LIGHT UNFLAVORED MESONS
($S = C = B = 0$)

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

NODE=MXXX005

$\pi^{\pm}$

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

NODE=S008

Mass $m = 139.57039 \pm 0.00018$ MeV (S = 1.8)
NODE=S008M;DTYPE=M

Mean life $\tau = (2.6033 \pm 0.0005) \times 10^{-8}$ s (S = 1.2)
NODE=S008T;DTYPE=T

$c\tau = 7.8045$ m
NODE=S008CTA;DTYPE=C;OUR EVAL

$\pi^{\pm} \to \ell^{\pm}\nu\gamma$ form factors [a]

CLUMP=F

$F_V = 0.0254 \pm 0.0017$
NODE=S008FV;DTYPE=f;CLUMP=F

$F_A = 0.0119 \pm 0.0001$
NODE=S008FA;DTYPE=f;CLUMP=F

F_V slope parameter $a = 0.10 \pm 0.06$
NODE=S008FSV;DTYPE=f;CLUMP=F

$R = 0.059^{+0.009}_{-0.008}$
NODE=S008FR;DTYPE=f;CLUMP=F

π^- modes are charge conjugates of the modes below.
NODE=S008230;NODE=S008

For decay limits to particles which are not established, see the section on Searches for Axions and Other Very Light Bosons.

π^+ DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\mu^+\nu_\mu$	[b]	(99.98770±0.00004) %		30	DESIG=1;OUR EVAL;→ UNCHECKED ←
$\mu^+\nu_\mu\gamma$	[c]	(2.00 ±0.25) $\times 10^{-4}$		30	DESIG=3
$e^+\nu_e$	[b]	(1.230 ±0.004) $\times 10^{-4}$		70	DESIG=2
$e^+\nu_e\gamma$	[c]	(7.39 ±0.05) $\times 10^{-7}$		70	DESIG=5
$e^+\nu_e\pi^0$		(1.036 ±0.006) $\times 10^{-8}$		4	DESIG=4
$e^+\nu_e e^+e^-$		(3.2 ±0.5) $\times 10^{-9}$		70	DESIG=6
$\mu^+\nu_\mu\nu\overline{\nu}$		$< 9 \times 10^{-6}$	90%	30	DESIG=11
$e^+\nu_e\nu\overline{\nu}$		$< 1.6 \times 10^{-7}$	90%	70	DESIG=10
Lepton Family number (LF) or Lepton number (L) violating modes					NODE=S008;CLUMP=A
$\mu^+\overline{\nu}_e$	L	[d] $< 1.5 \times 10^{-3}$	90%	30	DESIG=7
$\mu^+\nu_e$	LF	[d] $< 8.0 \times 10^{-3}$	90%	30	DESIG=8
$\mu^-e^+e^+\nu$	LF	$< 1.6 \times 10^{-6}$	90%	30	DESIG=9

π^0

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

NODE=S009

Mass $m = 134.9768 \pm 0.0005$ MeV (S = 1.1)
NODE=S009M;DTYPE=M

$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
NODE=S009D;DTYPE=D

Mean life $\tau = (8.43 \pm 0.13) \times 10^{-17}$ s (S = 1.2)
NODE=S009T;DTYPE=T

$c\tau = 25.3$ nm
NODE=S009CTA;DTYPE=C;OUR EVAL

For decay limits to particles which are not established, see the appropriate Search sections (A^0 (axion) and Other Light Boson (X^0) Searches, etc.).

NODE=S009215;NODE=S009

π^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
2γ	(98.823 ± 0.034) %	S=1.5	67	DESIG=1
$e^+e^-\gamma$	(1.174 ± 0.035) %	S=1.5	67	DESIG=2
γ positronium	$(1.82 \pm 0.29) \times 10^{-9}$		67	DESIG=20
$e^+e^+e^-e^-$	$(3.34 \pm 0.16) \times 10^{-5}$		67	DESIG=3
e^+e^-	$(6.46 \pm 0.33) \times 10^{-8}$		67	DESIG=6
4γ	$< 2 \times 10^{-8}$	CL=90%	67	DESIG=5
invisible	$< 4.4 \times 10^{-9}$	CL=90%	–	DESIG=23
$\nu_e\overline{\nu}_e$	$< 1.7 \times 10^{-6}$	CL=90%	67	DESIG=11
$\nu_\mu\overline{\nu}_\mu$	$< 1.6 \times 10^{-6}$	CL=90%	67	DESIG=12
$\nu_\tau\overline{\nu}_\tau$	$< 2.1 \times 10^{-6}$	CL=90%	67	DESIG=13
$\gamma\nu\overline{\nu}$	$< 1.9 \times 10^{-7}$	CL=90%	67	DESIG=15
Charge conjugation (C) or Lepton Family number (LF) violating modes				NODE=S009;CLUMP=A
3γ	C $< 3.1 \times 10^{-8}$	CL=90%	67	DESIG=4
μ^+e^-	LF $< 3.8 \times 10^{-10}$	CL=90%	26	DESIG=14
μ^-e^+	LF $< 3.2 \times 10^{-10}$	CL=90%	26	DESIG=22
$\mu^+e^- + \mu^-e^+$	LF $< 3.6 \times 10^{-10}$	CL=90%	26	DESIG=8

η

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

NODE=S014

Mass $m = 547.862 \pm 0.017$ MeV
Full width $\Gamma = 1.31 \pm 0.05$ keV

NODE=S014M;DTYPE=M
NODE=S014W;DTYPE=G

C-nonconserving decay parameters

CLUMP=D

$\pi^+\pi^-\pi^0$	left-right asymmetry $= (0.09^{+0.11}_{-0.12}) \times 10^{-2}$	NODE=S014A1;DTYPE=d;CLUMP=D
$\pi^+\pi^-\pi^0$	sextant asymmetry $= (0.12^{+0.10}_{-0.11}) \times 10^{-2}$	NODE=S014AS;DTYPE=d;CLUMP=D
$\pi^+\pi^-\pi^0$	quadrant asymmetry $= (-0.09 \pm 0.09) \times 10^{-2}$	NODE=S014AQ;DTYPE=d;CLUMP=D
$\pi^+\pi^-\gamma$	left-right asymmetry $= (0.9 \pm 0.4) \times 10^{-2}$	NODE=S014A2;DTYPE=d;CLUMP=D
$\pi^+\pi^-\gamma$	β (D-wave) $= -0.02 \pm 0.07$ (S = 1.3)	NODE=S014BET;DTYPE=d;CLUMP=D

CP-nonconserving decay parameters

CLUMP=F

$\pi^+\pi^-e^+e^-$ decay-plane asymmetry $A_\phi = (-0.6 \pm 3.1) \times 10^{-2}$

NODE=S014AET;DTYPE=d;CLUMP=F

Other decay parameters

CLUMP=E

$\pi^0\pi^0\pi^0$	Dalitz plot $\alpha = -0.0296 \pm 0.0016$ (S = 1.7)	NODE=S014A0;DTYPE=d;CLUMP=E
Parameter Λ in $\eta \to \ell^+\ell^-\gamma$ decay	$= 0.721 \pm 0.011$ GeV/c^2	NODE=S014LAM;DTYPE=d

η DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
Neutral modes				NODE=S014215;NODE=S014;CLUMP=N
neutral modes	(71.95±0.29) %	S=1.3	–	DESIG=101
2γ	(39.36±0.18) %	S=1.1	274	DESIG=1
$3\pi^0$	(32.56±0.21) %	S=1.2	179	DESIG=2
$\pi^0 2\gamma$	(2.55±0.22) $\times 10^{-4}$		257	DESIG=7
$2\pi^0 2\gamma$	< 1.2 $\times 10^{-3}$	CL=90%	238	DESIG=105
4γ	< 2.8 $\times 10^{-4}$	CL=90%	274	DESIG=108
invisible	< 1.0 $\times 10^{-4}$	CL=90%	–	DESIG=107
Charged modes				NODE=S014;CLUMP=C
charged modes	(28.05±0.29) %	S=1.3	–	DESIG=102
$\pi^+\pi^-\pi^0$	(23.02±0.25) %	S=1.2	174	DESIG=3
$\pi^+\pi^-\gamma$	(4.28±0.07) %	S=1.1	236	DESIG=4
$e^+e^-\gamma$	(7.00±0.22) $\times 10^{-3}$	S=1.1	274	DESIG=8
$\mu^+\mu^-\gamma$	(3.1 ±0.4) $\times 10^{-4}$		253	DESIG=13
e^+e^-	< 7 $\times 10^{-7}$	CL=90%	274	DESIG=16
$\mu^+\mu^-$	(5.8 ±0.8) $\times 10^{-6}$		253	DESIG=12
$2e^+2e^-$	(2.40±0.22) $\times 10^{-5}$		274	DESIG=25
$\pi^+\pi^- e^+e^-(\gamma)$	(2.68±0.11) $\times 10^{-4}$		235	DESIG=6
$e^+e^-\mu^+\mu^-$	< 1.6 $\times 10^{-4}$	CL=90%	253	DESIG=109
$2\mu^+2\mu^-$	(5.0 ±1.3) $\times 10^{-9}$		161	DESIG=110
$\mu^+\mu^-\pi^+\pi^-$	< 3.6 $\times 10^{-4}$	CL=90%	113	DESIG=111
$\pi^+ e^- \overline{\nu}_e$ + c.c.	< 1.7 $\times 10^{-4}$	CL=90%	256	DESIG=112
$\pi^+\pi^- 2\gamma$	< 2.1 $\times 10^{-3}$		236	DESIG=11
$\pi^+\pi^-\pi^0\gamma$	< 6 $\times 10^{-4}$	CL=90%	174	DESIG=10
$\pi^0\mu^+\mu^-\gamma$	< 3 $\times 10^{-6}$	CL=90%	210	DESIG=17
Charge conjugation (C), Parity (P), Charge conjugation × Parity (CP), or Lepton Family number (LF) violating modes				NODE=S014;CLUMP=A
$\pi^0\gamma$	C [e] < 9 $\times 10^{-5}$	CL=90%	257	DESIG=104
$\pi^+\pi^-$	P,CP < 4.4 $\times 10^{-6}$	CL=90%	236	DESIG=15
$2\pi^0$	P,CP < 3.5 $\times 10^{-4}$	CL=90%	238	DESIG=21
$2\pi^0\gamma$	C < 5 $\times 10^{-4}$	CL=90%	238	DESIG=103
$3\pi^0\gamma$	C < 6 $\times 10^{-5}$	CL=90%	179	DESIG=106
3γ	C < 1.6 $\times 10^{-5}$	CL=90%	274	DESIG=18
$4\pi^0$	P,CP < 6.9 $\times 10^{-7}$	CL=90%	40	DESIG=24
$\pi^0 e^+e^-$	C [f] < 8 $\times 10^{-6}$	CL=90%	257	DESIG=5
$\pi^0\mu^+\mu^-$	C [f] < 5 $\times 10^{-6}$	CL=90%	210	DESIG=14
$\mu^+ e^- + \mu^- e^+$	LF < 6 $\times 10^{-6}$	CL=90%	264	DESIG=20

$f_0(500)$

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

NODE=M014

also known as σ; was $f_0(600)$, $f_0(400–1200)$

See the review on "Scalar Mesons below 1 GeV."

Mass (T-Matrix Pole $\sqrt{s}$) = (400–550)$-i$(200–350) MeV — NODE=M014PP;DTYPE=p;OUR EST; → UNCHECKED ←

Mass (Breit-Wigner) = 400 to 800 MeV — NODE=M014M;DTYPE=M;OUR EST; → UNCHECKED ←

Full width (Breit-Wigner) = 100 to 800 MeV — NODE=M014W;DTYPE=G;OUR EST; → UNCHECKED ←

$f_0(500)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\pi$	seen	–	NODE=M014215;DESIG=1;OUR EST; → UNCHECKED ←
$\gamma\gamma$	seen	–	DESIG=5;OUR EST;→ UNCHECKED ←

$\rho(770)$

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

NODE=M009

See the review on "Spectroscopy of Light Meson Resonances."

T-Matrix Pole $\sqrt{s} = (761–765) - i\ (71–74)$ MeV — NODE=M009PP;DTYPE=p;OUR EST; → UNCHECKED ←

ρ^0 mass (Breit-Wigner) = 775.26 ± 0.23 MeV [g] — NODE=M009M0;DTYPE=M

$\rho^\pm$ mass (Breit-Wigner) = 775.11 ± 0.34 MeV [h] — NODE=M009M5;DTYPE=M

ρ^0 full width (Breit-Wigner) = 147.4 ± 0.8 MeV [g] (S = 2.0) — NODE=M009W0;DTYPE=G

$\rho^\pm$ full width (Breit-Wigner) = 149.1 ± 0.8 MeV [h] — NODE=M009W5;DTYPE=G

$\rho(770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$\pi\pi$	∼ 100 %		363	NODE=M009225;DESIG=1;OUR EVAL; → UNCHECKED ←
$\rho(770)^\pm$ decays				NODE=M009;CLUMP=A
$\pi^\pm\gamma$	(4.5 ±0.5) × 10^{-4}	S=2.2	375	DESIG=3
$\pi^\pm\eta$	< 6 × 10^{-3}	CL=84%	152	DESIG=5
$\pi^\pm\pi^+\pi^-\pi^0$	< 2.0 × 10^{-3}	CL=84%	254	DESIG=21
$\rho(770)^0$ decays				NODE=M009;CLUMP=B
$\pi^+\pi^-\gamma$	(9.9 ±1.6) × 10^{-3}		362	DESIG=60
$\pi^0\gamma$	(4.7 ±0.8) × 10^{-4}	S=1.7	376	DESIG=40
$\eta\gamma$	(3.00±0.21) × 10^{-4}		194	DESIG=8
$\pi^0\pi^0\gamma$	(4.5 ±0.8) × 10^{-5}		363	DESIG=80
$\mu^+\mu^-$	[i] (4.55±0.28) × 10^{-5}		373	DESIG=6
e^+e^-	[i] (4.72±0.05) × 10^{-5}		388	DESIG=4
$\pi^+\pi^-\pi^0$	($1.01^{+0.54}_{-0.36}$ ±0.34) × 10^{-4}		323	DESIG=7;OUR EVAL;→ UNCHECKED ←
$\pi^+\pi^-\pi^+\pi^-$	(1.8 ±0.9) × 10^{-5}		251	DESIG=22
$\pi^+\pi^-\pi^0\pi^0$	(1.6 ±0.8) × 10^{-5}		256	DESIG=30
$\pi^0 e^+ e^-$	< 1.2 × 10^{-5}	CL=90%	376	DESIG=9

$\omega(782)$

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

NODE=M001

Mass m = 782.66 ± 0.13 MeV (S = 2.0) — NODE=M001M;DTYPE=M

Full width Γ = 8.68 ± 0.13 MeV — 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 ±0.7) %		327	NODE=M001215;DESIG=1
$\pi^0\gamma$	(8.33±0.25) %	S=2.1	380	DESIG=3
$\pi^+\pi^-$	(1.53±0.12) %	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 ±0.4) $\times 10^{-4}$	S=1.1	200	DESIG=6
$\pi^0 e^+ e^-$	(7.7 ±0.6) $\times 10^{-4}$		380	DESIG=14
$\pi^0\mu^+\mu^-$	(1.34±0.18) $\times 10^{-4}$	S=1.5	349	DESIG=11
e^+e^-	(7.41±0.19) $\times 10^{-5}$	S=1.8	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 ±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 ±1.8) $\times 10^{-5}$		377	DESIG=8
3γ	< 1.9 $\times 10^{-4}$	CL=95%	391	DESIG=10
Charge conjugation (C) violating modes				NODE=M001;CLUMP=A
$\eta\pi^0$ C	< 2.1 $\times 10^{-4}$	CL=90%	162	DESIG=9
$2\pi^0$ C	< 2.2 $\times 10^{-4}$	CL=90%	367	DESIG=193
$3\pi^0$ C	< 2.3 $\times 10^{-4}$	CL=90%	330	DESIG=16
invisible	< 7 $\times 10^{-5}$	CL=90%	–	DESIG=194

$\eta'(958)$

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

NODE=M002

Mass $m = 957.78 \pm 0.06$ MeV NODE=M002M;DTYPE=M

Full width $\Gamma = 0.188 \pm 0.006$ MeV NODE=M002W;DTYPE=G

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\pi^+\pi^-\eta$	(42.5 ±0.5) %		232	NODE=M002215;DESIG=1
$\rho^0\gamma$(including non-resonant $\pi^+\pi^-\gamma$)	(29.48 ±0.35) %		165	DESIG=9
$\pi^0\pi^0\eta$	(22.4 ±0.5) %		239	DESIG=2
$\omega\gamma$	(2.52 ±0.07) %		159	DESIG=7
$\omega e^+ e^-$	(2.0 ±0.4) $\times 10^{-4}$		159	DESIG=205
$\gamma\gamma$	(2.307±0.033) %		479	DESIG=6
$3\pi^0$	(2.50 ±0.17) $\times 10^{-3}$		430	DESIG=8
$\mu^+\mu^-\gamma$	(1.13 ±0.28) $\times 10^{-4}$		467	DESIG=20
$\pi^+\pi^-\mu^+\mu^-$	(2.13 ±0.13) $\times 10^{-5}$		401	DESIG=201
$\pi^+\pi^-\pi^0$	(3.61 ±0.17) $\times 10^{-3}$		428	DESIG=121
$(\pi^+\pi^-\pi^0)$ S-wave	(3.8 ±0.5) $\times 10^{-3}$		428	DESIG=211
$\pi^\mp\rho^\pm$	(7.4 ±2.3) $\times 10^{-4}$		106	DESIG=210
$2(\pi^+\pi^-)$	(8.51 ±0.33) $\times 10^{-5}$		372	DESIG=131
$\pi^+\pi^-2\pi^0$	(2.11 ±0.15) $\times 10^{-4}$		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
$\pi^+\pi^- e^+ e^-$	(2.43 ±0.06) $\times 10^{-3}$		458	DESIG=10
$\pi^+ e^-\nu_e$ + c.c.	< 2.1 $\times 10^{-4}$	90%	469	DESIG=204
$\gamma e^+ e^-$	(4.80 ±0.15) $\times 10^{-4}$		479	DESIG=28
$\pi^0\gamma\gamma$	(3.20 ±0.24) $\times 10^{-3}$		469	DESIG=24
$\pi^0\gamma\gamma$(non resonant)	(6.2 ±0.9) $\times 10^{-4}$		–	DESIG=212
$\eta\gamma\gamma$	< 1.33 $\times 10^{-4}$	90%	322	DESIG=214
$4\pi^0$	< 1.2 $\times 10^{-5}$	90%	380	DESIG=26
e^+e^-	< 5.6 $\times 10^{-9}$	90%	479	DESIG=150
$e^+e^-e^+e^-$	(4.5 ±1.1) $\times 10^{-6}$		479	DESIG=215
invisible	< 2.1 $\times 10^{-4}$	90%	–	DESIG=200
γ Dark Photon	5.0×10^{-07} to 3.50×10^{-06}	90%	–	DESIG=217

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

NODE=M002;CLUMP=B

$\pi^+\pi^-$	P,CP		< 1.8	$\times 10^{-5}$	90%	458	DESIG=111
$\pi^0\pi^0$	P,CP		< 4	$\times 10^{-4}$	90%	459	DESIG=25
$\pi^0 e^+ e^-$	C	[f]	< 1.4	$\times 10^{-3}$	90%	469	DESIG=16
$\pi^0\rho^0$	C		< 4	%	90%	111	DESIG=18
$\eta e^+ e^-$	C	[f]	< 2.4	$\times 10^{-3}$	90%	322	DESIG=17
3γ	C		< 1.0	$\times 10^{-4}$	90%	479	DESIG=23
$\mu^+\mu^-\pi^0$	C	[f]	< 6.0	$\times 10^{-5}$	90%	445	DESIG=22
$\mu^+\mu^-\eta$	C	[f]	< 1.5	$\times 10^{-5}$	90%	273	DESIG=21
$e\mu$	LF		< 4.7	$\times 10^{-4}$	90%	473	DESIG=27
$\pi^+\pi^-$ ALP $\rightarrow$ $\pi^+\pi^- e^+ e^-$			< 1.9	$\times 10^{-5}$	90%	–	DESIG=218

$f_0(980)$

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

NODE=M003

See the review on "Scalar Mesons below 1 GeV."

T-matrix pole $\sqrt{s} = (980\text{–}1010) - i\ (20\text{–}35)$ MeV [j]
Mass (Breit-Wigner) = 990 ± 20 MeV [j]
Full width (Breit-Wigner) = 10 to 100 MeV [j]

NODE=M003PP;DTYPE=p;OUR EST; → UNCHECKED ←
NODE=M003M1;DTYPE=M;OUR EST; → UNCHECKED ←
NODE=M003W1;DTYPE=G;OUR EST; → UNCHECKED ←

$f_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\pi$	seen	476	NODE=M003215;DESIG=2;OUR EVAL; → UNCHECKED ←
$K\overline{K}$	seen	36	DESIG=1;OUR EVAL;→ UNCHECKED ←
$\gamma\gamma$	seen	495	DESIG=5;OUR EVAL;→ UNCHECKED ←

$a_0(980)$

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

NODE=M036

See the review on "Scalar Mesons below 1 GeV."

T-matrix pole $\sqrt{s} = (970\text{–}1020) - i\ (30\text{–}70)$ MeV [j]
Mass m = 980 ± 20 MeV [j]
Full width Γ = 50 to 100 MeV [j]

NODE=M036PP;DTYPE=p;OUR EST; → UNCHECKED ←
NODE=M036MX;DTYPE=M;OUR EST; → UNCHECKED ←
NODE=M036W1;DTYPE=G;OUR EST; → UNCHECKED ←

$a_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\pi$	seen	319	NODE=M036215;DESIG=1;OUR EST; → UNCHECKED ←
$K\overline{K}$	seen	†	DESIG=3;OUR EST;→ UNCHECKED ←
$\eta'\pi$	seen	†	DESIG=8
$\rho\pi$	not seen	138	DESIG=2;OUR EST;→ UNCHECKED ←
$\gamma\gamma$	seen	490	DESIG=5;OUR EST;→ UNCHECKED ←

$\phi(1020)$

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

NODE=M004

Mass m = 1019.460 ± 0.016 MeV
NODE=M004M;DTYPE=M

Full width Γ = 4.249 ± 0.013 MeV (S = 1.1)
NODE=M004W;DTYPE=G

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
K^+K^-	(49.9 ±0.5) %	S=1.5	127	NODE=M004215;DESIG=1
$K^0_L K^0_S$	(33.6 ±0.4) %	S=1.3	110	DESIG=2
$\rho\pi + \pi^+\pi^-\pi^0$	(14.9 ±0.4) %	S=1.3	–	DESIG=24
$\eta\gamma$	(1.306±0.024) %	S=1.2	363	DESIG=4
$\pi^0\gamma$	(1.33 ±0.05) $\times 10^{-3}$		501	DESIG=7
$\ell^+\ell^-$	—		510	DESIG=256;OUR EVAL;→ UNCHECKED ←
e^+e^-	(2.964±0.033) $\times 10^{-4}$	S=1.4	510	DESIG=5
$\mu^+\mu^-$	(2.86 ±0.22) $\times 10^{-4}$	S=1.2	499	DESIG=6
ηe^+e^-	(1.08 ±0.04) $\times 10^{-4}$		363	DESIG=17
$\pi^+\pi^-$	(9.5 ±1.9) $\times 10^{-5}$	S=2.0	490	DESIG=8
$\omega\pi^0$	(4.7 ±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 ±1.3) $\times 10^{-5}$		490	DESIG=9
$f_0(980)\gamma$	(3.22 ±0.19) $\times 10^{-4}$	S=1.1	29	DESIG=20
$\pi^0\pi^0\gamma$	(1.13 ±0.06) $\times 10^{-4}$		492	DESIG=19
$\pi^+\pi^-\pi^+\pi^-$	(3.9 $^{+2.8}_{-2.2}$) $\times 10^{-6}$		410	DESIG=15
$\pi^+\pi^+\pi^-\pi^-\pi^0$	< 4.6 $\times 10^{-6}$	CL=90%	342	DESIG=14
$\pi^0 e^+e^-$	(1.33 $^{+0.07}_{-0.10}$) $\times 10^{-5}$		501	DESIG=21
$\pi^0\eta\gamma$	(7.27 ±0.30) $\times 10^{-5}$	S=1.5	346	DESIG=22
$a_0(980)\gamma$	(7.6 ±0.6) $\times 10^{-5}$		39	DESIG=23
$K^0\overline{K}^0\gamma$	< 1.9 $\times 10^{-8}$	CL=90%	110	DESIG=257
$\eta'(958)\gamma$	(6.23 ±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 ±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
$\eta U \to \eta e^+e^-$	< 1 $\times 10^{-6}$	CL=90%	–	DESIG=259
invisible	< 1.7 $\times 10^{-4}$	CL=90%	–	DESIG=260
Lepton Family number (LF) violating modes				NODE=M004;CLUMP=A
$e^\pm\mu^\mp$ LF	< 2 $\times 10^{-6}$	CL=90%	504	DESIG=258

$h_1(1170)$

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

NODE=M030

Mass $m = 1166 \pm 6$ MeV
NODE=M030M;DTYPE=M

Full width $\Gamma = 375 \pm 35$ MeV
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; → UNCHECKED ←

$b_1(1235)$

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

NODE=M011

Mass $m = 1229.5 \pm 3.2$ MeV (S = 1.6)
NODE=M011M;DTYPE=M

Full width $\Gamma = 142 \pm 9$ MeV (S = 1.2)
NODE=M011W;DTYPE=G

$b_1(1235)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$\omega\pi$	seen		348	NODE=M011215;DESIG=1;OUR EST; → UNCHECKED ←
[D/S amplitude ratio = 0.277 ± 0.027]				
$\pi^\pm\gamma$	(1.6±0.4) × 10^{-3}		607	DESIG=9
$\eta\rho$	seen		†	DESIG=8;OUR EST;→ UNCHECKED ←
$\pi^+\pi^+\pi^-\pi^0$	< 50 %	84%	535	DESIG=2;OUR EST;→ UNCHECKED ←
$K^*(892)^\pm K^\mp$	seen		†	DESIG=74
$(K\overline{K})^\pm\pi^0$	< 8 %	90%	248	DESIG=71;OUR EST;→ UNCHECKED ←
$K^0_S K^0_L \pi^\pm$	< 6 %	90%	235	DESIG=73;OUR EST;→ UNCHECKED ←
$K^0_S K^0_S \pi^\pm$	< 2 %	90%	235	DESIG=72;OUR EST;→ UNCHECKED ←
$\phi\pi$	< 1.5 %	84%	147	DESIG=5;OUR EST;→ UNCHECKED ←

$a_1(1260)$ [k]

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

NODE=M010

ERROR=1

T-Matrix Pole $\sqrt{s} = (1209^{+13}_{-10}) - i(288^{+45}_{-12})$ MeV
Mass (Breit-Wigner) = 1230 ± 40 MeV [j]
Full width (Breit-Wigner) = 250 to 600 MeV [j]

NODE=M010PP;DTYPE=p;OUR EST; → UNCHECKED ←
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	NODE=M010215;DESIG=17;OUR EST; → UNCHECKED ←
$(\rho\pi)_{S-\text{wave}}$, $\rho \to \pi\pi$	seen	353	DESIG=7;OUR EST;→ UNCHECKED ←
$(\rho\pi)_{D-\text{wave}}$, $\rho \to \pi\pi$	seen	353	DESIG=8;OUR EST;→ UNCHECKED ←
$(\rho(1450)\pi)_{S-\text{wave}}$, $\rho \to \pi\pi$	seen	†	DESIG=9;OUR EST;→ UNCHECKED ←
$(\rho(1450)\pi)_{D-\text{wave}}$, $\rho \to \pi\pi$	seen	†	DESIG=10;OUR EST;→ UNCHECKED ←
$f_0(500)\pi$, $f_0 \to \pi\pi$	seen	–	DESIG=16;OUR EST;→ UNCHECKED ←
$f_0(980)\pi$, $f_0 \to \pi\pi$	seen	179	DESIG=11
$f_0(1370)\pi$, $f_0 \to \pi\pi$	seen	†	DESIG=12;OUR EST;→ UNCHECKED ←
$f_2(1270)\pi$, $f_2 \to \pi\pi$	seen	†	DESIG=13;OUR EST;→ UNCHECKED ←
$\pi^+\pi^-\pi^0$	seen	576	DESIG=22
$\pi^0\pi^0\pi^0$	not seen	577	DESIG=23;OUR EST;→ UNCHECKED ←
$K\overline{K}\pi$	seen	250	DESIG=18;OUR EST;→ UNCHECKED ←
$K^*(892)K$	seen	†	DESIG=14;OUR EST;→ UNCHECKED ←
$\pi\gamma$	seen	608	DESIG=4;OUR EST;→ UNCHECKED ←

$f_2(1270)$

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

NODE=M005

T-Matrix Pole $\sqrt{s}$ = (1260–1283) − i (90–110) MeV
Mass (Breit-Wigner) = 1275.4 ± 0.8 MeV (S = 1.1)
Full width (Breit-Wigner) = $186.6^{+2.8}_{-2.2}$ MeV (S = 1.5)

NODE=M005PP;DTYPE=p;OUR EST; → UNCHECKED ←
NODE=M005M;DTYPE=M
NODE=M005W;DTYPE=G

$f_2(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
$\pi\pi$	(84.3 $^{+2.8}_{-1.0}$) %	S=1.2	623	NODE=M005215;DESIG=1
$\pi^+\pi^-2\pi^0$	(7.7 $^{+1.2}_{-3.1}$) %	S=1.2	563	DESIG=3
$K\overline{K}$	(4.6 ±0.4) %	S=2.7	404	DESIG=4
$2\pi^+2\pi^-$	(2.8 ±0.4) %	S=1.2	559	DESIG=2
$\eta\eta$	(4.0 ±0.8) × 10^{-3}	S=2.1	326	DESIG=7
$4\pi^0$	(3.0 ±1.0) × 10^{-3}		565	DESIG=9
$\gamma\gamma$	(1.42±0.24) × 10^{-5}	S=1.4	638	DESIG=8
$\eta\pi\pi$	< 8 × 10^{-3}	CL=95%	478	DESIG=6
$K^0K^-\pi^+$ + c.c.	< 3.4 × 10^{-3}	CL=95%	293	DESIG=5
e^+e^-	< 6 × 10^{-10}	CL=90%	638	DESIG=10

$f_1(1285)$

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

NODE=M008

Mass m = 1281.8 ± 0.5 MeV (S = 1.7)
Full width Γ = 23.0 ± 1.1 MeV (S = 1.6)

NODE=M008M;DTYPE=M
NODE=M008W;DTYPE=G

$f_1(1285)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
4π	(32.7± 1.8) %	S=1.2	568	NODE=M008215;DESIG=21
$\pi^0\pi^0\pi^+\pi^-$	(21.8± 1.2) %	S=1.2	566	DESIG=22
$2\pi^+2\pi^-$	(10.9± 0.6) %	S=1.2	563	DESIG=20
$\rho^0\pi^+\pi^-$	(10.9± 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 ±15) %		479	DESIG=198
$\eta\pi\pi$	(52.2± 1.9) %	S=1.2	482	DESIG=3
$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	(38 ± 4) %		238	DESIG=4
$\eta\pi\pi$ [excluding $a_0(980)\pi$]	(14 ± 4) %		482	DESIG=5
$K\overline{K}\pi$	(9.0± 0.4) %	S=1.1	308	DESIG=1
$K\overline{K}^*(892)$	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± 1.0) %	S=1.7	407	DESIG=13
$\phi\gamma$	$(7.4\pm 2.6)\times 10^{-4}$		235	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 "Spectroscopy of Light Meson Resonances."

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

NODE=M037M;DTYPE=M

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

NODE=M037W;DTYPE=G

$\eta(1295)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\pi^+\pi^-$	seen	487	NODE=M037215;DESIG=2;OUR EST; → UNCHECKED ←
$a_0(980)\pi$	seen	248	DESIG=1;OUR EST;→ UNCHECKED ←
$\eta\pi^0\pi^0$	seen	490	DESIG=4;OUR EST;→ UNCHECKED ←
$\eta(\pi\pi)_{S\text{-wave}}$	seen	–	DESIG=5;OUR EST;→ UNCHECKED ←
$\sigma\eta$	seen	–	DESIG=6;OUR EST;→ UNCHECKED ←
$K\overline{K}\pi$	seen	320	DESIG=7;OUR EST;→ UNCHECKED ←

$\pi(1300)$

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

NODE=M058

Mass $m = 1300 \pm 100$ MeV [j]

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

Full width $\Gamma = 200$ to 600 MeV [j]

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

$\pi(1300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\rho\pi$	seen	404	NODE=M058215;DESIG=1;OUR EST; → UNCHECKED ←
$\pi(\pi\pi)_{S\text{-wave}}$	seen	–	DESIG=3;OUR EST;→ UNCHECKED ←

$a_2(1320)$

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

NODE=M012

T-Matrix Pole $\sqrt{s} = (1305\text{–}1321) - i(52\text{–}58)$ MeV

NODE=M012PP;DTYPE=p;OUR EST; → UNCHECKED ←

Mass (Breit-Wigner) = 1318.2 ± 0.6 MeV (S = 1.2)

NODE=M012M0;DTYPE=M

Full width $\Gamma = 107 \pm 5$ MeV

NODE=M012W;DTYPE=G;OUR EST; → UNCHECKED ←

$a_2(1320)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)	
3π	(70.1 ±2.7) %	S=1.2	624	NODE=M012215;DESIG=1
$\eta\pi$	(14.5 ±1.2) %		535	DESIG=3
$\omega\pi\pi$	(10.6 ±3.2) %	S=1.3	366	DESIG=4
$K\overline{K}$	(4.9 ±0.8) %		437	DESIG=2
$\eta'(958)\pi$	(5.5 ±0.9) $\times 10^{-3}$		288	DESIG=8
$\pi^{\pm}\gamma$	(2.91±0.27) $\times 10^{-3}$		652	DESIG=7
$\gamma\gamma$	(9.4 ±0.7) $\times 10^{-6}$		659	DESIG=9
e^+e^-	< 5 $\times 10^{-9}$	CL=90%	659	DESIG=10

$f_0(1370)$

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

NODE=M147

See the review on "Spectroscopy of Light Meson Resonances."
T-Matrix Pole $\sqrt{s}$ = (1250–1440) $-i$ (60–300) MeV
Mass (Breit-Wigner) = 1200 to 1500 MeV
Full width (Breit-Wigner) = 200 to 500 MeV

NODE=M147PP;DTYPE=p;OUR EST; → UNCHECKED ←
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	NODE=M147215;DESIG=1;OUR EST; → UNCHECKED ←
4π	seen	617	DESIG=10;OUR EST;→ UNCHECKED ←
$4\pi^0$	seen	617	DESIG=4;OUR EST;→ UNCHECKED ←
$2\pi^+2\pi^-$	seen	612	DESIG=5;OUR EST;→ UNCHECKED ←
$\pi^+\pi^-2\pi^0$	seen	615	DESIG=6;OUR EST;→ UNCHECKED ←
$\rho\rho$	seen	†	DESIG=14;OUR EST;→ UNCHECKED ←
$2(\pi\pi)_{S\text{-wave}}$	seen	–	DESIG=15;OUR EST;→ UNCHECKED ←
$\pi(1300)\pi$	seen	†	DESIG=16;OUR EVAL;→ UNCHECKED ←
$a_1(1260)\pi$	seen	35	DESIG=17;OUR EVAL;→ UNCHECKED ←
$\eta\eta$	seen	411	DESIG=2;OUR EST;→ UNCHECKED ←
$K\overline{K}$	seen	475	DESIG=11;OUR EST;→ UNCHECKED ←
$K\overline{K}n\pi$	not seen	†	DESIG=18;OUR EVAL;→ UNCHECKED ←
6π	not seen	508	DESIG=19;OUR EVAL;→ UNCHECKED ←
$\omega\omega$	not seen	†	DESIG=20;OUR EVAL;→ UNCHECKED ←
$\gamma\gamma$	seen	685	DESIG=12;OUR EST;→ UNCHECKED ←
e^+e^-	not seen	685	DESIG=13;OUR EST;→ UNCHECKED ←

$\eta(1405)$

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

NODE=M027

See the review on "Spectroscopy of Light Meson Resonances." See also $\eta(1475)$.
Mass $m = 1408.7^{+2.0}_{-1.2}$ MeV (S = 2.2)
Full width $\Gamma = 50.3 \pm 2.5$ MeV (S = 1.6)

NODE=M027MX;DTYPE=M
NODE=M027WX;DTYPE=G

$\eta(1405)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$K\overline{K}\pi$	seen		424	NODE=M027215;DESIG=2;OUR EST; → UNCHECKED ←
$\eta\pi\pi$	seen		562	DESIG=5;OUR EST;→ UNCHECKED ←
$a_0(980)\pi$	seen		344	DESIG=4;OUR EST;→ UNCHECKED ←
$\eta(\pi\pi)_{S\text{-wave}}$	seen		–	DESIG=9;OUR EST;→ UNCHECKED ←
$f_0(980)\eta$	seen		†	DESIG=10;OUR EST;→ UNCHECKED ←
4π	seen		638	DESIG=6;OUR EVAL;→ UNCHECKED ←
$\rho\rho$	<58 %	99.85%	†	DESIG=12
$\rho^0\gamma$	seen		491	DESIG=8;OUR EST;→ UNCHECKED ←
$K^*(892)K$	seen		122	DESIG=11;OUR EST;→ UNCHECKED ←

$h_1(1415)$

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

NODE=M109

Mass $m = 1409^{+9}_{-8}$ MeV (S = 1.9)
Full width $\Gamma = 78 \pm 11$ MeV

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

$f_1(1420)$

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

NODE=M006

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 1428.4^{+1.5}_{-1.3}$ MeV (S = 1.8)

NODE=M006M2;DTYPE=M

Full width $\Gamma = 56.7 \pm 3.3$ MeV (S = 1.3)

NODE=M006W;DTYPE=G

$f_1(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}\pi$	seen	440	NODE=M006215;DESIG=2;OUR EST; → UNCHECKED ←
$K\overline{K}^*(892)+$ c.c.	seen	167	DESIG=1;OUR EST;→ UNCHECKED ←
$\eta\pi\pi$	possibly seen	574	DESIG=5;OUR EST;→ UNCHECKED ←
$\phi\gamma$	seen	350	DESIG=9;OUR EST;→ UNCHECKED ←

$\omega(1420)$ [i]

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

NODE=M125

ERROR=2

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

NODE=M125M;DTYPE=M;OUR EST; → UNCHECKED ←

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

NODE=M125W;DTYPE=G;OUR EST; → UNCHECKED ←

$\omega(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\rho\pi$	seen	480	NODE=M125215;DESIG=1;OUR EST; → UNCHECKED ←
$\omega\pi\pi$	seen	437	DESIG=4;OUR EST;→ UNCHECKED ←
$b_1(1235)\pi$	seen	112	DESIG=5;OUR EST;→ UNCHECKED ←
e^+e^-	seen	705	DESIG=3;OUR EST;→ UNCHECKED ←

$a_0(1450)$

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

NODE=M149

See the review on "Spectroscopy of Light Meson Resonances."

T-Matrix Pole $\sqrt{s} = (1290\text{–}1500) - i\ (30\text{–}140)$ MeV

NODE=M149PP;DTYPE=p;OUR EST; → UNCHECKED ←

Mass (Breit-Wigner) = 1439 ± 34 MeV (S = 1.8)

NODE=M149M;DTYPE=M

Full width (Breit-Wigner) = 258 ± 14 MeV

NODE=M149W;DTYPE=G

Branching fractions are given relative to the one **DEFINED AS 1**.

NODE=M149215;NODE=M149

$a_0(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\eta$	0.093±0.020	607	DESIG=1
$\pi\eta'(958)$	0.033±0.017	384	DESIG=2
$K\overline{K}$	0.082±0.028	523	DESIG=3
$\omega\pi\pi$	**DEFINED AS 1**	458	DESIG=4
$a_0(980)\pi\pi$	seen	310	DESIG=5
$\gamma\gamma$	seen	719	DESIG=6

$\rho(1450)$

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

NODE=M105

See the review on "Spectroscopy of Light Meson Resonances."

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

NODE=M105M0;DTYPE=M;OUR EST; → UNCHECKED ←

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

NODE=M105W0;DTYPE=G;OUR EST; → UNCHECKED ←

$\rho(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\pi$	seen	720	NODE=M105215;DESIG=1;OUR EST;
$\pi^+\pi^-$	seen	719	→ UNCHECKED ← DESIG=20;OUR EVAL;→ UNCHECKED ←
4π	seen	669	DESIG=2;OUR EST;→ UNCHECKED ←
e^+e^-	seen	732	DESIG=4;OUR EST;→ UNCHECKED ←
$\eta\rho$	seen	311	DESIG=3
$a_2(1320)\pi$	not seen	55	DESIG=8;OUR EST;→ UNCHECKED ←
$K\overline{K}$	seen	541	DESIG=7;OUR EVAL;→ UNCHECKED ←
K^+K^-	seen	541	DESIG=21;OUR EVAL;→ UNCHECKED ←
$K\overline{K}^*(892)+$ c.c.	possibly seen	229	DESIG=15;OUR EST;→ UNCHECKED ←
$\pi^0\gamma$	seen	726	DESIG=23;OUR EST;→ UNCHECKED ←
$\eta\gamma$	seen	630	DESIG=9
$f_0(500)\gamma$	not seen	–	DESIG=16;OUR EST;→ UNCHECKED ←
$f_0(980)\gamma$	not seen	398	DESIG=17;OUR EST;→ UNCHECKED ←
$f_0(1370)\gamma$	not seen	92	DESIG=18;OUR EST;→ UNCHECKED ←
$f_2(1270)\gamma$	not seen	177	DESIG=19;OUR EST;→ UNCHECKED ←

$\eta(1475)$

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

NODE=M175

See the review on "Spectroscopy of Light Meson Resonances." See also $\eta(1405)$.

Mass $m = 1476 \pm 4$ MeV (S = 1.4)
Full width $\Gamma = 96 \pm 9$ MeV (S = 1.7)

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

$\eta(1475)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}\pi$	seen	477	NODE=M175215;DESIG=2;OUR EST;
$K\overline{K}^*(892)+$ c.c.	seen	245	→ UNCHECKED ← DESIG=1;OUR EST;→ UNCHECKED ←
$a_0(980)\pi$	seen	396	DESIG=4;OUR EST;→ UNCHECKED ←
$\gamma\gamma$	seen	738	DESIG=7;OUR EST;→ UNCHECKED ←
$K^0_S K^0_S \eta$	possibly seen	†	DESIG=8;OUR EVAL;→ UNCHECKED ←
$\gamma\phi(1020)$	possibly seen	386	DESIG=9

$f_0(1500)$

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

NODE=M152

See the review on "Spectroscopy of Light Meson Resonances."

T-Matrix Pole $\sqrt{s} = (1430\text{–}1530) - i\ (40\text{–}90)$ MeV
Mass (Breit-Wigner) = 1522 ± 25 MeV
Full width (Breit-Wigner) = 108 ± 33 MeV

NODE=M152PP;DTYPE=p;OUR EST;
→ UNCHECKED ←
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±2.2) %	1.2	749	NODE=M152215;DESIG=8
$\pi^+\pi^-$	seen		748	DESIG=9
$2\pi^0$	seen		749	DESIG=3;OUR EST;→ UNCHECKED ←
4π	(48.9±3.3) %	1.2	700	DESIG=7
$4\pi^0$	seen		700	DESIG=5;OUR EST;→ UNCHECKED ←
$2\pi^+2\pi^-$	seen		696	DESIG=6;OUR EST;→ UNCHECKED ←
$2(\pi\pi)_{S\text{-wave}}$	seen		–	DESIG=11;OUR EST;→ UNCHECKED ←
$\rho\rho$	seen		†	DESIG=12;OUR EST;→ UNCHECKED ←
$\pi(1300)\pi$	seen		163	DESIG=13;OUR EST;→ UNCHECKED ←
$a_1(1260)\pi$	seen		234	DESIG=14;OUR EST;→ UNCHECKED ←
$\eta\eta$	(6.0±0.9) %	1.1	528	DESIG=1
$\eta\eta'(958)$	(2.2±0.8) %	1.4	107	DESIG=2
$K\overline{K}$	(8.5±1.0) %	1.1	579	DESIG=4
$\gamma\gamma$	not seen		761	DESIG=10;OUR EST;→ UNCHECKED ←

$f_2'(1525)$

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

NODE=M013

Mass $m = 1517.3 \pm 2.4$ MeV (S = 2.8)
Full width $\Gamma = 72^{+7}_{-6}$ MeV

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

$f_2'(1525)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}$	(88.8 ±2.2) %	576	NODE=M013215;DESIG=2
$\eta\eta$	(10.3 ±2.2) %	525	DESIG=4
$\pi\pi$	(8.2 ±1.5) $\times 10^{-3}$	747	DESIG=1
$\gamma\gamma$	(1.12±0.15) $\times 10^{-6}$	759	DESIG=8

$f_2(1565)$

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

NODE=M123

See the review on "Spectroscopy of Light Meson Resonances."

T-Matrix Pole $\sqrt{s}$ = (1495–1560) $- i$ (40–110) MeV — NODE=M123PP;DTYPE=p;OUR EST; → UNCHECKED ←

Mass (Breit-Wigner) = 1571 ± 13 MeV — NODE=M123M;DTYPE=M

Full width (Breit-Wigner) = 132 ± 23 MeV (S = 1.1) — NODE=M123W;DTYPE=G

$f_2(1565)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\pi$	seen	774	NODE=M123215;DESIG=6;OUR EST; → UNCHECKED ←
$\pi^+\pi^-$	seen	773	DESIG=1;OUR EST;→ UNCHECKED ←
$\pi^0\pi^0$	seen	774	DESIG=3;OUR EST;→ UNCHECKED ←
$\rho^0\rho^0$	seen	126	DESIG=2;OUR EST;→ UNCHECKED ←
$2\pi^+2\pi^-$	seen	722	DESIG=5;OUR EST;→ UNCHECKED ←
$\eta\eta$	seen	563	DESIG=4;OUR EST;→ UNCHECKED ←
$\omega\omega$	seen	64	DESIG=7;OUR EST;→ UNCHECKED ←
$K\overline{K}$	seen	611	DESIG=9;OUR EST;→ UNCHECKED ←
$\gamma\gamma$	seen	785	DESIG=10;OUR EST;→ UNCHECKED ←

$\pi_1(1600)$

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

NODE=M164

See the review on "Spectroscopy of Light Meson Resonances."

Mass (T-Matrix Pole $\sqrt{s}$) = (1480–1680) $- i$ (150–300) MeV — NODE=M164TMP;DTYPE=M;OUR EST; → UNCHECKED ←

Mass (Breit-Wigner, $\eta\pi$ mode) = 1354 ± 25 MeV (S = 1.8) — NODE=M164MEP;DTYPE=M

Mass (Breit-Wigner, non-$\eta\pi$ mode) = 1645^{+40}_{-17} MeV (S = 1.3) — NODE=M164M;DTYPE=M

Full width (Breit-Wigner, $\eta\pi$ mode) = 330 ± 35 MeV — NODE=M164WEP;DTYPE=G

Full width (Breit-Wigner, non-$\eta\pi$ mode) = 370^{+50}_{-60} MeV — NODE=M164W;DTYPE=G

$\pi_1(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\pi\pi$	seen	795	NODE=M164215;DESIG=1;OUR EST; → UNCHECKED ←
$\rho^0\pi^-$	seen	631	DESIG=2
$f_2(1270)\pi^-$	not seen	304	DESIG=4
$b_1(1235)\pi$	seen	343	DESIG=5
$\eta'(958)\pi^-$	seen	532	DESIG=3
$\eta\pi$	seen	725	DESIG=7;OUR EST;→ UNCHECKED ←
$f_1(1285)\pi$	seen	300	DESIG=6;OUR EST;→ UNCHECKED ←

$a_1(1640)$

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

NODE=M161

Mass m = 1655 ± 16 MeV (S = 1.2) — NODE=M161M;DTYPE=M

Full width Γ = 250 ± 40 MeV (S = 1.8) — NODE=M161W;DTYPE=G

$a_1(1640)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi\pi\pi$	seen	800	NODE=M161215;DESIG=3;OUR EST; → UNCHECKED ←
$f_2(1270)\pi$	seen	314	DESIG=1;OUR EST;→ UNCHECKED ←
$\sigma\pi$	seen	–	DESIG=2;OUR EST;→ UNCHECKED ←
$\rho\pi$ $S-wave$	seen	638	DESIG=7;OUR EST;→ UNCHECKED ←
$\rho\pi$ $D-wave$	seen	638	DESIG=4;OUR EST;→ UNCHECKED ←
$\omega\pi\pi$	seen	607	DESIG=5;OUR EST;→ UNCHECKED ←
$f_1(1285)\pi$	seen	309	DESIG=6;OUR EST;→ UNCHECKED ←
$a_1(1260)\eta$	not seen	†	DESIG=8

$\eta_2(1645)$

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

NODE=M154

Mass $m = 1617 \pm 5$ MeV

NODE=M154M;DTYPE=M

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

NODE=M154W;DTYPE=G

$\eta_2(1645)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$a_2(1320)\pi$	seen	242	NODE=M154215;DESIG=1;OUR EST; → UNCHECKED ←
$K\overline{K}\pi$	seen	580	DESIG=2;OUR EST;→ UNCHECKED ←
$K^*\overline{K}$	seen	404	DESIG=3;OUR EST;→ UNCHECKED ←
$\eta\pi^+\pi^-$	seen	685	DESIG=4;OUR EST;→ UNCHECKED ←
$a_0(980)\pi$	seen	499	DESIG=5;OUR EST;→ UNCHECKED ←
$f_2(1270)\eta$	not seen	†	DESIG=6;OUR EST;→ UNCHECKED ←

$\omega(1650)$ [n]

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

NODE=M126

ERROR=3

Mass $m = 1670 \pm 30$ MeV [j]

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

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

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

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\rho\pi$	seen	647	NODE=M126215;DESIG=1;OUR EST; → UNCHECKED ←
$\rho(1450)\pi$	seen	145	DESIG=6
$\omega\pi\pi$	seen	617	DESIG=2;OUR EST;→ UNCHECKED ←
$\omega\eta$	seen	500	DESIG=4;OUR EST;→ UNCHECKED ←
e^+e^-	seen	835	DESIG=3;OUR EST;→ UNCHECKED ←
$\pi^0\gamma$	not seen	830	DESIG=5

$\omega_3(1670)$

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

NODE=M045

Mass $m = 1667 \pm 4$ MeV

NODE=M045M;DTYPE=M

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

NODE=M045W;DTYPE=G

$\omega_3(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\rho\pi$	seen	645	NODE=M045215;DESIG=1;OUR EST; → UNCHECKED ←
$\omega\pi\pi$	seen	615	DESIG=2;OUR EST;→ UNCHECKED ←
$b_1(1235)\pi$	possibly seen	361	DESIG=3;OUR EST;→ UNCHECKED ←

$\pi_2(1670)$

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

NODE=M034

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

NODE=M034M;DTYPE=M

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

NODE=M034W;DTYPE=G

$\pi_2(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
3π	(95.8±1.4) %		808	NODE=M034215;DESIG=20
$f_2(1270)\pi$	(56.3±3.2) %		327	DESIG=8
$\rho\pi$	(31 ±4) %		647	DESIG=2
$\sigma\pi$	(10 ±4) %		–	DESIG=13
$\pi(\pi\pi)_S$-wave	(8.7±3.4) %		–	DESIG=11
$\pi^\pm\pi^+\pi^-$	(53 ±4) %		806	DESIG=10
$K\overline{K}^*(892)+$ c.c.	(4.2±1.4) %		453	DESIG=5
$\omega\rho$	(2.7±1.1) %		302	DESIG=14
$\pi^\pm\gamma$	(7.0±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		291	DESIG=26

$\phi(1680)$

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

NODE=M067

Mass $m = 1680 \pm 20$ MeV [j]

NODE=M067M1;DTYPE=M;OUR EST; → UNCHECKED ←

Full width $\Gamma = 150 \pm 50$ MeV [j]

NODE=M067W1;DTYPE=G;OUR EST; → UNCHECKED ←

$\phi(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}^*(892)+$ c.c.	seen	462	NODE=M067215;DESIG=4;OUR EST; → UNCHECKED ←
$K^0_S K\pi$	seen	621	DESIG=5;OUR EST;→ UNCHECKED ←
$K\overline{K}$	seen	680	DESIG=3;OUR EST;→ UNCHECKED ←
e^+e^-	seen	840	DESIG=6;OUR EST;→ UNCHECKED ←
$\omega\pi\pi$	not seen	623	DESIG=1;OUR EST;→ UNCHECKED ←
$K^+K^-\pi^+\pi^-$	seen	544	DESIG=12;OUR EVAL;→ UNCHECKED ←
$\eta\phi$	seen	290	DESIG=10
$\eta\gamma$	seen	751	DESIG=13
$f_2'(1525)\gamma$	not seen	155	DESIG=15

$\rho_3(1690)$

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

NODE=M015

Mass $m = 1688.8 \pm 2.1$ MeV

NODE=M015M;DTYPE=M

Full width $\Gamma = 161 \pm 10$ MeV (S = 1.5)

NODE=M015W;DTYPE=G

$\rho_3(1690)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)	
4π	(71.1 ± 1.9) %		790	NODE=M015215;DESIG=2
$\pi^\pm\pi^+\pi^-\pi^0$	(67 ±22) %		787	DESIG=11
$\omega\pi$	(16 ± 6) %		655	DESIG=7
$\pi\pi$	(23.6 ± 1.3) %		834	DESIG=1
$K\overline{K}\pi$	(3.8 ± 1.2) %		629	DESIG=3
$K\overline{K}$	(1.58± 0.26) %	1.2	685	DESIG=4
$\eta\pi^+\pi^-$	seen		727	DESIG=13
$\rho(770)\eta$	seen		520	DESIG=14;OUR EST;→ UNCHECKED ←
$\pi\pi\rho$	seen		633	DESIG=5;OUR EST;→ UNCHECKED ←
$a_2(1320)\pi$	seen		307	DESIG=6;OUR EST;→ UNCHECKED ←
$\rho\rho$	seen		335	DESIG=8;OUR EST;→ UNCHECKED ←

$\rho(1700)$

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

NODE=M065

See the review on "Spectroscopy of Light Meson Resonances."

Mass $m = 1720 \pm 20$ MeV [j] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)

NODE=M065M0;DTYPE=M;OUR EST; → UNCHECKED ←

Full width $\Gamma = 250 \pm 100$ MeV [j] ($\eta\rho^0$ and $\pi^+\pi^-$ modes)

NODE=M065W0;DTYPE=G;OUR EST; → UNCHECKED ←

$\rho(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$2(\pi^+\pi^-)$	seen	803	NODE=M065215;DESIG=2;OUR EST; → UNCHECKED ←
$\rho\pi\pi$	seen	653	DESIG=12;OUR EST;→ UNCHECKED ←
$\rho^0\pi^+\pi^-$	seen	651	DESIG=1;OUR EST;→ UNCHECKED ←
$\rho^\pm\pi^\mp\pi^0$	seen	652	DESIG=9;OUR EST;→ UNCHECKED ←
$a_1(1260)\pi$	seen	404	DESIG=15;OUR EST;→ UNCHECKED ←
$h_1(1170)\pi$	seen	450	DESIG=16;OUR EST;→ UNCHECKED ←
$\pi(1300)\pi$	seen	349	DESIG=17;OUR EST;→ UNCHECKED ←
$\rho\rho$	seen	373	DESIG=18;OUR EST;→ UNCHECKED ←
$\pi^+\pi^-$	seen	849	DESIG=4;OUR EST;→ UNCHECKED ←
$\pi\pi$	seen	849	DESIG=13;OUR EST;→ UNCHECKED ←
$K\overline{K}^*(892)+$ c.c.	seen	496	DESIG=10;OUR EST;→ UNCHECKED ←
$\eta\rho$	seen	545	DESIG=11;OUR EST;→ UNCHECKED ←
$a_2(1320)\pi$	not seen	334	DESIG=14;OUR EST;→ UNCHECKED ←
$K\overline{K}$	seen	704	DESIG=5;OUR EST;→ UNCHECKED ←
e^+e^-	seen	860	DESIG=8;OUR EST;→ UNCHECKED ←
$\pi^0\omega$	seen	674	DESIG=6;OUR EST;→ UNCHECKED ←
$\pi^0\gamma$	not seen	855	DESIG=194
$f_0(1500)\gamma$	not seen	187	DESIG=195

$a_2(1700)$

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

NODE=M162

T-Matrix Pole $\sqrt{s} = (1630\text{–}1780) - i\ (60\text{–}250)$ MeV

Mass $m = 1706 \pm 14$ MeV (S = 1.2)

Full width $\Gamma = 380^{+60}_{-50}$ MeV (S = 3.9)

NODE=M162PP;DTYPE=p;OUR EST; → UNCHECKED ←

NODE=M162M;DTYPE=M

NODE=M162W;DTYPE=G

$a_2(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\pi$	(2.5±0.6) %	758	NODE=M162215;DESIG=4
$\eta'\pi$	seen	574	DESIG=8;OUR EVAL;→ UNCHECKED ←
$\gamma\gamma$	$(7.9\pm1.7)\times10^{-7}$	853	DESIG=1
$\rho\pi$	seen	669	DESIG=2;OUR EVAL;→ UNCHECKED ←
$f_2(1270)\pi$	seen	357	DESIG=3;OUR EVAL;→ UNCHECKED ←
$K\overline{K}$	(1.3±0.8) %	695	DESIG=5
$\omega\pi^-\pi^0$	seen	639	DESIG=6;OUR EVAL;→ UNCHECKED ←
$\omega\rho$	seen	347	DESIG=7;OUR EVAL;→ UNCHECKED ←

$f_0(1710)$

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

NODE=M068

See the review on "Spectroscopy of Light Meson Resonances."

T-matrix pole $\sqrt{s} = (1680\text{–}1820) - i\ (50\text{–}180)$ MeV

Mass (Breit-Wigner) $= 1733^{+8}_{-7}$ MeV (S = 1.5)

Full width (Breit-Wigner) $= 150^{+12}_{-10}$ MeV (S = 1.3)

NODE=M068PP;DTYPE=p;OUR EST; → UNCHECKED ←

NODE=M068M;DTYPE=M

NODE=M068W;DTYPE=G

$f_0(1710)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}$	seen	712	NODE=M068215;DESIG=2;OUR EST; → UNCHECKED ←
$\eta\eta$	seen	671	DESIG=1;OUR EST;→ UNCHECKED ←
$\eta\eta'$	not seen	417	DESIG=7;OUR EST;→ UNCHECKED ←
$\pi\pi$	seen	856	DESIG=5;OUR EST;→ UNCHECKED ←
$\gamma\gamma$	seen	866	DESIG=6;OUR EST;→ UNCHECKED ←
$\omega\omega$	seen	372	DESIG=4

$\pi(1800)$

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

NODE=M075

See the review on "Spectroscopy of Light Meson Resonances."

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

Full width $\Gamma = 215^{+7}_{-8}$ MeV

NODE=M075M;DTYPE=M

NODE=M075W;DTYPE=G

$\pi(1800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\pi^+\pi^-\pi^-$	seen	878	NODE=M075215;DESIG=10;OUR EST; → UNCHECKED ←
$f_0(500)\pi^-$	seen	–	DESIG=11;OUR EST;→ UNCHECKED ←
$f_0(980)\pi^-$	seen	624	DESIG=3;OUR EST;→ UNCHECKED ←
$f_0(1370)\pi^-$	seen	366	DESIG=1
$f_0(1500)\pi^-$	not seen	232	DESIG=12
$\rho\pi^-$	not seen	731	DESIG=2
$\eta\eta\pi^-$	seen	660	DESIG=7;OUR EST;→ UNCHECKED ←
$a_0(980)\eta$	seen	471	DESIG=5;OUR EST;→ UNCHECKED ←
$a_2(1320)\eta$	not seen	†	DESIG=13
$f_2(1270)\pi$	not seen	441	DESIG=14
$f_0(1370)\pi^-$	not seen	366	DESIG=15
$f_0(1500)\pi^-$	seen	232	DESIG=6;OUR EST;→ UNCHECKED ←
$\eta\eta'(958)\pi^-$	seen	373	DESIG=8;OUR EST;→ UNCHECKED ←
$K_0^*(1430)K^-$	seen	†	DESIG=4
$K^*(892)K^-$	not seen	568	DESIG=9

$\phi_3(1850)$

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

NODE=M054

Mass $m = 1854 \pm 7$ MeV
NODE=M054M;DTYPE=M

Full width $\Gamma = 87^{+28}_{-23}$ MeV (S = 1.2)
NODE=M054W;DTYPE=G

$\phi_3(1850)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}$	seen	785	NODE=M054215;DESIG=1;OUR EST; → UNCHECKED ←
$K\overline{K}^*(892)+$ c.c.	seen	602	DESIG=2;OUR EST;→ UNCHECKED ←

$\eta_2(1870)$

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

NODE=M101

Mass $m = 1842 \pm 8$ MeV
NODE=M101M;DTYPE=M

Full width $\Gamma = 225 \pm 14$ MeV
NODE=M101W;DTYPE=G

$\eta_2(1870)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\pi\pi$	seen	816	NODE=M101225;DESIG=1;OUR EVAL; → UNCHECKED ←
$a_2(1320)\pi$	seen	434	DESIG=4;OUR EVAL;→ UNCHECKED ←
$f_2(1270)\eta$	seen	119	DESIG=8;OUR EVAL;→ UNCHECKED ←
$a_0(980)\pi$	seen	651	DESIG=2;OUR EVAL;→ UNCHECKED ←
$\gamma\gamma$	seen	921	DESIG=9

$\pi_2(1880)$

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

NODE=M185

Mass $m = 1874^{+26}_{-5}$ MeV (S = 1.6)
NODE=M185M;DTYPE=M

Full width $\Gamma = 237^{+33}_{-30}$ MeV (S = 1.2)
NODE=M185W;DTYPE=G

$\pi_2(1880)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\eta\pi^-$	seen	702	NODE=M185215;DESIG=1;OUR EVAL; → UNCHECKED ←
$a_0(980)\eta$	seen	528	DESIG=2;OUR EVAL;→ UNCHECKED ←
$a_2(1320)\eta$	seen	76	DESIG=3;OUR EVAL;→ UNCHECKED ←
$f_0(1500)\pi$	seen	294	DESIG=4;OUR EVAL;→ UNCHECKED ←
$f_1(1285)\pi$	seen	485	DESIG=5;OUR EVAL;→ UNCHECKED ←
$\omega\pi^-\pi^0$	seen	744	DESIG=6;OUR EVAL;→ UNCHECKED ←

$f_2(1950)$

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

NODE=M135

T-Matrix Pole $\sqrt{s} = (1830\text{–}2020) - i\ (110\text{–}220)$ MeV
NODE=M135PP;DTYPE=p;OUR EST; → UNCHECKED ←

Mass (Breit-Wigner) = 1936 ± 12 MeV (S = 1.3)
NODE=M135M;DTYPE=M

Full width (Breit-Wigner) = 464 ± 24 MeV
NODE=M135W;DTYPE=G

$f_2(1950)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K^*(892)\overline{K}^*(892)$	seen	377	NODE=M135215;DESIG=1
$\pi^+\pi^-$	seen	958	DESIG=2;OUR EST;→ UNCHECKED ←
$\pi^0\pi^0$	seen	959	DESIG=10;OUR EST;→ UNCHECKED ←
4π	seen	921	DESIG=7;OUR EST;→ UNCHECKED ←
$\eta\eta$	seen	798	DESIG=6;OUR EST;→ UNCHECKED ←
$K\overline{K}$	seen	833	DESIG=8;OUR EST;→ UNCHECKED ←
$\gamma\gamma$	seen	968	DESIG=9;OUR EST;→ UNCHECKED ←
$p\overline{p}$	seen	238	DESIG=12

$a_4(1970)$

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

NODE=M017

Mass $m = 1967 \pm 16$ MeV (S = 2.1)
Full width $\Gamma = 324^{+15}_{-18}$ MeV

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

$a_4(1970)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$K\overline{K}$	seen	851	NODE=M017215;DESIG=1
$\pi^+\pi^-\pi^0$	seen	959	DESIG=2
$\rho\pi$	seen	825	DESIG=5;OUR EST;→ UNCHECKED ←
$f_2(1270)\pi$	seen	559	DESIG=6;OUR EST;→ UNCHECKED ←
$\omega\pi^-\pi^0$	seen	801	DESIG=7;OUR EST;→ UNCHECKED ←
$\omega\rho$	seen	601	DESIG=8
$\eta\pi$	seen	902	DESIG=3
$\eta'(958)\pi$	seen	743	DESIG=4;OUR EST;→ UNCHECKED ←

$f_2(2010)$

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

NODE=M106

Mass $m = 2010^{+60}_{-80}$ MeV
Full width $\Gamma = 200 \pm 60$ MeV

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

$f_2(2010)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\phi\phi$	seen	†	NODE=M106215;DESIG=1;OUR EST; → UNCHECKED ←
$K\overline{K}$	seen	876	DESIG=2

$f_0(2020)$

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

NODE=M156

T-Matrix Pole $\sqrt{s} = (1870\text{–}2080) - i\ (120\text{–}240)$ MeV
Mass (Breit-Wigner) $= 1982^{+54.1}_{-\ 3.0}$ MeV
Full width (Breit-Wigner) $= 440 \pm 50$ MeV

NODE=M156PP;DTYPE=p;OUR EST; → UNCHECKED ←
NODE=M156M;DTYPE=M
NODE=M156W;DTYPE=G

$f_0(2020)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\rho\pi\pi$	seen	814	NODE=M156215;DESIG=1;OUR EST; → UNCHECKED ←
$\pi^0\pi^0$	seen	982	DESIG=2;OUR EST;→ UNCHECKED ←
$\rho\rho$	seen	617	DESIG=3;OUR EST;→ UNCHECKED ←
$\omega\omega$	seen	608	DESIG=4;OUR EST;→ UNCHECKED ←
$\eta\eta$	seen	826	DESIG=5
$\eta'\eta'$	seen	254	DESIG=6

$f_4(2050)$

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

NODE=M016

Mass $m = 2018 \pm 11$ MeV (S = 2.1)
Full width $\Gamma = 237 \pm 18$ MeV (S = 1.9)

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

$f_4(2050)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\omega\omega$	seen	637	NODE=M016215;DESIG=6
$\pi\pi$	(17.0±1.5) %	1000	DESIG=1
$K\overline{K}$	$(\ 6.8^{+3.4}_{-1.8})\times10^{-3}$	880	DESIG=2
$\eta\eta$	$(\ 2.1\pm0.8)\times10^{-3}$	848	DESIG=3
$4\pi^0$	$<$ 1.2 %	964	DESIG=5
$\gamma\gamma$	seen	1009	DESIG=4;OUR EVAL;→ UNCHECKED ←
$a_2(1320)\pi$	seen	567	DESIG=7

$f_2(2150)$

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

NODE=M042

Mass $m = 2157 \pm 12$ MeV
NODE=M042M;DTYPE=M

Full width $\Gamma = 152 \pm 30$ MeV (S = 1.4)
NODE=M042W;DTYPE=G

$f_2(2150)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\eta\eta$	seen	929	NODE=M042215;DESIG=2;OUR EST; → UNCHECKED ←
$K\overline{K}$	seen	959	DESIG=3;OUR EST;→ UNCHECKED ←
$f_2(1270)\eta$	seen	542	DESIG=4;OUR EST;→ UNCHECKED ←
$a_2(1320)\pi$	seen	666	DESIG=5;OUR EST;→ UNCHECKED ←
$p\overline{p}$	seen	532	DESIG=6

$\phi(2170)$

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

NODE=M103

Mass $m = 2164 \pm 5$ MeV
NODE=M103M;DTYPE=M

Full width $\Gamma = 88^{+26}_{-21}$ MeV (S = 2.5)
NODE=M103W;DTYPE=G

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
e^+e^-	seen	1082	NODE=M103215;DESIG=1;OUR EVAL; → UNCHECKED ←
$\phi\eta$	seen	728	DESIG=5;OUR EVAL;→ UNCHECKED ←
$\phi\eta'$	seen	439	DESIG=11;OUR EVAL;→ UNCHECKED ←
$\phi\pi\pi$	seen	815	DESIG=9
$\phi f_0(980)$	seen	401	DESIG=2;OUR EVAL;→ UNCHECKED ←
$K^+K^-f_0(980) \rightarrow K^+K^-\pi^+\pi^-$	seen	–	DESIG=6
$K^+K^-f_0(980) \rightarrow K^+K^-\pi^0\pi^0$	seen	–	DESIG=7
$K^{*0}K^\pm\pi^\mp$	not seen	762	DESIG=8
$K^*(892)^0\overline{K}^*(892)^0$	not seen	613	DESIG=10

$f_2(2300)$

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

NODE=M107

Mass $m = 2297 \pm 28$ MeV
NODE=M107M;DTYPE=M

Full width $\Gamma = 150 \pm 40$ MeV
NODE=M107W;DTYPE=G

$f_2(2300)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\phi\phi$	seen	529	NODE=M107215;DESIG=1
$K\overline{K}$	seen	1037	DESIG=2
$\gamma\gamma$	seen	1149	DESIG=3
$\Lambda\overline{\Lambda}$	seen	273	DESIG=4

$f_2(2340)$

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

NODE=M108

Mass $m = 2346^{+21}_{-10}$ MeV
NODE=M108M;DTYPE=M

Full width $\Gamma = 331^{+27}_{-18}$ MeV
NODE=M108W;DTYPE=G

$f_2(2340)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\phi\phi$	seen	580	NODE=M108215;DESIG=1;OUR EST; → UNCHECKED ←
$\eta\eta$	seen	1037	DESIG=2
$\eta'\eta'$	seen	677	DESIG=3

NOTES

[a] See the review on "Form Factors for Radiative Pion and Kaon Decays" for definitions and details. LINKAGE=SWK

[b] Measurements of $\Gamma(e^+\nu_e)/\Gamma(\mu^+\nu_\mu)$ always include decays with γ's, and measurements of $\Gamma(e^+\nu_e\gamma)$ and $\Gamma(\mu^+\nu_\mu\gamma)$ never include low-energy γ's. Therefore, since no clean separation is possible, we consider the modes with γ's to be subreactions of the modes without them, and let $[\Gamma(e^+\nu_e) + \Gamma(\mu^+\nu_\mu)]/\Gamma_{\text{total}} = 100\%$. LINKAGE=LX2

[c] See the $\pi^\pm$ Particle Listings for the energy limits used in this measurement; low-energy γ's are not included. LINKAGE=LX1

[d] Derived from an analysis of neutrino-oscillation experiments. LINKAGE=CL

[e] Forbidden by angular momentum conservation. LINKAGE=JV

[f] C parity forbids this to occur as a single-photon process. LINKAGE=CS

[g] As measured in $e^+e^- \to \rho^0$. LINKAGE=EEN

[h] As measured in $e^+e^- \to \pi^+\pi^-\pi^0$ and τ decays. LINKAGE=EER

[i] The $\omega\rho$ interference is then due to $\omega\rho$ mixing only, and is expected to be small. If $e\mu$ universality holds, $\Gamma(\rho^0 \to \mu^+\mu^-) = \Gamma(\rho^0 \to e^+e^-) \times 0.99785$. LINKAGE=MD2

[j] Our estimate. See the Particle Listings for details. LINKAGE=BH

[k] 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

[l] See also the $\omega(1650)$. LINKAGE=MDE

[n] See also the $\omega(1420)$. LINKAGE=MDF