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 $m = 139.57018 \pm 0.00035$ MeV (S = 1.2)
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 $\pm$ 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 $m = 134.9766 \pm 0.0006$ MeV (S = 1.1)
$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
Mean life $\tau = (8.4 \pm 0.5) \times 10^{-17}$ s (S = 2.6)
$c\tau = 25.1$ 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 $m = 547.853 \pm 0.024$ MeV

Full width $\Gamma = 1.30 \pm 0.07$ 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

$\pi^0\pi^0\pi^0$ $\alpha = -0.0317 \pm 0.0016$

η DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Neutral modes			
neutral modes	(71.90 ± 0.34) %	S=1.2	–
2γ	(39.31 ± 0.20) %	S=1.1	274
$3\pi^0$	(32.57 ± 0.23) %	S=1.1	179
$\pi^0 2\gamma$	$(2.7\pm0.5)\times10^{-4}$	S=1.1	257
$2\pi^0 2\gamma$	$<1.2\times10^{-3}$	CL=90%	238
4γ	$<2.8\times10^{-4}$	CL=90%	274
invisible	$<6\times10^{-4}$	CL=90%	–
Charged modes			
charged modes	(28.10 ± 0.34) %	S=1.2	–
$\pi^+\pi^-\pi^0$	(22.74 ± 0.28) %	S=1.2	174
$\pi^+\pi^-\gamma$	(4.60 ± 0.16) %	S=2.1	236
$e^+e^-\gamma$	$(7.0\pm0.7)\times10^{-3}$	S=1.5	274
$\mu^+\mu^-\gamma$	$(3.1\pm0.4)\times10^{-4}$		253
e^+e^-	$<2.7\times10^{-5}$	CL=90%	274
$\mu^+\mu^-$	$(5.8\pm0.8)\times10^{-6}$		253
$2e^+2e^-$	$<6.9\times10^{-5}$	CL=90%	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
$\pi^+\pi^-2\gamma$	$<2.0\times10^{-3}$		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

			Fraction	Confidence level	p (MeV/c)
$\pi^0\gamma$	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
$\pi^0 e^+e^-$	C	[f]	$<4\times10^{-5}$	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

$f_0(600)$ [g] or σ

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

Mass $m = (400{-}1200)$ MeV
Full width $\Gamma = (600{-}1000)$ MeV

$f_0(600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	dominant	−
$\gamma\gamma$	seen	−

$\rho(770)$ [h]

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

Mass $m = 775.49 \pm 0.34$ MeV
Full width $\Gamma = 149.1 \pm 0.8$ MeV
$\Gamma_{ee} = 7.04 \pm 0.06$ keV

$\rho(770)$ DECAY MODES	Fraction (Γ_i/Γ)		Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$	~ 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%	153
$\pi^\pm\pi^+\pi^-\pi^0$	< 2.0	$\times 10^{-3}$	CL=84%	254
$\rho(770)^0$ decays				
$\pi^+\pi^-\gamma$	(9.9 ± 1.6	) $\times 10^{-3}$		362
$\pi^0\gamma$	(6.0 ± 0.8	) $\times 10^{-4}$		376
$\eta\gamma$	(3.00± 0.20	) $\times 10^{-4}$		194
$\pi^0\pi^0\gamma$	(4.5 ± 0.8	) $\times 10^{-5}$		363
$\mu^+\mu^-$ [i]	(4.55± 0.28	) $\times 10^{-5}$		373
e^+e^- [i]	(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
$\pi^0 e^+e^-$	< 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)
$\pi^+\pi^-\pi^0$	$(89.2 \pm 0.7\ )\%$		327
$\pi^0\gamma$	$(8.28 \pm 0.28)\%$	S=2.1	380
$\pi^+\pi^-$	$(1.53^{+0.11}_{-0.13})\%$	S=1.2	366
neutrals (excluding $\pi^0\gamma$)	$(8\ ^{+8}_{-5}\ )\times 10^{-3}$	S=1.1	−
$\eta\gamma$	$(4.6 \pm 0.4\ )\times 10^{-4}$	S=1.1	200
$\pi^0 e^+ e^-$	$(7.7 \pm 0.6\ )\times 10^{-4}$		380
$\pi^0 \mu^+\mu^-$	$(1.3 \pm 0.4\ )\times 10^{-4}$	S=2.1	349
$e^+ e^-$	$(7.28 \pm 0.14)\times 10^{-5}$	S=1.3	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
$\pi^0\pi^0\gamma$	$(6.6 \pm 1.1\ )\times 10^{-5}$		367
$\eta\pi^0\gamma$	$<\ 3.3\ \times 10^{-5}$	CL=90%	162
$\mu^+\mu^-$	$(9.0 \pm 3.1\ )\times 10^{-5}$		377
3γ	$<\ 1.9\ \times 10^{-4}$	CL=95%	391

Charge conjugation (C) violating modes

		Fraction (Γ_i/Γ)		Confidence level	p (MeV/c)
$\eta\pi^0$	C	$<\ 2.1$	$\times 10^{-4}$	CL=90%	162
$2\pi^0$	C	$<\ 2.1$	$\times 10^{-4}$	CL=90%	367
$3\pi^0$	C	$<\ 2.3$	$\times 10^{-4}$	CL=90%	330

$\eta'(958)$

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

Mass $m = 957.78 \pm 0.06$ MeV

Full width $\Gamma = 0.194 \pm 0.009$ MeV

$\eta'(958)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\pi^+\pi^-\eta$	$(43.2 \pm 0.7\ )\%$		232
$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	$(29.3 \pm 0.5\ )\%$		165
$\pi^0\pi^0\eta$	$(21.7 \pm 0.8\ )\%$		239
$\omega\gamma$	$(2.75 \pm 0.22)\%$		159
$\gamma\gamma$	$(2.22 \pm 0.08)\%$		479
$3\pi^0$	$(1.68 \pm 0.22)\times 10^{-3}$		430
$\mu^+\mu^-\gamma$	$(1.09 \pm 0.27)\times 10^{-4}$		467
$\pi^+\pi^-\mu^+\mu^-$	$<\ 2.2\ \times 10^{-4}$	90%	401
$\pi^+\pi^-\pi^0$	$(3.6\ ^{+1.1}_{-0.9}\ )\times 10^{-3}$		428
$\pi^0\rho^0$	$<\ 4\ \%$	90%	111
$2(\pi^+\pi^-)$	$<\ 2.4\ \times 10^{-4}$	90%	372

$\pi^+\pi^-2\pi^0$		$<$ 2.5	$\times 10^{-3}$	90%	376
$2(\pi^+\pi^-)$ neutrals		$<$ 1	%	95%	–
$2(\pi^+\pi^-)\pi^0$		$<$ 1.9	$\times 10^{-3}$	90%	298
$2(\pi^+\pi^-)2\pi^0$		$<$ 1	%	95%	197
$3(\pi^+\pi^-)$		$<$ 5	$\times 10^{-4}$	90%	189
$\pi^+\pi^-e^+e^-$		(2.4 $^{+1.3}_{-1.0}$)	$\times 10^{-3}$		458
γe^+e^-		$<$ 9	$\times 10^{-4}$	90%	479
$\pi^0\gamma\gamma$		$<$ 8	$\times 10^{-4}$	90%	469
$4\pi^0$		$<$ 5	$\times 10^{-4}$	90%	380
e^+e^-		$<$ 2.1	$\times 10^{-7}$	90%	479
invisible		$<$ 9	$\times 10^{-4}$	90%	–

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

$\pi^+\pi^-$	P,CP		$<$ 2.9	$\times 10^{-3}$	90%	458
$\pi^0\pi^0$	P,CP		$<$ 1.0	$\times 10^{-3}$	90%	459
$\pi^0 e^+e^-$	C	[f] $<$ 1.4		$\times 10^{-3}$	90%	469
ηe^+e^-	C	[f] $<$ 2.4		$\times 10^{-3}$	90%	322
3γ	C		$<$ 1.0	$\times 10^{-4}$	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 $m = 980 \pm 10$ MeV
Full width $\Gamma = 40$ to 100 MeV

$f_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	dominant	471
$K\overline{K}$	seen	†
$\gamma\gamma$	seen	490

$a_0(980)$ [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)
$\eta\pi$	dominant	319
$K\overline{K}$	seen	†
$\gamma\gamma$	seen	490

$\phi(1020)$

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

Mass $m = 1019.455 \pm 0.020$ MeV   (S = 1.1)

Full width $\Gamma = 4.26 \pm 0.04$ MeV   (S = 1.4)

$\phi(1020)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
K^+K^-	$(48.9 \pm 0.5\ )\ \%$	S=1.1	127
$K_L^0 K_S^0$	$(34.2 \pm 0.4\ )\ \%$	S=1.1	110
$\rho\pi + \pi^+\pi^-\pi^0$	$(15.32 \pm 0.32\ )\ \%$	S=1.1	–
$\eta\gamma$	$(1.309 \pm 0.024)\ \%$	S=1.2	363
$\pi^0\gamma$	$(1.27 \pm 0.06\ ) \times 10^{-3}$		501
$\ell^+\ell^-$	—		510
e^+e^-	$(2.954 \pm 0.030) \times 10^{-4}$	S=1.1	510
$\mu^+\mu^-$	$(2.87 \pm 0.19\ ) \times 10^{-4}$		499
ηe^+e^-	$(1.15 \pm 0.10\ ) \times 10^{-4}$		363
$\pi^+\pi^-$	$(7.4 \pm 1.3\ ) \times 10^{-5}$		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	39
$\pi^0\pi^0\gamma$	$(1.13 \pm 0.06\ ) \times 10^{-4}$		492
$\pi^+\pi^-\pi^+\pi^-$	$(4.0 \ ^{+2.8}_{-2.2}\ ) \times 10^{-6}$		410
$\pi^+\pi^+\pi^-\pi^-\pi^0$	$< 4.6 \times 10^{-6}$	CL=90%	342
$\pi^0 e^+e^-$	$(1.12 \pm 0.28\ ) \times 10^{-5}$		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
$\eta'(958)\gamma$	$(6.25 \pm 0.21\ ) \times 10^{-5}$		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

$h_1(1170)$ $I^G(J^{PC}) = 0^-(1^{+-})$

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	307

$b_1(1235)$ $I^G(J^{PC}) = 1^+(1^{+-})$

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)
$\omega\pi$	dominant			348
[D/S amplitude ratio $= 0.277 \pm 0.027$]				
$\pi^{\pm}\gamma$	$(1.6 \pm 0.4) \times 10^{-3}$			607
$\eta\rho$	seen			†
$\pi^+\pi^+\pi^-\pi^0$	< 50	%	84%	535
$(K\overline{K})^{\pm}\pi^0$	< 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)
$(\rho\pi)_{S-\text{wave}}$	seen	353
$(\rho\pi)_{D-\text{wave}}$	seen	353
$(\rho(1450)\pi)_{S-\text{wave}}$	seen	†
$(\rho(1450)\pi)_{D-\text{wave}}$	seen	†
$\sigma\pi$	seen	−
$f_0(980)\pi$	not seen	189
$f_0(1370)\pi$	seen	†
$f_2(1270)\pi$	seen	†
$K\overline{K}^*(892) +$ c.c.	seen	†
$\pi\gamma$	seen	608

$f_2(1270)$ $\quad\quad\quad I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1275.1 \pm 1.2$ MeV   (S = 1.1)
Full width $\Gamma = 185.1^{+2.9}_{-2.4}$ MeV   (S = 1.5)

$f_2(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$	$(84.8^{+2.4}_{-1.2})\,\%$	S=1.2	623
$\pi^+\pi^-2\pi^0$	$(7.1^{+1.4}_{-2.7})\,\%$	S=1.3	562
$K\overline{K}$	$(4.6\pm0.4)\,\%$	S=2.8	403
$2\pi^+2\pi^-$	$(2.8\pm0.4)\,\%$	S=1.2	559
$\eta\eta$	$(4.0\pm0.8)\times10^{-3}$	S=2.1	326
$4\pi^0$	$(3.0\pm1.0)\times10^{-3}$		564
$\gamma\gamma$	$(1.64\pm0.19)\times10^{-5}$	S=1.9	638
$\eta\pi\pi$	$<8\quad\times10^{-3}$	CL=95%	477
$K^0K^-\pi^+ +$ c.c.	$<3.4\quad\times10^{-3}$	CL=95%	293
e^+e^-	$<6\quad\times10^{-10}$	CL=90%	638

$f_1(1285)$ $\quad\quad\quad I^G(J^{PC}) = 0^+(1^{++})$

Mass $m = 1281.8 \pm 0.6$ MeV   (S = 1.6)
Full width $\Gamma = 24.3 \pm 1.1$ MeV   (S = 1.4)

$f_1(1285)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
4π	$(33.1^{+2.1}_{-1.8})\,\%$	S=1.3	568
$\pi^0\pi^0\pi^+\pi^-$	$(22.0^{+1.4}_{-1.2})\,\%$	S=1.3	566
$2\pi^+2\pi^-$	$(11.0^{+0.7}_{-0.6})\,\%$	S=1.3	563
$\rho^0\pi^+\pi^-$	$(11.0^{+0.7}_{-0.6})\,\%$	S=1.3	336
$\rho^0\rho^0$	seen		†
$4\pi^0$	$<7\quad\times10^{-4}$	CL=90%	568
$\eta\pi\pi$	$(52\pm5)\,\%$		482
$a_0(980)\pi$ [ignoring $a_0(980)\to K\overline{K}$]	$(36\pm7)\,\%$		238
$\eta\pi\pi$ [excluding $a_0(980)\pi$]	$(16\pm7)\,\%$		482
$K\overline{K}\pi$	$(9.0\pm0.4)\,\%$	S=1.1	308
$K\overline{K}^*(892)$	not seen		†
$\gamma\rho^0$	$(5.5\pm1.3)\,\%$	S=2.8	406
$\phi\gamma$	$(7.4\pm2.6)\times10^{-4}$		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 $m = 1318.3 \pm 0.6$ MeV   (S = 1.2)
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	$(70.1 \pm 2.7)\%$	S=1.2	624
$\eta\pi$	$(14.5 \pm 1.2)\%$		535
$\omega\pi\pi$	$(10.6 \pm 3.2)\%$	S=1.3	366
$K\overline{K}$	$(4.9 \pm 0.8)\%$		437
$\eta'(958)\pi$	$(5.3 \pm 0.9) \times 10^{-3}$		288
$\pi^\pm\gamma$	$(2.68\pm0.31) \times 10^{-3}$		652
$\gamma\gamma$	$(9.4 \pm 0.7) \times 10^{-6}$		659
e^+e^-	$< 5 \times 10^{-9}$	CL=90%	659

$f_0(1370)$ [j]

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

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

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

$\pi_1(1400)$ [m] $I^G(J^{PC}) = 1^-(1^{-+})$

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

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

$\eta(1405)$ [n] $I^G(J^{PC}) = 0^+(0^{-+})$

Mass $m = 1409.8 \pm 2.5$ MeV [l]   (S = 2.2)
Full width $\Gamma = 51.1 \pm 3.4$ MeV [l]   (S = 2.0)

$\eta(1405)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\overline{K}\pi$	seen		425
$\eta\pi\pi$	seen		563
$\quad a_0(980)\pi$	seen		345
$\quad \eta(\pi\pi)_{S\text{-wave}}$	seen		−

$f_0(980)\eta$	seen		†
4π	seen		639
$\rho\rho$	<58 %	99.85%	†
$\rho^0\gamma$	seen		492
$K^*(892)K$	seen		125

$f_1(1420)$ [o] $I^G(J^{PC}) = 0^+(1^{++})$

Mass $m = 1426.4 \pm 0.9$ MeV   (S = 1.1)
Full width $\Gamma = 54.9 \pm 2.6$ MeV

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

$\omega(1420)$ [p] $I^G(J^{PC}) = 0^-(1^{--})$

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

$\omega(1420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	dominant	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)
$\pi\eta$	seen	627
$\pi\eta'(958)$	seen	410
$K\overline{K}$	seen	547
$\omega\pi\pi$	seen	484
$a_0(980)\pi\pi$	seen	342
$\gamma\gamma$	seen	737

$\rho(1450)$ [q]

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

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
4π	seen	669
e^+e^-	seen	732
$\eta\rho$	possibly seen	310
$a_2(1320)\pi$	not seen	55
$K\overline{K}$	not seen	541
$K\overline{K}^*(892)+$ c.c.	possibly seen	229
$\eta\gamma$	possibly seen	630

$\eta(1475)$ [n]

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

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

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

$f_0(1500)$ [m]

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

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

$f_0(1500)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\pi\pi$	(34.9 ± 2.3) %	1.2	741
$\pi^+\pi^-$	seen		740
$2\pi^0$	seen		741
4π	(49.5 ± 3.3) %	1.2	691
$4\pi^0$	seen		691
$2\pi^+2\pi^-$	seen		687
$2(\pi\pi)_{S\text{-wave}}$	seen		–

$\rho\rho$	seen	†
$\pi(1300)\pi$	seen	144
$a_1(1260)\pi$	seen	218
$\eta\eta$	(5.1±0.9) %	1.4 516
$\eta\eta'(958)$	(1.9±0.8) %	1.7 †
$K\overline{K}$	(8.6±1.0) %	1.1 568
$\gamma\gamma$	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
$\gamma\gamma$	(1.11±0.14) $\times 10^{-6}$	763

$\pi_1(1600)$ [m] $I^G(J^{PC}) = 1^-(1^{-+})$

Mass $m = 1662^{+15}_{-11}$ MeV   (S = 1.2)

Full width $\Gamma = 234 \pm 50$ MeV   (S = 1.7)

$\pi_1(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	not seen	803
$\rho^0\pi^-$	not seen	641
$f_2(1270)\pi^-$	not seen	319
$b_1(1235)\pi$	seen	357
$\eta'(958)\pi^-$	seen	543
$f_1(1285)\pi$	seen	315

$\eta_2(1645)$ $I^G(J^{PC}) = 0^+(2^{-+})$

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	242
$K\overline{K}\pi$	seen	580
$K^*\overline{K}$	seen	404
$\eta\pi^+\pi^-$	seen	685
$a_0(980)\pi$	seen	499
$f_2(1270)\eta$	not seen	†

$\omega(1650)$ [r] $\qquad I^G(J^{PC}) = 0^-(1^{--})$

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	646
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835

$\omega_3(1670)$ $\qquad I^G(J^{PC}) = 0^-(3^{--})$

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

$\pi_2(1670)$ $\qquad I^G(J^{PC}) = 1^-(2^{-+})$

Mass $m = 1672.4 \pm 3.2$ MeV [l]   (S = 1.4)
Full width $\Gamma = 259 \pm 9$ MeV [l]   (S = 1.3)

$\pi_2(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
3π	(95.8 ± 1.4) %		809
$\quad f_2(1270)\pi$	(56.3 ± 3.2) %		329
$\quad \rho\pi$	$(31\ \pm4\ )$ %		648
$\quad \sigma\pi$	(10.9 ± 3.4) %		$-$
$\quad (\pi\pi)_{S\text{-wave}}$	$(\ 8.7\pm3.4)$ %		$-$
$K\overline{K}^*(892)+$ c.c.	$(\ 4.2\pm1.4)$ %		455
$\omega\rho$	$(\ 2.7\pm1.1)$ %		304
$\gamma\gamma$	$<\ 2.8\quad\times10^{-7}$	90%	836
$\rho(1450)\pi$	$<\ 3.6\quad\times10^{-3}$	97.7%	148
$b_1(1235)\pi$	$<\ 1.9\quad\times10^{-3}$	97.7%	366
$\quad f_1(1285)\pi$	possibly seen		323
$\quad a_2(1320)\pi$	not seen		292

$\boxed{\phi(1680)}$ $\qquad I^G(J^{PC}) = 0^-(1^{--})$

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.	dominant	462
$K_S^0 K\pi$	seen	621
$K\overline{K}$	seen	680
e^+e^-	seen	840
$\omega\pi\pi$	not seen	623
$\quad K^+K^-\pi^+\pi^-$	seen	544

$\boxed{\rho_3(1690)}$ $\qquad I^G(J^{PC}) = 1^+(3^{--})$

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	$(71.1\ \pm\ 1.9\ )$ %		790
$\quad \pi^\pm\pi^+\pi^-\pi^0$	$(67\ \ \pm22\ \ )$ %		787
$\quad \omega\pi$	$(16\ \ \pm\ 6\ \ )$ %		655
$\pi\pi$	$(23.6\ \pm\ 1.3\ )$ %		834
$K\overline{K}\pi$	$(\ 3.8\ \pm\ 1.2\ )$ %		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
Excluding 2ρ and $a_2(1320)\pi$.			
$a_2(1320)\pi$	seen		307
$\rho\rho$	seen		334

$\rho(1700)$ [q] $\qquad I^G(J^{PC}) = 1^+(1^{--})$

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

$f_0(1710)$ [s] $\qquad I^G(J^{PC}) = 0^+(0^{++})$

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

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

$\pi(1800)$ $\qquad I^G(J^{PC}) = 1^-(0^{-+})$

Mass $m = 1816 \pm 14$ MeV (S = 2.3)
Full width $\Gamma = 208 \pm 12$ MeV

$\pi(1800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi^+\pi^-\pi^-$	seen	881
$f_0(600)\pi^-$	seen	−
$f_0(980)\pi^-$	seen	634
$f_0(1370)\pi^-$	seen	371
$f_0(1500)\pi^-$	not seen	254
$\rho\pi^-$	not seen	735
$\eta\eta\pi^-$	seen	664
$a_0(980)\eta$	seen	477
$a_2(1320)\eta$	not seen	†
$f_2(1270)\pi$	not seen	445
$f_0(1370)\pi^-$	not seen	371
$f_0(1500)\pi^-$	seen	254
$\eta\eta'(958)\pi^-$	seen	380
$K_0^*(1430)K^-$	seen	†
$K^*(892)K^-$	not seen	573

$\phi_3(1850)$ $\qquad I^G(J^{PC}) = 0^-(3^{--})$

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

$\pi_2(1880)$ $\qquad\qquad I^G(J^{PC}) = 1^-(2^{-+})$

Mass $m = 1895 \pm 16$ MeV
Full width $\Gamma = 235 \pm 34$ MeV

$f_2(1950)$ $\qquad\qquad I^G(J^{PC}) = 0^+(2^{++})$

Mass $m = 1944 \pm 12$ MeV   (S = 1.5)
Full width $\Gamma = 472 \pm 18$ MeV

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

$f_2(2010)$ $\qquad\qquad I^G(J^{PC}) = 0^+(2^{++})$

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

$a_4(2040)$ $\qquad\qquad I^G(J^{PC}) = 1^-(4^{++})$

Mass $m = 2001 \pm 10$ MeV
Full width $\Gamma = 235 \pm 29$ MeV   (S = 1.3)

$a_4(2040)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	870
$\pi^+\pi^-\pi^0$	seen	976
$\rho\pi$	seen	844
$f_2(1270)\pi$	seen	583

$\omega \pi^- \pi^0$	seen	821
$\omega \rho$	seen	627
$\eta \pi^0$	seen	920
$\eta'(958) \pi$	seen	764

$f_4(2050)$ $\qquad\qquad I^G(J^{PC}) = 0^+(4^{++})$

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
$\eta \eta$	$(2.1 \pm 0.8) \times 10^{-3}$	848
$4\pi^0$	< 1.2 %	964
$a_2(1320) \pi$	seen	567

$\phi(2170)$ $\qquad\qquad I^G(J^{PC}) = 0^-(1^{--})$

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

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

$f_2(2300)$ $\qquad\qquad I^G(J^{PC}) = 0^+(2^{++})$

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

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

NOTES

[a] See the "Note on $\pi^\pm \to \ell^\pm \nu\gamma$ and $K^\pm \to \ell^\pm \nu\gamma$ 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 $f_0(1370)$ 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, $\Gamma(\rho^0 \to \mu^+\mu^-) = \Gamma(\rho^0 \to e^+e^-) \times 0.99785$.

[j] See the "Note on scalar mesons" in the $f_0(1370)$ Particle Listings .

[k] See the "Note on $a_1(1260)$" in the $a_1(1260)$ Particle Listings in PDG 06, Journal of Physics, G **33** 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.

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

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

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

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

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

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

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