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'): $c_1(u\overline{u} + d\overline{d}) + c_2(s\overline{s})$

$\pi^{\pm}$

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

Mass $m = 139.57061 \pm 0.00024$ MeV (S = 1.6)
Mean life $\tau = (2.6033 \pm 0.0005) \times 10^{-8}$ s (S = 1.2)
$c\tau = 7.8045$ m

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

$F_V = 0.0254 \pm 0.0017$
$F_A = 0.0119 \pm 0.0001$
F_V slope parameter $a = 0.10 \pm 0.06$
$R = 0.059^{+0.009}_{-0.008}$

π^- modes are charge conjugates of the modes below.

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
$\mu^+\nu_\mu\gamma$	[c]	$(2.00 \pm 0.25) \times 10^{-4}$		30
$e^+\nu_e$	[b]	$(1.230 \pm 0.004) \times 10^{-4}$		70
$e^+\nu_e\gamma$	[c]	$(7.39 \pm 0.05) \times 10^{-7}$		70
$e^+\nu_e\pi^0$		$(1.036 \pm 0.006) \times 10^{-8}$		4
$e^+\nu_e e^+e^-$		$(3.2 \pm 0.5) \times 10^{-9}$		70
$e^+\nu_e\nu\overline{\nu}$		$< 5 \times 10^{-6}$	90%	70
Lepton Family number (*LF*) or Lepton number (*L*) violating modes				
$\mu^+\overline{\nu}_e$	*L* [d]	$< 1.5 \times 10^{-3}$	90%	30
$\mu^+\nu_e$	*LF* [d]	$< 8.0 \times 10^{-3}$	90%	30
$\mu^-e^+e^+\nu$	*LF*	$< 1.6 \times 10^{-6}$	90%	30

π^0

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

Mass $m = 134.9770 \pm 0.0005$ MeV (S = 1.1)
$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
Mean life $\tau = (8.52 \pm 0.18) \times 10^{-17}$ s (S = 1.2)
$c\tau = 25.5$ nm

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.).

π^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
2γ		(98.823 ± 0.034) %	S=1.5	67
$e^+ e^- \gamma$		(1.174 ± 0.035) %	S=1.5	67
γ positronium		$(1.82 \pm 0.29) \times 10^{-9}$		67
$e^+ e^+ e^- e^-$		$(3.34 \pm 0.16) \times 10^{-5}$		67
$e^+ e^-$		$(6.46 \pm 0.33) \times 10^{-8}$		67
4γ		$< 2 \times 10^{-8}$	CL=90%	67
$\nu\overline{\nu}$	[e]	$< 2.7 \times 10^{-7}$	CL=90%	67
$\nu_e \overline{\nu}_e$		$< 1.7 \times 10^{-6}$	CL=90%	67
$\nu_\mu \overline{\nu}_\mu$		$< 1.6 \times 10^{-6}$	CL=90%	67
$\nu_\tau \overline{\nu}_\tau$		$< 2.1 \times 10^{-6}$	CL=90%	67
$\gamma \nu \overline{\nu}$		$< 6 \times 10^{-4}$	CL=90%	67
Charge conjugation (C) or Lepton Family number (LF) violating modes				
3γ	C	$< 3.1 \times 10^{-8}$	CL=90%	67
$\mu^+ e^-$	LF	$< 3.8 \times 10^{-10}$	CL=90%	26
$\mu^- e^+$	LF	$< 3.4 \times 10^{-9}$	CL=90%	26
$\mu^+ e^- + \mu^- e^+$	LF	$< 3.6 \times 10^{-10}$	CL=90%	26

η

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

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

C-nonconserving decay parameters

$\pi^+\pi^-\pi^0$ left-right asymmetry $= (0.09^{+0.11}_{-0.12}) \times 10^{-2}$
$\pi^+\pi^-\pi^0$ sextant asymmetry $= (0.12^{+0.10}_{-0.11}) \times 10^{-2}$
$\pi^+\pi^-\pi^0$ quadrant asymmetry $= (-0.09 \pm 0.09) \times 10^{-2}$
$\pi^+\pi^-\gamma$ left-right asymmetry $= (0.9 \pm 0.4) \times 10^{-2}$
$\pi^+\pi^-\gamma$ β (D-wave) $= -0.02 \pm 0.07$ (S = 1.3)

CP-nonconserving decay parameters

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

Dalitz plot parameter

$\pi^0\pi^0\pi^0$ $\alpha = -0.0288 \pm 0.0012$ (S = 1.1)
Parameter Λ in $\eta \to \ell^+\ell^-\gamma$ decay $= 0.716 \pm 0.011$ GeV/c^2

η DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Neutral modes				
neutral modes		(72.12 ± 0.34) %	S=1.2	–
2γ		(39.41 ± 0.20) %	S=1.1	274
$3\pi^0$		(32.68 ± 0.23) %	S=1.1	179
$\pi^0 2\gamma$		$(2.56\pm0.22)\times10^{-4}$		257
$2\pi^0 2\gamma$		$<1.2\times10^{-3}$	CL=90%	238
4γ		$<2.8\times10^{-4}$	CL=90%	274
invisible		$<1.0\times10^{-4}$	CL=90%	–
Charged modes				
charged modes		(28.10 ± 0.34) %	S=1.2	–
$\pi^+\pi^-\pi^0$		(22.92 ± 0.28) %	S=1.2	174
$\pi^+\pi^-\gamma$		(4.22 ± 0.08) %	S=1.1	236
$e^+e^-\gamma$		$(6.9\pm0.4)\times10^{-3}$	S=1.3	274
$\mu^+\mu^-\gamma$		$(3.1\pm0.4)\times10^{-4}$		253
e^+e^-		$<7\times10^{-7}$	CL=90%	274
$\mu^+\mu^-$		$(5.8\pm0.8)\times10^{-6}$		253
$2e^+2e^-$		$(2.40\pm0.22)\times10^{-5}$		274
$\pi^+\pi^-e^+e^-(\gamma)$		$(2.68\pm0.11)\times10^{-4}$		235
$e^+e^-\mu^+\mu^-$		$<1.6\times10^{-4}$	CL=90%	253
$2\mu^+2\mu^-$		$<3.6\times10^{-4}$	CL=90%	161
$\mu^+\mu^-\pi^+\pi^-$		$<3.6\times10^{-4}$	CL=90%	113
$\pi^+e^-\overline{\nu}_e+$ c.c.		$<1.7\times10^{-4}$	CL=90%	256
$\pi^+\pi^-2\gamma$		$<2.1\times10^{-3}$		236
$\pi^+\pi^-\pi^0\gamma$		$<5\times10^{-4}$	CL=90%	174
$\pi^0\mu^+\mu^-\gamma$		$<3\times10^{-6}$	CL=90%	210
Charge conjugation (C), Parity (P), Charge conjugation × Parity (CP), or Lepton Family number (LF) violating modes				
$\pi^0\gamma$	C	$<9\times10^{-5}$	CL=90%	257
$\pi^+\pi^-$	P,CP	$<1.3\times10^{-5}$	CL=90%	236
$2\pi^0$	P,CP	$<3.5\times10^{-4}$	CL=90%	238
$2\pi^0\gamma$	C	$<5\times10^{-4}$	CL=90%	238
$3\pi^0\gamma$	C	$<6\times10^{-5}$	CL=90%	179
3γ	C	$<1.6\times10^{-5}$	CL=90%	274
$4\pi^0$	P,CP	$<6.9\times10^{-7}$	CL=90%	40
$\pi^0e^+e^-$	C	[f] $<8\times10^{-6}$	CL=90%	257
$\pi^0\mu^+\mu^-$	C	[f] $<5\times10^{-6}$	CL=90%	210
$\mu^+e^-+\mu^-e^+$	LF	$<6\times10^{-6}$	CL=90%	264

$f_0(500)$ [g]

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

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	–

$\rho(770)$ [h]

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

Mass $m = 775.26 \pm 0.25$ MeV
Full width $\Gamma = 149.1 \pm 0.8$ MeV
$\Gamma_{ee} = 7.04 \pm 0.06$ keV

$\rho(770)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$		$\sim$ 100 %		363
		$\rho(770)^\pm$ decays		
$\pi^\pm\gamma$		$(4.5 \pm 0.5) \times 10^{-4}$	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		
$\pi^+\pi^-\gamma$		$(9.9 \pm 1.6) \times 10^{-3}$		362
$\pi^0\gamma$		$(4.7 \pm 0.6) \times 10^{-4}$	S=1.4	376
$\eta\gamma$		$(3.00 \pm 0.21) \times 10^{-4}$		194
$\pi^0\pi^0\gamma$		$(4.5 \pm 0.8) \times 10^{-5}$		363
$\mu^+\mu^-$	[i]	$(4.55 \pm 0.28) \times 10^{-5}$		373
e^+e^-	[i]	$(4.72 \pm 0.05) \times 10^{-5}$		388
$\pi^+\pi^-\pi^0$		$(1.01^{+0.54}_{-0.36} \pm 0.34) \times 10^{-4}$		323
$\pi^+\pi^-\pi^+\pi^-$		$(1.8 \pm 0.9) \times 10^{-5}$		251
$\pi^+\pi^-\pi^0\pi^0$		$(1.6 \pm 0.8) \times 10^{-5}$		257
$\pi^0 e^+e^-$		$< 1.2 \times 10^{-5}$	CL=90%	376

$\omega(782)$

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

Mass $m = 782.65 \pm 0.12$ MeV (S = 1.9)
Full width $\Gamma = 8.49 \pm 0.08$ MeV
$\Gamma_{ee} = 0.60 \pm 0.02$ keV

$\omega(782)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi^+\pi^-\pi^0$	(89.3 ± 0.6) %		327
$\pi^0\gamma$	(8.40 ± 0.22) %	S=1.8	380
$\pi^+\pi^-$	(1.53 ± 0.06) %		366
neutrals (excluding $\pi^0\gamma$)	$(7 \; {}^{+7}_{-4}) \times 10^{-3}$	S=1.1	–
$\eta\gamma$	$(4.5 \pm 0.4) \times 10^{-4}$	S=1.1	200
$\pi^0 e^+ e^-$	$(7.7 \pm 0.6) \times 10^{-4}$		380
$\pi^0\mu^+\mu^-$	$(1.34 \pm 0.18) \times 10^{-4}$	S=1.5	349
e^+e^-	$(7.36 \pm 0.15) \times 10^{-5}$	S=1.5	391
$\pi^+\pi^-\pi^0\pi^0$	$< 2 \times 10^{-4}$	CL=90%	262
$\pi^+\pi^-\gamma$	$< 3.6 \times 10^{-3}$	CL=95%	366
$\pi^+\pi^-\pi^+\pi^-$	$< 1 \times 10^{-3}$	CL=90%	256
$\pi^0\pi^0\gamma$	$(6.7 \pm 1.1) \times 10^{-5}$		367
$\eta\pi^0\gamma$	$< 3.3 \times 10^{-5}$	CL=90%	162
$\mu^+\mu^-$	$(7.4 \pm 1.8) \times 10^{-5}$		377
3γ	$< 1.9 \times 10^{-4}$	CL=95%	391
Charge conjugation (C) violating modes			
$\eta\pi^0$ C	$< 2.2 \times 10^{-4}$	CL=90%	162
$2\pi^0$ C	$< 2.2 \times 10^{-4}$	CL=90%	367
$3\pi^0$ C	$< 2.3 \times 10^{-4}$	CL=90%	330
invisible	$< 7 \times 10^{-5}$	CL=90%	–

$\eta'(958)$

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

Mass $m = 957.78 \pm 0.06$ MeV
Full width $\Gamma = 0.196 \pm 0.009$ MeV

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\pi^+\pi^-\eta$	(42.6 ± 0.7) %		232
$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(28.9 ± 0.5) %		165
$\pi^0\pi^0\eta$	(22.8 ± 0.8) %		239
$\omega\gamma$	(2.62 ± 0.13) %		159
ωe^+e^-	$(2.0 \pm 0.4) \times 10^{-4}$		159
$\gamma\gamma$	(2.22 ± 0.08) %		479
$3\pi^0$	$(2.54 \pm 0.18) \times 10^{-3}$		430
$\mu^+\mu^-\gamma$	$(1.09 \pm 0.27) \times 10^{-4}$		467
$\pi^+\pi^-\mu^+\mu^-$	$< 2.9 \times 10^{-5}$	90%	401
$\pi^+\pi^-\pi^0$	$(3.61 \pm 0.17) \times 10^{-3}$		428
$(\pi^+\pi^-\pi^0)$ S-wave	$(3.8 \pm 0.5) \times 10^{-3}$		428

$\pi^\mp \rho^\pm$	$(7.4 \pm 2.3) \times 10^{-4}$			106
$\pi^0 \rho^0$	< 4	%	90%	111
$2(\pi^+\pi^-)$	$(8.4 \pm 0.9) \times 10^{-5}$			372
$\pi^+\pi^- 2\pi^0$	$(1.8 \pm 0.4) \times 10^{-4}$			376
$2(\pi^+\pi^-)$ neutrals	< 1	%	95%	–
$2(\pi^+\pi^-)\pi^0$	< 1.8	$\times 10^{-3}$	90%	298
$2(\pi^+\pi^-)2\pi^0$	< 1	%	95%	197
$3(\pi^+\pi^-)$	< 3.1	$\times 10^{-5}$	90%	189
$K^\pm \pi^\mp$	< 4	$\times 10^{-5}$	90%	334
$\pi^+\pi^- e^+ e^-$	$(2.4 {}^{+1.3}_{-1.0}) \times 10^{-3}$			458
$\pi^+ e^- \nu_e +$ c.c.	< 2.1	$\times 10^{-4}$	90%	469
$\gamma e^+ e^-$	$(4.73 \pm 0.30) \times 10^{-4}$			479
$\pi^0 \gamma\gamma$	$(3.20 \pm 0.24) \times 10^{-3}$			469
$\pi^0 \gamma\gamma$(non resonant)	$(6.2 \pm 0.9) \times 10^{-4}$			–
$4\pi^0$	< 3.2	$\times 10^{-4}$	90%	380
$e^+ e^-$	< 5.6	$\times 10^{-9}$	90%	479
invisible	< 5	$\times 10^{-4}$	90%	–

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	[f] < 1.4	$\times 10^{-3}$	90%	469
$\eta e^+ e^-$	C	[f] < 2.4	$\times 10^{-3}$	90%	322
3γ	C	< 1.1	$\times 10^{-4}$	90%	479
$\mu^+\mu^-\pi^0$	C	[f] < 6.0	$\times 10^{-5}$	90%	445
$\mu^+\mu^-\eta$	C	[f] < 1.5	$\times 10^{-5}$	90%	273
$e\mu$	LF	< 4.7	$\times 10^{-4}$	90%	473

$f_0(980)$ [j]

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

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

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

$a_0(980)$ [j]

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

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

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

$\phi(1020)$

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

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

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
K^+K^-	(49.2 ± 0.5) %	S=1.3	127
$K^0_L K^0_S$	(34.0 ± 0.4) %	S=1.3	110
$\rho\pi + \pi^+\pi^-\pi^0$	(15.24 ± 0.33) %	S=1.2	–
$\eta\gamma$	(1.303 ± 0.025) %	S=1.2	363
$\pi^0\gamma$	$(1.30 \pm 0.05) \times 10^{-3}$		501
$\ell^+\ell^-$	—		510
e^+e^-	$(2.973 \pm 0.034) \times 10^{-4}$	S=1.3	510
$\mu^+\mu^-$	$(2.86 \pm 0.19) \times 10^{-4}$		499
ηe^+e^-	$(1.08 \pm 0.04) \times 10^{-4}$		363
$\pi^+\pi^-$	$(7.3 \pm 1.3) \times 10^{-5}$		490
$\omega\pi^0$	$(4.7 \pm 0.5) \times 10^{-5}$		171
$\omega\gamma$	< 5 %	CL=84%	209
$\rho\gamma$	$< 1.2 \times 10^{-5}$	CL=90%	215
$\pi^+\pi^-\gamma$	$(4.1 \pm 1.3) \times 10^{-5}$		490
$f_0(980)\gamma$	$(3.22 \pm 0.19) \times 10^{-4}$	S=1.1	29
$\pi^0\pi^0\gamma$	$(1.12 \pm 0.06) \times 10^{-4}$		492
$\pi^+\pi^-\pi^+\pi^-$	$(3.9 {}^{+2.8}_{-2.2}) \times 10^{-6}$		410
$\pi^+\pi^+\pi^-\pi^-\pi^0$	$< 4.6 \times 10^{-6}$	CL=90%	342
$\pi^0 e^+e^-$	$(1.33 {}^{+0.07}_{-0.10}) \times 10^{-5}$		501
$\pi^0\eta\gamma$	$(7.27 \pm 0.30) \times 10^{-5}$	S=1.5	346
$a_0(980)\gamma$	$(7.6 \pm 0.6) \times 10^{-5}$		39
$K^0\overline{K}^0\gamma$	$< 1.9 \times 10^{-8}$	CL=90%	110
$\eta'(958)\gamma$	$(6.22 \pm 0.21) \times 10^{-5}$		60
$\eta\pi^0\pi^0\gamma$	$< 2 \times 10^{-5}$	CL=90%	293
$\mu^+\mu^-\gamma$	$(1.4 \pm 0.5) \times 10^{-5}$		499
$\rho\gamma\gamma$	$< 1.2 \times 10^{-4}$	CL=90%	215
$\eta\pi^+\pi^-$	$< 1.8 \times 10^{-5}$	CL=90%	288

$\eta\mu^+\mu^-$		$<$ 9.4	$\times 10^{-6}$	CL=90%	321
$\eta U \rightarrow \eta e^+ e^-$		$<$ 1	$\times 10^{-6}$	CL=90%	–
invisible		$<$ 1.7	$\times 10^{-4}$	CL=90%	–
Lepton Family number (LF) violating modes					
$e^\pm\mu^\mp$	*LF*	$<$ 2	$\times 10^{-6}$	CL=90%	504

$h_1(1170)$

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

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

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

$b_1(1235)$

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

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

$b_1(1235)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\omega\pi$	seen		348
[D/S amplitude ratio $= 0.277 \pm 0.027$]			
$\pi^\pm\gamma$	$(1.6\pm0.4)\times10^{-3}$		607
$\eta\rho$	seen		†
$\pi^+\pi^+\pi^-\pi^0$	$<$ 50 %	84%	535
$K^*(892)^\pm K^\mp$	seen		†
$(K\overline{K})^\pm\pi^0$	$<$ 8 %	90%	248
$K^0_S K^0_L \pi^\pm$	$<$ 6 %	90%	235
$K^0_S K^0_S \pi^\pm$	$<$ 2 %	90%	235
$\phi\pi$	$<$ 1.5 %	84%	147

$a_1(1260)$ [k]

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

Mass $m = 1230 \pm 40$ MeV [l]
Full width $\Gamma = 250$ to 600 MeV

$a_1(1260)$ 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
$K\,K\,\pi$	seen	250
$K^*(892)\,K$	seen	†
$\pi\gamma$	seen	608

$f_2(1270)$

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

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

$f_2(1270)$ 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
$\pi^+\pi^-2\pi^0$	$(\ 7.7\ ^{+1.1}_{-3.2})$ %	S=1.2	563
$K\overline{K}$	$(\ 4.6\ ^{+0.5}_{-0.4})$ %	S=2.7	404
$2\pi^+2\pi^-$	$(\ 2.8\ \pm 0.4)$ %	S=1.2	560
$\eta\eta$	$(\ 4.0\ \pm 0.8) \times 10^{-3}$	S=2.1	326
$4\pi^0$	$(\ 3.0\ \pm 1.0) \times 10^{-3}$		565
$\gamma\gamma$	$(\ 1.42 \pm 0.24) \times 10^{-5}$	S=1.4	638
$\eta\pi\pi$	$<\ 8\ \times 10^{-3}$	CL=95%	478
$K^0K^-\pi^+ +$ c.c.	$<\ 3.4\ \times 10^{-3}$	CL=95%	293
e^+e^-	$<\ 6\ \times 10^{-10}$	CL=90%	638

$f_1(1285)$

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

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

$f_1(1285)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
4π	$(33.5^{+\ 2.0}_{-\ 1.8})$ %	S=1.3	568
$\pi^0\pi^0\pi^+\pi^-$	$(22.3^{+\ 1.3}_{-\ 1.2})$ %	S=1.3	566
$2\pi^+2\pi^-$	$(11.2^{+\ 0.7}_{-\ 0.6})$ %	S=1.3	563

$\rho^0\pi^+\pi^-$	$(11.2^{+0.7}_{-0.6})$ %	S=1.3	336
$\rho^0\rho^0$	seen		†
$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	568
$\eta\pi^+\pi^-$	(35 ± 15) %		479
$\eta\pi\pi$	$(52.0^{+1.8}_{-2.1})$ %	S=1.2	482
$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	(38 ± 4) %		238
$\eta\pi\pi$ [excluding $a_0(980)\pi$]	(14 ± 4) %		482
$K\overline{K}\pi$	(9.1 ± 0.4) %	S=1.1	308
$K\overline{K}^*(892)$	not seen		†
$\pi^+\pi^-\pi^0$	$(3.0 \pm 0.9) \times 10^{-3}$		603
$\rho^\pm\pi^\mp$	$< 3.1 \times 10^{-3}$	CL=95%	390
$\gamma\rho^0$	(5.3 ± 1.2) %	S=2.9	406
$\phi\gamma$	$(7.5 \pm 2.7) \times 10^{-4}$		236

$\eta(1295)$

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

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

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

$\pi(1300)$

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

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

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

$a_2(1320)$

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

Mass $m = 1316.9 \pm 0.9$ MeV (S = 1.9)
Full width $\Gamma = 107 \pm 5$ MeV [l]

$a_2(1320)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
3π	(70.1 ±2.7) %	S=1.2	623
$\eta\pi$	(14.5 ±1.2) %		535
$\omega\pi\pi$	(10.6 ±3.2) %	S=1.3	364
$K\overline{K}$	(4.9 ±0.8) %		436
$\eta'(958)\pi$	(5.5 ±0.9) $\times 10^{-3}$		287
$\pi^{\pm}\gamma$	(2.91±0.27) $\times 10^{-3}$		651
$\gamma\gamma$	(9.4 ±0.7) $\times 10^{-6}$		658
e^+e^-	$<$ 5 $\times 10^{-9}$	CL=90%	658

$f_0(1370)$ [j]

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

Mass m = 1200 to 1500 MeV
Full width Γ = 200 to 500 MeV

$f_0(1370)$ 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	†
$2(\pi\pi)_{S\text{-wave}}$	seen	–
$\pi(1300)\pi$	seen	†
$a_1(1260)\pi$	seen	35
$\eta\eta$	seen	411
$K\overline{K}$	seen	475
$K\overline{K}n\pi$	not seen	†
6π	not seen	508
$\omega\omega$	not seen	†
$\gamma\gamma$	seen	685
e^+e^-	not seen	685

$\pi_1(1400)$ [n]

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

Mass m = 1354 ± 25 MeV (S = 1.8)
Full width Γ = 330 ± 35 MeV

$\pi_1(1400)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi^0$	seen	557
$\eta\pi^-$	seen	556
$\rho(770)\pi$	not seen	442

$\eta(1405)$ [o]

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

Mass $m = 1408.8 \pm 2.0$ MeV [l] (S = 2.2)
Full width $\Gamma = 50.1 \pm 2.6$ MeV [l] (S = 1.7)

$\eta(1405)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\overline{K}\pi$	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

$h_1(1415)$

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

Mass $m = 1416 \pm 8$ MeV (S = 1.5)
Full width $\Gamma = 90 \pm 15$ MeV

$f_1(1420)$ [p]

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

Mass $m = 1426.3 \pm 0.9$ MeV (S = 1.1)
Full width $\Gamma = 54.5 \pm 2.6$ MeV

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

$\omega(1420)$ [q]

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

Mass m (1400–1450) MeV
Full width Γ (180–250) MeV

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

$a_0(1450)$ [j]

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

Mass $m = 1474 \pm 19$ MeV
Full width $\Gamma = 265 \pm 13$ MeV

$a_0(1450)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\eta$	0.093±0.020	627
$\pi\eta'(958)$	0.033±0.017	410
$K\overline{K}$	0.082±0.028	547
$\omega\pi\pi$	**DEFINED AS 1**	484
$a_0(980)\pi\pi$	seen	342
$\gamma\gamma$	seen	737

$\rho(1450)$ [r]

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

Mass $m = 1465 \pm 25$ MeV [l]
Full width $\Gamma = 400 \pm 60$ MeV [l]

$\rho(1450)$ 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
$K\overline{K}$	seen	541
K^+K^-	seen	541

$K\overline{K}^*(892)+$ 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

$\eta(1475)$

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

Mass $m = 1475 \pm 4$ MeV (S = 1.4)
Full width $\Gamma = 90 \pm 9$ MeV (S = 1.6)

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

$f_0(1500)$ [n]

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

Mass $m = 1506 \pm 6$ MeV (S = 1.4)
Full width $\Gamma = 112 \pm 9$ MeV

$f_0(1500)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\pi\pi$	(34.5±2.2) %	1.2	741
$\pi^+\pi^-$	seen		740
$2\pi^0$	seen		741
4π	(48.9±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±0.9) %	1.1	517
$\eta\eta'(958)$	(2.2±0.8) %	1.4	20
$K\overline{K}$	(8.5±1.0) %	1.1	569
$\gamma\gamma$	not seen		753

$f_2'(1525)$

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

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

$f_2'(1525)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	(88.7 ±2.2) %	581
$\eta\eta$	(10.4 ±2.2) %	530
$\pi\pi$	(8.2 ±1.5) $\times 10^{-3}$	750
$\gamma\gamma$	(1.10±0.14) $\times 10^{-6}$	763

$\pi_1(1600)$ [n]

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

Mass $m = 1660^{+15}_{-11}$ MeV (S = 1.2)
Full width $\Gamma = 257 \pm 60$ MeV (S = 1.9)

$\pi_1(1600)$ 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

$a_1(1640)$

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

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

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

$\eta_2(1645)$

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

Mass $m = 1617 \pm 5$ MeV
Full width $\Gamma = 181 \pm 11$ MeV

$\eta_2(1645)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$a_2(1320)\pi$	seen	243
$K\overline{K}\pi$	seen	580
$K^*\overline{K}$	seen	404
$\eta\pi^+\pi^-$	seen	685
$a_0(980)\pi$	seen	499
$f_2(1270)\eta$	not seen	†

$\omega(1650)$ [s]

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

Mass $m = 1670 \pm 30$ MeV
Full width $\Gamma = 315 \pm 35$ MeV

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	647
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835
$\pi^0\gamma$	not seen	830

$\omega_3(1670)$

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

Mass $m = 1667 \pm 4$ MeV
Full width $\Gamma = 168 \pm 10$ MeV [l]

$\omega_3(1670)$ 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

$\pi_2(1670)$

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

Mass $m = 1670.6^{+2.9}_{-1.2}$ MeV [l] (S = 1.3)
Full width $\Gamma = 258^{+8}_{-9}$ MeV [l] (S = 1.2)

$\pi_2(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
3π	(95.8±1.4) %		808
$f_2(1270)\pi$	(56.3±3.2) %		327
$\rho\pi$	(31 ±4) %		647
$\sigma\pi$	(10 ±4) %		–
$\pi(\pi\pi)_S$-wave	(8.7±3.4) %		–
$\pi^\pm\pi^+\pi^-$	(53 ±4) %		806
$K\overline{K}^*(892)+$ c.c.	(4.2±1.4) %		453
$\omega\rho$	(2.7±1.1) %		302
$\pi^\pm\gamma$	(7.0±1.2) $\times 10^{-4}$		829
$\gamma\gamma$	$<$ 2.8 $\times 10^{-7}$	90%	835
$\eta\pi$	$<$ 5 %		739
$\pi^\pm 2\pi^+ 2\pi^-$	$<$ 5 %		735
$\rho(1450)\pi$	$<$ 3.6 $\times 10^{-3}$	97.7%	145
$b_1(1235)\pi$	$<$ 1.9 $\times 10^{-3}$	97.7%	364
$f_1(1285)\pi$	possibly seen		322
$a_2(1320)\pi$	not seen		292

$\phi(1680)$

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

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

$\phi(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}^*(892)+$ c.c.	seen	462
$K^0_S K\pi$	seen	621
$K\overline{K}$	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

$\rho_3(1690)$

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

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

$\rho_3(1690)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
4π	(71.1 ± 1.9) %		790
$\pi^\pm\pi^+\pi^-\pi^0$	(67 ±22) %		787

$\omega\pi$	(16 ± 6) %		655
$\pi\pi$	(23.6 ± 1.3) %		834
$K\overline{K}\pi$	(3.8 ± 1.2) %		629
$K\overline{K}$	(1.58± 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

$\rho(1700)$ [r]

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

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

$\rho(1700)$ 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	447
$\pi(1300)\pi$	seen	349
$\rho\rho$	seen	372
$\pi^+\pi^-$	seen	849
$\pi\pi$	seen	849
$K\overline{K}^*(892)+$ c.c.	seen	496
$\eta\rho$	seen	545
$a_2(1320)\pi$	not seen	335
$K\overline{K}$	seen	704
e^+e^-	seen	860
$\pi^0\omega$	seen	674
$\pi^0\gamma$	not seen	855

$a_2(1700)$

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

Mass $m = 1705 \pm 40$ MeV
Full width $\Gamma = 258 \pm 40$ MeV

$a_2(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	(3.7 ±1.0) %	758
$\gamma\gamma$	$(1.16\pm0.27)\times10^{-6}$	852

$\rho\pi$	seen	668
$f_2(1270)\pi$	seen	356
$K\overline{K}$	(1.9 ±1.2) %	695
$\omega\pi^-\pi^0$	seen	638
$\omega\rho$	seen	346

$f_0(1710)$ [t]

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

Mass $m = 1704 \pm 12$ MeV
Full width $\Gamma = 123 \pm 18$ MeV

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

$\pi(1800)$

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

Mass $m = 1810^{+9}_{-11}$ MeV (S = 2.2)
Full width $\Gamma = 215^{+7}_{-8}$ MeV

$\pi(1800)$ 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

$\phi_3(1850)$

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

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

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

$\eta_2(1870)$

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

Mass $m = 1842 \pm 8$ MeV
Full width $\Gamma = 225 \pm 14$ MeV

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

$\pi_2(1880)$

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

Mass $m = 1874^{+26}_{-5}$ MeV (S = 1.6)
Full width $\Gamma = 237^{+33}_{-30}$ MeV (S = 1.2)

$f_2(1950)$

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

Mass $m = 1936 \pm 12$ MeV (S = 1.3)
Full width $\Gamma = 464 \pm 24$ MeV

$f_2(1950)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\overline{K}^*(892)$	seen	377
$\pi^+\pi^-$	seen	958
$\pi^0\pi^0$	seen	959
4π	seen	921
$\eta\eta$	seen	798
$K\overline{K}$	seen	833
$\gamma\gamma$	seen	968
$p\overline{p}$	seen	238

$a_4(1970)$

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

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

$a_4(1970)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	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

$f_2(2010)$

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

Mass $m = 2011^{+60}_{-80}$ MeV
Full width $\Gamma = 202 \pm 60$ MeV

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

$f_4(2050)$

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

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

$f_4(2050)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega\omega$	seen	637
$\pi\pi$	(17.0 ± 1.5) %	1000
$K\overline{K}$	$(6.8^{+3.4}_{-1.8}) \times 10^{-3}$	880
$\eta\eta$	$(2.1\pm0.8) \times 10^{-3}$	848
$4\pi^0$	< 1.2 %	964
$a_2(1320)\pi$	seen	568

$\phi(2170)$

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

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$e^+ e^-$	seen	1094
$\phi f_0(980)$	seen	433
$K^+ K^- f_0(980) \rightarrow K^+ K^- \pi^+ \pi^-$	seen	–
$K^+ K^- f_0(980) \rightarrow K^+ K^- \pi^0 \pi^0$	seen	–
$K^{*0} K^{\pm} \pi^{\mp}$	not seen	779
$K^*(892)^0 \overline{K}^*(892)^0$	not seen	634

$f_2(2300)$

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

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

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

$f_2(2340)$

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

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

$f_2(2340)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	580
$\eta\eta$	seen	1037

NOTES

[*a*] See the "Note on $\pi^{\pm} \rightarrow \ell^{\pm}\nu\gamma$ and $K^{\pm} \rightarrow \ell^{\pm}\nu\gamma$ Form Factors" in the $\pi^{\pm}$ Particle Listings for definitions and details.

[*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 $[\Gamma(e^+\nu_e) + \Gamma(\mu^+\nu_\mu)]/\Gamma_{\text{total}} = 100\%$.

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

[*d*] Derived from an analysis of neutrino-oscillation experiments.

[*e*] Astrophysical and cosmological arguments give limits of order 10^{-13}; see the π^0 Particle Listings.

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

[*g*] See the "Note on scalar mesons" in the $f_0(500)$ Particle Listings . The interpretation of this entry as a particle is controversial.

[*h*] See the "Note on $\rho(770)$" in the $\rho(770)$ Particle Listings .

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

[*j*] See the "Note on scalar mesons" in the $f_0(500)$ Particle Listings .

[*k*] See the "Note on $a_1(1260)$" in the $a_1(1260)$ Particle Listings in PDG 06, Journal of Physics **G33** 1 (2006).

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

[*n*] See the "Note on non-$q\overline{q}$ mesons" in the Particle Listings in PDG 06, Journal of Physics **G33** 1 (2006).

[*o*] See the "Note on the $\eta(1405)$" in the $\eta(1405)$ Particle Listings.

[*p*] See the "Note on the $f_1(1420)$" in the $\eta(1405)$ Particle Listings.

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

[*r*] See the "Note on the $\rho(1450)$ and the $\rho(1700)$" in the $\rho(1700)$ Particle Listings.

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

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