3
$\pi^\pm 2\pi^+ 2\pi^-$	$< 5 \%$		735	DESIG=4
$\rho(1450)\pi$	$< 3.6 \times 10^{-3}$	97.7%	145	DESIG=15
$b_1(1235)\pi$	$< 1.9 \times 10^{-3}$	97.7%	364	DESIG=16
$f_1(1285)\pi$	possibly seen		322	DESIG=25
$a_2(1320)\pi$	not seen		292	DESIG=26

 $\phi(1680)$

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

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

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)
$K\bar{K}^*(892) + \text{c.c.}$	seen	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
$\eta\phi$	seen	290
$\eta\gamma$	seen	751

NODE=M067215;DESIG=4;OUR EST;
 → UNCHECKED ←
 DESIG=5;OUR EST;→ UNCHECKED ←
 DESIG=3;OUR EST;→ UNCHECKED ←
 DESIG=6;OUR EST;→ UNCHECKED ←
 DESIG=1;OUR EST;→ UNCHECKED ←
 DESIG=12;OUR EVAL;→ UNCHECKED ←
 DESIG=10
 DESIG=13

 $\rho_3(1690)$

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

Mass $m = 1688.8 \pm 2.1$ MeVFull width $\Gamma = 161 \pm 10$ MeV (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	$(71.1 \pm 1.9) \%$		790
$\pi^\pm\pi^+\pi^-\pi^0$	$(67 \pm 22) \%$		787
$\omega\pi$	$(16 \pm 6) \%$		655
$\pi\pi$	$(23.6 \pm 1.3) \%$		834
$K\bar{K}\pi$	$(3.8 \pm 1.2) \%$		629
$K\bar{K}$	$(1.58 \pm 0.26) \%$	1.2	685
$\eta\pi^+\pi^-$	seen		727
$\rho(770)\eta$	seen		520
$\pi\pi\rho$	seen		633
$a_2(1320)\pi$	seen		308
$\rho\rho$	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 ←

 $\rho(1700)$

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

See the note in $\rho(1700)$ Particle Listings.Mass $m = 1720 \pm 20$ MeV ^[d] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)Full width $\Gamma = 250 \pm 100$ MeV ^[d] ($\eta\rho^0$ 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)
$2(\pi^+\pi^-)$	seen	803
$\rho\pi\pi$	seen	653
$\rho^0\pi^+\pi^-$	seen	651
$\rho^\pm\pi^\mp\pi^0$	seen	652
$a_1(1260)\pi$	seen	404
$h_1(1170)\pi$	seen	450
$\pi(1300)\pi$	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	335
$K\bar{K}$	seen	704
e^+e^-	seen	860
$\pi^0\omega$	seen	674
$\pi^0\gamma$	not seen	855

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 $\leftarrow$
DESIG=194

$a_2(1700)$

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

Mass $m = 1698 \pm 40$ MeV

Full width $\Gamma = 265 \pm 60$ MeV

NODE=M162
NODE=M162M;DTYPE=M
NODE=M162W;DTYPE=G

$a_2(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	$(3.6 \pm 1.1) \%$	758
$\gamma\gamma$	$(1.13 \pm 0.30) \times 10^{-6}$	852
$\rho\pi$	seen	668
$f_2(1270)\pi$	seen	356
$K\bar{K}$	$(1.9 \pm 1.2) \%$	695
$\omega\pi^-\pi^0$	seen	638
$\omega\rho$	seen	346

NODE=M162215;DESIG=4
DESIG=1
DESIG=2;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=3;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=5
DESIG=6;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=7;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$

$f_0(1710)$

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

See the review on "Non- $q\bar{q}$ Mesons."

Mass $m = 1704 \pm 12$ MeV

Full width $\Gamma = 123 \pm 18$ MeV

NODE=M068

NODE=M068M;DTYPE=M;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
NODE=M068W;DTYPE=G;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$

$f_0(1710)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\bar{K}$	seen	694
$\eta\eta$	seen	652
$\pi\pi$	seen	841
$\gamma\gamma$	seen	852
$\omega\omega$	seen	337

NODE=M068215;DESIG=2;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=1;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=5;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=6;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4

$\pi(1800)$

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

Mass $m = 1810^{+9}_{-11}$ MeV ($S = 2.2$)

Full width $\Gamma = 215^{+7}_{-8}$ 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	878
$f_0(500) \pi^-$	seen	—
$f_0(980) \pi^-$	seen	624
$f_0(1370) \pi^-$	seen	366
$f_0(1500) \pi^-$	not seen	247
$\rho \pi^-$	not seen	731
$\eta \eta \pi^-$	seen	660
$a_0(980) \eta$	seen	471
$a_2(1320) \eta$	not seen	†
$f_2(1270) \pi$	not seen	441
$f_0(1370) \pi^-$	not seen	366
$f_0(1500) \pi^-$	seen	247
$\eta \eta' (958) \pi^-$	seen	373
$K_0^*(1430) K^-$	seen	†
$K^*(892) K^-$	not seen	568

NODE=M075215;DESIG=10;OUR EST;
→ UNCHECKED ←
DESIG=11;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=1
DESIG=12
DESIG=2
DESIG=7;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←
DESIG=13
DESIG=14
DESIG=15
DESIG=6;OUR EST;→ UNCHECKED ←
DESIG=8;OUR EST;→ UNCHECKED ←
DESIG=4
DESIG=9

$\phi_3(1850)$

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

Mass $m = 1854 \pm 7$ MeV

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

NODE=M054
NODE=M054M;DTYPE=M
NODE=M054W;DTYPE=G

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

NODE=M054215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←

$\eta_2(1870)$

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

Mass $m = 1842 \pm 8$ MeV

Full width $\Gamma = 225 \pm 14$ MeV

NODE=M101
NODE=M101M;DTYPE=M
NODE=M101W;DTYPE=G

$\eta_2(1870)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma \gamma$	seen	921

NODE=M101225;DESIG=9

$\pi_2(1880)$

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

Mass $m = 1874^{+26}_{-5}$ MeV ($S = 1.6$)

Full width $\Gamma = 237^{+33}_{-30}$ MeV ($S = 1.2$)

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

$f_2(1950)$

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

Mass $m = 1936 \pm 12$ MeV ($S = 1.3$)

Full width $\Gamma = 464 \pm 24$ 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	377
$\pi^+\pi^-$	seen	958
$\pi^0\pi^0$	seen	959
4π	seen	921
$\eta\eta$	seen	798
$K\bar{K}$	seen	833
$\gamma\gamma$	seen	968
$p\bar{p}$	seen	238

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

$a_4(1970)$

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

was $a_4(2040)$

Mass $m = 1967 \pm 16$ MeV ($S = 2.1$)

Full width $\Gamma = 324^{+15}_{-18}$ MeV

NODE=M017

NODE=M017M;DTYPE=M

NODE=M017W;DTYPE=G

$a_4(1970)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\bar{K}$	seen	851
$\pi^+\pi^-\pi^0$	seen	959
$\rho\pi$	seen	825
$f_2(1270)\pi$	seen	559
$\omega\pi^-\pi^0$	seen	801
$\omega\rho$	seen	601
$\eta\pi$	seen	902
$\eta'(958)\pi$	seen	743

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 ←

$f_2(2010)$

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

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

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

NODE=M106

NODE=M106M;DTYPE=M

NODE=M106W;DTYPE=G

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

NODE=M106215;DESIG=1;OUR EST;
 DESIG=2 → UNCHECKED ←

$f_4(2050)$

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

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	568

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

$\phi(2170)$

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

Mass $m = 2159 \pm 17$ MeV ^[d] ($S = 1.4$)

Full width $\Gamma = 137 \pm 16$ MeV ^[d]

NODE=M103

NODE=M103M;DTYPE=M

NODE=M103W;DTYPE=G

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	seen	1080
$\phi f_0(980)$	seen	395
$K^+K^- f_0(980) \rightarrow$	seen	—
$K^+K^- \pi^+\pi^-$		
$K^+K^- f_0(980) \rightarrow K^+K^- \pi^0\pi^0$	seen	—
$K^{*0}K^\pm\pi^\mp$	not seen	759
$K^*(892)^0\bar{K}^*(892)^0$	not seen	609

NODE=M103215;DESIG=1;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=2;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
 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;
 $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=2;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=3;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$

 $f_2(2340)$

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

Mass $m = 2345^{+50}_{-40}$ MeV
 Full width $\Gamma = 322^{+70}_{-60}$ 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	580
$\eta\eta$	seen	1037

NODE=M108215;DESIG=1;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=2

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

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

NODE=MXXX020

 $K_0^*(700)$

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

also known as κ ; was $K_0^*(800)$

Mass (T-Matrix Pole $\sqrt{s}$) = $(630-730) - i(260-340)$ MeV
 Mass (Breit-Wigner) = 824 ± 30 MeV
 Full width (Breit-Wigner) = 478 ± 50 MeV

NODE=M174

NODE=M174TMP;DTYPE=M;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
 NODE=M174M;DTYPE=M
 NODE=M174W;DTYPE=G

$K_0^*(700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	100 %	240

NODE=M174215;DESIG=1;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$

 $K^*(892)$

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

Mass (T-Matrix Pole $\sqrt{s}$) = $(890 \pm 14) - i(26 \pm 6)$ MeV
 $K^*(892)^\pm$ hadroproduced mass $m = 891.67 \pm 0.26$ MeV
 $K^*(892)^\pm$ in τ decays mass $m = 895.5 \pm 0.8$ MeV
 $K^*(892)^0$ mass $m = 895.55 \pm 0.20$ MeV ($S = 1.7$)
 $K^*(892)^\pm$ hadroproduced full width $\Gamma = 51.4 \pm 0.8$ MeV
 $K^*(892)^\pm$ in τ decays full width $\Gamma = 46.2 \pm 1.3$ MeV
 $K^*(892)^0$ full width $\Gamma = 47.3 \pm 0.5$ MeV ($S = 1.9$)

NODE=M018

NODE=M018TMP;DTYPE=M;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
 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
$K^\pm\gamma$	$(9.8 \pm 0.9) \times 10^{-4}$		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 $m = 1253 \pm 7$ MeV $^{[d]}$ (S = 2.2)
Full width $\Gamma = 90 \pm 20$ MeV $^{[d]}$

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)
$K\rho$	$(42 \pm 6) \%$	$\dagger$
$K_0^*(1430)\pi$	$(28 \pm 4) \%$	$\dagger$
$K^*(892)\pi$	$(16 \pm 5) \%$	286
$K\omega$	$(11.0 \pm 2.0) \%$	$\dagger$
$Kf_0(1370)$	$(3.0 \pm 2.0) \%$	$\dagger$
γK^0	seen	528

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	< 2.3	$\times 10^{-4}$ 90%	619

NODE=M094215;DESIG=2
DESIG=1
DESIG=3;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4

 $K_0^*(1430)$

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

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
$K\eta$	(8.6 $^{+2.7}_{-3.4}$) %	486
$K\eta'(958)$	seen	†

NODE=M019215;DESIG=1
DESIG=2
DESIG=3

 $K_2^*(1430)$

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

$K_2^*(1430)^\pm$ mass $m = 1427.3 \pm 1.5$ MeV ($S = 1.3$)
 $K_2^*(1430)^0$ mass $m = 1432.4 \pm 1.3$ MeV
 $K_2^*(1430)^\pm$ full width $\Gamma = 100.0 \pm 2.1$ MeV
 $K_2^*(1430)^0$ 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) %		620
$K^*(892)\pi$	(24.7 $\pm$ 1.5) %		420
$K^*(892)\pi\pi$	(13.4 $\pm$ 2.2) %		373
$K\rho$	(8.7 $\pm$ 0.8) %	S=1.2	320
$K\omega$	(2.9 $\pm$ 0.8) %		313
$K^+\gamma$	(2.4 $\pm$ 0.5) $\times 10^{-3}$	S=1.1	628
$K\eta$	(1.5 $^{+3.4}_{-1.0}$) $\times 10^{-3}$	S=1.3	488
$K\omega\pi$	< 7.2 $\times 10^{-4}$	CL=95%	106
$K^0\gamma$	< 9 $\times 10^{-4}$	CL=90%	627

NODE=M022215;DESIG=1
 DESIG=2
 DESIG=6
 DESIG=3
 DESIG=4
 DESIG=8
 DESIG=5

DESIG=7
 DESIG=10;OUR EVAL;→ UNCHECKED ←

 $K(1460)$

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

NODE=M021

$K(1460)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	seen	—
$K\rho$	seen	—
$K_0^*(1430)\pi$	seen	—

NODE=M021215;DESIG=1;OUR EST;
 → UNCHECKED ←
 DESIG=2;OUR EST;→ UNCHECKED ←
 DESIG=3;OUR EST;→ UNCHECKED ←

 $K_1(1650)$

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

Mass $m = 1672 \pm 50$ MeV ($S = 1.1$)
 Full width $\Gamma = 158 \pm 50$ MeV

NODE=M099

NODE=M099M;DTYPE=M
 NODE=M099W;DTYPE=G

 $K^*(1680)$

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

Mass $m = 1718 \pm 18$ MeV
 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) %	782
$K\rho$	(31.4 $^{+5.0}_{-2.1}$) %	571
$K^*(892)\pi$	(29.9 $^{+2.2}_{-5.0}$) %	618
$K\phi$	seen	387
$K\eta$	(1.4 $^{+1.0}_{-0.8}$) %	683

NODE=M095215;DESIG=1
 DESIG=3
 DESIG=2
 DESIG=4
 DESIG=6

 $K_2(1770)$ [g]

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

Mass $m = 1773 \pm 8$ MeV
 Full 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
$K_2^*(1430)\pi$	seen	287
$K^*(892)\pi$	seen	654
$Kf_2(1270)$	seen	53
$K\phi$	seen	441
$K\omega$	seen	607

NODE=M023215;DESIG=1;OUR EST;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=2;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=9;OUR EST; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=10
DESIG=8

$K_3^*(1780)$

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

Mass $m = 1779 \pm 8$ MeV ($S = 1.2$)
Full width $\Gamma = 161 \pm 17$ MeV ($S = 1.1$)

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) %		616
$K^*(892)\pi$	(20 $\pm$ 5) %		657
$K\pi$	(18.8 $\pm$ 1.0) %		815
$K\eta$	(30 $\pm$ 13) %		721
$K_2^*(1430)\pi$	< 16 %	95%	292

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

$K_2(1820)$ $[g]$

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

Mass $m = 1819 \pm 12$ MeV
Full width $\Gamma = 264 \pm 34$ 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	328
$K^*(892)\pi$	seen	683
$Kf_2(1270)$	seen	191
$K\omega$	seen	640
$K\phi$	seen	483

NODE=M146215;DESIG=1;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=2;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=3;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=6;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=7

$K_2^*(1980)$

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

Mass $m = 1995^{+60}_{-50}$ MeV ($S = 2.8$)
Full width $\Gamma = 349^{+50}_{-30}$ MeV ($S = 1.3$)

NODE=M104
NODE=M104M;DTYPE=M
NODE=M104W;DTYPE=G

$K_2^*(1980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	possibly seen	791
$K\rho$	possibly seen	762
$Kf_2(1270)$	possibly seen	424
$K\phi$	seen	627
$K\eta$	seen	850

NODE=M104215;DESIG=2
DESIG=3
DESIG=4
DESIG=5
DESIG=6

$K_4^*(2045)$

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

Mass $m = 2048^{+8}_{-9}$ MeV ($S = 1.1$)
Full width $\Gamma = 199^{+27}_{-19}$ MeV

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

$K_4^*(2045)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	$(9.9 \pm 1.2) \%$	960
$K^*(892)\pi\pi$	$(9 \pm 5) \%$	804
$K^*(892)\pi\pi\pi$	$(7 \pm 5) \%$	770
$\rho K\pi$	$(5.7 \pm 3.2) \%$	744
$\omega K\pi$	$(5.0 \pm 3.0) \%$	740
$\phi K\pi$	$(2.8 \pm 1.4) \%$	597
$\phi K^*(892)$	$(1.4 \pm 0.7) \%$	368

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.

NODE=M061

Mass $m = 2006.85 \pm 0.05$ MeV ($S = 1.1$)
 $m_{D^{*0}} - m_{D^0} = 142.014 \pm 0.030$ MeV ($S = 1.5$)
Full width $\Gamma < 2.1$ MeV, CL = 90%

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

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

NODE=M061220;NODE=M061

$D^*(2007)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^0$	$(64.7 \pm 0.9) \%$	43
$D^0\gamma$	$(35.3 \pm 0.9) \%$	137

DESIG=1
DESIG=2

$D^*(2010)^\pm$

$I(J^P) = \frac{1}{2}(1^-)$
 I, J, P need confirmation.

NODE=M062

Mass $m = 2010.26 \pm 0.05$ MeV
 $m_{D^*(2010)^+} - m_{D^+} = 140.603 \pm 0.015$ MeV
 $m_{D^*(2010)^+} - m_{D^0} = 145.4257 \pm 0.0017$ MeV
Full width $\Gamma = 83.4 \pm 1.8$ keV

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

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

NODE=M062225;NODE=M062

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

DESIG=1
DESIG=3
DESIG=2

$D_0^*(2300)^0$

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

NODE=M178

was $D_0^*(2400)^0$

Mass $m = 2300 \pm 19$ MeV
Full width $\Gamma = 274 \pm 40$ MeV

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

$D_0^*(2300)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^+\pi^-$	seen	369

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

$D_0^*(2300)$

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

was $D_0^*(2400)$

NODE=M252

Mass $m = 2343 \pm 10$ MeV ($S = 1.5$)
Full width $\Gamma = 229 \pm 16$ MeV

NODE=M252M;DTYPE=M
NODE=M252W;DTYPE=G

$D_0^*(2300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D\pi^\pm$	seen	411

NODE=M252215;DESIG=1

$D_1(2420)^0$

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

Mass $m = 2421.8 \pm 0.6$ MeV ($S = 1.8$)
 $m_{D_1^0} - m_{D^{*+}} = 411.5 \pm 0.6$ MeV ($S = 1.7$)
Full width $\Gamma = 31.8 \pm 2.2$ MeV ($S = 3.1$)

NODE=M097

NODE=M097M;DTYPE=M

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

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

NODE=M097215;NODE=M097

$D_1(2420)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+\pi^-$	seen	354
$D^0\pi^+\pi^-$	seen	426
$D^+\pi^-$	not seen	473
$D^{*0}\pi^+\pi^-$	not seen	280

DESIG=1

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=2;OUR EST;→ UNCHECKED ←

DESIG=7;OUR EST;→ UNCHECKED ←

$D_1(2430)^0$

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

Mass $m = 2412 \pm 9$ MeV
Full width $\Gamma = 314 \pm 29$ MeV

NODE=M180

NODE=M180M;DTYPE=M

NODE=M180W;DTYPE=G

$D_1(2430)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2010)^+\pi^-$	seen	345

NODE=M180215;DESIG=1;OUR EVAL;
→ UNCHECKED ←

$D_2^*(2460)^0$

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

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

NODE=M119

Mass $m = 2460.7 \pm 0.4$ MeV ($S = 2.9$)
 $m_{D_2^{*0}} - m_{D^+} = 591.0 \pm 0.4$ MeV ($S = 2.8$)
 $m_{D_2^{*0}} - m_{D^{*+}} = 450.4 \pm 0.4$ MeV ($S = 2.8$)
Full width $\Gamma = 47.4 \pm 1.0$ MeV ($S = 1.7$)

NODE=M119M;DTYPE=M

NODE=M119DM;DTYPE=D

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

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

NODE=M119215;NODE=M119

$D_2^*(2460)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^+\pi^-$	seen	505
$D^*(2010)^+\pi^-$	seen	389
$D^0\pi^+\pi^-$	not seen	462
$D^{*0}\pi^+\pi^-$	not seen	324

CLUMP=A;DESIG=1

DESIG=2

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=4;OUR EST;→ UNCHECKED ←

$D_2^*(2460)^\pm$

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

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

Mass $m = 2465.4 \pm 1.3$ MeV ($S = 3.1$)

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

Full width $\Gamma = 46.7 \pm 1.2$ MeV

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

NODE=M150

NODE=M150M;DTYPE=M

NODE=M150DM;DTYPE=D

NODE=M150W;DTYPE=G

NODE=M150215;NODE=M150

$D_2^*(2460)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^+$	seen	513
$D^{*0}\pi^+$	seen	396
$D^+\pi^+\pi^-$	not seen	462
$D^{*+}\pi^+\pi^-$	not seen	326

DESIG=1

DESIG=2;OUR EST;→ UNCHECKED ←

DESIG=3;OUR EST;→ UNCHECKED ←

DESIG=4;OUR EST;→ UNCHECKED ←

$D_3^*(2750)$

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

Mass $m = 2763.1 \pm 3.2$ MeV ($S = 2.1$)

Full width $\Gamma = 66 \pm 5$ MeV

NODE=M203

NODE=M203M;DTYPE=M

NODE=M203W;DTYPE=G

$D_3^*(2750)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D\pi$	seen	743
$D^+\pi^-$	seen	739
$D^0\pi^\pm$	seen	743
$D^*\pi$	seen	639
$D^{*+}\pi^-$	seen	639

NODE=M203215;DESIG=1;OUR EVAL;

→ UNCHECKED ←

DESIG=2;OUR EVAL;→ UNCHECKED ←

DESIG=3;OUR EVAL;→ UNCHECKED ←

DESIG=4;OUR EVAL;→ UNCHECKED ←

DESIG=5;OUR EVAL;→ UNCHECKED ←

CHARMED, STRANGE MESONS ($C = S = \pm 1$) (including possibly non- $q\bar{q}$ states)

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

NODE=MXXX040

$D_s^{*\pm}$

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

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

Mass $m = 2112.2 \pm 0.4$ MeV

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

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

NODE=S074

NODE=S074M;DTYPE=M

NODE=S074DM;DTYPE=D

NODE=S074W;DTYPE=G

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

NODE=S074215;NODE=S074

D_s^{*+} DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D_s^+ \gamma$	(93.5 ± 0.7) %	139
$D_s^+ \pi^0$	(5.8 ± 0.7) %	48
$D_s^+ e^+ e^-$	(6.7 ± 1.6) × 10 ⁻³	139

DESIG=1

DESIG=2

DESIG=3

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

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

J, P need confirmation.

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

Mass $m = 2317.8 \pm 0.5$ MeV

$m_{D_{s0}^*(2317)^\pm} - m_{D_s^\pm} = 349.4 \pm 0.5$ MeV

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

$D_{s0}^*(2317)^\pm$ 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)	Confidence level	p (MeV/c)
$D_s^+ \pi^0$	(100 ⁺ ₋₂₀) %		298
$D_s^+ \gamma$	< 5 %	90%	323
$D_s^*(2112)^+ \gamma$	< 6 %	90%	—
$D_s^+ \gamma \gamma$	< 18 %	95%	323
$D_s^*(2112)^+ \pi^0$	< 11 %	90%	—
$D_s^+ \pi^+ \pi^-$	< 4 × 10 ⁻³	90%	194
$D_s^+ \pi^0 \pi^0$	not seen		205

DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

DESIG=6

DESIG=7;OUR EVAL;→ UNCHECKED ←

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

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

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

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

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

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

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

NODE=M173

NODE=M173M;DTYPE=M

NODE=M173MD;DTYPE=D

NODE=M173DM;DTYPE=D

NODE=M173W;DTYPE=G

NODE=M173215;NODE=M173

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

DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

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

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

J, P need confirmation.

Mass $m = 2535.11 \pm 0.06$ MeV

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

NODE=M121

NODE=M121M;DTYPE=M

NODE=M121W;DTYPE=G

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

$D_{s1}(2536)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D^*(2010)^+ K^0$	0.85 ± 0.12		149
$(D^*(2010)^+ K^0)_{S-wave}$	0.61 ± 0.09		149
$D^+ \pi^- K^+$	0.028 ± 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

NODE=M121215;NODE=M121

DESIG=1

DESIG=7

DESIG=8

DESIG=4

DESIG=2

DESIG=5

DESIG=3

DESIG=6

$D_{s2}^*(2573)$

$$I(J^P) = 0(2^+)$$

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

Mass $m = 2569.1 \pm 0.8$ MeV ($S = 2.4$)

Full width $\Gamma = 16.9 \pm 0.7$ MeV

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

$D_{s2}^*(2573)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	431
$D^*(2007)^0 K^+$	not seen	238

NODE=M148

NODE=M148M;DTYPE=M

NODE=M148W;DTYPE=G

NODE=M148215;NODE=M148

DESIG=1

DESIG=2;OUR EVAL;→ UNCHECKED ←

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

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

Mass $m = 2714 \pm 5$ MeV ($S = 1.5$)

Full width $\Gamma = 122 \pm 10$ MeV

NODE=M182

NODE=M182M;DTYPE=M

NODE=M182W;DTYPE=G

BOTTOM MESONS ($B = \pm 1$)

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

NODE=MXXX045

$B_1(5721)$

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

I, J, P need confirmation.

$B_1(5721)^+$ mass = $5725.9^{+2.5}_{-2.7}$ MeV

$m_{B_1^+} - m_{B^{*0}} = 401.2^{+2.4}_{-2.7}$ MeV

$B_1(5721)^0$ mass = 5726.1 ± 1.3 MeV ($S = 1.2$)

$m_{B_1^0} - m_{B^+} = 446.7 \pm 1.3$ MeV ($S = 1.2$)

$m_{B_1^0} - m_{B^{*+}} = 401.4 \pm 1.2$ MeV ($S = 1.2$)

Full width $\Gamma(B_1(5721)^+) = 31 \pm 6$ MeV ($S = 1.1$)

Full width $\Gamma(B_1(5721)^0) = 27.5 \pm 3.4$ MeV ($S = 1.1$)

NODE=M244

NODE=M244M+;DTYPE=M

NODE=M244DM+;DTYPE=D

NODE=M244M0;DTYPE=M

NODE=M244DM0;DTYPE=D

NODE=M244DM1;DTYPE=D

NODE=M244W+;DTYPE=G

NODE=M244W0;DTYPE=G

$B_1(5721)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B^* \pi$	seen	365

NODE=M244215;DESIG=1

 $B_2^*(5747)$

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

I, J, P need confirmation.

NODE=M245

$$B_2^*(5747)^+ \text{ mass} = 5737.2 \pm 0.7 \text{ MeV}$$

NODE=M245M+;DTYPE=M

$$m_{B_2^{*+}} - m_{B^0} = 457.5 \pm 0.7 \text{ MeV}$$

NODE=M245DM+;DTYPE=D

$$B_2^*(5747)^0 \text{ mass} = 5739.5 \pm 0.7 \text{ MeV} \quad (S = 1.4)$$

NODE=M245M0;DTYPE=M

$$m_{B_2^{*0}} - m_{B^0} = 13.4 \pm 1.4 \text{ MeV} \quad (S = 1.3)$$

NODE=M245DM0;DTYPE=D

$$m_{B_2^{*0}} - m_{B^+} = 460.2 \pm 0.6 \text{ MeV} \quad (S = 1.4)$$

NODE=M245DM2;DTYPE=D

$$\text{Full width } \Gamma(B_2^*(5747)^+) = 20 \pm 5 \text{ MeV} \quad (S = 2.2)$$

NODE=M245W+;DTYPE=G

$$\text{Full width } \Gamma(B_2^*(5747)^0) = 24.2 \pm 1.7 \text{ MeV}$$

NODE=M245W0;DTYPE=G

$B_2^*(5747)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B \pi$	seen	420
$B^* \pi$	seen	376

NODE=M245215;DESIG=1

DESIG=2

 $B_J(5970)$

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

I, J, P need confirmation.

NODE=M248

$$\text{Mass } m = 5964 \pm 5 \text{ MeV}$$

NODE=M248M+;DTYPE=M

$$m_{B_J(5970)^+} - m_{B^0} = 685 \pm 5 \text{ MeV}$$

NODE=M248DM+;DTYPE=D

$$\text{Mass } m = 5971 \pm 5 \text{ MeV}$$

NODE=M248M0;DTYPE=M

$$m_{B_J(5970)^0} - m_{B^+} = 691 \pm 5 \text{ MeV}$$

NODE=M248DM0;DTYPE=D

$$\text{Full width } \Gamma = 62 \pm 20 \text{ MeV}$$

NODE=M248W+;DTYPE=G

$$\text{Full width } \Gamma = 81 \pm 12 \text{ MeV}$$

NODE=M248W0;DTYPE=G

$B_J(5970)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B \pi$	possibly seen	633
$B^* \pi$	seen	592

NODE=M248215;DESIG=1

DESIG=2

BOTTOM, STRANGE MESONS

($B = \pm 1, S = \mp 1$)

$$B_s^0 = s\bar{b}, \bar{B}_s^0 = \bar{s}b, \quad \text{similarly for } B_s^{*'}s$$

NODE=MXXX046

 $B_{s1}(5830)^0$

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

I, J, P need confirmation.

NODE=M187

$$\text{Mass } m = 5828.70 \pm 0.20 \text{ MeV}$$

NODE=M187M;DTYPE=M

$$m_{B_{s1}^0} - m_{B^{*+}} = 504.00 \pm 0.17 \text{ MeV}$$

NODE=M187DM;DTYPE=D

$$\text{Full width } \Gamma = 0.5 \pm 0.4 \text{ MeV}$$

NODE=M187W;DTYPE=G

$B_{s1}(5830)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B^{*+} K^-$	seen	97

NODE=M187215;DESIG=1

 $B_{s2}^*(5840)^0$

$$I(J^P) = 0(2^+)$$

I, J, P need confirmation.

NODE=M186

$$\text{Mass } m = 5839.86 \pm 0.12 \text{ MeV}$$

NODE=M186M;DTYPE=M

$$m_{B_{s2}^{*0}} - m_{B^+} = 560.52 \pm 0.14 \text{ MeV}$$

NODE=M186DM2;DTYPE=D

$$\text{Full width } \Gamma = 1.49 \pm 0.27 \text{ MeV}$$

NODE=M186W;DTYPE=G

$B_{s2}^*(5840)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B^+ K^-$	DEFINED AS 1	252
$B^{*+} K^-$	0.093 ± 0.018	141
$B^0 K_S^0$	0.43 ± 0.11	245
$B^{*0} K_S^0$	0.04 ± 0.04	—

NODE=M186215;DESIG=1
DESIG=2
DESIG=4
DESIG=3

BOTTOM, CHARMED MESONS ($B = C = \pm 1$)

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

NODE=MXXX049

$B_c(2S)^\pm$

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

Mass $m = 6871.2 \pm 1.0$ MeV

NODE=M217

NODE=M217M;DTYPE=M

$B_c(2S)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B_c^+ \pi^+ \pi^-$	seen	3370

NODE=M217215;DESIG=1

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

NODE=MXXX025

$\eta_c(1S)$

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

Mass $m = 2983.9 \pm 0.4$ MeV ($S = 1.2$)

Full width $\Gamma = 32.0 \pm 0.7$ 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)
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Decays involving hadronic resonances

$\eta'(958) \pi \pi$	(4.1 $\pm$ 1.7) %		1323	NODE=M026215;NODE=M026;CLUMP=A
$\rho \rho$	(1.8 $\pm$ 0.5) %		1275	DESIG=24
$K^*(892)^0 K^- \pi^+ + \text{c.c.}$	(2.0 $\pm$ 0.7) %		1278	DESIG=19
$K^*(892)^0 \bar{K}^*(892)$	(6.9 $\pm$ 1.3) $\times 10^{-3}$		1196	DESIG=26
$K^*(892)^0 \bar{K}^*(892)^0 \pi^+ \pi^-$	(1.1 $\pm$ 0.5) %		1073	DESIG=18
$\phi K^+ K^-$	(2.9 $\pm$ 1.4) $\times 10^{-3}$		1104	DESIG=57
$\phi \phi$	(1.74 $\pm$ 0.19) $\times 10^{-3}$		1089	DESIG=28
$\phi 2(\pi^+ \pi^-)$	$< 4 \times 10^{-3}$	90%	1251	DESIG=17
$a_0(980) \pi$	< 2 %	90%	1327	DESIG=58
$a_2(1320) \pi$	< 2 %	90%	1197	DESIG=21
$K^*(892) \bar{K} + \text{c.c.}$	< 1.28 %	90%	1310	DESIG=22
$f_2(1270) \eta$	< 1.1 %	90%	1145	DESIG=40
$\omega \omega$	(2.9 $\pm$ 0.8) $\times 10^{-3}$		1270	DESIG=23
$\omega \phi$	$< 2.5 \times 10^{-4}$	90%	1185	DESIG=20
$f_2(1270) f_2(1270)$	(9.8 $\pm$ 2.5) $\times 10^{-3}$		774	DESIG=47
$f_2(1270) f_2'(1525)$	(9.5 $\pm$ 3.2) $\times 10^{-3}$		524	DESIG=46
$f_0(980) \eta$	seen		1264	DESIG=59
$f_0(1500) \eta$	seen		1025	DESIG=70
$f_0(2200) \eta$	seen		498	DESIG=71
$a_0(980) \pi$	seen		1327	DESIG=72
$a_0(1320) \pi$	seen		—	DESIG=73
$a_0(1450) \pi$	seen		1123	DESIG=74
$a_0(1950) \pi$	seen		860	DESIG=75
$K_0^*(1430) \bar{K}$	seen		—	DESIG=76
$K_2^*(1430) \bar{K}$	seen		—	DESIG=77
$K_0^*(1950) \bar{K}$	seen		—	DESIG=78

Decays into stable hadrons

$K\bar{K}\pi$	(7.3 $\pm$ 0.4) %	1381	NODE=M026;CLUMP=B DESIG=14
$K\bar{K}\eta$	(1.36 $\pm$ 0.15) %	1265	DESIG=25
$\eta\pi^+\pi^-$	(1.7 $\pm$ 0.6) %	1428	DESIG=16
$\eta 2(\pi^+\pi^-)$	(4.4 $\pm$ 1.6) %	1386	DESIG=61
$K^+K^-\pi^+\pi^-$	(6.6 $\pm$ 1.1) $\times 10^{-3}$	1345	DESIG=15
$K^+K^-\pi^+\pi^-\pi^0$	(3.5 $\pm$ 0.6) %	1304	DESIG=60
$K^0K^-\pi^+\pi^-\pi^++\text{c.c.}$	(5.6 $\pm$ 1.9) %	—	DESIG=62
$K^+K^-2(\pi^+\pi^-)$	(7.5 $\pm$ 2.4) $\times 10^{-3}$	1254	DESIG=55
$2(K^+K^-)$	(1.43 $\pm$ 0.30) $\times 10^{-3}$	1056	DESIG=27
$\pi^+\pi^-\pi^0$	< 5 $\times 10^{-4}$	90% 1476	DESIG=81
$\pi^+\pi^-\pi^0\pi^0$	(4.7 $\pm$ 1.4) %	1460	DESIG=63
$2(\pi^+\pi^-)$	(9.1 $\pm$ 1.2) $\times 10^{-3}$	1459	DESIG=11
$2(\pi^+\pi^-\pi^0)$	(15.8 $\pm$ 2.3) %	1409	DESIG=64
$3(\pi^+\pi^-)$	(1.7 $\pm$ 0.4) %	1407	DESIG=56
$p\bar{p}$	(1.44 $\pm$ 0.14) $\times 10^{-3}$	1160	DESIG=12
$p\bar{p}\pi^0$	(3.6 $\pm$ 1.5) $\times 10^{-3}$	1101	DESIG=65
$\Lambda\bar{\Lambda}$	(1.06 $\pm$ 0.23) $\times 10^{-3}$	991	DESIG=45
$K^+\bar{p}\Lambda + \text{c.c.}$	(2.5 $\pm$ 0.4) $\times 10^{-3}$	772	DESIG=82
$\bar{\Lambda}(1520)\Lambda + \text{c.c.}$	(3.1 $\pm$ 1.3) $\times 10^{-3}$	694	DESIG=83
$\Sigma^+\bar{\Sigma}^-$	(2.1 $\pm$ 0.6) $\times 10^{-3}$	901	DESIG=66
$\Xi^-\bar{\Xi}^+$	(9.0 $\pm$ 2.6) $\times 10^{-4}$	692	DESIG=67
$\pi^+\pi^-p\bar{p}$	(5.3 $\pm$ 2.1) $\times 10^{-3}$	1027	DESIG=13

Radiative decays

$\gamma\gamma$	(1.61 $\pm$ 0.12) $\times 10^{-4}$	1492	NODE=M026;CLUMP=C DESIG=31
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**Charge conjugation (C), Parity (P),
Lepton family number (LF) violating modes**

$\pi^+\pi^-$	P, CP	< 1.1 $\times 10^{-4}$	90% 1485	NODE=M026;CLUMP=D DESIG=51
$\pi^0\pi^0$	P, CP	< 4 $\times 10^{-5}$	90% 1486	DESIG=52
K^+K^-	P, CP	< 6 $\times 10^{-4}$	90% 1408	DESIG=53
$K_S^0K_S^0$	P, CP	< 3.1 $\times 10^{-4}$	90% 1407	DESIG=54

 $J/\psi(1S)$

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

Mass $m = 3096.900 \pm 0.006$ MeVFull width $\Gamma = 92.6 \pm 1.7$ keV ($S = 1.1$)

NODE=M070

NODE=M070M;DTYPE=M

NODE=M070W;DTYPE=G

$J/\psi(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level (MeV/c)	p
hadrons	(87.7 $\pm$ 0.5) %	—	NODE=M070215;DESIG=3
virtual $\gamma \rightarrow$ hadrons	(13.50 $\pm$ 0.30) %	—	DESIG=4
$g g g$	(64.1 $\pm$ 1.0) %	—	DESIG=249
$\gamma g g$	(8.8 $\pm$ 1.1) %	—	DESIG=250
$e^+ e^-$	(5.971 $\pm$ 0.032) %	1548	DESIG=1
$e^+ e^- \gamma$	[h] (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			
$\rho \pi$	(1.69 $\pm$ 0.15) %	S=2.4 1448	NODE=M070;CLUMP=A DESIG=20
$\rho^0 \pi^0$	(5.6 $\pm$ 0.7) $\times 10^{-3}$	1448	DESIG=21
$\rho(770)^\mp K^\pm K_S^0$	(1.9 $\pm$ 0.4) $\times 10^{-3}$	—	DESIG=342
$\rho(1450) \pi \rightarrow \pi^+ \pi^- \pi^0$	(2.3 $\pm$ 0.7) $\times 10^{-3}$	—	DESIG=328
$\rho(1450)^\pm \pi^\mp \rightarrow K_S^0 K^\pm \pi^\mp$	(3.5 $\pm$ 0.6) $\times 10^{-4}$	—	DESIG=329
$\rho(1450)^0 \pi^0 \rightarrow K^+ K^- \pi^0$	(2.7 $\pm$ 0.6) $\times 10^{-4}$	—	DESIG=312
$\rho(1450) \eta'(958) \rightarrow$ $\pi^+ \pi^- \eta'(958)$	(3.3 $\pm$ 0.7) $\times 10^{-6}$	—	DESIG=345
$\rho(1700) \pi \rightarrow \pi^+ \pi^- \pi^0$	(1.7 $\pm$ 1.1) $\times 10^{-4}$	—	DESIG=313
$\rho(2150) \pi \rightarrow \pi^+ \pi^- \pi^0$	(8 $\pm$ 40) $\times 10^{-6}$	—	DESIG=314
$a_2(1320) \rho$	(1.09 $\pm$ 0.22) %	1124	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
$\omega \pi^+ \pi^-$	(7.2 $\pm$ 1.0) $\times 10^{-3}$	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 $\pm$ 0.6) $\times 10^{-4}$	1266	DESIG=46
$K^*(892)^\pm K^*(892)^\mp$	(1.00 $\pm$ 0.22) $\times 10^{-3}$	1266	DESIG=256
$K^*(892)^\pm K^*(700)^\mp$	(1.1 $\pm$ 1.0) $\times 10^{-3}$	—	DESIG=257
$K_S^0 \pi^- K^*(892)^+ + \text{c.c.}$	(2.0 $\pm$ 0.5) $\times 10^{-3}$	1342	DESIG=299
$K_S^0 \pi^- K^*(892)^+ + \text{c.c.} \rightarrow$ $K_S^0 K_S^0 \pi^+ \pi^-$	(6.7 $\pm$ 2.2) $\times 10^{-4}$	—	DESIG=300
$K_S^0 K^*(892)^0 \rightarrow \gamma K_S^0 K_S^0$	(6.3 $\pm$ 0.6) $\times 10^{-6}$	—	DESIG=376
$K_2^*(1430)^+ K^- + \text{c.c.} \rightarrow$ $K^+ K^- \pi^0$	(2.69 $\pm$ 0.25) $\times 10^{-4}$	—	DESIG=381
$K_2^*(1980)^+ K^- + \text{c.c.} \rightarrow$ $K^+ K^- \pi^0$	(1.10 $\pm$ 0.60) $\times 10^{-5}$	—	DESIG=382
$K_4^*(2045)^+ K^- + \text{c.c.} \rightarrow$ $K^+ K^- \pi^0$	(6.2 $\pm$ 2.9) $\times 10^{-6}$	—	DESIG=383
$\eta K^*(892)^0 \bar{K}^*(892)^0$	(1.15 $\pm$ 0.26) $\times 10^{-3}$	1003	DESIG=252
$\eta' K^{*\pm} K^\mp$	(1.48 $\pm$ 0.13) $\times 10^{-3}$	—	DESIG=355
$\eta' K^{*0} \bar{K}^0 + \text{c.c.}$	(1.66 $\pm$ 0.21) $\times 10^{-3}$	1000	DESIG=357
$\eta' h_1(1415) \rightarrow \eta' K^* \bar{K} + \text{c.c.}$	(2.16 $\pm$ 0.31) $\times 10^{-4}$	—	DESIG=353
$\eta' h_1(1415) \rightarrow \eta' K^{*\pm} K^\mp$	(1.51 $\pm$ 0.23) $\times 10^{-4}$	—	DESIG=354
$K^*(1410) \bar{K} + \text{c.c.} \rightarrow$ $K^\pm K^\mp \pi^0$	(7 $\pm$ 4) $\times 10^{-5}$	—	DESIG=330
$K^*(1410) \bar{K} + \text{c.c.} \rightarrow$ $K_S^0 K^\pm \pi^\mp$	(8 $\pm$ 6) $\times 10^{-5}$	—	DESIG=318
$K_2^*(1430) \bar{K} + \text{c.c.} \rightarrow$ $K^\pm K^\mp \pi^0$	(1.0 $\pm$ 0.5) $\times 10^{-4}$	—	DESIG=321
$K_2^*(1430) \bar{K} + \text{c.c.} \rightarrow$ $K_S^0 K^\pm \pi^\mp$	(4.0 $\pm$ 1.0) $\times 10^{-4}$	—	DESIG=320
$K^*(892)^0 \bar{K}_2^*(1430)^0 + \text{c.c.}$	(4.67 $\pm$ 0.29) $\times 10^{-3}$	1011	DESIG=48
$K^*(892)^+ K_2^*(1430)^- + \text{c.c.}$	(3.4 $\pm$ 2.9) $\times 10^{-3}$	1011	DESIG=303
$K^*(892)^+ K_2^*(1430)^- + \text{c.c.} \rightarrow$ $K^*(892)^+ K_S^0 \pi^- + \text{c.c.}$	(4 $\pm$ 4) $\times 10^{-4}$	—	DESIG=304

$K^*(892)^0 \bar{K}_2(1770)^0 + \text{c.c.} \rightarrow$	$(6.9 \pm 0.9) \times 10^{-4}$	—	DESIG=235
$K^*(892)^0 K^- \pi^+ + \text{c.c.}$			
$\omega K^*(892) \bar{K} + \text{c.c.}$	$(6.1 \pm 0.9) \times 10^{-3}$	1097	DESIG=102
$\bar{K} K^*(892) + \text{c.c.} \rightarrow$	$(5.0 \pm 0.5) \times 10^{-3}$	—	DESIG=332
$K_S^0 K^\pm \pi^\mp$			
$K^+ K^*(892)^- + \text{c.c.}$	$(6.0 \pm 0.8 \pm 1.0) \times 10^{-3}$	S=2.9 1373	DESIG=121
$K^+ K^*(892)^- + \text{c.c.} \rightarrow$	$(2.69 \pm 0.13 \pm 0.20) \times 10^{-3}$	—	DESIG=231
$K^+ K^- \pi^0$			
$K^+ K^*(892)^- + \text{c.c.} \rightarrow$	$(3.0 \pm 0.4) \times 10^{-3}$	—	DESIG=232
$K^0 K^\pm \pi^\mp + \text{c.c.}$			
$K^0 \bar{K}^*(892)^0 + \text{c.c.}$	$(4.2 \pm 0.4) \times 10^{-3}$	1373	DESIG=122
$K^0 \bar{K}^*(892)^0 + \text{c.c.} \rightarrow$	$(3.2 \pm 0.4) \times 10^{-3}$	—	DESIG=233
$K^0 K^\pm \pi^\mp + \text{c.c.}$			
$K_1(1400)^\pm K^\mp$	$(3.8 \pm 1.4) \times 10^{-3}$	1170	DESIG=132
$\bar{K}^*(892)^0 K^+ \pi^- + \text{c.c.}$	$(7.7 \pm 1.6) \times 10^{-3}$	1343	DESIG=214
$K^*(892)^\pm K^\mp \pi^0$	$(4.1 \pm 1.3) \times 10^{-3}$	1344	DESIG=343
$K^*(892)^0 K_S^0 \pi^0$	$(7 \pm 4) \times 10^{-4}$	1343	DESIG=344
$\omega \pi^0 \pi^0$	$(3.4 \pm 0.8) \times 10^{-3}$	1436	DESIG=140
$\omega \pi^0 \eta$	$(3.4 \pm 1.7) \times 10^{-4}$	1363	DESIG=360
$b_1(1235)^\pm \pi^\mp$	[i] $(3.0 \pm 0.5) \times 10^{-3}$	1300	DESIG=49
$\omega K^\pm K_S^0 \pi^\mp$	[i] $(3.4 \pm 0.5) \times 10^{-3}$	1210	DESIG=101
$b_1(1235)^0 \pi^0$	$(2.3 \pm 0.6) \times 10^{-3}$	1300	DESIG=160
$\eta K^\pm K_S^0 \pi^\mp$	[i] $(2.2 \pm 0.4) \times 10^{-3}$	1278	DESIG=230
$\phi K^*(892) \bar{K} + \text{c.c.}$	$(2.18 \pm 0.23) \times 10^{-3}$	969	DESIG=104
$\omega K \bar{K}$	$(1.9 \pm 0.4) \times 10^{-3}$	1268	DESIG=27
$\omega f_0(1710) \rightarrow \omega K \bar{K}$	$(4.8 \pm 1.1) \times 10^{-4}$	878	DESIG=130
$\phi 2(\pi^+ \pi^-)$	$(1.60 \pm 0.32) \times 10^{-3}$	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
$\omega \eta' \pi^+ \pi^-$	$(1.12 \pm 0.13) \times 10^{-3}$	1173	DESIG=385
$\phi K \bar{K}$	$(1.77 \pm 0.16) \times 10^{-3}$	S=1.3 1179	DESIG=36
$\phi K_S^0 K_S^0$	$(5.9 \pm 1.5) \times 10^{-4}$	1176	DESIG=305
$\phi f_0(1710) \rightarrow \phi K \bar{K}$	$(3.6 \pm 0.6) \times 10^{-4}$	875	DESIG=129
$\phi K^+ K^-$	$(8.3 \pm 1.1) \times 10^{-4}$	1179	DESIG=295
$\phi f_2(1270)$	$(3.2 \pm 0.6) \times 10^{-4}$	1036	DESIG=39
$\Delta(1232)^{++} \bar{\Delta}(1232)^{--}$	$(1.10 \pm 0.29) \times 10^{-3}$	938	DESIG=66
$\Sigma(1385)^- \bar{\Sigma}(1385)^+ (\text{or c.c.})$	[i] $(1.16 \pm 0.05) \times 10^{-3}$	697	DESIG=67
$\Sigma(1385)^0 \bar{\Sigma}(1385)^0$	$(1.07 \pm 0.08) \times 10^{-3}$	697	DESIG=309
$K^+ K^- f_2'(1525)$	$(1.06 \pm 0.35) \times 10^{-3}$	897	DESIG=308
$\phi f_2'(1525)$	$(8 \pm 4) \times 10^{-4}$	S=2.7 877	DESIG=40
$\phi \pi^+ \pi^-$	$(9.4 \pm 1.5) \times 10^{-4}$	S=1.7 1365	DESIG=34
$\phi \pi^0 \pi^0$	$(5.0 \pm 1.0) \times 10^{-4}$	1366	DESIG=76
$\phi K^\pm K_S^0 \pi^\mp$	[i] $(7.2 \pm 0.8) \times 10^{-4}$	1114	DESIG=103
$\omega f_1(1420)$	$(6.8 \pm 2.4) \times 10^{-4}$	1062	DESIG=105
$\phi \eta$	$(7.4 \pm 0.8) \times 10^{-4}$	S=1.5 1320	DESIG=37
$\Xi^0 \Xi^0$	$(1.17 \pm 0.04) \times 10^{-3}$	818	DESIG=248
$\Xi(1530)^- \Xi^+ + \text{c.c.}$	$(3.18 \pm 0.08) \times 10^{-4}$	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
$\omega \pi^0 \rightarrow \pi^+ \pi^- \pi^0$	$(1.7 \pm 0.8) \times 10^{-5}$	—	DESIG=327
$\phi \eta'(958)$	$(4.6 \pm 0.5) \times 10^{-4}$	S=2.2 1192	DESIG=38
$\phi f_0(980)$	$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9 1178	DESIG=41
$\phi f_0(980) \rightarrow \phi \pi^+ \pi^-$	$(2.60 \pm 0.34) \times 10^{-4}$	—	DESIG=236
$\phi f_0(980) \rightarrow \phi \pi^0 \pi^0$	$(1.8 \pm 0.5) \times 10^{-4}$	—	DESIG=237
$\phi \eta \eta'$	$(2.32 \pm 0.17) \times 10^{-4}$	885	DESIG=387
$\phi \pi^0 f_0(980) \rightarrow \phi \pi^0 \pi^+ \pi^-$	$(4.5 \pm 1.0) \times 10^{-6}$	—	DESIG=278
$\phi \pi^0 f_0(980) \rightarrow \phi \pi^0 p^0 \pi^0$	$(1.7 \pm 0.6) \times 10^{-6}$	1045	DESIG=279
$\eta \phi f_0(980) \rightarrow \eta \phi \pi^+ \pi^-$	$(3.2 \pm 1.0) \times 10^{-4}$	—	DESIG=229

$\phi a_0(980)^0 \rightarrow \phi \eta \pi^0$	$(4.4 \pm 1.4) \times 10^{-6}$	—	DESIG=258
$\Xi(1530)^0 \Xi^0$	$(3.2 \pm 1.4) \times 10^{-4}$	608	DESIG=108
$\Sigma(1385)^- \bar{\Sigma}^+ \text{ (or c.c.)}$	[i] $(3.1 \pm 0.5) \times 10^{-4}$	855	DESIG=68
$\phi f_1(1285)$	$(2.6 \pm 0.5) \times 10^{-4}$	1032	DESIG=106
$\phi f_1(1285) \rightarrow$ $\phi \pi^0 f_0(980) \rightarrow$ $\phi \pi^0 \pi^+ \pi^-$	$(9.4 \pm 2.8) \times 10^{-7}$	952	DESIG=280
$\phi f_1(1285) \rightarrow$ $\phi \pi^0 f_0(980) \rightarrow$ $\phi \pi^0 \pi^0 \pi^0$	$(2.1 \pm 2.2) \times 10^{-7}$	955	DESIG=281
$\eta \pi^+ \pi^-$	$(3.8 \pm 0.7) \times 10^{-4}$	1487	DESIG=239
$\eta \rho$	$(1.93 \pm 0.23) \times 10^{-4}$	1396	DESIG=22
$\omega \eta'(958)$	$(1.89 \pm 0.18) \times 10^{-4}$	1279	DESIG=31
$\omega f_0(980)$	$(1.4 \pm 0.5) \times 10^{-4}$	1267	DESIG=150
$\rho \eta'(958)$	$(8.1 \pm 0.8) \times 10^{-5}$	S=1.6 1281	DESIG=23
$a_2(1320)^\pm \pi^\mp$	[i] $< 4.3 \times 10^{-3}$	CL=90% 1264	DESIG=42
$K \bar{K}_2^*(1430) + \text{c.c.}$	$< 4.0 \times 10^{-3}$	CL=90% 1158	DESIG=45
$K_1(1270)^\pm K^\mp$	$< 3.0 \times 10^{-3}$	CL=90% 1240	DESIG=131
$K_1(1270) K_S^0 \rightarrow \gamma K_S^0 K_S^0$	$(8.5 \pm 2.5) \times 10^{-7}$	—	DESIG=377
$K_S^0 \pi^- K_2^*(1430)^+ + \text{c.c.}$	$(3.6 \pm 1.8) \times 10^{-3}$	1116	DESIG=301
$K_2^*(1430)^0 \bar{K}_2^*(1430)^0$	$< 2.9 \times 10^{-3}$	CL=90% 601	DESIG=47
$\phi \pi^0$	$3 \times 10^{-6} \text{ or } 1 \times 10^{-7}$	1377	DESIG=33;OUR EVAL;→ UNCHECKED ←
$\phi \eta(1405) \rightarrow \phi \eta \pi^+ \pi^-$	$(2.0 \pm 1.0) \times 10^{-5}$	946	DESIG=128
$\omega f_2'(1525)$	$< 2.2 \times 10^{-4}$	CL=90% 1007	DESIG=29
$\omega X(1835) \rightarrow \omega p \bar{p}$	$< 3.9 \times 10^{-6}$	CL=95% —	DESIG=263
$\omega X(1835), X \rightarrow \eta' \pi^+ \pi^-$	$< 6.2 \times 10^{-5}$	—	DESIG=386
$\phi X(1835) \rightarrow \phi p \bar{p}$	$< 2.1 \times 10^{-7}$	CL=90% —	DESIG=291
$\phi X(1835) \rightarrow \phi \eta \pi^+ \pi^-$	$< 2.8 \times 10^{-4}$	CL=90% 578	DESIG=288
$\phi X(1870) \rightarrow \phi \eta \pi^+ \pi^-$	$< 6.13 \times 10^{-5}$	CL=90% —	DESIG=289
$\eta \phi(2170) \rightarrow \eta \phi f_0(980) \rightarrow$ $\eta \phi \pi^+ \pi^-$	$(1.2 \pm 0.4) \times 10^{-4}$	628	DESIG=287
$\eta \phi(2170) \rightarrow$ $\eta K^*(892)^0 \bar{K}^*(892)^0$	$< 2.52 \times 10^{-4}$	CL=90% —	DESIG=253
$\Sigma(1385)^0 \bar{\Lambda} + \text{c.c.}$	$< 8.2 \times 10^{-6}$	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
$\bar{\Lambda}(1520) \Lambda + \text{c.c.}$	$< 1.80 \times 10^{-3}$	CL=90% 807	DESIG=364
$\Theta(1540) \bar{\Theta}(1540) \rightarrow$ $K_S^0 p K^- \bar{n} + \text{c.c.}$	$< 1.1 \times 10^{-5}$	CL=90% —	DESIG=205
$\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$	$< 2.1 \times 10^{-5}$	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

Decays into stable hadrons

$2(\pi^+ \pi^-) \pi^0$	$(3.73 \pm 0.32) \%$	S=1.4 1496	DESIG=9
$3(\pi^+ \pi^-) \pi^0$	$(2.9 \pm 0.6) \%$	1433	DESIG=11
$\pi^+ \pi^- \pi^0$	$(2.10 \pm 0.08) \%$	S=1.6 1533	DESIG=7
$\pi^+ \pi^- \pi^0 \pi^0 \pi^0$	$(2.71 \pm 0.29) \%$	1497	DESIG=358
$\rho^\pm \pi^\mp \pi^0 \pi^0$	$(1.41 \pm 0.22) \%$	1421	DESIG=362
$\rho^+ \rho^- \pi^0$	$(6.0 \pm 1.1) \times 10^{-3}$	1298	DESIG=363
$\pi^+ \pi^- \pi^0 K^+ K^-$	$(1.20 \pm 0.30) \%$	1368	DESIG=18
$4(\pi^+ \pi^-) \pi^0$	$(9.0 \pm 3.0) \times 10^{-3}$	1345	DESIG=12
$\pi^+ \pi^- K^+ K^-$	$(6.86 \pm 0.28) \times 10^{-3}$	1407	DESIG=16
$\pi^+ \pi^- K_S^0 K_L^0$	$(3.8 \pm 0.6) \times 10^{-3}$	1406	DESIG=296
$\pi^+ \pi^- K_S^0 K_S^0$	$(1.68 \pm 0.19) \times 10^{-3}$	1406	DESIG=297
$\pi^\pm \pi^0 K^\mp K_S^0$	$(5.7 \pm 0.5) \times 10^{-3}$	1408	DESIG=341
$K^+ K^- K_S^0 K_S^0$	$(4.2 \pm 0.7) \times 10^{-4}$	1127	DESIG=298
$\pi^+ \pi^- K^+ K^- \eta$	$(4.7 \pm 0.7) \times 10^{-3}$	1221	DESIG=238
$\pi^0 \pi^0 K^+ K^-$	$(2.13 \pm 0.22) \times 10^{-3}$	1410	DESIG=234

NODE=M070;CLUMP=B

$\pi^0 \pi^0 K_S^0 K_L^0$	$(1.9 \pm 0.4) \times 10^{-3}$	1408	DESIG=337
$K \bar{K} \pi$	$(6.1 \pm 1.0) \times 10^{-3}$	1442	DESIG=15
$K^+ K^- \pi^0$	$(2.88 \pm 0.12) \times 10^{-3}$	1442	DESIG=334
$K_S^0 K^\pm \pi^\mp$	$(5.6 \pm 0.5) \times 10^{-3}$	1440	DESIG=335
$K_S^0 K_L^0 \pi^0$	$(2.06 \pm 0.26) \times 10^{-3}$	1440	DESIG=336
$K^*(892)^0 \bar{K}^0 + \text{c.c.} \rightarrow K_S^0 K_L^0 \pi^0$	$(1.21 \pm 0.18) \times 10^{-3}$	—	DESIG=339
$K_2^*(1430)^0 \bar{K}^0 + \text{c.c.} \rightarrow K_S^0 K_L^0 \pi^0$	$(4.3 \pm 1.3) \times 10^{-4}$	—	DESIG=338
$K_S^0 K_L^0 \eta$	$(1.45 \pm 0.33) \times 10^{-3}$	1328	DESIG=340
$2(\pi^+ \pi^-)$	$(3.57 \pm 0.30) \times 10^{-3}$	1517	DESIG=8
$3(\pi^+ \pi^-)$	$(4.3 \pm 0.4) \times 10^{-3}$	1466	DESIG=10
$2(\pi^+ \pi^- \pi^0)$	$(1.61 \pm 0.20) \%$	1468	DESIG=210
$2(\pi^+ \pi^-) \eta$	$(2.26 \pm 0.28) \times 10^{-3}$	1446	DESIG=201
$3(\pi^+ \pi^-) \eta$	$(7.2 \pm 1.5) \times 10^{-4}$	1379	DESIG=202
$\pi^+ \pi^- \pi^0 \pi^0 \eta$	$(2.3 \pm 0.5) \times 10^{-3}$	1448	DESIG=359
$\rho^\pm \pi^\mp \pi^0 \eta$	$(1.9 \pm 0.8) \times 10^{-3}$	1326	DESIG=361
$p \bar{p}$	$(2.120 \pm 0.029) \times 10^{-3}$	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
$p \bar{p} \pi^+ \pi^- \pi^0$	[i] $(2.3 \pm 0.9) \times 10^{-3}$	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
$p \bar{p} \eta'(958)$	$(1.29 \pm 0.14) \times 10^{-4}$	S=2.0 596	DESIG=59
$p \bar{p} a_0(980) \rightarrow p \bar{p} \pi^0 \eta$	$(6.8 \pm 1.8) \times 10^{-5}$	—	DESIG=276
$p \bar{p} \phi$	$(5.19 \pm 0.33) \times 10^{-5}$	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
$\Sigma^0 \bar{\Sigma}^0$	$(1.172 \pm 0.032) \times 10^{-3}$	S=1.4 988	DESIG=63
$2(\pi^+ \pi^-) K^+ K^-$	$(3.1 \pm 1.3) \times 10^{-3}$	1320	DESIG=17
$p \bar{n} \pi^-$	$(2.12 \pm 0.09) \times 10^{-3}$	1174	DESIG=53
$n N(1440)$	seen	978	DESIG=215;OUR EST;→ UNCHECKED ←
$n N(1520)$	seen	928	DESIG=216;OUR EST;→ UNCHECKED ←
$n N(1535)$	seen	917	DESIG=217;OUR EST;→ UNCHECKED ←
$\Xi^- \bar{\Xi}^+$	$(9.7 \pm 0.8) \times 10^{-4}$	S=1.4 807	DESIG=62
$\Lambda \bar{\Lambda}$	$(1.89 \pm 0.09) \times 10^{-3}$	S=2.8 1074	DESIG=60
$\Lambda \bar{\Sigma}^- \pi^+ (\text{or c.c.})$	[i] $(8.3 \pm 0.7) \times 10^{-4}$	S=1.2 950	DESIG=71
$p K^- \bar{\Lambda} + \text{c.c.}$	$(8.6 \pm 1.1) \times 10^{-4}$	876	DESIG=72
$2(K^+ K^-)$	$(7.2 \pm 0.8) \times 10^{-4}$	1131	DESIG=19
$p K^- \bar{\Sigma}^0$	$(2.9 \pm 0.8) \times 10^{-4}$	819	DESIG=73
$K^+ K^-$	$(2.86 \pm 0.21) \times 10^{-4}$	1468	DESIG=13
$K_S^0 K_L^0$	$(1.95 \pm 0.11) \times 10^{-4}$	S=2.4 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
$\bar{\Lambda} n K_S^0 + \text{c.c.}$	$(6.5 \pm 1.1) \times 10^{-4}$	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
$K_S^0 K_S^0$	$< 1.4 \times 10^{-8}$	CL=95% 1466	DESIG=14

Radiative decays

NODE=M070;CLUMP=C

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
$\gamma\pi^0\pi^0$	$(1.15 \pm 0.05) \times 10^{-3}$		1543	DESIG=283
$\gamma\eta\pi^0$	$(2.14 \pm 0.31) \times 10^{-5}$		1497	DESIG=292
$\gamma a_0(980)^0 \rightarrow \gamma\eta\pi^0$	$< 2.5 \times 10^{-6}$	CL=95%	—	DESIG=293
$\gamma a_2(1320)^0 \rightarrow \gamma\eta\pi^0$	$< 6.6 \times 10^{-6}$	CL=95%	—	DESIG=294
$\gamma K_S^0 K_S^0$	$(8.1 \pm 0.4) \times 10^{-4}$		1466	DESIG=378
$\gamma\eta_c(1S)$	$(1.7 \pm 0.4) \%$	S=1.5	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
$\gamma\eta_c(1S) \rightarrow \gamma\eta\eta\eta'$	$(4.9 \pm 0.8) \times 10^{-5}$		—	DESIG=391
$\gamma\pi^+\pi^-\pi^0$	$(8.3 \pm 3.1) \times 10^{-3}$		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
$\gamma\eta(1405/1475) \rightarrow \gamma K \bar{K} \pi$	$(2.8 \pm 0.6) \times 10^{-3}$	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
$\gamma\eta(1405) \rightarrow \gamma\gamma\gamma$	$< 2.63 \times 10^{-6}$	CL=90%	—	DESIG=348
$\gamma\eta(1475) \rightarrow \gamma\gamma\gamma$	$< 1.86 \times 10^{-6}$	CL=90%	—	DESIG=349
$\gamma\rho\rho$	$(4.5 \pm 0.8) \times 10^{-3}$		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
$\gamma\eta'(958)$	$(5.25 \pm 0.07) \times 10^{-3}$	S=1.3	1400	DESIG=84
$\gamma 2\pi^+ 2\pi^-$	$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9	1517	DESIG=95
$\gamma f_2(1270) f_2(1270)$	$(9.5 \pm 1.7) \times 10^{-4}$		878	DESIG=203
$\gamma f_2(1270) f_2(1270) (\text{non resonant})$	$(8.2 \pm 1.9) \times 10^{-4}$		—	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
$\gamma f_2(1270)$	$(1.64 \pm 0.12) \times 10^{-3}$	S=1.3	1286	DESIG=86
$\gamma f_2(1270) \rightarrow \gamma K_S^0 K_S^0$	$(2.58 \pm 0.60 \pm 0.22) \times 10^{-5}$		—	DESIG=373
$\gamma f_0(1370) \rightarrow \gamma K \bar{K}$	$(4.2 \pm 1.5) \times 10^{-4}$		—	DESIG=284
$\gamma f_0(1370) \rightarrow \gamma K_S^0 K_S^0$	$(1.1 \pm 0.4) \times 10^{-5}$		—	DESIG=368
$\gamma f_0(1500) \rightarrow \gamma K_S^0 K_S^0$	$(1.59 \pm 0.24 \pm 0.60) \times 10^{-5}$		—	DESIG=369
$\gamma f_0(1710) \rightarrow \gamma K \bar{K}$	$(9.5 \pm 1.0 \pm 0.5) \times 10^{-4}$	S=1.5	1075	DESIG=91
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	$(3.8 \pm 0.5) \times 10^{-4}$		—	DESIG=135
$\gamma f_0(1710) \rightarrow \gamma\omega\omega$	$(3.1 \pm 1.0) \times 10^{-4}$		—	DESIG=221
$\gamma f_0(1710) \rightarrow \gamma\eta\eta$	$(2.4 \pm 1.2 \pm 0.7) \times 10^{-4}$		—	DESIG=266
$\gamma\eta$	$(1.108 \pm 0.027) \times 10^{-3}$		1500	DESIG=83
$\gamma f_1(1420) \rightarrow \gamma K \bar{K} \pi$	$(7.9 \pm 1.3) \times 10^{-4}$		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
$\gamma f_2'(1525)$	$(5.7 \pm 0.8 \pm 0.5) \times 10^{-4}$	S=1.5	1177	DESIG=87
$\gamma f_2'(1525) \rightarrow \gamma K_S^0 K_S^0$	$(8.0 \pm 0.7 \pm 0.5) \times 10^{-5}$		—	DESIG=374
$\gamma f_2'(1525) \rightarrow \gamma\eta\eta$	$(3.4 \pm 1.4) \times 10^{-5}$		—	DESIG=268
$\gamma f_2(1640) \rightarrow \gamma\omega\omega$	$(2.8 \pm 1.8) \times 10^{-4}$		—	DESIG=222
$\gamma f_2(1910) \rightarrow \gamma\omega\omega$	$(2.0 \pm 1.4) \times 10^{-4}$		—	DESIG=223
$\gamma f_0(1750) \rightarrow \gamma K_S^0 K_S^0$	$(1.11 \pm 0.20 \pm 0.33) \times 10^{-5}$		—	DESIG=370
$\gamma f_0(1710) \rightarrow \gamma\omega\phi$	$(2.5 \pm 0.6) \times 10^{-4}$		—	DESIG=262
$\gamma f_2(1810) \rightarrow \gamma\eta\eta$	$(5.4 \pm 3.5 \pm 2.4) \times 10^{-5}$		—	DESIG=269

$\gamma f_2(1950) \rightarrow \gamma K^*(892) \bar{K}^*(892)$	$(7.0 \pm 2.2) \times 10^{-4}$	—	DESIG=144
$\gamma K^*(892) \bar{K}^*(892)$	$(4.0 \pm 1.3) \times 10^{-3}$	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
$\gamma \eta(2225)$	$(3.14 \pm_{-0.19}^{0.50}) \times 10^{-4}$	752	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
$\gamma \eta(1760) \rightarrow \gamma \gamma \gamma$	$< 4.80 \times 10^{-6}$	CL=90% —	DESIG=347
$\gamma X(1835) \rightarrow \gamma \pi^+ \pi^- \eta'$	$(2.7 \pm_{-0.8}^{0.6}) \times 10^{-4}$	S=1.6 1006	DESIG=213
$\gamma X(1835) \rightarrow \gamma p \bar{p}$	$(7.7 \pm_{-0.9}^{1.5}) \times 10^{-5}$	—	DESIG=254
$\gamma X(1835) \rightarrow \gamma K_S^0 K_S^0 \eta$	$(3.3 \pm_{-1.3}^{2.0}) \times 10^{-5}$	—	DESIG=282
$\gamma X(1835) \rightarrow \gamma \gamma \gamma$	$< 3.56 \times 10^{-6}$	CL=90% —	DESIG=350
$\gamma X(2370) \rightarrow \gamma K^+ K^- \eta'$	$(1.8 \pm 0.7) \times 10^{-5}$	—	DESIG=388
$\gamma X(2370) \rightarrow \gamma K_S^0 K_S^0 \eta'$	$(1.2 \pm 0.5) \times 10^{-5}$	—	DESIG=389
$\gamma X(2370) \rightarrow \gamma \eta \eta \eta'$	$< 9.2 \times 10^{-6}$	CL=90% —	DESIG=390
$\gamma X(1840) \rightarrow \gamma 3(\pi^+ \pi^-)$	$(2.4 \pm_{-0.8}^{0.7}) \times 10^{-5}$	—	DESIG=264
$\gamma (K \bar{K} \pi) [J^{PC} = 0^{-+}]$	$(7 \pm 4) \times 10^{-4}$	S=2.1 1442	DESIG=176
$\gamma \pi^0$	$(3.56 \pm 0.17) \times 10^{-5}$	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
$\gamma f_0(2100) \rightarrow \gamma \eta \eta$	$(1.13 \pm_{-0.30}^{0.60}) \times 10^{-4}$	—	DESIG=267
$\gamma f_0(2100) \rightarrow \gamma \pi \pi$	$(6.2 \pm 1.0) \times 10^{-4}$	—	DESIG=286
$\gamma f_0(2200) \rightarrow \gamma K \bar{K}$	$(5.9 \pm 1.3) \times 10^{-4}$	—	DESIG=285
$\gamma f_0(2200) \rightarrow \gamma K_S^0 K_S^0$	$(2.72 \pm_{-0.50}^{0.19}) \times 10^{-4}$	—	DESIG=371
$\gamma f_J(2220) \rightarrow \gamma \pi \pi$	$< 3.9 \times 10^{-5}$	CL=90% —	DESIG=136
$\gamma f_J(2220) \rightarrow \gamma K \bar{K}$	$< 4.1 \times 10^{-5}$	CL=90% —	DESIG=137
$\gamma f_J(2220) \rightarrow \gamma p \bar{p}$	$(1.5 \pm 0.8) \times 10^{-5}$	—	DESIG=138
$\gamma f_0(2330) \rightarrow \gamma K_S^0 K_S^0$	$(4.9 \pm 0.7) \times 10^{-5}$	—	DESIG=372
$\gamma f_2(2340) \rightarrow \gamma \eta \eta$	$(5.6 \pm_{-2.2}^{2.4}) \times 10^{-5}$	—	DESIG=270
$\gamma f_2(2340) \rightarrow \gamma K_S^0 K_S^0$	$(5.5 \pm_{-1.5}^{4.0}) \times 10^{-5}$	—	DESIG=375
$\gamma f_0(1500) \rightarrow \gamma \pi \pi$	$(1.09 \pm 0.24) \times 10^{-4}$	1183	DESIG=172
$\gamma f_0(1500) \rightarrow \gamma \eta \eta$	$(1.7 \pm_{-1.4}^{0.6}) \times 10^{-5}$	—	DESIG=265
$\gamma A \rightarrow \gamma \text{invisible}$	$[k] < 1.7 \times 10^{-6}$	CL=90% —	DESIG=251
$\gamma A^0 \rightarrow \gamma \mu^+ \mu^-$	$[l] < 5 \times 10^{-6}$	CL=90% —	DESIG=259

Dalitz decays

$\pi^0 e^+ e^-$	$(7.6 \pm 1.4) \times 10^{-7}$	1546	DESIG=271	NODE=M070;CLUMP=G
$\eta e^+ e^-$	$(1.43 \pm 0.07) \times 10^{-5}$	1500	DESIG=272	
$\eta'(958) e^+ e^-$	$(6.59 \pm 0.18) \times 10^{-5}$	1400	DESIG=273	
$\eta U \rightarrow \eta e^+ e^-$	$< 9.11 \times 10^{-7}$	CL=90% —	DESIG=352	
$\eta'(958) U \rightarrow \eta'(958) e^+ e^-$	$< 2.0 \times 10^{-7}$	CL=90% —	DESIG=366	
$\phi e^+ e^-$	$< 1.2 \times 10^{-7}$	CL=90% 1381	DESIG=384	

Weak decays

$D^- e^+ \nu_e + \text{c.c.}$	$< 1.2 \times 10^{-5}$	CL=90% 984	DESIG=218	NODE=M070;CLUMP=E
$\bar{D}^0 e^+ e^- + \text{c.c.}$	$< 8.5 \times 10^{-8}$	CL=90% 987	DESIG=219	
$D_s^- e^+ \nu_e + \text{c.c.}$	$< 1.3 \times 10^{-6}$	CL=90% 923	DESIG=220	
$D_s^{*-} e^+ \nu_e + \text{c.c.}$	$< 1.8 \times 10^{-6}$	CL=90% 828	DESIG=290	
$D^- \pi^+ + \text{c.c.}$	$< 7.5 \times 10^{-5}$	CL=90% 977	DESIG=241	
$\bar{D}^0 \bar{K}^0 + \text{c.c.}$	$< 1.7 \times 10^{-4}$	CL=90% 898	DESIG=242	
$\bar{D}^0 \bar{K}^{*0} + \text{c.c.}$	$< 2.5 \times 10^{-6}$	CL=90% 670	DESIG=275	
$D_s^- \pi^+ + \text{c.c.}$	$< 1.3 \times 10^{-4}$	CL=90% 915	DESIG=243	
$D_s^- \rho^+ + \text{c.c.}$	$< 1.3 \times 10^{-5}$	CL=90% 663	DESIG=274	

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

$\gamma\gamma$	C	< 2.7	$\times 10^{-7}$	CL=90%	1548
$\gamma\phi$	C	< 1.4	$\times 10^{-6}$	CL=90%	1381
$e^\pm \mu^\mp$	LF	< 1.6	$\times 10^{-7}$	CL=90%	1547
$e^\pm \tau^\mp$	LF	< 8.3	$\times 10^{-6}$	CL=90%	1039
$\mu^\pm \tau^\mp$	LF	< 2.0	$\times 10^{-6}$	CL=90%	1035
$\Lambda_c^+ e^- + \text{c.c.}$		< 6.9	$\times 10^{-8}$	CL=90%	—

Other decays

invisible	< 7	$\times 10^{-4}$	CL=90%	—
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NODE=M070;CLUMP=D

DESIG=80
DESIG=277
DESIG=177
DESIG=178
DESIG=179
DESIG=379

NODE=M070;CLUMP=F
DESIG=240

 $\chi_{c0}(1P)$

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

Mass $m = 3414.71 \pm 0.30$ MeVFull width $\Gamma = 10.8 \pm 0.6$ 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)
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Hadronic decays

$2(\pi^+ \pi^-)$	(2.34 ± 0.18) %		1679
$\rho^0 \pi^+ \pi^-$	(9.1 ± 2.9) $\times 10^{-3}$		1607
$f_0(980) f_0(980)$	(6.6 ± 2.1) $\times 10^{-4}$		1391
$\pi^+ \pi^- \pi^0 \pi^0$	(3.3 ± 0.4) %		1680
$\rho^+ \pi^- \pi^0 + \text{c.c.}$	(2.9 ± 0.4) %		1607
$4\pi^0$	(3.3 ± 0.4) $\times 10^{-3}$		1681
$\pi^+ \pi^- K^+ K^-$	(1.81 ± 0.14) %		1580
$K_0^*(1430)^0 \bar{K}_0^*(1430)^0 \rightarrow$ $\pi^+ \pi^- K^+ K^-$	(9.8 $^{+4.0}_{-2.8}$) $\times 10^{-4}$		—
$K_0^*(1430)^0 \bar{K}_2^*(1430)^0 + \text{c.c.} \rightarrow$ $\pi^+ \pi^- K^+ K^-$	(8.0 $^{+2.0}_{-2.4}$) $\times 10^{-4}$		—
$K_1(1270)^+ K^- + \text{c.c.} \rightarrow$ $\pi^+ \pi^- K^+ K^-$	(6.3 ± 1.9) $\times 10^{-3}$		—
$K_1(1400)^+ K^- + \text{c.c.} \rightarrow$ $\pi^+ \pi^- K^+ K^-$	< 2.7 $\times 10^{-3}$	CL=90%	—
$f_0(980) f_0(980)$	(1.6 $^{+1.0}_{-0.9}$) $\times 10^{-4}$		1391
$f_0(980) f_0(2200)$	(7.9 $^{+2.0}_{-2.5}$) $\times 10^{-4}$		586
$f_0(1370) f_0(1370)$	< 2.7 $\times 10^{-4}$	CL=90%	1019
$f_0(1370) f_0(1500)$	< 1.7 $\times 10^{-4}$	CL=90%	920
$f_0(1370) f_0(1710)$	(6.7 $^{+3.5}_{-2.3}$) $\times 10^{-4}$		740
$f_0(1500) f_0(1370)$	< 1.3 $\times 10^{-4}$	CL=90%	920
$f_0(1500) f_0(1500)$	< 5 $\times 10^{-5}$	CL=90%	804
$f_0(1500) f_0(1710)$	< 7 $\times 10^{-5}$	CL=90%	581
$K^+ K^- \pi^+ \pi^- \pi^0$	(8.6 ± 0.9) $\times 10^{-3}$		1545
$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	(4.2 ± 0.4) $\times 10^{-3}$		1543
$K^+ K^- \pi^0 \pi^0$	(5.6 ± 0.9) $\times 10^{-3}$		1582
$K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(2.49 ± 0.33) %		1581
$\rho^+ K^- K^0 + \text{c.c.}$	(1.21 ± 0.21) %		1458
$K^*(892)^- K^+ \pi^0 \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(4.6 ± 1.2) $\times 10^{-3}$		—
$K_S^0 K_S^0 \pi^+ \pi^-$	(5.7 ± 1.1) $\times 10^{-3}$		1579
$K^+ K^- \eta \pi^0$	(3.0 ± 0.7) $\times 10^{-3}$		1468
$3(\pi^+ \pi^-)$	(1.20 ± 0.18) %		1633
$K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	(7.5 ± 1.6) $\times 10^{-3}$		1523
$K^*(892)^0 \bar{K}^*(892)^0$	(1.7 ± 0.6) $\times 10^{-3}$		1456
$\pi \pi$	(8.51 ± 0.33) $\times 10^{-3}$		1702
$\pi^0 \eta$	< 1.8 $\times 10^{-4}$		1661
$\pi^0 \eta'$	< 1.1 $\times 10^{-3}$		1570
$\pi^0 \eta_c$	< 1.6 $\times 10^{-3}$	CL=90%	383

NODE=M056215;NODE=M056;CLUMP=A
DESIG=3

DESIG=9
DESIG=20
DESIG=61
DESIG=62
DESIG=70
DESIG=5
DESIG=31

DESIG=32

DESIG=33

DESIG=34

DESIG=23

DESIG=24

DESIG=25

DESIG=26

DESIG=27

DESIG=28

DESIG=29

DESIG=30

DESIG=75

DESIG=87

DESIG=63

DESIG=65

DESIG=66

DESIG=67

DESIG=41

DESIG=68

DESIG=4

DESIG=10

DESIG=21

DESIG=18

DESIG=35

DESIG=36

DESIG=86

$\eta\eta$	$(3.01 \pm 0.19) \times 10^{-3}$		1617	DESIG=13
$\eta\eta'$	$(9.1 \pm 1.1) \times 10^{-5}$		1521	DESIG=37
$\eta'\eta'$	$(2.17 \pm 0.12) \times 10^{-3}$		1413	DESIG=46
$\omega\omega$	$(9.7 \pm 1.1) \times 10^{-4}$		1517	DESIG=22
$\omega\phi$	$(1.41 \pm 0.13) \times 10^{-4}$		1447	DESIG=76
$\omega K^+ K^-$	$(1.94 \pm 0.21) \times 10^{-3}$		1457	DESIG=88
$K^+ K^-$	$(6.05 \pm 0.31) \times 10^{-3}$		1634	DESIG=2
$K_S^0 K_S^0$	$(3.16 \pm 0.17) \times 10^{-3}$		1633	DESIG=15
$\pi^+ \pi^- \eta$	$< 2.0 \times 10^{-4}$	CL=90%	1651	DESIG=50
$\pi^+ \pi^- \eta'$	$< 4 \times 10^{-4}$	CL=90%	1560	DESIG=53
$\bar{K}^0 K^+ \pi^- + \text{c.c.}$	$< 9 \times 10^{-5}$	CL=90%	1610	DESIG=17
$K^+ K^- \pi^0$	$< 6 \times 10^{-5}$	CL=90%	1611	DESIG=47
$K^+ K^- \eta$	$< 2.3 \times 10^{-4}$	CL=90%	1512	DESIG=51
$K^+ K^- K_S^0 K_S^0$	$(1.4 \pm 0.5) \times 10^{-3}$		1331	DESIG=42
$K_S^0 K_S^0 K_S^0 K_S^0$	$(5.8 \pm 0.5) \times 10^{-4}$		1327	DESIG=94
$K^+ K^- K^+ K^-$	$(2.82 \pm 0.29) \times 10^{-3}$		1333	DESIG=14
$K^+ K^- \phi$	$(9.7 \pm 2.5) \times 10^{-4}$		1381	DESIG=44
$\bar{K}^0 K^+ \pi^- \phi + \text{c.c.}$	$(3.7 \pm 0.6) \times 10^{-3}$		1326	DESIG=91
$K^+ K^- \pi^0 \phi$	$(1.90 \pm 0.35) \times 10^{-3}$		1329	DESIG=92
$\phi \pi^+ \pi^- \pi^0$	$(1.18 \pm 0.15) \times 10^{-3}$		1525	DESIG=89
$\phi\phi$	$(8.0 \pm 0.7) \times 10^{-4}$		1370	DESIG=16
$\phi\phi\eta$	$(8.4 \pm 1.0) \times 10^{-4}$		1100	DESIG=96
$p\bar{p}$	$(2.21 \pm 0.08) \times 10^{-4}$		1426	DESIG=11
$p\bar{p}\pi^0$	$(7.0 \pm 0.7) \times 10^{-4}$	S=1.3	1379	DESIG=48
$p\bar{p}\eta$	$(3.5 \pm 0.4) \times 10^{-4}$		1187	DESIG=52
$p\bar{p}\omega$	$(5.2 \pm 0.6) \times 10^{-4}$		1043	DESIG=69
$p\bar{p}\phi$	$(6.0 \pm 1.4) \times 10^{-5}$		876	DESIG=74
$p\bar{p}\pi^+ \pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4	1320	DESIG=8
$p\bar{p}\pi^0 \pi^0$	$(1.04 \pm 0.28) \times 10^{-3}$		1324	DESIG=64
$p\bar{p}K^+ K^- (\text{non-resonant})$	$(1.22 \pm 0.26) \times 10^{-4}$		890	DESIG=71
$p\bar{p}K_S^0 K_S^0$	$< 8.8 \times 10^{-4}$	CL=90%	884	DESIG=40
$p\bar{n}\pi^-$	$(1.27 \pm 0.11) \times 10^{-3}$		1376	DESIG=43
$\bar{p}n\pi^+$	$(1.37 \pm 0.12) \times 10^{-3}$		1376	DESIG=82
$p\bar{n}\pi^- \pi^0$	$(2.34 \pm 0.21) \times 10^{-3}$		1321	DESIG=83
$\bar{p}n\pi^+ \pi^0$	$(2.21 \pm 0.18) \times 10^{-3}$		1321	DESIG=84
$\Lambda\bar{\Lambda}$	$(3.27 \pm 0.24) \times 10^{-4}$		1292	DESIG=19
$\Lambda\bar{\Lambda}\pi^+ \pi^-$	$(1.18 \pm 0.13) \times 10^{-3}$		1153	DESIG=38
$\Lambda\bar{\Lambda}\pi^+ \pi^- (\text{non-resonant})$	$< 5 \times 10^{-4}$	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
$K^+ \bar{p}\Lambda + \text{c.c.}$	$(1.25 \pm 0.12) \times 10^{-3}$	S=1.3	1132	DESIG=49
$K^*(892)^+ \bar{p}\Lambda + \text{c.c.}$	$(4.8 \pm 0.9) \times 10^{-4}$		845	DESIG=98
$K^+ \bar{p}\Lambda(1520) + \text{c.c.}$	$(2.9 \pm 0.7) \times 10^{-4}$		859	DESIG=72
$\Lambda(1520) \bar{\Lambda}(1520)$	$(3.1 \pm 1.2) \times 10^{-4}$		780	DESIG=73
$\Sigma^0 \bar{\Sigma}^0$	$(4.68 \pm 0.32) \times 10^{-4}$		1222	DESIG=58
$\Sigma^+ \bar{p}K_S^0 + \text{c.c.}$	$(3.52 \pm 0.27) \times 10^{-4}$		1089	DESIG=97
$\Sigma^0 \bar{p}K^+ + \text{c.c.}$	$(3.03 \pm 0.20) \times 10^{-4}$		1090	DESIG=100
$\Sigma^+ \bar{\Sigma}^-$	$(4.6 \pm 0.8) \times 10^{-4}$	S=2.6	1225	DESIG=59
$\Sigma^- \bar{\Sigma}^+$	$(5.1 \pm 0.5) \times 10^{-4}$		1217	DESIG=99
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	$(1.6 \pm 0.6) \times 10^{-4}$		1001	DESIG=80
$\Sigma(1385)^- \bar{\Sigma}(1385)^+$	$(2.3 \pm 0.7) \times 10^{-4}$		1001	DESIG=81
$K^- \Lambda \Xi^+ + \text{c.c.}$	$(1.94 \pm 0.35) \times 10^{-4}$		873	DESIG=85
$\Xi^0 \Xi^0$	$(3.1 \pm 0.8) \times 10^{-4}$		1089	DESIG=60
$\Xi^- \Xi^+$	$(4.8 \pm 0.7) \times 10^{-4}$		1081	DESIG=39
$\eta_c \pi^+ \pi^-$	$< 7 \times 10^{-4}$	CL=90%	307	DESIG=90

Radiative decays

$\gamma J/\psi(1S)$	$(1.40 \pm 0.05) \%$		303
$\gamma \rho^0$	$< 9 \times 10^{-6}$	CL=90%	1619
$\gamma \omega$	$< 8 \times 10^{-6}$	CL=90%	1618
$\gamma \phi$	$< 6 \times 10^{-6}$	CL=90%	1555
$\gamma \gamma$	$(2.04 \pm 0.09) \times 10^{-4}$		1707
$e^+ e^- J/\psi(1S)$	$(1.33 \pm 0.29) \times 10^{-4}$		303
$\mu^+ \mu^- J/\psi(1S)$	$< 1.9 \times 10^{-5}$	CL=90%	226

NODE=M056;CLUMP=B

DESIG=6

DESIG=55

DESIG=56

DESIG=57

DESIG=7

DESIG=93

DESIG=95

 $\chi_{c1}(1P)$

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

NODE=M055

Mass $m = 3510.67 \pm 0.05$ MeV (S = 1.2)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)
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Hadronic decays

$3(\pi^+ \pi^-)$	$(5.8 \pm 1.4) \times 10^{-3}$	S=1.2	1683
$2(\pi^+ \pi^-)$	$(7.6 \pm 2.6) \times 10^{-3}$		1728
$\pi^+ \pi^- \pi^0$	$(1.19 \pm 0.15) \%$		1729
$\rho^+ \pi^- \pi^0 + \text{c.c.}$	$(1.45 \pm 0.24) \%$		1658
$\rho^0 \pi^+ \pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$		1657
$4\pi^0$	$(5.4 \pm 0.8) \times 10^{-4}$		1729
$\pi^+ \pi^- K^+ K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		1632
$K^+ K^- \pi^0 \pi^0$	$(1.12 \pm 0.27) \times 10^{-3}$		1634
$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.15 \pm 0.13) \%$		1598
$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	$(7.5 \pm 0.8) \times 10^{-3}$		1596
$K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	$(8.6 \pm 1.4) \times 10^{-3}$		1632
$\rho^- K^+ \bar{K}^0 + \text{c.c.}$	$(5.0 \pm 1.2) \times 10^{-3}$		1514
$K^*(892)^0 \bar{K}^0 \pi^0 \rightarrow$	$(2.3 \pm 0.6) \times 10^{-3}$		—
$K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$			
$K^+ K^- \eta \pi^0$	$(1.12 \pm 0.34) \times 10^{-3}$		1523
$\pi^+ \pi^- K_S^0 K_S^0$	$(6.9 \pm 2.9) \times 10^{-4}$		1630
$K^+ K^- \eta$	$(3.2 \pm 1.0) \times 10^{-4}$		1566
$\bar{K}^0 K^+ \pi^- + \text{c.c.}$	$(7.0 \pm 0.6) \times 10^{-3}$		1661
$K^*(892)^0 \bar{K}^0 + \text{c.c.}$	$(10 \pm 4) \times 10^{-4}$		1602
$K^*(892)^+ K^- + \text{c.c.}$	$(1.4 \pm 0.6) \times 10^{-3}$		1602
$K_J^*(1430)^0 \bar{K}^0 + \text{c.c.} \rightarrow$	$< 8 \times 10^{-4}$	CL=90%	—
$K_S^0 K^+ \pi^- + \text{c.c.}$			
$K_J^*(1430)^+ K^- + \text{c.c.} \rightarrow$	$< 2.1 \times 10^{-3}$	CL=90%	—
$K_S^0 K^+ \pi^- + \text{c.c.}$			
$K^+ K^- \pi^0$	$(1.81 \pm 0.24) \times 10^{-3}$		1662
$\eta \pi^+ \pi^-$	$(4.62 \pm 0.23) \times 10^{-3}$		1701
$a_0(980)^+ \pi^- + \text{c.c.} \rightarrow \eta \pi^+ \pi^-$	$(3.2 \pm 0.4) \times 10^{-3}$	S=2.2	—
$a_2(1320)^+ \pi^- + \text{c.c.} \rightarrow \eta \pi^+ \pi^-$	$(1.76 \pm 0.24) \times 10^{-4}$		—
$a_2(1700)^+ \pi^- + \text{c.c.} \rightarrow \eta \pi^+ \pi^-$	$(4.6 \pm 0.7) \times 10^{-5}$		—
$f_2(1270) \eta \rightarrow \eta \pi^+ \pi^-$	$(3.5 \pm 0.6) \times 10^{-4}$		—
$f_4(2050) \eta \rightarrow \eta \pi^+ \pi^-$	$(2.5 \pm 0.9) \times 10^{-5}$		—
$\pi_1(1400)^+ \pi^- + \text{c.c.} \rightarrow$	$< 5 \times 10^{-5}$	CL=90%	—
$\eta \pi^+ \pi^-$			
$\pi_1(1600)^+ \pi^- + \text{c.c.} \rightarrow$	$< 1.5 \times 10^{-5}$	CL=90%	—
$\eta \pi^+ \pi^-$			
$\pi_1(2015)^+ \pi^- + \text{c.c.} \rightarrow$	$< 8 \times 10^{-6}$	CL=90%	—
$\eta \pi^+ \pi^-$			
$f_2(1270) \eta$	$(6.7 \pm 1.1) \times 10^{-4}$		1467
$\pi^+ \pi^- \eta'$	$(2.2 \pm 0.4) \times 10^{-3}$		1612
$K^+ K^- \eta'(958)$	$(8.8 \pm 0.9) \times 10^{-4}$		1461
$K_0^*(1430)^+ K^- + \text{c.c.}$	$(6.4 \pm 2.2 \pm 2.8) \times 10^{-4}$		—
$f_0(980) \eta'(958)$	$(1.6 \pm 1.4 \pm 0.7) \times 10^{-4}$		1460

NODE=M055215;NODE=M055;CLUMP=A

DESIG=6

DESIG=5

DESIG=51

DESIG=52

DESIG=9

DESIG=60

DESIG=7

DESIG=53

DESIG=79

DESIG=84

DESIG=55

DESIG=56

DESIG=57

DESIG=58

DESIG=28

DESIG=42

DESIG=17

DESIG=32

DESIG=33

DESIG=34

DESIG=35

DESIG=38

DESIG=31

DESIG=36

DESIG=93

DESIG=96

DESIG=94

DESIG=95

DESIG=97

DESIG=98

DESIG=99

DESIG=37

DESIG=44

DESIG=85

DESIG=86

DESIG=87

$f_0(1710)\eta'(958)$	$(7 \pm 7) \times 10^{-5}$	1118	DESIG=88
$f'_2(1525)\eta'(958)$	$(9 \pm 6) \times 10^{-5}$	1229	DESIG=89
$\pi^0 f_0(980) \rightarrow \pi^0 \pi^+ \pi^-$	$(3.5 \pm 0.9) \times 10^{-7}$	—	DESIG=61
$K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	$(3.2 \pm 2.1) \times 10^{-3}$	1577	DESIG=10
$K^*(892)^0 \bar{K}^*(892)^0$	$(1.4 \pm 0.4) \times 10^{-3}$	1512	DESIG=21
$K^+ K^- K_S^0 K_S^0$	$< 4 \times 10^{-4}$	1390	DESIG=29
$K_S^0 K_S^0 K_S^0 K_S^0$	$(3.5 \pm 1.0) \times 10^{-5}$	1387	DESIG=102
$K^+ K^- K^+ K^-$	$(5.4 \pm 1.1) \times 10^{-4}$	1393	DESIG=14
$K^+ K^- \phi$	$(4.1 \pm 1.5) \times 10^{-4}$	1440	DESIG=30
$\bar{K}^0 K^+ \pi^- \phi + \text{c.c.}$	$(3.3 \pm 0.5) \times 10^{-3}$	1387	DESIG=90
$K^+ K^- \pi^0 \phi$	$(1.62 \pm 0.30) \times 10^{-3}$	1390	DESIG=91
$\phi \pi^+ \pi^- \pi^0$	$(7.5 \pm 1.0) \times 10^{-4}$	1578	DESIG=82
$\omega \omega$	$(5.7 \pm 0.7) \times 10^{-4}$	1571	DESIG=66
$\omega K^+ K^-$	$(7.8 \pm 0.9) \times 10^{-4}$	1513	DESIG=81
$\omega \phi$	$(2.7 \pm 0.4) \times 10^{-5}$	1503	DESIG=67
$\phi \phi$	$(4.2 \pm 0.5) \times 10^{-4}$	1429	DESIG=68
$\phi \phi \eta$	$(3.0 \pm 0.5) \times 10^{-4}$	1172	DESIG=104
$p \bar{p}$	$(7.60 \pm 0.34) \times 10^{-5}$	1484	DESIG=11
$p \bar{p} \pi^0$	$(1.55 \pm 0.18) \times 10^{-4}$	1438	DESIG=39
$p \bar{p} \eta$	$(1.45 \pm 0.25) \times 10^{-4}$	1254	DESIG=43
$p \bar{p} \omega$	$(2.12 \pm 0.31) \times 10^{-4}$	1117	DESIG=59
$p \bar{p} \phi$	$< 1.7 \times 10^{-5}$	962	DESIG=65
$p \bar{p} \pi^+ \pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$	1381	DESIG=8
$p \bar{p} \pi^0 \pi^0$	$< 5 \times 10^{-4}$	1385	DESIG=54
$p \bar{p} K^+ K^- (\text{non-resonant})$	$(1.27 \pm 0.22) \times 10^{-4}$	974	DESIG=62
$p \bar{p} K_S^0 K_S^0$	$< 4.5 \times 10^{-4}$	968	DESIG=25
$p \bar{n} \pi^-$	$(3.8 \pm 0.5) \times 10^{-4}$	1435	DESIG=74
$\bar{p} n \pi^+$	$(3.9 \pm 0.5) \times 10^{-4}$	1435	DESIG=75
$p \bar{n} \pi^- \pi^0$	$(1.03 \pm 0.12) \times 10^{-3}$	1383	DESIG=76
$\bar{p} n \pi^+ \pi^0$	$(1.01 \pm 0.12) \times 10^{-3}$	1383	DESIG=77
$\Lambda \bar{\Lambda}$	$(1.14 \pm 0.11) \times 10^{-4}$	1355	DESIG=19
$\Lambda \bar{\Lambda} \pi^+ \pi^-$	$(2.9 \pm 0.5) \times 10^{-4}$	1223	DESIG=24
$\Lambda \bar{\Lambda} \pi^+ \pi^- (\text{non-resonant})$	$(2.5 \pm 0.6) \times 10^{-4}$	1223	DESIG=69
$\Sigma(1385)^+ \bar{\Lambda} \pi^- + \text{c.c.}$	$< 1.3 \times 10^{-4}$	1157	DESIG=70
$\Sigma(1385)^- \bar{\Lambda} \pi^+ + \text{c.c.}$	$< 1.3 \times 10^{-4}$	1157	DESIG=71
$K^+ \bar{p} \Lambda + \text{c.c.}$	$(4.2 \pm 0.4) \times 10^{-4}$	1203	DESIG=40
$K^*(892)^+ \bar{p} \Lambda + \text{c.c.}$	$(4.9 \pm 0.7) \times 10^{-4}$	935	DESIG=106
$K^+ \bar{p} \Lambda(1520) + \text{c.c.}$	$(1.7 \pm 0.4) \times 10^{-4}$	951	DESIG=63
$\Lambda(1520) \bar{\Lambda}(1520)$	$< 9 \times 10^{-5}$	880	DESIG=64
$\Sigma^0 \bar{\Sigma}^0$	$(4.2 \pm 0.6) \times 10^{-5}$	1288	DESIG=48
$\Sigma^+ \bar{p} K_S^0 + \text{c.c.}$	$(1.53 \pm 0.12) \times 10^{-4}$	1163	DESIG=105
$\Sigma^0 \bar{p} K^+ + \text{c.c.}$	$(1.46 \pm 0.10) \times 10^{-4}$	1163	DESIG=108
$\Sigma^+ \bar{\Sigma}^-$	$(3.6 \pm 0.7) \times 10^{-5}$	1291	DESIG=49
$\Sigma^- \bar{\Sigma}^+$	$(5.7 \pm 1.5) \times 10^{-5}$	1283	DESIG=107
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	$< 9 \times 10^{-5}$	1081	DESIG=72
$\Sigma(1385)^- \bar{\Sigma}(1385)^+$	$< 5 \times 10^{-5}$	1081	DESIG=73
$K^- \Lambda \Xi^+ + \text{c.c.}$	$(1.35 \pm 0.24) \times 10^{-4}$	963	DESIG=92
$\Xi^0 \Xi^0$	$< 6 \times 10^{-5}$	1163	DESIG=50
$\Xi^- \Xi^+$	$(8.0 \pm 2.1) \times 10^{-5}$	1155	DESIG=26
$\pi^+ \pi^- + K^+ K^-$	$< 2.1 \times 10^{-3}$	—	DESIG=23
$K_S^0 K_S^0$	$< 6 \times 10^{-5}$	1683	DESIG=27
$\eta_c \pi^+ \pi^-$	$< 3.2 \times 10^{-3}$	413	DESIG=83

Radiative decays

$\gamma J/\psi(1S)$	$(34.3 \pm 1.0) \%$	389
$\gamma \rho^0$	$(2.16 \pm 0.17) \times 10^{-4}$	1670
$\gamma \omega$	$(6.8 \pm 0.8) \times 10^{-5}$	1668
$\gamma \phi$	$(2.4 \pm 0.5) \times 10^{-5}$	1607
$\gamma \gamma$	$< 6.3 \times 10^{-6}$	CL=90% 1755
$e^+ e^- J/\psi(1S)$	$(3.46 \pm 0.22) \times 10^{-3}$	389
$\mu^+ \mu^- J/\psi(1S)$	$(2.33 \pm 0.29) \times 10^{-4}$	335

NODE=M055;CLUMP=B

DESIG=1

DESIG=45

DESIG=46

DESIG=47

DESIG=4

DESIG=100

DESIG=103

 $h_c(1P)$

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

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
$J/\psi(1S) \pi^+ \pi^-$	$< 2.3 \times 10^{-3}$	90%	305
$p \bar{p}$	$< 1.5 \times 10^{-4}$	90%	1492
$p \bar{p} \pi^+ \pi^-$	$(2.9 \pm 0.6) \times 10^{-3}$		1390
$p \bar{p} \pi^0 \pi^0$	$< 5 \times 10^{-4}$	90%	1394
$\pi^+ \pi^- \pi^0$	$(1.6 \pm 0.5) \times 10^{-3}$		1749
$\pi^+ \pi^- \pi^0 \eta$	$(7.2 \pm 2.3) \times 10^{-3}$		1695
$2\pi^+ 2\pi^- \pi^0$	$(8.1 \pm 1.8) \times 10^{-3}$		1716
$3\pi^+ 3\pi^- \pi^0$	$< 9 \times 10^{-3}$	90%	1661
$K^+ K^- \pi^+ \pi^-$	$< 6 \times 10^{-4}$	90%	1640
$K^+ K^- \pi^+ \pi^- \pi^0$	$(3.2 \pm 0.8) \times 10^{-3}$		1606
$K^+ K^- \pi^+ \pi^- \eta$	$< 2.3 \times 10^{-3}$	90%	1480
$K^+ K^- \pi^0$	$< 6 \times 10^{-4}$	90%	1670
$K^+ K^- \pi^0 \eta$	$< 2.1 \times 10^{-3}$	90%	1532
$K^+ K^- \eta$	$< 9 \times 10^{-4}$	90%	1574
$2K^+ 2K^- \pi^0$	$< 2.4 \times 10^{-4}$	90%	1339
$K_S^0 K^\pm \pi^\mp$	$< 6 \times 10^{-4}$	90%	1668
$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	$(2.8 \pm 1.0) \times 10^{-3}$		1604

Radiative decays

$\gamma \eta$	$(4.7 \pm 2.1) \times 10^{-4}$	1720
$\gamma \eta'(958)$	$(1.5 \pm 0.4) \times 10^{-3}$	1633
$\gamma \eta_c(1S)$	$(50 \pm 9) \%$	500

NODE=M144215;DESIG=2;OUR EST;

DESIG=10 UNCHECKED ←

DESIG=3

DESIG=11

DESIG=13

DESIG=5

DESIG=14

DESIG=6

DESIG=7

DESIG=12

DESIG=15

DESIG=16

DESIG=17

DESIG=18

DESIG=19

DESIG=20

DESIG=21

DESIG=22

NODE=M144;CLUMP=R

DESIG=9

DESIG=8

DESIG=4

 $\chi_{c2}(1P)$

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

Mass $m = 3556.17 \pm 0.07$ MeVFull width $\Gamma = 1.97 \pm 0.09$ 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			
$2(\pi^+\pi^-)$	(1.02±0.09) %	1751	NODE=M057215;NODE=M057;CLUMP=A DESIG=3
$\pi^+\pi^-\pi^0\pi^0$	(1.83±0.23) %	1752	DESIG=50
$\rho^+\pi^-\pi^0 + \text{c.c.}$	(2.19±0.34) %	1682	DESIG=51
$4\pi^0$	(1.11±0.15) $\times 10^{-3}$	1752	DESIG=62
$K^+K^-\pi^0\pi^0$	(2.1 ±0.4) $\times 10^{-3}$	1658	DESIG=52
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$	(1.38±0.20) %	1657	DESIG=54
$\rho^-K^+\bar{K}^0 + \text{c.c.}$	(4.1 ±1.2) $\times 10^{-3}$	1540	DESIG=55
$K^*(892)^0K^-\pi^+ \rightarrow$	(2.9 ±0.8) $\times 10^{-3}$	—	DESIG=60
$K^-\pi^+K^0\pi^0 + \text{c.c.}$			
$K^*(892)^0\bar{K}^0\pi^0 \rightarrow$	(3.8 ±0.9) $\times 10^{-3}$	—	DESIG=56
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$			
$K^*(892)^-K^+\pi^0 \rightarrow$	(3.7 ±0.8) $\times 10^{-3}$	—	DESIG=57
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$			
$K^*(892)^+\bar{K}^0\pi^- \rightarrow$	(2.9 ±0.8) $\times 10^{-3}$	—	DESIG=58
$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$			
$K^+K^-\eta\pi^0$	(1.3 ±0.4) $\times 10^{-3}$	1549	DESIG=59
$K^+K^-\pi^+\pi^-$	(8.4 ±0.9) $\times 10^{-3}$	1656	DESIG=5
$K^+K^-\pi^+\pi^-\pi^0$	(1.17±0.13) %	1623	DESIG=67
$K_S^0K^\pm\pi^\mp\pi^+\pi^-$	(7.3 ±0.8) $\times 10^{-3}$	1621	DESIG=78
$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	(2.1 ±1.1) $\times 10^{-3}$	1602	DESIG=10
$K^*(892)^0\bar{K}^*(892)^0$	(2.3 ±0.4) $\times 10^{-3}$	1538	DESIG=21
$3(\pi^+\pi^-)$	(8.6 ±1.8) $\times 10^{-3}$	1707	DESIG=4
$\phi\phi$	(1.06±0.09) $\times 10^{-3}$	1457	DESIG=16
$\phi\phi\eta$	(5.3 ±0.6) $\times 10^{-4}$	1206	DESIG=99
$\omega\omega$	(8.4 ±1.0) $\times 10^{-4}$	1597	DESIG=25
ωK^+K^-	(7.3 ±0.9) $\times 10^{-4}$	1540	DESIG=79
$\omega\phi$	(9.6 ±2.7) $\times 10^{-6}$	1529	DESIG=68
$\pi\pi$	(2.23±0.09) $\times 10^{-3}$	1773	DESIG=22
$\rho^0\pi^+\pi^-$	(3.7 ±1.6) $\times 10^{-3}$	1682	DESIG=9
$\pi^+\pi^-\pi^0$ (non-resonant)	(2.0 ±0.4) $\times 10^{-5}$	1765	DESIG=95
$\rho(770)^\pm\pi^\mp$	(6 ±4) $\times 10^{-6}$	—	DESIG=96
$\pi^+\pi^-\eta$	(4.8 ±1.3) $\times 10^{-4}$	1724	DESIG=39
$\pi^+\pi^-\eta'$	(5.0 ±1.8) $\times 10^{-4}$	1636	DESIG=42
$\eta\eta$	(5.4 ±0.4) $\times 10^{-4}$	1692	DESIG=14
K^+K^-	(1.01±0.06) $\times 10^{-3}$	1708	DESIG=2
$K_S^0K_S^0$	(5.2 ±0.4) $\times 10^{-4}$	1707	DESIG=15
$K^*(892)^\pm K^\mp$	(1.44±0.21) $\times 10^{-4}$	1627	DESIG=87
$K^*(892)^0\bar{K}^0 + \text{c.c.}$	(1.24±0.27) $\times 10^{-4}$	1627	DESIG=88
$K_2^*(1430)^\pm K^\mp$	(1.48±0.12) $\times 10^{-3}$	—	DESIG=89
$K_2^*(1430)^0\bar{K}^0 + \text{c.c.}$	(1.24±0.17) $\times 10^{-3}$	1443	DESIG=90
$K_3^*(1780)^\pm K^\mp$	(5.2 ±0.8) $\times 10^{-4}$	—	DESIG=91
$K_3^*(1780)^0\bar{K}^0 + \text{c.c.}$	(5.6 ±2.1) $\times 10^{-4}$	1274	DESIG=92
$a_2(1320)^0\pi^0$	(1.29±0.34) $\times 10^{-3}$	—	DESIG=93
$a_2(1320)^\pm\pi^\mp$	(1.8 ±0.6) $\times 10^{-3}$	1531	DESIG=94
$\bar{K}^0K^+\pi^- + \text{c.c.}$	(1.28±0.18) $\times 10^{-3}$	1685	DESIG=17
$K^+K^-\pi^0$	(3.0 ±0.8) $\times 10^{-4}$	1686	DESIG=36
$K^+K^-\eta$	< 3.2 $\times 10^{-4}$	90% 1592	DESIG=40
$K^+K^-\eta'(958)$	(1.94±0.34) $\times 10^{-4}$	1488	DESIG=82
$\eta\eta'$	(2.2 ±0.5) $\times 10^{-5}$	1600	DESIG=34
$\eta'\eta'$	(4.6 ±0.6) $\times 10^{-5}$	1498	DESIG=35
$\pi^+\pi^-K_S^0K_S^0$	(2.2 ±0.5) $\times 10^{-3}$	1655	DESIG=29
$K^+K^-K_S^0K_S^0$	< 4 $\times 10^{-4}$	90% 1418	DESIG=30
$K_S^0K_S^0K_S^0K_S^0$	(1.13±0.18) $\times 10^{-4}$	1415	DESIG=97
$K^+K^-K^+K^-$	(1.65±0.20) $\times 10^{-3}$	1421	DESIG=24
$K^+K^-\phi$	(1.42±0.29) $\times 10^{-3}$	1468	DESIG=32

$\bar{K}^0 K^+ \pi^- \phi + \text{c.c.}$	$(4.8 \pm 0.7) \times 10^{-3}$		1416	DESIG=83
$K^+ K^- \pi^0 \phi$	$(2.7 \pm 0.5) \times 10^{-3}$		1419	DESIG=84
$\phi \pi^+ \pi^- \pi^0$	$(9.3 \pm 1.2) \times 10^{-4}$		1603	DESIG=80
$p \bar{p}$	$(7.33 \pm 0.33) \times 10^{-5}$		1510	DESIG=11
$p \bar{p} \pi^0$	$(4.7 \pm 0.4) \times 10^{-4}$		1465	DESIG=37
$p \bar{p} \eta$	$(1.74 \pm 0.25) \times 10^{-4}$		1285	DESIG=41
$p \bar{p} \omega$	$(3.6 \pm 0.4) \times 10^{-4}$		1152	DESIG=61
$p \bar{p} \phi$	$(2.8 \pm 0.9) \times 10^{-5}$		1002	DESIG=66
$p \bar{p} \pi^+ \pi^-$	$(1.32 \pm 0.34) \times 10^{-3}$		1410	DESIG=8
$p \bar{p} \pi^0 \pi^0$	$(7.8 \pm 2.3) \times 10^{-4}$		1414	DESIG=53
$p \bar{p} K^+ K^- (\text{non-resonant})$	$(1.91 \pm 0.32) \times 10^{-4}$		1013	DESIG=63
$p \bar{p} K_S^0 K_S^0$	$< 7.9 \times 10^{-4}$	90%	1007	DESIG=28
$p \bar{n} \pi^-$	$(8.5 \pm 0.9) \times 10^{-4}$		1463	DESIG=31
$\bar{p} n \pi^+$	$(8.9 \pm 0.8) \times 10^{-4}$		1463	DESIG=75
$p \bar{n} \pi^- \pi^0$	$(2.17 \pm 0.18) \times 10^{-3}$		1411	DESIG=76
$\bar{p} n \pi^+ \pi^0$	$(2.11 \pm 0.18) \times 10^{-3}$		1411	DESIG=77
$\Lambda \bar{\Lambda}$	$(1.84 \pm 0.15) \times 10^{-4}$		1384	DESIG=19
$\Lambda \bar{\Lambda} \pi^+ \pi^-$	$(1.25 \pm 0.15) \times 10^{-3}$		1255	DESIG=27
$\Lambda \bar{\Lambda} \pi^+ \pi^- (\text{non-resonant})$	$(6.6 \pm 1.5) \times 10^{-4}$		1255	DESIG=70
$\Sigma(1385)^+ \Lambda \pi^- + \text{c.c.}$	$< 4 \times 10^{-4}$	90%	1192	DESIG=71
$\Sigma(1385)^- \Lambda \pi^+ + \text{c.c.}$	$< 6 \times 10^{-4}$	90%	1192	DESIG=72
$K^+ \bar{p} \Lambda + \text{c.c.}$	$(7.8 \pm 0.5) \times 10^{-4}$		1236	DESIG=38
$K^*(892)^+ \bar{p} \Lambda + \text{c.c.}$	$(8.2 \pm 1.1) \times 10^{-4}$		976	DESIG=101
$K^+ \bar{p} \Lambda(1520) + \text{c.c.}$	$(2.8 \pm 0.7) \times 10^{-4}$		992	DESIG=64
$\Lambda(1520) \bar{\Lambda}(1520)$	$(4.6 \pm 1.5) \times 10^{-4}$		924	DESIG=65
$\Sigma^0 \bar{\Sigma}^0$	$(3.7 \pm 0.6) \times 10^{-5}$		1319	DESIG=47
$\Sigma^+ \bar{p} K_S^0 + \text{c.c.}$	$(8.2 \pm 0.9) \times 10^{-5}$		1197	DESIG=100
$\Sigma^0 \bar{p} K^+ + \text{c.c.}$	$(9.1 \pm 0.8) \times 10^{-5}$		1197	DESIG=103
$\Sigma^+ \bar{\Sigma}^-$	$(3.4 \pm 0.7) \times 10^{-5}$		1322	DESIG=48
$\Sigma^- \bar{\Sigma}^+$	$(4.4 \pm 1.8) \times 10^{-5}$		1314	DESIG=102
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	$< 1.6 \times 10^{-4}$	90%	1118	DESIG=73
$\Sigma(1385)^- \bar{\Sigma}(1385)^+$	$< 8 \times 10^{-5}$	90%	1118	DESIG=74
$K^- \Lambda \bar{\Xi}^+ + \text{c.c.}$	$(1.76 \pm 0.32) \times 10^{-4}$		1004	DESIG=85
$\Xi^0 \bar{\Xi}^0$	$< 1.0 \times 10^{-4}$	90%	1197	DESIG=49
$\Xi^- \bar{\Xi}^+$	$(1.42 \pm 0.32) \times 10^{-4}$		1189	DESIG=26
$J/\psi(1S) \pi^+ \pi^- \pi^0$	$< 1.5 \%$	90%	185	DESIG=12
$\pi^0 \eta_c$	$< 3.2 \times 10^{-3}$	90%	511	DESIG=81
$\eta_c(1S) \pi^+ \pi^-$	$< 5.4 \times 10^{-3}$	90%	459	DESIG=69

Radiative decays

$\gamma J/\psi(1S)$	$(19.0 \pm 0.5) \%$		430	DESIG=6
$\gamma \rho^0$	$< 1.9 \times 10^{-5}$	90%	1694	DESIG=44
$\gamma \omega$	$< 6 \times 10^{-6}$	90%	1692	DESIG=45
$\gamma \phi$	$< 7 \times 10^{-6}$	90%	1632	DESIG=46
$\gamma \gamma$	$(2.85 \pm 0.10) \times 10^{-4}$		1778	DESIG=7
$e^+ e^- J/\psi(1S)$	$(2.15 \pm 0.14) \times 10^{-3}$		430	DESIG=86
$\mu^+ \mu^- J/\psi(1S)$	$(2.02 \pm 0.33) \times 10^{-4}$		381	DESIG=98

 $\eta_c(2S)$

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

NODE=M059

Quantum numbers are quark model predictions.

$$\text{Mass } m = 3637.5 \pm 1.1 \text{ MeV } (S = 1.2)$$

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

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		—	NODE=M059215;DESIG=1
$K\bar{K}\pi$	(1.9 ± 1.2) %		1729	DESIG=4
$K\bar{K}\eta$	(5 ± 4) $\times 10^{-3}$		1637	DESIG=20
$2\pi^+ 2\pi^-$	not seen		1792	DESIG=5
$\rho^0 \rho^0$	not seen		1645	DESIG=16
$3\pi^+ 3\pi^-$	not seen		1749	DESIG=8;OUR EVAL;→ UNCHECKED ←
$K^+ K^- \pi^+ \pi^-$	not seen		1700	DESIG=6
$K^{*0} \bar{K}^{*0}$	not seen		1585	DESIG=17
$K^+ K^- \pi^+ \pi^- \pi^0$	(1.4 ± 1.0) %		1667	DESIG=9
$K^+ K^- 2\pi^+ 2\pi^-$	not seen		1627	DESIG=10;OUR EVAL;→ UNCHECKED ←
$K_S^0 K^- 2\pi^+ \pi^- + \text{c.c.}$	seen		1666	DESIG=11
$2K^+ 2K^-$	not seen		1470	DESIG=7
$\phi\phi$	not seen		1506	DESIG=18
$p\bar{p}$	seen		1558	DESIG=3
$p\bar{p}\pi^+ \pi^-$	seen		1461	DESIG=22
$\gamma\gamma$	(1.9 ± 1.3) $\times 10^{-4}$		1819	DESIG=2
$\gamma J/\psi(1S)$	< 1.4 %	90%	500	DESIG=21
$\pi^+ \pi^- \eta$	not seen		1766	DESIG=12;OUR EVAL;→ UNCHECKED ←
$\pi^+ \pi^- \eta'$	not seen		1680	DESIG=13;OUR EVAL;→ UNCHECKED ←
$\pi^+ \pi^- \eta_c(1S)$	< 25 %	90%	537	DESIG=15

 $\psi(2S)$

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

Mass $m = 3686.10 \pm 0.06$ MeV (S = 5.9)Full width $\Gamma = 294 \pm 8$ keV

NODE=M071

NODE=M071M;DTYPE=M

NODE=M071W;DTYPE=G

$\psi(2S)$ 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
ggg	(10.6 $\pm$ 1.6) %		—	DESIG=255
γgg	(1.03 $\pm$ 0.29) %		—	DESIG=256
light hadrons	(15.4 $\pm$ 1.5) %		—	DESIG=226
$e^+ e^-$	(7.93 $\pm$ 0.17) $\times 10^{-3}$		1843	DESIG=1
$\mu^+ \mu^-$	(8.0 $\pm$ 0.6) $\times 10^{-3}$		1840	DESIG=2
$\tau^+ \tau^-$	(3.1 $\pm$ 0.4) $\times 10^{-3}$		489	DESIG=68

Decays into $J/\psi(1S)$ and anything

$J/\psi(1S)$ anything	(61.4 $\pm$ 0.6) %		—	NODE=M071;CLUMP=A
$J/\psi(1S)$ neutrals	(25.38 $\pm$ 0.32) %		—	DESIG=11
$J/\psi(1S) \pi^+ \pi^-$	(34.68 $\pm$ 0.30) %		477	DESIG=12
$J/\psi(1S) \pi^0 \pi^0$	(18.24 $\pm$ 0.31) %		481	DESIG=13
$J/\psi(1S) \eta$	(3.37 $\pm$ 0.05) %		199	DESIG=14
$J/\psi(1S) \pi^0$	(1.268 $\pm$ 0.032) $\times 10^{-3}$		528	DESIG=15
				DESIG=18

Hadronic decays

$\pi^0 h_c(1P)$	(8.6 $\pm$ 1.3) $\times 10^{-4}$		85	NODE=M071;CLUMP=B
$3(\pi^+ \pi^-) \pi^0$	(3.5 $\pm$ 1.6) $\times 10^{-3}$		1746	DESIG=254
$2(\pi^+ \pi^-) \pi^0$	(2.9 $\pm$ 1.0) $\times 10^{-3}$	S=4.7	1799	DESIG=37
$\rho a_2(1320)$	(2.6 $\pm$ 0.9) $\times 10^{-4}$		1501	DESIG=25
$\pi^+ \pi^- \pi^0 \pi^0 \pi^0$	(5.3 $\pm$ 0.9) $\times 10^{-3}$		1800	DESIG=65
$\rho^\pm \pi^\mp \pi^0 \pi^0$	< 2.7 $\times 10^{-3}$	CL=90%	1737	DESIG=312
$p\bar{p}$	(2.94 $\pm$ 0.08) $\times 10^{-4}$		1586	DESIG=315
$n\bar{n}$	(3.06 $\pm$ 0.15) $\times 10^{-4}$		1586	DESIG=27
$\Delta^{++} \bar{\Delta}^{--}$	(1.28 $\pm$ 0.35) $\times 10^{-4}$		1371	DESIG=309
$\Lambda \bar{\Lambda} \pi^0$	< 2.9 $\times 10^{-6}$	CL=90%	1412	DESIG=70
$\Lambda \bar{\Lambda} \eta$	(2.5 $\pm$ 0.4) $\times 10^{-5}$		1197	DESIG=238
$\Lambda \bar{p} K^+$	(1.00 $\pm$ 0.14) $\times 10^{-4}$		1327	DESIG=239
$K^*(892)^+ \bar{p} \Lambda + \text{c.c.}$	(6.3 $\pm$ 0.7) $\times 10^{-5}$		1087	DESIG=214
				DESIG=321

$\Lambda \bar{p} K^+ \pi^+ \pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$		1167	DESIG=215
$\Lambda \bar{\Lambda} \pi^+ \pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$		1346	DESIG=213
$\Lambda \bar{\Lambda}$	$(3.81 \pm 0.13) \times 10^{-4}$	S=1.4	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
$\Lambda \bar{\Sigma}^0$	$(1.23 \pm 0.24) \times 10^{-5}$		1437	DESIG=307
$\Sigma^0 \bar{p} K^+ + \text{c.c.}$	$(1.67 \pm 0.18) \times 10^{-5}$		1291	DESIG=274
$\Sigma^+ \bar{\Sigma}^-$	$(2.32 \pm 0.12) \times 10^{-4}$		1408	DESIG=223
$\Sigma^0 \bar{\Sigma}^0$	$(2.35 \pm 0.09) \times 10^{-4}$	S=1.1	1405	DESIG=71
$\Sigma(1385)^+ \bar{\Sigma}(1385)^-$	$(8.5 \pm 0.7) \times 10^{-5}$		1218	DESIG=72
$\Sigma(1385)^- \bar{\Sigma}(1385)^+$	$(8.5 \pm 0.8) \times 10^{-5}$		1218	DESIG=297
$\Sigma(1385)^0 \bar{\Sigma}(1385)^0$	$(6.9 \pm 0.7) \times 10^{-5}$		1218	DESIG=299
$\Xi^- \bar{\Xi}^+$	$(2.87 \pm 0.11) \times 10^{-4}$	S=1.1	1284	DESIG=29
$\Xi^0 \bar{\Xi}^0$	$(2.3 \pm 0.4) \times 10^{-4}$	S=4.2	1291	DESIG=224
$\Xi(1530)^0 \bar{\Xi}(1530)^0$	$(5.2 \pm 1.2) \times 10^{-5}$		1025	DESIG=73
$K^- \Lambda \bar{\Xi}^+ + \text{c.c.}$	$(3.9 \pm 0.4) \times 10^{-5}$		1114	DESIG=293
$\Xi(1530)^- \bar{\Xi}(1530)^+$	$(1.15 \pm 0.07) \times 10^{-4}$		1025	DESIG=322
$\Xi(1530)^- \bar{\Xi}^+$	$(7.0 \pm 1.2) \times 10^{-6}$		1165	DESIG=323
$\Xi(1690)^- \bar{\Xi}^+ \rightarrow K^- \Lambda \bar{\Xi}^+ + \text{c.c.}$	$(5.2 \pm 1.6) \times 10^{-6}$		—	DESIG=294
$\Xi(1820)^- \bar{\Xi}^+ \rightarrow K^- \Lambda \bar{\Xi}^+ + \text{c.c.}$	$(1.20 \pm 0.32) \times 10^{-5}$		—	DESIG=295
$K^- \Sigma^0 \bar{\Xi}^+ + \text{c.c.}$	$(3.7 \pm 0.4) \times 10^{-5}$		1060	DESIG=296
$\Omega^- \bar{\Omega}^+$	$(5.66 \pm 0.30) \times 10^{-5}$	S=1.3	774	DESIG=74
$\pi^0 p \bar{p}$	$(1.53 \pm 0.07) \times 10^{-4}$		1543	DESIG=35
$N(940) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(6.4 \pm 1.8) \times 10^{-5}$		—	DESIG=267
$N(1440) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(7.3 \pm 1.7) \times 10^{-5}$	S=2.5	—	DESIG=261
$N(1520) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(6.4 \pm 2.3) \times 10^{-6}$		—	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
$N(1650) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(3.8 \pm 1.4) \times 10^{-5}$		—	DESIG=270
$N(1720) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(1.79 \pm 0.26) \times 10^{-5}$		—	DESIG=271
$N(2300) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(2.6 \pm 1.2) \times 10^{-5}$		—	DESIG=272
$N(2570) \bar{p} + \text{c.c.} \rightarrow \pi^0 p \bar{p}$	$(2.13 \pm 0.40) \times 10^{-5}$		—	DESIG=273
$\eta p \bar{p}$	$(6.0 \pm 0.4) \times 10^{-5}$		1373	DESIG=200
$N(1535) \bar{p} + \text{c.c.} \rightarrow \eta p \bar{p}$	$(4.4 \pm 0.7) \times 10^{-5}$		—	DESIG=264
$\omega p \bar{p}$	$(6.9 \pm 2.1) \times 10^{-5}$		1247	DESIG=77
$\eta' p \bar{p}$	$(1.10 \pm 0.13) \times 10^{-5}$		1141	DESIG=317
$\phi p \bar{p}$	$(6.1 \pm 0.6) \times 10^{-6}$		1109	DESIG=80
$\phi X(1835) \rightarrow \phi p \bar{p}$	$< 1.82 \times 10^{-7}$	CL=90%	—	DESIG=318
$\pi^+ \pi^- p \bar{p}$	$(6.0 \pm 0.4) \times 10^{-4}$		1491	DESIG=31
$p \bar{n} \pi^- \text{ or c.c.}$	$(2.48 \pm 0.17) \times 10^{-4}$		—	DESIG=227
$p \bar{n} \pi^- \pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$		1492	DESIG=228
$2(\pi^+ \pi^- \pi^0)$	$(4.8 \pm 1.5) \times 10^{-3}$		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
$\pi^+ \pi^- \pi^0 \pi^0 \eta$	$< 4 \times 10^{-4}$	CL=90%	1760	DESIG=313
$\eta' \pi^+ \pi^- \pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$		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
$\omega \pi^0 \pi^0$	$(1.11 \pm 0.35) \times 10^{-3}$		1749	DESIG=314
$\pi^0 \pi^0 K^+ K^-$	$(2.6 \pm 1.3) \times 10^{-4}$		1728	DESIG=298
$\pi^+ \pi^- K^+ K^-$	$(7.3 \pm 0.5) \times 10^{-4}$		1726	DESIG=26

$\pi^0 \pi^0 K_S^0 K_L^0$	$(1.3 \pm 0.6) \times 10^{-3}$	1726	DESIG=304
$\rho^0 K^+ K^-$	$(2.2 \pm 0.4) \times 10^{-4}$	1616	DESIG=205
$K^*(892)^0 \bar{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$	1417	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
$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$	1588	DESIG=41
$K_S^0 K_S^0 \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$	1724	DESIG=225
$\rho^0 \rho \bar{\rho}$	$(5.0 \pm 2.2) \times 10^{-5}$	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 $\eta \phi$	$(3.49 \pm 0.17) \times 10^{-5}$	1664	DESIG=207
$\omega K^+ K^-$	$(1.62 \pm 0.11) \times 10^{-4}$	S=1.1 1614	DESIG=76
$\omega K^*(892)^+ K^- + \text{c.c.}$	$(2.07 \pm 0.26) \times 10^{-4}$	1482	DESIG=276
$\omega K_2^*(1430)^+ K^- + \text{c.c.}$	$(6.1 \pm 1.2) \times 10^{-5}$	1252	DESIG=277
$\omega \bar{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$	1481	DESIG=278
$\omega \bar{K}_2^*(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$	1250	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
$\rho \bar{\rho} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$	1435	DESIG=211
$K^+ K^-$	$(7.5 \pm 0.5) \times 10^{-5}$	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
$K_S^0 K_L^0 \pi^0$	$< 3.0 \times 10^{-4}$	CL=90% 1753	DESIG=303
$K_S^0 K_L^0 \eta$	$(1.3 \pm 0.5) \times 10^{-3}$	1661	DESIG=305
$K^+ K^*(892)^- + \text{c.c.}$	$(2.9 \pm 0.4) \times 10^{-5}$	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
$\phi \pi^+ \pi^-$	$(1.18 \pm 0.26) \times 10^{-4}$	S=1.5 1690	DESIG=78
$\phi f_0(980) \rightarrow \pi^+ \pi^-$	$(7.5 \pm 3.3) \times 10^{-5}$	S=1.6 —	DESIG=81
$2(K^+ K^-)$	$(6.3 \pm 1.3) \times 10^{-5}$	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
$\eta \phi(2170), \phi(2170) \rightarrow \phi f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 2.2 \times 10^{-6}$	CL=90% —	DESIG=316
$\phi \eta'$	$(1.54 \pm 0.20) \times 10^{-5}$	1555	DESIG=90
$\phi f_1(1285)$	$(3.0 \pm 1.3) \times 10^{-5}$	1436	DESIG=319
$\phi \eta(1405) \rightarrow \phi \pi^+ \pi^- \eta$	$(8.5 \pm 1.7) \times 10^{-6}$	—	DESIG=320

$\omega\eta'$	(3.2 $\begin{smallmatrix} +2.5 \\ -2.1 \end{smallmatrix}$) $\times 10^{-5}$	1623	DESIG=91
$\omega\pi^0$	(2.1 ± 0.6) $\times 10^{-5}$	1757	DESIG=92
$\rho\eta'$	(1.9 $\begin{smallmatrix} +1.7 \\ -1.2 \end{smallmatrix}$) $\times 10^{-5}$	1625	DESIG=93
$\rho\eta$	(2.2 ± 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%	512	DESIG=229
$p\bar{p}K^+K^-$	(2.7 ± 0.7) $\times 10^{-5}$	1118	DESIG=212
$\bar{\Lambda}nK_S^0 + \text{c.c.}$	(8.1 ± 1.8) $\times 10^{-5}$	1324	DESIG=237
$\phi f_2'(1525)$	(4.4 ± 1.6) $\times 10^{-5}$	1325	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
$\Lambda_c^+ \bar{p} e^+ e^- + \text{c.c.}$	< 1.7 $\times 10^{-6}$ CL=90%	830	DESIG=310

Radiative decays

NODE=M071;CLUMP=C

$\gamma\chi_{c0}(1P)$	(9.79 ± 0.20) %	261	DESIG=56
$\gamma\chi_{c1}(1P)$	(9.75 ± 0.24) %	171	DESIG=58
$\gamma\chi_{c2}(1P)$	(9.52 ± 0.20) %	128	DESIG=59
$\gamma\eta_c(1S)$	(3.4 ± 0.5) $\times 10^{-3}$ S=1.3	635	DESIG=61
$\gamma\eta_c(2S)$	(7 ± 5) $\times 10^{-4}$	48	DESIG=63
$\gamma\pi^0$	(1.04 ± 0.22) $\times 10^{-6}$ S=1.4	1841	DESIG=52
$\gamma\eta'(958)$	(1.24 ± 0.04) $\times 10^{-4}$	1719	DESIG=54
$\gamma f_2(1270)$	(2.73 $\begin{smallmatrix} +0.29 \\ -0.25 \end{smallmatrix}$) $\times 10^{-4}$ S=1.8	1622	DESIG=82
$\gamma f_0(1370) \rightarrow \gamma K \bar{K}$	(3.1 ± 1.7) $\times 10^{-5}$	1588	DESIG=286
$\gamma f_0(1500)$	(9.3 ± 1.9) $\times 10^{-5}$	1535	DESIG=287
$\gamma f_2'(1525)$	(3.3 ± 0.8) $\times 10^{-5}$	1531	DESIG=288
$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	(3.5 ± 0.6) $\times 10^{-5}$	—	DESIG=83
$\gamma f_0(1710) \rightarrow \gamma K \bar{K}$	(6.6 ± 0.7) $\times 10^{-5}$	—	DESIG=84
$\gamma f_0(2100) \rightarrow \gamma\pi\pi$	(4.8 ± 1.0) $\times 10^{-6}$	1244	DESIG=289
$\gamma f_0(2200) \rightarrow \gamma K \bar{K}$	(3.2 ± 1.0) $\times 10^{-6}$	1193	DESIG=290
$\gamma f_J(2220) \rightarrow \gamma\pi\pi$	< 5.8 $\times 10^{-6}$ CL=90%	1168	DESIG=291
$\gamma f_J(2220) \rightarrow \gamma K \bar{K}$	< 9.5 $\times 10^{-6}$ CL=90%	1168	DESIG=292
$\gamma\gamma$	< 1.5 $\times 10^{-4}$ CL=90%	1843	DESIG=51
$\gamma\eta$	(9.2 ± 1.8) $\times 10^{-7}$	1802	DESIG=53
$\gamma\eta\pi^+\pi^-$	(8.7 ± 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 ± 2.5) $\times 10^{-5}$	—	DESIG=232
$\gamma\eta(1405) \rightarrow \gamma f_0(980)\pi^0 \rightarrow \gamma\pi^+\pi^-\pi^0$	< 5.0 $\times 10^{-7}$ CL=90%	—	DESIG=308
$\gamma\eta(1475) \rightarrow K \bar{K} \pi$	< 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 ± 0.6) $\times 10^{-4}$	1817	DESIG=241
$\gamma K^{*0} K^+ \pi^- + \text{c.c.}$	(3.7 ± 0.9) $\times 10^{-4}$	1674	DESIG=242
$\gamma K^{*0} \bar{K}^{*0}$	(2.4 ± 0.7) $\times 10^{-4}$	1613	DESIG=243
$\gamma K_S^0 K^+ \pi^- + \text{c.c.}$	(2.6 ± 0.5) $\times 10^{-4}$	1753	DESIG=244
$\gamma K^+ K^- \pi^+ \pi^-$	(1.9 ± 0.5) $\times 10^{-4}$	1726	DESIG=245
$\gamma p\bar{p}$	(3.9 ± 0.5) $\times 10^{-5}$ S=2.0	1586	DESIG=246
$\gamma f_2(1950) \rightarrow \gamma p\bar{p}$	(1.20 ± 0.22) $\times 10^{-5}$	—	DESIG=257
$\gamma f_2(2150) \rightarrow \gamma p\bar{p}$	(7.2 ± 1.8) $\times 10^{-6}$	—	DESIG=258
$\gamma X(1835) \rightarrow \gamma p\bar{p}$	(4.6 $\begin{smallmatrix} +1.8 \\ -4.0 \end{smallmatrix}$) $\times 10^{-6}$	—	DESIG=259

$\gamma X \rightarrow \gamma p \bar{p}$	$[n] < 2$	$\times 10^{-6}$	CL=90%	—	DESIG=260
$\gamma \pi^+ \pi^- p \bar{p}$	(2.8 ± 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 ± 1.0)	$\times 10^{-4}$		542	DESIG=266
$e^+ e^- \eta'$	(1.90 ± 0.26)	$\times 10^{-6}$		1719	DESIG=311
$e^+ e^- \chi_{c0}(1P)$	(1.06 ± 0.24)	$\times 10^{-3}$		261	DESIG=300
$e^+ e^- \chi_{c1}(1P)$	(8.5 ± 0.6)	$\times 10^{-4}$		171	DESIG=301
$e^+ e^- \chi_{c2}(1P)$	(7.0 ± 0.8)	$\times 10^{-4}$		128	DESIG=302
Weak decays					
$D^0 e^+ e^- + \text{c.c.}$	< 1.4	$\times 10^{-7}$	CL=90%	1371	NODE=M071;CLUMP=E DESIG=306
Other decays					
invisible	< 1.6	%	CL=90%	—	NODE=M071;CLUMP=D DESIG=275

 $\psi(3770)$

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

Mass $m = 3773.7 \pm 0.4$ MeV ($S = 1.4$)

Full width $\Gamma = 27.2 \pm 1.0$ MeV

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=M053220;NODE=M053

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$D\bar{D}$	$(93 \pm 8) \%$	S=2.0	287	DESIG=2
$D^0 \bar{D}^0$	$(52 \pm 4) \%$	S=2.0	287	DESIG=5
$D^+ D^-$	$(41 \pm 4) \%$	S=2.0	254	DESIG=6
$J/\psi \pi^+ \pi^-$	$(1.93 \pm 0.28) \times 10^{-3}$		561	DESIG=4
$J/\psi \pi^0 \pi^0$	$(8.0 \pm 3.0) \times 10^{-4}$		565	DESIG=46
$J/\psi \eta$	$(9 \pm 4) \times 10^{-4}$		361	DESIG=47
$J/\psi \pi^0$	$< 2.8 \times 10^{-4}$	CL=90%	604	DESIG=48
$e^+ e^-$	$(9.6 \pm 0.7) \times 10^{-6}$	S=1.3	1887	DESIG=1
Decays to light hadrons				
$b_1(1235)\pi$	$< 1.4 \times 10^{-5}$	CL=90%	1684	NODE=M053;CLUMP=H DESIG=20
$\phi\eta'$	$< 7 \times 10^{-4}$	CL=90%	1607	DESIG=17
$\omega\eta'$	$< 4 \times 10^{-4}$	CL=90%	1672	DESIG=16
$\rho^0\eta'$	$< 6 \times 10^{-4}$	CL=90%	1674	DESIG=15
$\phi\eta$	$(3.1 \pm 0.7) \times 10^{-4}$		1703	DESIG=8
$\omega\eta$	$< 1.4 \times 10^{-5}$	CL=90%	1762	DESIG=14
$\rho^0\eta$	$< 5 \times 10^{-4}$	CL=90%	1764	DESIG=13
$\phi\pi^0$	$< 3 \times 10^{-5}$	CL=90%	1746	DESIG=12
$\omega\pi^0$	$< 6 \times 10^{-4}$	CL=90%	1803	DESIG=11
$\pi^+ \pi^- \pi^0$	$< 5 \times 10^{-6}$	CL=90%	1874	DESIG=9
$\rho\pi$	$< 5 \times 10^{-6}$	CL=90%	1805	DESIG=10
$K^*(892)^+ K^- + \text{c.c.}$	$< 1.4 \times 10^{-5}$	CL=90%	1745	DESIG=19
$K^*(892)^0 \bar{K}^0 + \text{c.c.}$	$< 1.2 \times 10^{-3}$	CL=90%	1745	DESIG=18
$K_S^0 K_L^0$	$< 1.2 \times 10^{-5}$	CL=90%	1820	DESIG=3
$2(\pi^+ \pi^-)$	$< 1.12 \times 10^{-3}$	CL=90%	1861	DESIG=21
$2(\pi^+ \pi^-) \pi^0$	$< 1.06 \times 10^{-3}$	CL=90%	1844	DESIG=22
$2(\pi^+ \pi^- \pi^0)$	$< 5.85 \%$	CL=90%	1821	DESIG=208
$\omega\pi^+ \pi^-$	$< 6.0 \times 10^{-4}$	CL=90%	1794	DESIG=24
$3(\pi^+ \pi^-)$	$< 9.1 \times 10^{-3}$	CL=90%	1820	DESIG=52
$3(\pi^+ \pi^-) \pi^0$	$< 1.37 \%$	CL=90%	1792	DESIG=55
$3(\pi^+ \pi^-) 2\pi^0$	$< 11.74 \%$	CL=90%	1760	DESIG=210

$\eta\pi^+\pi^-$	< 1.24	$\times 10^{-3}$	CL=90%	1836	DESIG=23
$\pi^+\pi^-2\pi^0$	< 8.9	$\times 10^{-3}$	CL=90%	1862	DESIG=206
$\rho^0\pi^+\pi^-$	< 6.9	$\times 10^{-3}$	CL=90%	1796	DESIG=64
$\eta3\pi$	< 1.34	$\times 10^{-3}$	CL=90%	1824	DESIG=25
$\eta2(\pi^+\pi^-)$	< 2.43	%	CL=90%	1804	DESIG=53
$\eta\rho^0\pi^+\pi^-$	< 1.45	%	CL=90%	1708	DESIG=221
$\eta'3\pi$	< 2.44	$\times 10^{-3}$	CL=90%	1741	DESIG=26
$K^+K^-\pi^+\pi^-$	< 9.0	$\times 10^{-4}$	CL=90%	1773	DESIG=27
$\phi\pi^+\pi^-$	< 4.1	$\times 10^{-4}$	CL=90%	1737	DESIG=28
$K^+K^-2\pi^0$	< 4.2	$\times 10^{-3}$	CL=90%	1774	DESIG=207
$4(\pi^+\pi^-)$	< 1.67	%	CL=90%	1757	DESIG=62
$4(\pi^+\pi^-)\pi^0$	< 3.06	%	CL=90%	1720	DESIG=63
$\phi f_0(980)$	< 4.5	$\times 10^{-4}$	CL=90%	1597	DESIG=29
$K^+K^-\pi^+\pi^-\pi^0$	< 2.36	$\times 10^{-3}$	CL=90%	1741	DESIG=30
$K^+K^-\rho^0\pi^0$	< 8	$\times 10^{-4}$	CL=90%	1624	DESIG=67
$K^+K^-\rho^+\pi^-$	< 1.46	%	CL=90%	1623	DESIG=68
ωK^+K^-	< 3.4	$\times 10^{-4}$	CL=90%	1664	DESIG=32
$\phi\pi^+\pi^-\pi^0$	< 3.8	$\times 10^{-3}$	CL=90%	1723	DESIG=69
$K^{*0}K^-\pi^+\pi^0 + \text{c.c.}$	< 1.62	%	CL=90%	1694	DESIG=70
$K^{*+}K^-\pi^+\pi^- + \text{c.c.}$	< 3.23	%	CL=90%	1693	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%	1661	DESIG=58
ηK^+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%	1666	DESIG=65
$2(K^+K^-)$	< 6.0	$\times 10^{-4}$	CL=90%	1552	DESIG=33
ϕK^+K^-	< 7.5	$\times 10^{-4}$	CL=90%	1598	DESIG=34
$2(K^+K^-)\pi^0$	< 2.9	$\times 10^{-4}$	CL=90%	1494	DESIG=35
$2(K^+K^-)\pi^+\pi^-$	< 3.2	$\times 10^{-3}$	CL=90%	1426	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%	1665	DESIG=214
$K_S^0 K^-2\pi^+\pi^-$	< 8.7	$\times 10^{-3}$	CL=90%	1740	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%	1670	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%	1491	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
$p\bar{p}\pi^0$	< 4	$\times 10^{-5}$	CL=90%	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%	1522	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%	1310	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%	1426	DESIG=61
$\eta p\bar{p}$	< 5.4	$\times 10^{-4}$	CL=90%	1431	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%	1314	DESIG=66
$p\bar{p}K^+K^-$	< 3.2	$\times 10^{-4}$	CL=90%	1186	DESIG=40
$\eta p\bar{p}K^+K^-$	< 6.9	$\times 10^{-3}$	CL=90%	737	DESIG=224
$\pi^0 p\bar{p}K^+K^-$	< 1.2	$\times 10^{-3}$	CL=90%	1094	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%	1263	DESIG=226
$\Sigma^+\bar{\Sigma}^-$	< 1.0	$\times 10^{-4}$	CL=90%	1465	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%	1347	DESIG=229
$\Xi^0\bar{\Xi}^0$	< 1.4	$\times 10^{-4}$	CL=90%	1353	DESIG=230

Radiative decays

$\gamma\chi_{c2}$	$< 6.4 \times 10^{-4}$	CL=90%	211
$\gamma\chi_{c1}$	$(2.49 \pm 0.23) \times 10^{-3}$		254
$\gamma\chi_{c0}$	$(6.9 \pm 0.6) \times 10^{-3}$		342
$\gamma\eta_c$	$< 7 \times 10^{-4}$	CL=90%	707
$\gamma\eta_c(2S)$	$< 9 \times 10^{-4}$	CL=90%	134
$\gamma\eta'$	$< 1.8 \times 10^{-4}$	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=231
 DESIG=232
 DESIG=213
 DESIG=212
 DESIG=211

 $\psi_2(3823)$

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

I, J, P need confirmation.

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

NODE=M212

Mass $m = 3823.7 \pm 0.5$ MeV ($S = 1.1$)Full width $\Gamma < 5.2$ MeV, CL = 90%

NODE=M212M;DTYPE=M
 NODE=M212W;DTYPE=G

 $\psi_2(3823)$ DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi(1S)\pi^+\pi^-$	seen	607
$\chi_{c1}\gamma$	seen	300
$\chi_{c2}\gamma$	not seen	258

NODE=M212215;DESIG=3
 DESIG=1
 DESIG=2

 $\psi_3(3842)$

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

J, P need confirmation.

Seen by a single experiment only.

Mass $m = 3842.71 \pm 0.20$ MeVFull width $\Gamma = 2.8 \pm 0.6$ MeV

NODE=M241

NODE=M241M;DTYPE=M
 NODE=M241W;DTYPE=G

 $\psi_3(3842)$ DECAY MODES

	Fraction (Γ_i/Γ)	p (MeV/c)
D^+D^-	seen	443
$D^0\bar{D}^0$	seen	463

NODE=M241215;DESIG=1
 DESIG=2

 $\chi_{c1}(3872)$

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

also known as $X(3872)$

NODE=M176

Mass $m = 3871.65 \pm 0.06$ MeV $m_{\chi_{c1}(3872)} - m_{J/\psi} = 775 \pm 4$ MeVFull width $\Gamma = 1.19 \pm 0.21$ MeV ($S = 1.1$)

NODE=M176M;DTYPE=M
 NODE=M176DM;DTYPE=D
 NODE=M176W;DTYPE=G

$\chi_{c1}(3872)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$e^+ e^-$	$< 3.2 \times 10^{-6}$	90%	1936	NODE=M176215;DESIG=1
$\pi^+ \pi^- J/\psi(1S)$	$(3.4 \pm 0.7) \%$		650	DESIG=2
$\pi^+ \pi^- \pi^0 J/\psi(1S)$	not seen		588	DESIG=25
$\omega \eta_c(1S)$	$< 30 \%$	90%	368	DESIG=24
$\omega J/\psi(1S)$	$(3.9 \pm 1.6) \%$		†	DESIG=13
$\phi \phi$	not seen		1646	DESIG=26
$D^0 \bar{D}^0 \pi^0$	$(44 \pm^{16}_{-18}) \%$		116	DESIG=8
$\bar{D}^{*0} D^0$	$(33 \pm 8) \%$		†	DESIG=12
$\gamma \gamma$	$< 10 \%$	90%	1936	DESIG=5
$D^0 \bar{D}^0$	$< 26 \%$	90%	519	DESIG=6
$D^+ D^-$	$< 17 \%$	90%	502	DESIG=7
$\pi^0 \chi_{c2}$	$< 4 \%$	90%	273	DESIG=20
$\pi^0 \chi_{c1}$	$(3.0 \pm^{1.3}_{-1.1}) \%$		319	DESIG=18
$\pi^0 \chi_{c0}$	$< 70 \%$	90%	—	DESIG=19
$\pi^+ \pi^- \eta_c(1S)$	$< 13 \%$	90%	745	DESIG=14
$\pi^+ \pi^- \chi_{c1}$	$< 6 \times 10^{-3}$	90%	218	DESIG=17
$p \bar{p}$	$< 2.2 \times 10^{-5}$	95%	1693	DESIG=16
Radiative decays				NODE=M176;CLUMP=B
$\gamma D^+ D^-$	$< 3.4 \%$	90%	502	DESIG=21
$\gamma \bar{D}^0 D^0$	$< 5 \%$	90%	519	DESIG=23
$\gamma J/\psi$	$(7.7 \pm 2.5) \times 10^{-3}$		697	DESIG=9
$\gamma \chi_{c1}$	$< 8 \times 10^{-3}$	90%	344	DESIG=3
$\gamma \chi_{c2}$	$< 2.9 \%$	90%	303	DESIG=15
$\gamma \psi(2S)$	$(4.1 \pm 1.4) \%$		181	DESIG=11
C-violating decays				NODE=M176;CLUMP=A
$\eta J/\psi$	$< 1.6 \%$	90%	491	DESIG=4

Z_c(3900)

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

NODE=M210

was X(3900)

Mass $m = 3887.1 \pm 2.6$ MeV ($S = 1.7$)Full width $\Gamma = 28.4 \pm 2.6$ MeV

NODE=M210M;DTYPE=M

NODE=M210W;DTYPE=G

$Z_c(3900)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$J/\psi \pi$	seen	699	NODE=M210215;DESIG=1
$h_c \pi^\pm$	not seen	318	DESIG=2
$\eta_c \pi^+ \pi^-$	not seen	759	DESIG=10
$(D \bar{D}^*)^\pm$	seen	—	DESIG=3;OUR EVAL;→ UNCHECKED ←
$D^0 D^{*-} + c.c.$	seen	152	DESIG=8
$D^- D^{*0} + c.c.$	seen	143	DESIG=9
$\omega \pi^\pm$	not seen	1862	DESIG=4
$J/\psi \eta$	not seen	510	DESIG=5
$D^+ D^{*-} + c.c.$	seen	—	DESIG=6
$D^0 \bar{D}^{*0} + c.c.$	seen	—	DESIG=7

X(3915)

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

NODE=M159

was $\chi_{c0}(3915)$ Mass $m = 3921.7 \pm 1.8$ MeV ($S = 1.5$)Full width $\Gamma = 18.8 \pm 3.5$ MeV

NODE=M159M;DTYPE=M

NODE=M159W;DTYPE=G

X(3915) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega J/\psi$	seen	231
$\pi^+ \pi^- \eta_c(1S)$	not seen	788
$\eta_c \eta$	not seen	668
$\eta_c \pi^0$	not seen	817
$K \bar{K}$	not seen	1898
$\gamma\gamma$	seen	1961

NODE=M159215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=4;OUR EVAL;→ UNCHECKED ←
DESIG=6
DESIG=7
DESIG=5;OUR EVAL;→ UNCHECKED ←
DESIG=2

$\chi_{c2}(3930)$

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

Mass $m = 3922.5 \pm 1.0$ MeV ($S = 1.7$)

Full width $\Gamma = 35.2 \pm 2.2$ MeV ($S = 1.2$)

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

$\chi_{c2}(3930)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma$	seen	1961
$D \bar{D}$	seen	607
$D^+ D^-$	seen	592
$D^0 \bar{D}^0$	seen	607
$\pi^+ \pi^- \eta_c(1S)$	not seen	788
$K \bar{K}$	not seen	1898

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 ←

$X(4020)^\pm$

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

Mass $m = 4024.1 \pm 1.9$ MeV

Full width $\Gamma = 13 \pm 5$ MeV ($S = 1.7$)

NODE=M213
NODE=M213M;DTYPE=M
NODE=M213W;DTYPE=G

$X(4020)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$h_c(1P)\pi$	seen	450
$D^* \bar{D}^*$	seen	85
$D \bar{D}^* + \text{c.c.}$	not seen	542
$\eta_c \pi^+ \pi^-$	not seen	872
$J/\psi(1S)\pi^\pm$	not seen	811

NODE=M213215;DESIG=1
DESIG=2
DESIG=4
DESIG=3
DESIG=5

$\psi(4040)^{[0]}$

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

Mass $m = 4039 \pm 1$ MeV

Full width $\Gamma = 80 \pm 10$ MeV

NODE=M072
NODE=M072M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=M072W;DTYPE=G;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=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	DESIG=5
$D\bar{D}$	seen		775	DESIG=17;OUR EST;→ UNCHECKED ←
$D^0\bar{D}^0$	seen		775	DESIG=1
D^+D^-	seen		763	DESIG=18
$D^*\bar{D} + \text{c.c.}$	seen		569	DESIG=19;OUR EST;→ UNCHECKED ←
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		575	DESIG=2
$D^*(2010)^+D^- + \text{c.c.}$	seen		561	DESIG=20
$D^*\bar{D}^*$	seen		193	DESIG=21;OUR EST;→ UNCHECKED ←
$D^*(2007)^0\bar{D}^*(2007)^0$	seen		226	DESIG=3
$D^*(2010)^+D^*(2010)^-$	seen		193	DESIG=22
$D^0D^-\pi^+ + \text{c.c. (excl. } D^*(2007)^0\bar{D}^0 + \text{c.c., } D^*(2010)^+D^- + \text{c.c.})$	not seen		—	DESIG=24
$D\bar{D}^*\pi \text{ (excl. } D^*\bar{D}^*)$	not seen		—	DESIG=25
$D^0\bar{D}^{*-}\pi^+ + \text{c.c. (excl. } D^*(2010)^+D^*(2010)^-)$	seen		—	DESIG=26
$D_s^+D_s^-$	seen		452	DESIG=27
$J/\psi\pi^+\pi^-$	$< 4 \times 10^{-3}$	90%	794	DESIG=7
$J/\psi\pi^0\pi^0$	$< 2 \times 10^{-3}$	90%	797	DESIG=8
$J/\psi\eta$	$(5.2 \pm 0.7) \times 10^{-3}$		675	DESIG=9
$J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	90%	823	DESIG=10
$J/\psi\pi^+\pi^-\pi^0$	$< 2 \times 10^{-3}$	90%	746	DESIG=11
$\chi_{c1}\gamma$	$< 3.4 \times 10^{-3}$	90%	494	DESIG=12
$\chi_{c2}\gamma$	$< 5 \times 10^{-3}$	90%	454	DESIG=13
$\chi_{c1}\pi^+\pi^-\pi^0$	$< 1.1 \%$	90%	306	DESIG=14
$\chi_{c2}\pi^+\pi^-\pi^0$	$< 3.2 \%$	90%	233	DESIG=15
$h_c(1P)\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%	403	DESIG=28
$\phi\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%	1880	DESIG=16
$\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 2.9 \times 10^{-4}$	90%	1578	DESIG=29
$\Lambda\bar{\Lambda}\pi^0$	$< 9 \times 10^{-5}$	90%	1636	DESIG=30
$\Lambda\bar{\Lambda}\eta$	$< 3.0 \times 10^{-4}$	90%	1452	DESIG=31
$\Sigma^+\bar{\Sigma}^-$	$< 1.3 \times 10^{-4}$	90%	1632	DESIG=32
$\Sigma^0\bar{\Sigma}^0$	$< 7 \times 10^{-5}$	90%	1630	DESIG=33
$\Xi^+\bar{\Xi}^-$	$< 1.6 \times 10^{-4}$	90%	1527	DESIG=34
$\Xi^0\bar{\Xi}^0$	$< 1.8 \times 10^{-4}$	90%	1533	DESIG=35
$\mu^+\mu^-$	$(9 \pm 6) \times 10^{-6}$		2017	DESIG=6

 $\chi_{c1}(4140)$

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

NODE=M193

was $X(4140)$

$$\text{Mass } m = 4146.8 \pm 2.4 \text{ MeV } (S = 1.1)$$

$$\text{Full width } \Gamma = 22^{+8}_{-7} \text{ MeV } (S = 1.3)$$

NODE=M193M;DTYPE=M

NODE=M193W;DTYPE=G

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

NODE=M193215;DESIG=1

DESIG=2

 $\psi(4160)$ [o]

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

NODE=M025

$$\text{Mass } m = 4191 \pm 5 \text{ MeV}$$

NODE=M025M;DTYPE=M

$$\text{Full width } \Gamma = 70 \pm 10 \text{ MeV}$$

NODE=M025W;DTYPE=G

Due to the complexity of the $c\bar{c}$ threshold region, in this listing, “seen” (“not seen”) means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle’s central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

NODE=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			604	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			719	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%	822	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
$\chi_{c1} \gamma$	< 5	$\times 10^{-3}$	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
$\gamma \chi_{c1}(3872)$	< 2.0	$\times 10^{-3}$	90%	308	DESIG=44
$\gamma X(3915) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.36	$\times 10^{-4}$	90%	—	DESIG=35
$\gamma X(3930) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.18	$\times 10^{-4}$	90%	—	DESIG=36
$\gamma X(3940) \rightarrow \gamma J/\psi \pi^+ \pi^-$	< 1.47	$\times 10^{-4}$	90%	—	DESIG=37
$\gamma X(3915) \rightarrow \gamma \gamma J/\psi$	< 1.26	$\times 10^{-4}$	90%	—	DESIG=39
$\gamma X(3930) \rightarrow \gamma \gamma J/\psi$	< 8.8	$\times 10^{-5}$	90%	—	DESIG=40
$\gamma X(3940) \rightarrow \gamma \gamma J/\psi$	< 1.79	$\times 10^{-4}$	90%	—	DESIG=41
$p\bar{p}p\bar{p}$	not seen			834	DESIG=45

 $\psi(4230)$

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

NODE=M222

also known as $Y(4230)$; was $X(4230)$ See also $\psi(4260)$ entry in Particle Listings.Mass $m = 4220 \pm 15$ MeVFull width $\Gamma = 20$ to 100 MeV

NODE=M222M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=M222W;DTYPE=G;OUR EST;
→ UNCHECKED ←

$\psi(4230)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\omega\chi_{c0}$	seen	171	NODE=M222215;DESIG=2
$\pi^+\pi^-\eta_c$	seen	583	DESIG=3
$\pi^0\pi^0J/\psi$	seen	944	DESIG=9
$\pi^+\pi^-J/\psi$	seen	942	DESIG=7
$\eta J/\psi$	seen	848	DESIG=10
$\pi^+\pi^-\psi(2S)$	seen	426	DESIG=4
$\pi^+D^0D^{*-} + \text{c.c.}$	seen	650	DESIG=5
$\gamma\chi_{c1}(3872)$	seen	334	DESIG=8
$\pi^+\pi^-\pi^0\eta_c$	seen	992	DESIG=11
$\pi^+\pi^-\eta_c$	not seen	1027	DESIG=13
$\gamma\pi^0\eta_c$	not seen	1049	DESIG=14
$p\bar{p}p\bar{p}$	not seen	864	DESIG=12

 $\chi_{c1}(4274)$

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

NODE=M233

was $X(4274)$

$$\text{Mass } m = 4274^{+8}_{-6} \text{ MeV}$$

$$\text{Full width } \Gamma = 49 \pm 12 \text{ MeV}$$

NODE=M233M;DTYPE=M
NODE=M233W;DTYPE=G

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

NODE=M233215;DESIG=1

 $\psi(4360)$

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

NODE=M181

also known as $Y(4360)$; was $X(4360)$

$$\psi(4360) \text{ MASS} = 4368 \pm 13 \text{ MeV} \quad (S = 3.7)$$

$$\psi(4360) \text{ WIDTH} = 96 \pm 7 \text{ MeV}$$

NODE=M181M;DTYPE=M
NODE=M181W;DTYPE=G

$\psi(4360)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\psi(2S)\pi^+\pi^-$	seen	573
$\psi_2(3823)\pi^+\pi^-$	possibly seen	438
$D_1(2420)\bar{D} + \text{c.c.}$	possibly seen	416

NODE=M181215;DESIG=2;OUR EVAL;
→ UNCHECKED ←
DESIG=5
DESIG=10 **$\psi(4415)$ ^[o]**

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

NODE=M073

$$\text{Mass } m = 4421 \pm 4 \text{ MeV}$$

$$\text{Full width } \Gamma = 62 \pm 20 \text{ MeV}$$

NODE=M073M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=M073W;DTYPE=G;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)
$D\bar{D}$	seen		1187
$D^0\bar{D}^0$	seen		1187
D^+D^-	seen		1179
$D^*\bar{D} + \text{c.c.}$	seen		1063
$D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen		1067
$D^*(2010)^+D^- + \text{c.c.}$	seen		1059
$D^*\bar{D}^*$	seen		919
$D^*(2007)^0\bar{D}^*(2007)^0 + \text{c.c.}$	seen		927
$D^*(2010)^+D^*(2010)^- + \text{c.c.}$	seen		919
$D^0D^-\pi^+$ (excl. $D^*(2007)^0\bar{D}^0$ +c.c., $D^*(2010)^+D^- + \text{c.c.}$)	< 2.3 %	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
$D_1(2420)\bar{D} + \text{c.c.}$	possibly seen		537
$D_s^+D_s^-$	not seen		1006
$\omega\chi_{c2}$	possibly seen		330
$D_s^{*+}D_s^- + \text{c.c.}$	seen		—
$D_s^{*+}D_s^{*-}$	not seen		652
$\psi_2(3823)\pi^+\pi^-$	possibly seen		492
$\psi(3770)\pi^+\pi^-$	possibly seen		541
$J/\psi\eta$	< 6 $\times 10^{-3}$	90%	1022
$\chi_{c1}\gamma$	< 8 $\times 10^{-4}$	90%	817
$\chi_{c2}\gamma$	< 4 $\times 10^{-3}$	90%	780
e^+e^-	(9.4 $\pm$ 3.2) $\times 10^{-6}$		2210
$\mu^+\mu^-$	(2.0 $\pm$ 1.0) $\times 10^{-5}$		2208

DESIG=7;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=8
 DESIG=9
 DESIG=10;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=11
 DESIG=12
 DESIG=13;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
 DESIG=14
 DESIG=15
 DESIG=4
 DESIG=5
 DESIG=6
 DESIG=25
 DESIG=16
 DESIG=20
 DESIG=17
 DESIG=18
 DESIG=21
 DESIG=24
 DESIG=19
 DESIG=22
 DESIG=23
 DESIG=1
 DESIG=26

 $Z_c(4430)$

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

G, C need confirmation.

was $X(4430)^\pm$

Quantum numbers not established.

$$\text{Mass } m = 4478_{-18}^{+15} \text{ MeV}$$

$$\text{Full width } \Gamma = 181 \pm 31 \text{ MeV}$$

NODE=M195

NODE=M195M;DTYPE=M
 NODE=M195W;DTYPE=G

$Z_c(4430)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\psi(2S)$	seen	711
π^+J/ψ	seen	1162

NODE=M195215;DESIG=1
 DESIG=2

 $\psi(4660)$

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

also known as $Y(4660)$; was $X(4660)$

$$\psi(4660) \text{ MASS} = 4630 \pm 6 \text{ MeV} \quad (S = 1.4)$$

$$\psi(4660) \text{ WIDTH} = 62_{-7}^{+9} \text{ MeV}$$

NODE=M189

NODE=M189M;DTYPE=M
 NODE=M189W;DTYPE=G

$\psi(4660)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	not seen	2315
$\psi(2S)\pi^+\pi^-$	seen	809
$J/\psi\eta$	not seen	1192
$D^0D^{*-}\pi^+$	not seen	1153
$\chi_{c1}\gamma$	not seen	984
$\chi_{c2}\gamma$	not seen	949
$\Lambda_c^+\Lambda_c^-$	seen	362
$D_s^+D_{s1}(2536)^-$	seen	533

NODE=M189215;DESIG=1;OUR EVAL;
→ UNCHECKED ←
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=4;OUR EVAL;→ UNCHECKED ←
DESIG=3;OUR EVAL;→ UNCHECKED ←
DESIG=6;OUR EVAL;→ UNCHECKED ←
DESIG=7;OUR EVAL;→ UNCHECKED ←
DESIG=5;OUR EVAL;→ UNCHECKED ←
DESIG=8;OUR EVAL;→ UNCHECKED ←

$b\bar{b}$ MESONS
(including possibly non- $q\bar{q}$ states)

NODE=MXXX030

$\eta_b(1S)$

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

NODE=M171
NODE=M171M;DTYPE=M
NODE=M171W;DTYPE=G

Mass $m = 9398.7 \pm 2.0$ MeV ($S = 1.5$)
Full width $\Gamma = 10^{+5}_{-4}$ MeV

$\eta_b(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
hadrons	seen		—
$3h^+3h^-$	not seen		4672
$2h^+2h^-$	not seen		4689
$4h^+4h^-$	not seen		4648
$\gamma\gamma$	not seen		4699
$\mu^+\mu^-$	$<9 \times 10^{-3}$	90%	4698
$\tau^+\tau^-$	$<8\%$	90%	4350

NODE=M171225;DESIG=7
DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=5
DESIG=6

$\Upsilon(1S)$

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

Mass $m = 9460.30 \pm 0.26$ MeV ($S = 3.3$)
Full width $\Gamma = 54.02 \pm 1.25$ keV

NODE=M049
NODE=M049M;DTYPE=M
NODE=M049W;DTYPE=G;OUR EVAL;
→ UNCHECKED ←

$\Upsilon(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ 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	(5.4 $\pm$ 0.4) $\times 10^{-4}$	S=1.4	4223	DESIG=12
$J/\psi(1S)\eta_c$	< 2.2	$\times 10^{-6}$ CL=90%	3623	DESIG=146
$J/\psi(1S)\chi_{c0}$	< 3.4	$\times 10^{-6}$ CL=90%	3429	DESIG=147
$J/\psi(1S)\chi_{c1}$	(3.9 $\pm$ 1.2) $\times 10^{-6}$		3382	DESIG=148
$J/\psi(1S)\chi_{c2}$	< 1.4	$\times 10^{-6}$ CL=90%	3359	DESIG=149
$J/\psi(1S)\eta_c(2S)$	< 2.2	$\times 10^{-6}$ CL=90%	3317	DESIG=150
$J/\psi(1S)X(3940)$	< 5.4	$\times 10^{-6}$ CL=90%	3148	DESIG=151
$J/\psi(1S)X(4160)$	< 5.4	$\times 10^{-6}$ CL=90%	3018	DESIG=152
$X(4350)$ anything, $X \rightarrow$	< 8.1	$\times 10^{-6}$ CL=90%	—	DESIG=167
$J/\psi(1S)\phi$				
$Z_c(3900)^\pm$ anything, $Z_c \rightarrow$	< 1.3	$\times 10^{-5}$ CL=90%	—	DESIG=168
$J/\psi(1S)\pi^\pm$				
$Z_c(4200)^\pm$ anything, $Z_c \rightarrow$	< 6.0	$\times 10^{-5}$ CL=90%	—	DESIG=169
$J/\psi(1S)\pi^\pm$				
$Z_c(4430)^\pm$ anything, $Z_c \rightarrow$	< 4.9	$\times 10^{-5}$ CL=90%	—	DESIG=170
$J/\psi(1S)\pi^\pm$				
$X_{cs}^\pm$ anything, $X \rightarrow$	< 5.7	$\times 10^{-6}$ CL=90%	—	DESIG=173
$J/\psi K^\pm$				
$\psi(4260)$ anything, $\psi \rightarrow$	< 3.8	$\times 10^{-5}$ CL=90%	—	DESIG=161
$J/\psi(1S)\pi^+\pi^-$				
$\psi(4260)$ anything, $\psi \rightarrow$	< 7.5	$\times 10^{-6}$ CL=90%	—	DESIG=165
$J/\psi(1S)K^+K^-$				
$\chi_{c1}(4140)$ anything, $\chi_{c1} \rightarrow$	< 5.2	$\times 10^{-6}$ CL=90%	—	DESIG=166
$J/\psi(1S)\phi$				
χ_{c0} anything	< 4	$\times 10^{-3}$ CL=90%	—	DESIG=5
χ_{c1} anything	(1.90 $\pm$ 0.35) $\times 10^{-4}$		—	DESIG=6
$\chi_{c1}(1P)X_{tetra}$	< 3.78	$\times 10^{-5}$ CL=90%	—	DESIG=175
χ_{c2} anything	(2.8 $\pm$ 0.8) $\times 10^{-4}$		—	DESIG=7
$\psi(2S)$ anything	(1.23 $\pm$ 0.20) $\times 10^{-4}$		—	DESIG=8
$\psi(2S)\eta_c$	< 3.6	$\times 10^{-6}$ CL=90%	3345	DESIG=153
$\psi(2S)\chi_{c0}$	< 6.5	$\times 10^{-6}$ CL=90%	3124	DESIG=154
$\psi(2S)\chi_{c1}$	< 4.5	$\times 10^{-6}$ CL=90%	3070	DESIG=155
$\psi(2S)\chi_{c2}$	< 2.1	$\times 10^{-6}$ CL=90%	3043	DESIG=156
$\psi(2S)\eta_c(2S)$	< 3.2	$\times 10^{-6}$ CL=90%	2994	DESIG=157
$\psi(2S)X(3940)$	< 2.9	$\times 10^{-6}$ CL=90%	2797	DESIG=158
$\psi(2S)X(4160)$	< 2.9	$\times 10^{-6}$ CL=90%	2642	DESIG=159
$\psi(4260)$ anything, $\psi \rightarrow$	< 7.9	$\times 10^{-5}$ CL=90%	—	DESIG=162
$\psi(2S)\pi^+\pi^-$				
$\psi(4360)$ anything, $\psi \rightarrow$	< 5.2	$\times 10^{-5}$ CL=90%	—	DESIG=163
$\psi(2S)\pi^+\pi^-$				
$\psi(4660)$ anything, $\psi \rightarrow$	< 2.2	$\times 10^{-5}$ CL=90%	—	DESIG=164
$\psi(2S)\pi^+\pi^-$				
$X(4050)^\pm$ anything, $X \rightarrow$	< 8.8	$\times 10^{-5}$ CL=90%	—	DESIG=171
$\psi(2S)\pi^\pm$				
$Z_c(4430)^\pm$ anything, $Z_c \rightarrow$	< 6.7	$\times 10^{-5}$ CL=90%	—	DESIG=172
$\psi(2S)\pi^\pm$				
$\chi_{c1}(3872)$ anything	< 2.7	$\times 10^{-4}$ CL=90%	—	DESIG=194
$Z_c(4200)^+ Z_c(4200)^-$	< 2.23	$\times 10^{-5}$ CL=90%	—	DESIG=178
$Z_c(3900)^\pm Z_c(4200)^\mp$	< 8.1	$\times 10^{-6}$ CL=90%	—	DESIG=179

$Z_c(3900)^+ Z_c(3900)^-$	< 1.8	$\times 10^{-6}$	CL=90%	—	DESIG=180
$X(4050)^+ X(4050)^-$	< 1.58	$\times 10^{-5}$	CL=90%	—	DESIG=181
$X(4250)^+ X(4250)^-$	< 2.66	$\times 10^{-5}$	CL=90%	—	DESIG=182
$X(4050)^\pm X(4250)^\mp$	< 4.42	$\times 10^{-5}$	CL=90%	—	DESIG=183
$Z_c(4430)^+ Z_c(4430)^-$	< 2.03	$\times 10^{-5}$	CL=90%	—	DESIG=184
$X(4055)^\pm X(4055)^\mp$	< 2.33	$\times 10^{-5}$	CL=90%	—	DESIG=186
$X(4055)^\pm Z_c(4430)^\mp$	< 4.55	$\times 10^{-5}$	CL=90%	—	DESIG=189
$\rho\pi$	< 3.68	$\times 10^{-6}$	CL=90%	4697	DESIG=11
$\omega\pi^0$	< 3.90	$\times 10^{-6}$	CL=90%	4697	DESIG=131
$\pi^+\pi^-$	< 5	$\times 10^{-4}$	CL=90%	4728	DESIG=23
K^+K^-	< 5	$\times 10^{-4}$	CL=90%	4704	DESIG=24
$p\bar{p}$	< 5	$\times 10^{-4}$	CL=90%	4636	DESIG=25
$\pi^+\pi^-\pi^0$	$(2.1 \pm 0.8) \times 10^{-6}$			4725	DESIG=72
ϕK^+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	$\times 10^{-6}$	CL=90%	4551	DESIG=139
$\omega f_2(1270)$	< 1.79	$\times 10^{-6}$	CL=90%	4611	DESIG=140
$\rho(770) a_2(1320)$	< 2.24	$\times 10^{-6}$	CL=90%	4605	DESIG=141
$K^*(892)^0 \bar{K}_2^*(1430)^0 + \text{c.c.}$	$(3.0 \pm 0.8) \times 10^{-6}$			4578	DESIG=142
$K_1(1270)^\pm K^\mp$	< 2.41	$\times 10^{-6}$	CL=90%	4634	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	$\times 10^{-6}$	CL=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	$\times 10^{-6}$	CL=90%	4675	DESIG=135
$f_1(1285) \text{ anything}$	$(4.6 \pm 3.1) \times 10^{-3}$			—	DESIG=174
$D^*(2010)^\pm \text{ anything}$	$(2.52 \pm 0.20) \%$			—	DESIG=30
$f_1(1285) X_{tetra}$	< 6.24	$\times 10^{-5}$	CL=90%	—	DESIG=176
$^2H \text{ anything}$	$(2.85 \pm 0.25) \times 10^{-5}$			—	DESIG=107
Sum of 100 exclusive modes	$(1.200 \pm 0.017) \%$			—	DESIG=128

Radiative decays

$\gamma\pi^+\pi^-$	$(6.3 \pm 1.8) \times 10^{-5}$			4728	DESIG=70
$\gamma\pi^0\pi^0$	$(1.7 \pm 0.7) \times 10^{-5}$			4728	DESIG=71
$\gamma\pi\pi(\text{S-wave})$	$(4.6 \pm 0.7) \times 10^{-5}$			4728	DESIG=190
$\gamma\pi^0\eta$	< 2.4	$\times 10^{-6}$	CL=90%	4713	DESIG=111
γK^+K^-	$[p] (1.14 \pm 0.13) \times 10^{-5}$			4704	DESIG=102
$\gamma p\bar{p}$	$[q] < 6 \times 10^{-6}$		CL=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	$\times 10^{-6}$	CL=90%	4682	DESIG=55
$\gamma\eta$	< 1.0	$\times 10^{-6}$	CL=90%	4714	DESIG=54
$\gamma f_0(980)$	< 3	$\times 10^{-5}$	CL=90%	4678	DESIG=105
$\gamma f_2'(1525)$	$(2.9 \pm 0.6) \times 10^{-5}$			4608	DESIG=52
$\gamma f_2(1270)$	$(1.01 \pm 0.06) \times 10^{-4}$			4644	DESIG=51
$\gamma\eta(1405)$	< 8.2	$\times 10^{-5}$	CL=90%	4625	DESIG=65
$\gamma f_0(1500)$	< 1.5	$\times 10^{-5}$	CL=90%	4610	DESIG=108
$\gamma f_0(1500) \rightarrow \gamma K^+K^-$	$(1.0 \pm 0.4) \times 10^{-5}$			—	DESIG=192
$\gamma f_0(1710)$	< 2.6	$\times 10^{-4}$	CL=90%	4577	DESIG=53
$\gamma f_0(1710) \rightarrow \gamma K^+K^-$	$(1.01 \pm 0.32) \times 10^{-5}$			—	DESIG=112

NODE=M049;CLUMP=B

$\gamma f_0(1710) \rightarrow \gamma \pi^+ \pi^-$	$(5.3 \pm 2.0) \times 10^{-6}$	—	DESIG=191
$\gamma f_0(1710) \rightarrow \gamma \pi^0 \pi^0$	$< 1.4 \times 10^{-6}$	CL=90%	DESIG=109
$\gamma f_0(1710) \rightarrow \gamma \eta \eta$	$< 1.8 \times 10^{-6}$	CL=90%	DESIG=110
$\gamma f_4(2050)$	$< 5.3 \times 10^{-5}$	CL=90%	4515 DESIG=104
$\gamma f_0(2200) \rightarrow \gamma K^+ K^-$	$< 2 \times 10^{-4}$	CL=90%	4475 DESIG=69
$\gamma f_J(2220) \rightarrow \gamma K^+ K^-$	$< 8 \times 10^{-7}$	CL=90%	4469 DESIG=60
$\gamma f_J(2220) \rightarrow \gamma \pi^+ \pi^-$	$< 6 \times 10^{-7}$	CL=90%	— DESIG=61
$\gamma f_J(2220) \rightarrow \gamma p \bar{p}$	$< 1.1 \times 10^{-6}$	CL=90%	— DESIG=62
$\gamma \eta(2225) \rightarrow \gamma \phi \phi$	$< 3 \times 10^{-3}$	CL=90%	4469 DESIG=68
$\gamma \eta_c(1S)$	$< 2.9 \times 10^{-5}$	CL=90%	4260 DESIG=119
$\gamma \eta_c(2S)$	$< 4 \times 10^{-4}$	CL=90%	4031 DESIG=193
$\gamma \chi_{c0}$	$< 6.6 \times 10^{-5}$	CL=90%	4114 DESIG=120
$\gamma \chi_{c1}$	$(4.7^{+2.4}_{-1.9}) \times 10^{-5}$		4079 DESIG=121
$\gamma \chi_{c2}$	$< 7.6 \times 10^{-6}$	CL=90%	4062 DESIG=122
$\gamma \chi_{c1}(3872)$	$< 5 \times 10^{-5}$	CL=90%	3938 DESIG=195
$\gamma \chi_{c1}(3872), \chi_{c1} \rightarrow \pi^+ \pi^- \pi^0 J/\psi$	$< 2.8 \times 10^{-6}$	CL=90%	— DESIG=124
$\gamma X(3915) \rightarrow \omega J/\psi$	$< 3.0 \times 10^{-6}$	CL=90%	— DESIG=125
$\gamma \chi_{c1}(4140) \rightarrow \phi J/\psi$	$< 2.2 \times 10^{-6}$	CL=90%	— DESIG=126
γX	$[r] < 4.5 \times 10^{-6}$	CL=90%	— DESIG=66
$\gamma X \bar{X} (m_X < 3.1 \text{ GeV})$	$[s] < 1 \times 10^{-3}$	CL=90%	— DESIG=67
$\gamma X \bar{X} (m_X < 4.5 \text{ GeV})$	$[t] < 2.4 \times 10^{-4}$	CL=90%	— DESIG=127
$\gamma X \rightarrow \gamma + \geq 4 \text{ prongs}$	$[u] < 1.78 \times 10^{-4}$	CL=95%	— DESIG=113
$\gamma a_1^0 \rightarrow \gamma \mu^+ \mu^-$	$[v] < 9 \times 10^{-6}$	CL=90%	— DESIG=114
$\gamma a_1^0 \rightarrow \gamma \tau^+ \tau^-$	$[p] < 1.30 \times 10^{-4}$	CL=90%	— DESIG=115
$\gamma a_1^0 \rightarrow \gamma g g$	$[x] < 1 \%$	CL=90%	— DESIG=129
$\gamma a_1^0 \rightarrow \gamma s \bar{s}$	$[x] < 1 \times 10^{-3}$	CL=90%	— DESIG=130

Lepton Family number (LF) violating modes

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

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

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

J needs confirmation.

NODE=M076

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

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

$\chi_{b0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
$\gamma \Upsilon(1S)$	(1.94 $\pm$ 0.27) %		391	NODE=M076215;DESIG=1
$D^0 X$	< 10.4 %	90%	—	DESIG=2
$\pi^+ \pi^- K^+ K^- \pi^0$	< 1.6 $\times 10^{-4}$	90%	4875	DESIG=3
$2\pi^+ \pi^- K^- K_S^0$	< 5 $\times 10^{-5}$	90%	4875	DESIG=4
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	< 5 $\times 10^{-4}$	90%	4846	DESIG=5
$2\pi^+ 2\pi^- 2\pi^0$	< 2.1 $\times 10^{-4}$	90%	4905	DESIG=6
$2\pi^+ 2\pi^- K^+ K^-$	(1.1 $\pm$ 0.6) $\times 10^{-4}$		4861	DESIG=7
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.7 $\times 10^{-4}$	90%	4846	DESIG=8
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 5 $\times 10^{-4}$	90%	4828	DESIG=9
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	< 1.6 $\times 10^{-4}$	90%	4827	DESIG=10
$3\pi^+ 3\pi^-$	< 8 $\times 10^{-5}$	90%	4904	DESIG=11
$3\pi^+ 3\pi^- 2\pi^0$	< 6 $\times 10^{-4}$	90%	4881	DESIG=12
$3\pi^+ 3\pi^- K^+ K^-$	(2.4 $\pm$ 1.2) $\times 10^{-4}$		4827	DESIG=13
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 1.0 $\times 10^{-3}$	90%	4808	DESIG=14
$4\pi^+ 4\pi^-$	< 8 $\times 10^{-5}$	90%	4880	DESIG=15
$4\pi^+ 4\pi^- 2\pi^0$	< 2.1 $\times 10^{-3}$	90%	4850	DESIG=16
$J/\psi J/\psi$	< 7 $\times 10^{-5}$	90%	3836	DESIG=17
$J/\psi \psi(2S)$	< 1.2 $\times 10^{-4}$	90%	3571	DESIG=18
$\psi(2S) \psi(2S)$	< 3.1 $\times 10^{-5}$	90%	3273	DESIG=19
$J/\psi(1S)$ anything	< 2.3 $\times 10^{-3}$	90%	—	DESIG=20

 $\chi_{b1}(1P)$ [γ]

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

J needs confirmation.

NODE=M077

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

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

$\chi_{b1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
$\gamma \Upsilon(1S)$	(35.2 $\pm$ 2.0) %		423	NODE=M077215;DESIG=1
$D^0 X$	(12.6 $\pm$ 2.2) %		—	DESIG=2
$\pi^+ \pi^- K^+ K^- \pi^0$	(2.0 $\pm$ 0.6) $\times 10^{-4}$		4892	DESIG=3
$2\pi^+ \pi^- K^- K_S^0$	(1.3 $\pm$ 0.5) $\times 10^{-4}$		4892	DESIG=4
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	< 6 $\times 10^{-4}$	90%	4863	DESIG=5
$2\pi^+ 2\pi^- 2\pi^0$	(8.0 $\pm$ 2.5) $\times 10^{-4}$		4921	DESIG=6
$2\pi^+ 2\pi^- K^+ K^-$	(1.5 $\pm$ 0.5) $\times 10^{-4}$		4878	DESIG=7
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	(3.5 $\pm$ 1.2) $\times 10^{-4}$		4863	DESIG=8
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	(8.6 $\pm$ 3.2) $\times 10^{-4}$		4845	DESIG=9
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	(9.3 $\pm$ 3.3) $\times 10^{-4}$		4844	DESIG=10
$3\pi^+ 3\pi^-$	(1.9 $\pm$ 0.6) $\times 10^{-4}$		4921	DESIG=11
$3\pi^+ 3\pi^- 2\pi^0$	(1.7 $\pm$ 0.5) $\times 10^{-3}$		4898	DESIG=12
$3\pi^+ 3\pi^- K^+ K^-$	(2.6 $\pm$ 0.8) $\times 10^{-4}$		4844	DESIG=13
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	(7.5 $\pm$ 2.6) $\times 10^{-4}$		4825	DESIG=14
$4\pi^+ 4\pi^-$	(2.6 $\pm$ 0.9) $\times 10^{-4}$		4897	DESIG=15
$4\pi^+ 4\pi^- 2\pi^0$	(1.4 $\pm$ 0.6) $\times 10^{-3}$		4867	DESIG=16
ω anything	(4.9 $\pm$ 1.4) %		—	DESIG=21
ωX_{tetra}	< 4.44 $\times 10^{-4}$	90%	—	DESIG=22
$J/\psi J/\psi$	< 2.7 $\times 10^{-5}$	90%	3857	DESIG=17
$J/\psi \psi(2S)$	< 1.7 $\times 10^{-5}$	90%	3594	DESIG=18
$\psi(2S) \psi(2S)$	< 6 $\times 10^{-5}$	90%	3298	DESIG=19
$J/\psi(1S)$ anything	< 1.1 $\times 10^{-3}$	90%	—	DESIG=20
$J/\psi(1S) X_{tetra}$	< 2.27 $\times 10^{-4}$	90%	—	DESIG=23

 $h_b(1P)$

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

NODE=M204

$$\text{Mass } m = 9899.3 \pm 0.8 \text{ MeV}$$

NODE=M204M;DTYPE=M

$h_b(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta_b(1S)\gamma$	$(52^{+6}_{-5})\%$	488

NODE=M204215;DESIG=1

 $\chi_{b2}(1P)$ [ψ]
 $I^G(J^{PC}) = 0^+(2^{++})$
 J needs confirmation.

NODE=M078

Mass $m = 9912.21 \pm 0.26 \pm 0.31$ MeVNODE=M078M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←

$\chi_{b2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \Upsilon(1S)$	$(18.0 \pm 1.0)\%$		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
$J/\psi(1S)$ anything	$(1.5 \pm 0.4) \times 10^{-3}$		—

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

DESIG=20

 $\Upsilon(2S)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M052

Mass $m = 10023.26 \pm 0.31$ MeV

NODE=M052M;DTYPE=M

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

NODE=M052DM3;DTYPE=D

Full width $\Gamma = 31.98 \pm 2.63$ keVNODE=M052W;DTYPE=G;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
$J/\psi(1S)\eta_c$	< 5.4 $\times 10^{-6}$	CL=90%	3984	DESIG=143
$J/\psi(1S)\chi_{c0}$	< 3.4 $\times 10^{-6}$	CL=90%	3808	DESIG=144
$J/\psi(1S)\chi_{c1}$	< 1.2 $\times 10^{-6}$	CL=90%	3765	DESIG=145
$J/\psi(1S)\chi_{c2}$	< 2.0 $\times 10^{-6}$	CL=90%	3744	DESIG=146
$J/\psi(1S)\eta_c(2S)$	< 2.5 $\times 10^{-6}$	CL=90%	3707	DESIG=147
$J/\psi(1S)X(3940)$	< 2.0 $\times 10^{-6}$	CL=90%	3555	DESIG=148
$J/\psi(1S)X(4160)$	< 2.0 $\times 10^{-6}$	CL=90%	3440	DESIG=149
χ_{c1} anything	(2.2 $\pm$ 0.5) $\times 10^{-4}$		—	DESIG=157
$\chi_{c1}(1P)^0 X_{tetra}$	< 3.67 $\times 10^{-5}$	CL=90%	—	DESIG=160
χ_{c2} anything	(2.3 $\pm$ 0.8) $\times 10^{-4}$		—	DESIG=158
$\psi(2S)\eta_c$	< 5.1 $\times 10^{-6}$	CL=90%	3732	DESIG=150
$\psi(2S)\chi_{c0}$	< 4.7 $\times 10^{-6}$	CL=90%	3536	DESIG=151
$\psi(2S)\chi_{c1}$	< 2.5 $\times 10^{-6}$	CL=90%	3488	DESIG=152
$\psi(2S)\chi_{c2}$	< 1.9 $\times 10^{-6}$	CL=90%	3464	DESIG=153
$\psi(2S)\eta_c(2S)$	< 3.3 $\times 10^{-6}$	CL=90%	3422	DESIG=154
$\psi(2S)X(3940)$	< 3.9 $\times 10^{-6}$	CL=90%	3250	DESIG=155
$\psi(2S)X(4160)$	< 3.9 $\times 10^{-6}$	CL=90%	3118	DESIG=156
$Z_c(3900)^+ Z_c(3900)^-$	< 1.0 $\times 10^{-6}$	CL=90%	—	DESIG=162
$Z_c(4200)^+ Z_c(4200)^-$	< 1.67 $\times 10^{-5}$	CL=90%	—	DESIG=163
$Z_c(3900)^\pm Z_c(4200)^\mp$	< 7.3 $\times 10^{-6}$	CL=90%	—	DESIG=164
$X(4050)^+ X(4050)^-$	< 1.35 $\times 10^{-5}$	CL=90%	—	DESIG=165
$X(4250)^+ X(4250)^-$	< 2.67 $\times 10^{-5}$	CL=90%	—	DESIG=166
$X(4050)^\pm X(4250)^\mp$	< 2.72 $\times 10^{-5}$	CL=90%	—	DESIG=167
$Z_c(4430)^+ Z_c(4430)^-$	< 2.03 $\times 10^{-5}$	CL=90%	—	DESIG=168
$X(4055)^\pm X(4055)^\mp$	< 1.11 $\times 10^{-5}$	CL=90%	—	DESIG=170
$X(4055)^\pm Z_c(4430)^\mp$	< 2.11 $\times 10^{-5}$	CL=90%	—	DESIG=171
$^2\bar{H}$ anything	(2.78 $^{+0.30}_{-0.26}$) $\times 10^{-5}$	S=1.2	—	DESIG=16
hadrons	(94 $\pm$ 11) %		—	DESIG=101
ggg	(58.8 $\pm$ 1.2) %		—	DESIG=105
γgg	(1.87 $\pm$ 0.28) %		—	DESIG=106
$\phi K^+ K^-$	(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%	4842	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%	4921	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
$f_1(1285)$ anything	(2.2 $\pm$ 1.6) $\times 10^{-3}$		—	DESIG=159
$f_1(1285) X_{tetra}$	< 6.47 $\times 10^{-5}$	CL=90%	—	DESIG=161
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%	4867	DESIG=9
$\gamma f'_2(1525)$	< 5.3 $\times 10^{-4}$ CL=90%	4897	DESIG=13
$\gamma f_2(1270)$	< 2.41 $\times 10^{-4}$ CL=90%	4930	DESIG=12
$\gamma\eta_c(1S)$	< 2.7 $\times 10^{-5}$ CL=90%	4567	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
$\gamma\chi_{c1}(3872)$	< 2.3 $\times 10^{-5}$ CL=90%	4264	DESIG=114
$\gamma\chi_{c1}(3872), \chi_{c1} \rightarrow \pi^+\pi^-\pi^0 J/\psi$	< 2.4 $\times 10^{-6}$ CL=90%	—	DESIG=172
$\gamma X(3915) \rightarrow \omega J/\psi$	< 2.8 $\times 10^{-6}$ CL=90%	—	DESIG=116
$\gamma\chi_{c1}(4140) \rightarrow \phi J/\psi$	< 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
$\gamma\eta_b(1S)$	(5.5 $\pm$ 1.1 $\pm$ 0.9) $\times 10^{-4}$ S=1.2	605	DESIG=119
$\gamma\eta_b(1S) \rightarrow \gamma$ Sum of 26 exclusive modes	< 3.7 $\times 10^{-6}$ CL=90%	—	DESIG=102
$\gamma X_{b\bar{b}} \rightarrow \gamma$ Sum of 26 exclusive modes	< 4.9 $\times 10^{-6}$ CL=90%	—	DESIG=124
$\gamma X \rightarrow \gamma + \geq 4$ prongs [z]	< 1.95 $\times 10^{-4}$ CL=95%	—	DESIG=125
$\gamma A^0 \rightarrow \gamma$ hadrons	< 8 $\times 10^{-5}$ CL=90%	—	DESIG=103
$\gamma a_1^0 \rightarrow \gamma\mu^+\mu^-$	< 8.3 $\times 10^{-6}$ CL=90%	—	DESIG=108
			DESIG=123

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=107
				DESIG=104

 $\tau_2(1D)$

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

NODE=M177

was $\tau(1D)$

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

NODE=M177M;DTYPE=M

$\tau_2(1D)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma \tau(1S)$	seen	679
$\gamma\chi_{bJ}(1P)$	seen	300
$\eta \tau(1S)$	not seen	426
$\pi^+\pi^- \tau(1S)$	$(6.6 \pm 1.6) \times 10^{-3}$	623

NODE=M177215;DESIG=1;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=2;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=3;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
DESIG=4

 $\chi_{b0}(2P)$ [ν]

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

J needs confirmation.

NODE=M079

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

NODE=M079M;DTYPE=M;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$

$\chi_{b0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\gamma \Upsilon(2S)$	$(1.38 \pm 0.30) \%$		207	NODE=M079215;DESIG=2
$\gamma \Upsilon(1S)$	$(3.8 \pm 1.7) \times 10^{-3}$		743	DESIG=1
$D^0 X$	$< 8.2 \%$	90%	—	DESIG=3
$\pi^+ \pi^- K^+ K^- \pi^0$	$< 3.4 \times 10^{-5}$	90%	5064	DESIG=4
$2\pi^+ \pi^- K^- K_S^0$	$< 5 \times 10^{-5}$	90%	5063	DESIG=5
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	$< 2.2 \times 10^{-4}$	90%	5036	DESIG=6
$2\pi^+ 2\pi^- 2\pi^0$	$< 2.4 \times 10^{-4}$	90%	5092	DESIG=7
$2\pi^+ 2\pi^- K^+ K^-$	$< 1.5 \times 10^{-4}$	90%	5050	DESIG=8
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$< 2.2 \times 10^{-4}$	90%	5035	DESIG=9
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$< 1.1 \times 10^{-3}$	90%	5019	DESIG=10
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	$< 7 \times 10^{-4}$	90%	5018	DESIG=11
$3\pi^+ 3\pi^-$	$< 7 \times 10^{-5}$	90%	5091	DESIG=12
$3\pi^+ 3\pi^- 2\pi^0$	$< 1.2 \times 10^{-3}$	90%	5070	DESIG=13
$3\pi^+ 3\pi^- K^+ K^-$	$< 1.5 \times 10^{-4}$	90%	5017	DESIG=14
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$< 7 \times 10^{-4}$	90%	4999	DESIG=15
$4\pi^+ 4\pi^-$	$< 1.7 \times 10^{-4}$	90%	5069	DESIG=16
$4\pi^+ 4\pi^- 2\pi^0$	$< 6 \times 10^{-4}$	90%	5039	DESIG=17

 $\chi_{b1}(2P)$ [γ]
 $I^G(J^{PC}) = 0^+(1^{++})$
 J needs confirmation.

NODE=M080

Mass $m = 10255.46 \pm 0.22 \pm 0.50$ MeV $m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)} = 23.5 \pm 1.0$ MeV
 NODE=M080M;DTYPE=M;OUR EVAL;
 $\rightarrow$ UNCHECKED $\leftarrow$
 NODE=M080M2;DTYPE=D

$\chi_{b1}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\omega \Upsilon(1S)$	$(1.63^{+0.40}_{-0.34}) \%$	135	NODE=M080215;DESIG=3
$\gamma \Upsilon(2S)$	$(18.1 \pm 1.9) \%$	230	DESIG=2
$\gamma \Upsilon(1S)$	$(9.9 \pm 1.0) \%$	764	DESIG=1
$\pi\pi\chi_{b1}(1P)$	$(9.1 \pm 1.3) \times 10^{-3}$	238	DESIG=4
$D^0 X$	$(8.8 \pm 1.7) \%$	—	DESIG=5
$\pi^+ \pi^- K^+ K^- \pi^0$	$(3.1 \pm 1.0) \times 10^{-4}$	5075	DESIG=6
$2\pi^+ \pi^- K^- K_S^0$	$(1.1 \pm 0.5) \times 10^{-4}$	5075	DESIG=7
$2\pi^+ \pi^- K^- K_S^0 2\pi^0$	$(7.7 \pm 3.2) \times 10^{-4}$	5047	DESIG=8
$2\pi^+ 2\pi^- 2\pi^0$	$(5.9 \pm 2.0) \times 10^{-4}$	5104	DESIG=9
$2\pi^+ 2\pi^- K^+ K^-$	$(10 \pm 4) \times 10^{-5}$	5062	DESIG=10
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(5.5 \pm 1.8) \times 10^{-4}$	5047	DESIG=11
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(10 \pm 4) \times 10^{-4}$	5030	DESIG=12
$3\pi^+ 2\pi^- K^- K_S^0 \pi^0$	$(6.7 \pm 2.6) \times 10^{-4}$	5029	DESIG=13
$3\pi^+ 3\pi^-$	$(1.2 \pm 0.4) \times 10^{-4}$	5103	DESIG=14
$3\pi^+ 3\pi^- 2\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$	5081	DESIG=15
$3\pi^+ 3\pi^- K^+ K^-$	$(2.0 \pm 0.8) \times 10^{-4}$	5029	DESIG=16
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(6.1 \pm 2.2) \times 10^{-4}$	5011	DESIG=17
$4\pi^+ 4\pi^-$	$(1.7 \pm 0.6) \times 10^{-4}$	5080	DESIG=18
$4\pi^+ 4\pi^- 2\pi^0$	$(1.9 \pm 0.7) \times 10^{-3}$	5051	DESIG=19

 $h_b(2P)$ $I^G(J^{PC}) = 0^-(1^{+-})$

NODE=M205

Mass $m = 10259.8 \pm 1.2$ MeV

NODE=M205M;DTYPE=M

$h_b(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
hadrons	not seen	—
$\eta_b(1S)\gamma$	$(22 \pm 5) \%$	825
$\eta_b(2S)\gamma$	$(48 \pm 13) \%$	257

NODE=M205215;DESIG=1
DESIG=2
DESIG=3

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

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

J needs confirmation.

NODE=M081

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

$$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)} = 13.10 \pm 0.24 \text{ MeV}$$

NODE=M081M;DTYPE=M;OUR EVAL;
→ UNCHECKED ←
NODE=M081M2;DTYPE=D

$\chi_{b2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\omega \Upsilon(1S)$	$(1.10^{+0.34}_{-0.30}) \%$		194
$\gamma \Upsilon(2S)$	$(8.9 \pm 1.2) \%$		242
$\gamma \Upsilon(1S)$	$(6.6 \pm 0.8) \%$		777
$\pi\pi\chi_{b2}(1P)$	$(5.1 \pm 0.9) \times 10^{-3}$		229
$D^0 X$	$< 2.4 \%$	90%	—
$\pi^+\pi^-K^+K^-\pi^0$	$< 1.1 \times 10^{-4}$	90%	5082
$2\pi^+\pi^-K^-K_S^0$	$< 9 \times 10^{-5}$	90%	5082
$2\pi^+\pi^-K^-K_S^0 2\pi^0$	$< 7 \times 10^{-4}$	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
$3\pi^+2\pi^-K^-K_S^0\pi^0$	$< 4 \times 10^{-4}$	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

$\Upsilon(3S)$

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

NODE=M048

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

NODE=M048M;DTYPE=M

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

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

NODE=M048DM2;DTYPE=D
NODE=M048W;DTYPE=G;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^-	(2.18 $\pm$ 0.20) %		5178	DESIG=2
hadrons	(93 $\pm$ 12) %		—	DESIG=101
$g g g$	(35.7 $\pm$ 2.6) %		—	DESIG=109
$\gamma g g$	(9.7 $\pm$ 1.8) $\times 10^{-3}$		—	DESIG=110
2H anything	(2.33 $\pm$ 0.33) $\times 10^{-5}$		—	DESIG=117

Radiative decays

$\gamma\chi_{b2}(2P)$	(13.1 $\pm$ 1.6) %	S=3.4	86	NODE=M048;CLUMP=B 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
$\gamma\chi_{b2}(1P)$	(10.0 $\pm$ 1.0) $\times 10^{-3}$	S=1.7	434	DESIG=103
$\gamma\chi_{b1}(1P)$	(9 $\pm$ 5) $\times 10^{-4}$	S=1.8	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) $\times 10^{-4}$		912	DESIG=15
$\gamma A^0 \rightarrow \gamma$ hadrons	< 8 $\times 10^{-5}$	CL=90%	—	DESIG=115
$\gamma X \rightarrow \gamma + \geq 4$ prongs	[aa] < 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
$\gamma a_1^0 \rightarrow \gamma\tau^+\tau^-$	[bb] < 1.6 $\times 10^{-4}$	CL=90%	—	DESIG=108

Lepton Family number (LF) violating modes

$e^\pm\tau^\mp$	LF	< 4.2 $\times 10^{-6}$	CL=90%	5025	NODE=M048;CLUMP=C DESIG=111
$\mu^\pm\tau^\mp$	LF	< 3.1 $\times 10^{-6}$	CL=90%	5025	DESIG=105

 $\chi_{b1}(3P)$

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

NODE=M206

Mass $m = 10513.4 \pm 0.7$ MeV

NODE=M206M;DTYPE=M

$\chi_{b1}(3P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\gamma$	seen	1000
$\Upsilon(2S)\gamma$	seen	479
$\Upsilon(3S)\gamma$	seen	157

NODE=M206215;DESIG=1

DESIG=2

DESIG=3

 $\chi_{b2}(3P)$

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

NODE=M238

Mass $m = 10524.0 \pm 0.8$ MeV

NODE=M238M;DTYPE=M

$\chi_{b2}(3P)$ DECAY MODESFraction (Γ_i/Γ) p (MeV/c) $\Upsilon(3S)\gamma$

seen

167

NODE=M238215;DESIG=1

 $\Upsilon(4S)$

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

NODE=M047

also known as $\Upsilon(10580)$ Mass $m = 10579.4 \pm 1.2$ MeVFull width $\Gamma = 20.5 \pm 2.5$ MeV

NODE=M047M;DTYPE=M

NODE=M047W;DTYPE=G

 $\Upsilon(4S)$ DECAY MODESFraction (Γ_i/Γ)

Confidence level

 p
(MeV/c) $B\bar{B}$

> 96

%

95%

326

NODE=M047215;DESIG=8;OUR EST;

 B^+B^- (51.4 $\pm$ 0.6) %

331

DESIG=10

 D_s^+ anything + c.c.(17.8 $\pm$ 2.6) %

—

DESIG=12

 $B^0\bar{B}^0$ (48.6 $\pm$ 0.6) %

326

DESIG=11

 $J/\psi K_S^0 + (J/\psi, \eta_c) K_S^0$

< 4

 $\times 10^{-7}$

90%

—

DESIG=15

non- $B\bar{B}$

< 4

%

95%

—

DESIG=6

 e^+e^- (1.57 $\pm$ 0.08) $\times 10^{-5}$

5290

DESIG=1

 $\rho^+\rho^-$

< 5.7

 $\times 10^{-6}$

90%

5233

DESIG=16

 $K^*(892)^0\bar{K}^0$

< 2.0

 $\times 10^{-6}$

90%

5240

DESIG=22

 $J/\psi(1S)$ anything

< 1.9

 $\times 10^{-4}$

95%

—

DESIG=2

 D^{*+} anything + c.c.

< 7.4

%

90%

5099

DESIG=3

 ϕ anything(7.1 $\pm$ 0.6) %

5240

DESIG=4

 $\phi\eta$

< 1.8

 $\times 10^{-6}$

90%

5226

DESIG=13

 $\phi\eta'$

< 4.3

 $\times 10^{-6}$

90%

5196

DESIG=18

 $\rho\eta$

< 1.3

 $\times 10^{-6}$

90%

5247

DESIG=19

 $\rho\eta'$

< 2.5

 $\times 10^{-6}$

90%

5217

DESIG=20

 $\Upsilon(1S)$ anything

< 4

 $\times 10^{-3}$

90%

1053

DESIG=5

 $\Upsilon(1S)\pi^+\pi^-$ (8.2 $\pm$ 0.4) $\times 10^{-5}$

1026

DESIG=7

 $\Upsilon(1S)\eta$ (1.81 $\pm$ 0.18) $\times 10^{-4}$

924

DESIG=17

 $\Upsilon(1S)\eta'$ (3.4 $\pm$ 0.9) $\times 10^{-5}$

—

DESIG=26

 $\Upsilon(2S)\pi^+\pi^-$ (8.2 $\pm$ 0.8) $\times 10^{-5}$

468

DESIG=9

 $h_b(1P)\pi^+\pi^-$

not seen

600

DESIG=21

 $h_b(1P)\eta$ (2.18 $\pm$ 0.21) $\times 10^{-3}$

390

DESIG=23

 $\eta_b(1S)\omega$

< 1.8

 $\times 10^{-4}$

90%

—

DESIG=27

 2H anything

< 1.3

 $\times 10^{-5}$

90%

—

DESIG=14

Double Radiative Decays $\gamma\gamma \Upsilon(D) \rightarrow \gamma\gamma\eta \Upsilon(1S)$

< 2.3

 $\times 10^{-5}$

90%

—

NODE=M047;CLUMP=B

DESIG=24

 $Z_b(10610)$

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

NODE=M207

was $X(10610)$ Mass $m = 10607.2 \pm 2.0$ MeVFull width $\Gamma = 18.4 \pm 2.4$ MeV

NODE=M207M;DTYPE=M

NODE=M207W;DTYPE=G

Z_b(10610) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\Upsilon(1S)\pi^+$	$(5.4^{+1.9}_{-1.5}) \times 10^{-3}$	1077	NODE=M207215;DESIG=1
$\Upsilon(1S)\pi^0$	not seen	1077	DESIG=9
$\Upsilon(2S)\pi^+$	$(3.6^{+1.1}_{-0.8}) \%$	551	DESIG=2
$\Upsilon(2S)\pi^0$	seen	552	DESIG=10
$\Upsilon(3S)\pi^+$	$(2.1^{+0.8}_{-0.6}) \%$	207	DESIG=3
$\Upsilon(3S)\pi^0$	seen	210	DESIG=11
$h_b(1P)\pi^+$	$(3.5^{+1.2}_{-0.9}) \%$	671	DESIG=4
$h_b(2P)\pi^+$	$(4.7^{+1.7}_{-1.3}) \%$	313	DESIG=5
$B^+\bar{B}^0$	not seen	505	DESIG=8
$B^+\bar{B}^{*0} + B^{*+}\bar{B}^0$	$(85.6^{+2.1}_{-2.9}) \%$	—	DESIG=6

Z_b(10650)

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

I, G, C need confirmation.

NODE=M208

was $X(10650)^\pm$ Mass $m = 10652.2 \pm 1.5$ MeV

NODE=M208M;DTYPE=M

Full width $\Gamma = 11.5 \pm 2.2$ MeV

NODE=M208W;DTYPE=G

 $Z_b(10650)^-$ decay modes are charge conjugates of the modes below.

NODE=M208215;NODE=M208

Z_b(10650)⁺ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\Upsilon(1S)\pi^+$	$(1.7^{+0.8}_{-0.6}) \times 10^{-3}$	1117	DESIG=1
$\Upsilon(2S)\pi^+$	$(1.4^{+0.6}_{-0.4}) \%$	595	DESIG=2
$\Upsilon(3S)\pi^+$	$(1.6^{+0.7}_{-0.5}) \%$	259	DESIG=3
$h_b(1P)\pi^+$	$(8.4^{+2.9}_{-2.4}) \%$	714	DESIG=4
$h_b(2P)\pi^+$	$(15 \pm 4) \%$	360	DESIG=5
$B^+\bar{B}^0$	not seen	703	DESIG=8
$B^+\bar{B}^{*0} + B^{*+}\bar{B}^0$	not seen	—	DESIG=6
$B^{*+}\bar{B}^{*0}$	$(74^{+4}_{-6}) \%$	122	DESIG=7

 $\Upsilon(10860)$

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

NODE=M092

Mass $m = 10885.2^{+2.6}_{-1.6}$ MeV

NODE=M092M;DTYPE=M

Full width $\Gamma = 37 \pm 4$ MeV

NODE=M092W;DTYPE=G

$\Upsilon(10860)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)	
$B\bar{B}X$	(76.2 $^{+2.7}_{-4.0}$) %		—	NODE=M092215;DESIG=9
$B\bar{B}$	(5.5 ± 1.0) %		1322	DESIG=2
$B\bar{B}^* + \text{c.c.}$	(13.7 ± 1.6) %		—	DESIG=3
$B^*\bar{B}^*$	(38.1 ± 3.4) %		1127	DESIG=4
$B\bar{B}^{(*)}\pi$	< 19.7 %	90%	1015	DESIG=10
$B\bar{B}\pi$	(0.0 ± 1.2) %		1015	DESIG=23
$B^*\bar{B}\pi + B\bar{B}^*\pi$	(7.3 ± 2.3) %		—	DESIG=24
$B^*\bar{B}^*\pi$	(1.0 ± 1.4) %		739	DESIG=25
$B\bar{B}\pi\pi$	< 8.9 %	90%	551	DESIG=11
$B_s^{(*)}\bar{B}_s^{(*)}$	(20.1 ± 3.1) %		905	DESIG=16
$B_s\bar{B}_s$	(5 ± 5) $\times 10^{-3}$		905	DESIG=5
$B_s\bar{B}_s^* + \text{c.c.}$	(1.35 ± 0.32) %		—	DESIG=7
$B_s^*\bar{B}_s^*$	(17.6 ± 2.7) %		543	DESIG=8
no open-bottom	(3.8 $^{+5.0}_{-0.5}$) %		—	DESIG=28
e^+e^-	(8.3 ± 2.1) $\times 10^{-6}$		5443	DESIG=1
$K^*(892)^0\bar{K}^0$	< 1.0 $\times 10^{-5}$	90%	5395	DESIG=29
$\Upsilon(1S)\pi^+\pi^-$	(5.3 ± 0.6) $\times 10^{-3}$		1306	DESIG=17
$\Upsilon(2S)\pi^+\pi^-$	(7.8 ± 1.3) $\times 10^{-3}$		783	DESIG=18
$\Upsilon(3S)\pi^+\pi^-$	(4.8 $^{+1.9}_{-1.7}$) $\times 10^{-3}$		440	DESIG=19
$\Upsilon(1S)K^+K^-$	(6.1 ± 1.8) $\times 10^{-4}$		959	DESIG=20
$\eta\Upsilon_J(1D)$	(4.8 ± 1.1) $\times 10^{-3}$		—	DESIG=40
$h_b(1P)\pi^+\pi^-$	(3.5 $^{+1.0}_{-1.3}$) $\times 10^{-3}$		903	DESIG=26
$h_b(2P)\pi^+\pi^-$	(5.7 $^{+1.7}_{-2.1}$) $\times 10^{-3}$		544	DESIG=27
$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	(2.5 ± 2.3) $\times 10^{-3}$		894	DESIG=41
$\chi_{b0}(1P)\pi^+\pi^-\pi^0$	< 6.3 $\times 10^{-3}$	90%	894	DESIG=30
$\chi_{b0}(1P)\omega$	< 3.9 $\times 10^{-3}$	90%	631	DESIG=31
$\chi_{b0}(1P)(\pi^+\pi^-\pi^0)_{\text{non-}\omega}$	< 4.8 $\times 10^{-3}$	90%	—	DESIG=32
$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	(1.85 ± 0.33) $\times 10^{-3}$		861	DESIG=33
$\chi_{b1}(1P)\omega$	(1.57 ± 0.30) $\times 10^{-3}$		582	DESIG=34
$\chi_{b1}(1P)(\pi^+\pi^-\pi^0)_{\text{non-}\omega}$	(5.2 ± 1.9) $\times 10^{-4}$		—	DESIG=35
$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	(1.17 ± 0.30) $\times 10^{-3}$		841	DESIG=36
$\chi_{b2}(1P)\omega$	(6.0 ± 2.7) $\times 10^{-4}$		552	DESIG=37
$\chi_{b2}(1P)(\pi^+\pi^-\pi^0)_{\text{non-}\omega}$	(6 ± 4) $\times 10^{-4}$		—	DESIG=38
$\gamma\chi_b \rightarrow \gamma\Upsilon(1S)\omega$	< 3.8 $\times 10^{-5}$	90%	—	DESIG=39
$\eta_b(1S)\omega$	< 1.3 $\times 10^{-3}$	90%	1177	DESIG=42
$\eta_b(2S)\omega$	< 5.6 $\times 10^{-3}$	90%	399	DESIG=43

Inclusive Decays.

NODE=M092;CLUMP=I

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

NODE=M092

ϕ anything	(13.8 $^{+2.4}_{-1.7}$) %	—	DESIG=12
D^0 anything + c.c.	(108 ± 8) %	—	DESIG=13
D_s anything + c.c.	(46 ± 6) %	—	DESIG=6
J/ψ anything	(2.06 ± 0.21) %	—	DESIG=14
B^0 anything + c.c.	(77 ± 8) %	—	DESIG=21
B^+ anything + c.c.	(72 ± 6) %	—	DESIG=22

 $\Upsilon(11020)$

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

NODE=M093

Mass $m = 11000 \pm 4$ MeV

NODE=M093M;DTYPE=M

Full width $\Gamma = 24^{+8}_{-6}$ MeV

NODE=M093W;DTYPE=G

$\Upsilon(11020)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$e^+ e^-$	$(5.4^{+1.9}_{-2.1}) \times 10^{-6}$	5500	NODE=M093215;DESIG=1
$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	$(9^{+9}_{-8}) \times 10^{-3}$	1007	DESIG=2
$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	seen	975	DESIG=3
$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	seen	956	DESIG=4

NOTES

- [a] 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
- [b] C parity forbids this to occur as a single-photon process. LINKAGE=CS
- [c] See the "Note on $a_1(1260)$ " in the $a_1(1260)$ Particle Listings in PDG 06, Journal of Physics **G33** 1 (2006). LINKAGE=NA1
- [d] Our estimate. See the Particle Listings for details. LINKAGE=BH
- [e] See also the $\omega(1650)$. LINKAGE=MDE
- [f] See also the $\omega(1420)$. LINKAGE=MDF
- [g] See our minireview under the $K_2(1770)$ in the 2004 edition of this *Review*. LINKAGE=MBD
- [h] For $E_\gamma > 100$ MeV. LINKAGE=EGM
- [i] The value is for the sum of the charge states or particle/antiparticle states indicated. LINKAGE=SG
- [j] Includes $p\bar{p}\pi^+\pi^-\gamma$ and excludes $p\bar{p}\eta$, $p\bar{p}\omega$, $p\bar{p}\eta'$. LINKAGE=MF
- [k] For a narrow state A with mass less than 960 MeV. LINKAGE=NSA
- [l] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV. LINKAGE=NA0
- [n] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV. LINKAGE=NMR
- [o] 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
- [p] $2m_\tau < M(\tau^+\tau^-) < 9.2$ GeV LINKAGE=E49
- [q] $2 \text{ GeV} < m_{K^+K^-} < 3 \text{ GeV}$ LINKAGE=G49
- [r] $X = \text{scalar with } m < 8.0 \text{ GeV}$ LINKAGE=A49
- [s] $X\bar{X} = \text{vectors with } m < 3.1 \text{ GeV}$ LINKAGE=B49
- [t] X and $\bar{X} = \text{zero spin with } m < 4.5 \text{ GeV}$ LINKAGE=F49
- [u] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$ LINKAGE=C49
- [v] $201 \text{ MeV} < M(\mu^+\mu^-) < 3565 \text{ MeV}$ LINKAGE=D49
- [x] $0.5 \text{ GeV} < m_X < 9.0 \text{ GeV}$, where m_X is the invariant mass of the hadronic final state. LINKAGE=I49
- [y] Spectroscopic labeling for these states is theoretical, pending experimental information. LINKAGE=MJ
- [z] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$ LINKAGE=C52
- [aa] $1.5 \text{ GeV} < m_X < 5.0 \text{ GeV}$ LINKAGE=C48
- [bb] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV. LINKAGE=MRG