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 $m = 139.56995 \pm 0.00035$ MeV [a]
Mean life $\tau = (2.6030 \pm 0.0024) \times 10^{-8}$ s
$c\tau = 7.804$ m

$\pi^\pm \rightarrow \ell^\pm \nu \gamma$ form factors [b]

$F_V = 0.017 \pm 0.008$
$F_A = 0.0116 \pm 0.0016$ (S = 1.3)
$R = 0.059^{+0.009}_{-0.008}$

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

π^+ DECAY MODES			Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\mu^+\nu_\mu$		[c]	(99.98770±0.00004) %		30
$\mu^+\nu_\mu\gamma$		[d]	(1.24 ±0.25) $\times 10^{-4}$		30
$e^+\nu_e$		[c]	(1.230 ±0.004) $\times 10^{-4}$		70
$e^+\nu_e\gamma$		[d]	(1.61 ±0.23) $\times 10^{-7}$		70
$e^+\nu_e\pi^0$			(1.025 ±0.034) $\times 10^{-8}$		4
$e^+\nu_e e^+ e^-$			(3.2 ±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*	[e]	< 1.5 $\times 10^{-3}$	90%	30
$\mu^+\nu_e$	*LF*	[e]	< 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 $m = 134.9764 \pm 0.0006$ MeV [a]
$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
Mean life $\tau = (8.4 \pm 0.6) \times 10^{-17}$ s (S = 3.0)
$c\tau = 25.1$ nm

π^0 DECAY MODES			Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
2γ			(98.798±0.032) %	S=1.1	67
$e^+e^-\gamma$			(1.198±0.032) %	S=1.1	67
γ positronium			(1.82 ±0.29) $\times 10^{-9}$		67
$e^+e^+e^-e^-$			(3.14 ±0.30) $\times 10^{-5}$		67
e^+e^-			(7.5 ±2.0) $\times 10^{-8}$		67
4γ			< 2 $\times 10^{-8}$	CL=90%	67
$\nu\overline{\nu}$		[f]	< 8.3 $\times 10^{-7}$	CL=90%	67
$\nu_e\overline{\nu}_e$			< 1.7 $\times 10^{-6}$	CL=90%	67
$\nu_\mu\overline{\nu}_\mu$			< 3.1 $\times 10^{-6}$	CL=90%	67
$\nu_\tau\overline{\nu}_\tau$			< 2.1 $\times 10^{-6}$	CL=90%	67
Charge conjugation (*C*) or Lepton Family number (*LF*) violating modes					
3γ	*C*		< 3.1 $\times 10^{-8}$	CL=90%	67
$\mu^+e^- + e^-\mu^+$	*LF*		< 1.72 $\times 10^{-8}$	CL=90%	26

η

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

Mass $m = 547.45 \pm 0.19$ MeV (S = 1.6)
Full width $\Gamma = 1.20 \pm 0.11$ keV [g] (S = 1.8)

***C*-nonconserving decay parameters** [h]

$\pi^+\pi^-\pi^0$ Left-right asymmetry $= (0.09 \pm 0.17) \times 10^{-2}$
$\pi^+\pi^-\pi^0$ Sextant asymmetry $= (0.18 \pm 0.16) \times 10^{-2}$
$\pi^+\pi^-\pi^0$ Quadrant asymmetry $= (-0.17 \pm 0.17) \times 10^{-2}$
$\pi^+\pi^-\gamma$ Left-right asymmetry $= (0.9 \pm 0.4) \times 10^{-2}$
$\pi^+\pi^-\gamma$ β (*D*-wave) $= 0.05 \pm 0.06$ (S = 1.5)

η DECAY MODES			Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
neutral modes			(70.8 ±0.8) %	S=1.2	–
2γ		[g]	(38.8 ±0.5) %	S=1.2	274
$3\pi^0$			(31.9 ±0.4) %	S=1.2	180
$\pi^0 2\gamma$			(7.1 ±1.4) $\times 10^{-4}$		258
charged modes			(29.2 ±0.8) %	S=1.2	–
$\pi^+\pi^-\pi^0$			(23.6 ±0.6) %	S=1.2	175
$\pi^+\pi^-\gamma$			(4.88±0.15) %	S=1.2	236
$e^+e^-\gamma$			(5.0 ±1.2) $\times 10^{-3}$		274
$\mu^+\mu^-\gamma$			(3.1 ±0.4) $\times 10^{-4}$		253
e^+e^-			< 3 $\times 10^{-4}$	CL=90%	274
$\mu^+\mu^-$			(5.7 ±0.8) $\times 10^{-6}$		253
$\pi^+\pi^-e^+e^-$			(1.3 $^{+1.3}_{-0.8}$) $\times 10^{-3}$		236
$\pi^+\pi^-2\gamma$			< 2.1 $\times 10^{-3}$		236
$\pi^+\pi^-\pi^0\gamma$			< 6 $\times 10^{-4}$	CL=90%	175
$\pi^0\mu^+\mu^-\gamma$			< 3 $\times 10^{-6}$	CL=90%	211
Charge conjugation (*C*), Parity (*P*), or Charge conjugation × Parity (*CP*) violating modes					
$\pi^+\pi^-$	*P,CP*		< 1.5 $\times 10^{-3}$		236
3γ	*C*		< 5 $\times 10^{-4}$	CL=95%	274
$\pi^0 e^+e^-$	*C*	[i]	< 4 $\times 10^{-5}$	CL=90%	258
$\pi^0\mu^+\mu^-$	*C*	[i]	< 5 $\times 10^{-6}$	CL=90%	211

$\rho(770)$

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

Mass $m = 769.9 \pm 0.8$ MeV (S = 1.8)
Full width $\Gamma = 151.2 \pm 1.2$ MeV
$\Gamma_{ee} = 6.77 \pm 0.32$ keV

$\rho(770)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$		~ 100 %		359
$\rho(770)^\pm$ decays				
$\pi^\pm\gamma$		(4.5 ±0.5) $\times 10^{-4}$	S=2.2	372
$\pi^\pm\eta$		< 6 $\times 10^{-3}$	CL=84%	147
$\pi^\pm\pi^+\pi^-\pi^0$		< 2.0 $\times 10^{-3}$	CL=84%	250
$\rho(770)^0$ decays				
$\pi^+\pi^-\gamma$		(9.9 ±1.6) $\times 10^{-3}$		359
$\pi^0\gamma$		(7.9 ±2.0) $\times 10^{-4}$		373
$\eta\gamma$		(3.8 ±0.7) $\times 10^{-4}$		190
$\mu^+\mu^-$	[j]	(4.60±0.28) $\times 10^{-5}$		370
e^+e^-	[j]	(4.46±0.21) $\times 10^{-5}$		385
$\pi^+\pi^-\pi^0$		< 1.2 $\times 10^{-4}$	CL=90%	320
$\pi^+\pi^-\pi^+\pi^-$		< 2 $\times 10^{-4}$	CL=90%	247
$\pi^+\pi^-\pi^0\pi^0$		< 4 $\times 10^{-5}$	CL=90%	253

$\omega(782)$

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

Mass $m = 781.94 \pm 0.12$ MeV (S = 1.5)
Full width $\Gamma = 8.43 \pm 0.10$ MeV
$\Gamma_{ee} = 0.60 \pm 0.02$ keV

$\omega(782)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\pi^+\pi^-\pi^0$	(88.8 ±0.7) %		327
$\pi^0\gamma$	(8.5 ±0.5) %		379
$\pi^+\pi^-$	(2.21±0.30) %		365
neutrals (excluding $\pi^0\gamma$)	(5.3 $^{+8.7}_{-3.5}$) $\times 10^{-3}$		–
$\eta\gamma$	(8.3 ±2.1) $\times 10^{-4}$		199
$\pi^0 e^+e^-$	(5.9 ±1.9) $\times 10^{-4}$		379
$\pi^0\mu^+\mu^-$	(9.6 ±2.3) $\times 10^{-5}$		349
e^+e^-	(7.15±0.19) $\times 10^{-5}$		391
$\pi^+\pi^-\pi^0\pi^0$	< 2 %	90%	261
$\pi^+\pi^-\gamma$	< 3.6 $\times 10^{-3}$	95%	365
$\pi^+\pi^-\pi^+\pi^-$	< 1 $\times 10^{-3}$	90%	256
$\pi^0\pi^0\gamma$	< 4 $\times 10^{-4}$	90%	367
$\mu^+\mu^-$	< 1.8 $\times 10^{-4}$	90%	376