GAUGE AND HIGGS BOSONS

γ (photon)

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

Mass $m < 1 \times 10^{-18}$ eV
Charge $q < 1 \times 10^{-46}$ e (mixed charge)
Charge $q < 1 \times 10^{-35}$ e (single charge)
Mean life τ = Stable

g or gluon

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

Mass $m = 0$ [a]
SU(3) color octet

graviton

$J = 2$

Mass $m < 1.76 \times 10^{-23}$ eV

W

$J = 1$

Charge $= \pm 1$ e
Mass $m = 80.377 \pm 0.012$ GeV [b]
W/Z mass ratio $= 0.88145 \pm 0.00013$
$m_Z - m_W = 10.811 \pm 0.012$ GeV
$m_{W^+} - m_{W^-} = -0.029 \pm 0.028$ GeV
Full width $\Gamma = 2.085 \pm 0.042$ GeV
$\langle N_{\pi^\pm} \rangle = 15.70 \pm 0.35$
$\langle N_{K^\pm} \rangle = 2.20 \pm 0.19$
$\langle N_{p} \rangle = 0.92 \pm 0.14$
$\langle N_{\text{charged}} \rangle = 19.39 \pm 0.08$

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

W^+ DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\ell^+ \nu$	[c]	(10.86 ± 0.09) %		–
$e^+ \nu$		(10.71 ± 0.16) %		40188
$\mu^+ \nu$		(10.63 ± 0.15) %		40188
$\tau^+ \nu$		(11.38 ± 0.21) %		40169
hadrons		(67.41 ± 0.27) %		–

$\pi^+\gamma$		$<$ 7	$\times 10^{-6}$	95%	40188
$D_s^+\gamma$		$<$ 1.3	$\times 10^{-3}$	95%	40164
$c X$		(33.3 $\pm$ 2.6) %			–
$c\bar{s}$		(31 $^{+13}_{-11}$) %			–
invisible	[d]	(1.4 $\pm$ 2.9) %			–
$\pi^+\pi^+\pi^-$		$<$ 1.01	$\times 10^{-6}$	95%	40188

Z

$J = 1$

Charge = 0
Mass $m = 91.1876 \pm 0.0021$ GeV [e]
Full width $\Gamma = 2.4955 \pm 0.0023$ GeV
$\Gamma(\ell^+\ell^-) = 83.984 \pm 0.086$ MeV [c]
$\Gamma(\text{invisible}) = 499.0 \pm 1.5$ MeV [f]
$\Gamma(\text{hadrons}) = 1744.4 \pm 2.0$ MeV
$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-) = 1.0001 \pm 0.0024$
$\Gamma(\tau^+\tau^-)/\Gamma(e^+e^-) = 1.0020 \pm 0.0032$ [g]

Average charged multiplicity

$\langle N_{charged}\rangle = 20.76 \pm 0.16$ (S = 2.1)

Couplings to quarks and leptons

$g_V^\ell = -0.03783 \pm 0.00041$
$g_V^u = 0.266 \pm 0.034$
$g_V^d = -0.38^{+0.04}_{-0.05}$
$g_A^\ell = -0.50123 \pm 0.00026$
$g_A^u = 0.519^{+0.028}_{-0.033}$
$g_A^d = -0.527^{+0.040}_{-0.028}$
$g^{\nu_\ell} = 0.5008 \pm 0.0008$
$g^{\nu_e} = 0.53 \pm 0.09$
$g^{\nu_\mu} = 0.502 \pm 0.017$

Asymmetry parameters [h]

$A_e = 0.1515 \pm 0.0019$
$A_\mu = 0.142 \pm 0.015$
$A_\tau = 0.143 \pm 0.004$
$A_s = 0.90 \pm 0.09$
$A_c = 0.670 \pm 0.027$
$A_b = 0.923 \pm 0.020$

Charge asymmetry (%) at *Z* pole

$A_{FB}^{(0\ell)} = 1.71 \pm 0.10$

$A_{FB}^{(0u)} = 4 \pm 7$
$A_{FB}^{(0s)} = 9.8 \pm 1.1$
$A_{FB}^{(0c)} = 7.07 \pm 0.35$
$A_{FB}^{(0b)} = 9.92 \pm 0.16$

Z DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$e^+ e^-$	[i]	(3.3632±0.0042) %		45594
$\mu^+ \mu^-$	[i]	(3.3662±0.0066) %		45594
$\tau^+ \tau^-$	[i]	(3.3696±0.0083) %		45559
$\ell^+ \ell^-$	[c,i]	(3.3658±0.0023) %		–
$\ell^+ \ell^- \ell^+ \ell^-$	[j]	(4.55 ±0.17) $\times 10^{-6}$		45594
invisible	[i]	(20.000 ±0.055) %		–
hadrons	[i]	(69.911 ±0.056) %		–
$(u\overline{u}+c\overline{c})/2$		(11.6 ±0.6) %		–
$(d\overline{d}+s\overline{s}+b\overline{b})/3$		(15.6 ±0.4) %		–
$c\overline{c}$		(12.03 ±0.21) %		–
$b\overline{b}$		(15.12 ±0.05) %		–
$b\overline{b}b\overline{b}$		(3.6 ±1.3) $\times 10^{-4}$		–
$g g g$		< 1.1 %	CL=95%	–
$\pi^0 \gamma$		< 2.01 $\times 10^{-5}$	CL=95%	45594
$\eta \gamma$		< 5.1 $\times 10^{-5}$	CL=95%	45592
$\rho^0 \gamma$		< 2.5 $\times 10^{-5}$	CL=95%	45591
$\omega \gamma$		< 6.5 $\times 10^{-4}$	CL=95%	45590
$\eta'(958) \gamma$		< 4.2 $\times 10^{-5}$	CL=95%	45589
$\phi \gamma$		< 9 $\times 10^{-7}$	CL=95%	45588
$\gamma \gamma$		< 1.46 $\times 10^{-5}$	CL=95%	45594
$\pi^0 \pi^0$		< 1.52 $\times 10^{-5}$	CL=95%	45594
$\gamma \gamma \gamma$		< 2.2 $\times 10^{-6}$	CL=95%	45594
$\pi^\pm W^\mp$	[k]	< 7 $\times 10^{-5}$	CL=95%	10169
$\rho^\pm W^\mp$	[k]	< 8.3 $\times 10^{-5}$	CL=95%	10143
$J/\psi(1S)$X		(3.51 $^{+0.23}_{-0.25}$) $\times 10^{-3}$	S=1.1	–
$J/\psi(1S) \gamma$		< 1.4 $\times 10^{-6}$	CL=95%	45541
$\psi(2S)$X		(1.60 ±0.29) $\times 10^{-3}$		–
$\psi(2S) \gamma$		< 4.5 $\times 10^{-6}$	CL=95%	45519
$J/\psi(1S) J/\psi(1S)$		< 2.2 $\times 10^{-6}$	CL=95%	45489
$\chi_{c1}(1P)$X		(2.9 ±0.7) $\times 10^{-3}$		–
$\chi_{c2}(1P)$X		< 3.2 $\times 10^{-3}$	CL=90%	–
$\Upsilon(1S)$ X + $\Upsilon(2S)$ X + $\Upsilon(3S)$ X		(1.0 ±0.5) $\times 10^{-4}$		–
$\Upsilon(1S)$X		< 4.4 $\times 10^{-5}$	CL=95%	–
$\Upsilon(1S) \gamma$		< 2.8 $\times 10^{-6}$	CL=95%	45103
$\Upsilon(2S)$X		< 1.39 $\times 10^{-4}$	CL=95%	–

$\Upsilon(2S)\gamma$			< 1.7		$\times 10^{-6}$	CL=95%	45043
$\Upsilon(3S)$X			< 9.4		$\times 10^{-5}$	CL=95%	–
$\Upsilon(3S)\gamma$			< 4.8		$\times 10^{-6}$	CL=95%	45006
$\Upsilon(1,2,3S)\,\Upsilon(1,2,3S)$			< 1.5		$\times 10^{-6}$	CL=95%	–
$(D^0/\overline{D}^0)$ X			(20.7	± 2.0	) %		–
$D^{\pm}$X			(12.2	± 1.7	) %		–
$D^*(2010)^{\pm}$X		[k]	(11.4	± 1.3	) %		–
$D_{s1}(2536)^{\pm}$X			(3.6	± 0.8	) $\times 10^{-3}$		–
$D_{sJ}(2573)^{\pm}$X			(5.8	± 2.2	) $\times 10^{-3}$		–
$D^{*\prime}(2629)^{\pm}$X			searched for				–
B^+X		[l]	(6.08	± 0.13	) %		–
B^0_sX		[l]	(1.59	± 0.13	) %		–
B^+_cX			searched for				–
Λ^+_cX			(1.54	± 0.33	) %		–
Ξ^0_cX			seen				–
Ξ_bX			seen				–
b-baryon X		[l]	(1.38	± 0.22	) %		–
anomalous $\gamma+$ hadrons		[n]	< 3.2		$\times 10^{-3}$	CL=95%	–
$e^+e^-\gamma$		[n]	< 5.2		$\times 10^{-4}$	CL=95%	45594
$\mu^+\mu^-\gamma$		[n]	< 5.6		$\times 10^{-4}$	CL=95%	45594
$\tau^+\tau^-\gamma$		[n]	< 7.3		$\times 10^{-4}$	CL=95%	45559
$\ell^+\ell^-\gamma\gamma$		[o]	< 6.8		$\times 10^{-6}$	CL=95%	–
$q\overline{q}\gamma\gamma$		[o]	< 5.5		$\times 10^{-6}$	CL=95%	–
$\nu\overline{\nu}\gamma\gamma$		[o]	< 3.1		$\times 10^{-6}$	CL=95%	45594
$e^{\pm}\mu^{\mp}$	LF	[k]	< 7.5		$\times 10^{-7}$	CL=95%	45594
$e^{\pm}\tau^{\mp}$	LF	[k]	< 5.0		$\times 10^{-6}$	CL=95%	45576
$\mu^{\pm}\tau^{\mp}$	LF	[k]	< 6.5		$\times 10^{-6}$	CL=95%	45576
$p\,e$	L,B		< 1.8		$\times 10^{-6}$	CL=95%	45589
$p\,\mu$	L,B		< 1.8		$\times 10^{-6}$	CL=95%	45589

H

$J = 0$

was H^0

Mass $m = 125.25 \pm 0.17$ GeV (S = 1.5)
Full width $\Gamma = 3.2^{+2.4}_{-1.7}$ MeV (assumes equal on-shell and off-shell effective couplings)

H Signal Strengths in Different Channels

Combined Final States = 1.03 ± 0.04
$W W^* = 1.00 \pm 0.08$
$Z Z^* = 1.02 \pm 0.08$
$\gamma\gamma = 1.10 \pm 0.07$
$c\overline{c}$ Final State = 8 ± 22 (S = 1.9)

$b\overline{b}$ = 0.99 ± 0.12
$\mu^+\mu^-$ = 1.21 ± 0.35
$\tau^+\tau^-$ = 0.91 ± 0.09
$\gamma^*\gamma$ Final State = 1.5 ± 0.5
Fermion coupling (κ_F) = 0.95 ± 0.05
Gauge boson coupling (κ_V) = 1.035 ± 0.031
$t\overline{t}H$ Production = 1.10 ± 0.18
tH production = 6 ± 4
H Production Cross Section in pp Collisions at $\sqrt{s}$ = 13 TeV = 56.9 ± 3.4 pb

***H* DECAY MODES**		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
WW^*		(25.7 ±2.5) %		–
ZZ^*		(2.80±0.30) %		–
$\gamma\gamma$		(2.50±0.20) × 10^{-3}		62625
$b\overline{b}$		(53 ±8) %		–
e^+e^-		< 3.6 × 10^{-4}	95%	62625
$\mu^+\mu^-$		(2.6 ±1.3) × 10^{-4}		62625
$\tau^+\tau^-$		(6.0 $^{+0.8}_{-0.7}$) %		62600
$Z\gamma$		(3.2 ±1.5) × 10^{-3}		29431
$Z\rho(770)$		< 1.21 %	95%	29423
$Z\phi(1020)$		< 3.6 × 10^{-3}	95%	29417
$J/\psi\gamma$		< 3.5 × 10^{-4}	95%	62587
$J/\psi J/\psi$		< 1.8 × 10^{-3}	95%	62548
$\psi(2S)\gamma$		< 2.0 × 10^{-3}	95%	62571
$\Upsilon(1S)\gamma$		< 4.9 × 10^{-4}	95%	62268
$\Upsilon(2S)\gamma$		< 5.9 × 10^{-4}	95%	62224
$\Upsilon(3S)\gamma$		< 5.7 × 10^{-4}	95%	62197
Υ(nS) Υ(mS)		< 1.4 × 10^{-3}	95%	–
$\rho(770)\gamma$		< 8.8 × 10^{-4}	95%	62623
$\phi(1020)\gamma$		< 4.8 × 10^{-4}	95%	62621
$e\mu$	*LF*	< 6.1 × 10^{-5}	95%	62625
$e\tau$	*LF*	< 2.2 × 10^{-3}	95%	62612
$\mu\tau$	*LF*	< 1.5 × 10^{-3}	95%	62612
invisible		< 13 %	95%	–
γ invisible		< 2.9 %	95%	–

Neutral Higgs Bosons, Searches for

Mass limits for heavy neutral Higgs bosons (H_2^0, A^0) in the MSSM

m > 389 GeV, CL = 95% (tanβ = 10)
m > 863 GeV, CL = 95% (tanβ = 20)
m > 1157 GeV, CL = 95% (tanβ = 30)
m > 1341 GeV, CL = 95% (tanβ = 40)
m > 1496 GeV, CL = 95% (tanβ = 50)
m > 1613 GeV, CL = 95% (tanβ = 60)

Charged Higgs Bosons ($H^{\pm}$ and $H^{\pm\pm}$), Searches for

Mass limits for m_{H^+} < m(top) in the MSSM

m > 155 GeV, CL = 95%

Mass limits for m_{H^+} > m(top) in the MSSM

m > 181 GeV, CL = 95% (tanβ = 10)
m > 249 GeV, CL = 95% (tanβ = 20)
m > 390 GeV, CL = 95% (tanβ = 30)
m > 894 GeV, CL = 95% (tanβ = 40)
m > 1017 GeV, CL = 95% (tanβ = 50)
m > 1103 GeV, CL = 95% (tanβ = 60)

New Heavy Bosons (W', Z', leptoquarks, etc.), Searches for

Additional W Bosons

W' with standard couplings
Mass m > 6000 GeV, CL = 95% (pp direct search)
W_R (Right-handed W Boson)
Mass m > 715 GeV, CL = 90% (electroweak fit)

Additional Z Bosons

Z'_{SM} with standard couplings
Mass m > 5150 GeV, CL = 95% (pp direct search)
Z_{LR} of SU(2)$_L$×SU(2)$_R$×U(1) (with $g_L = g_R$)
Mass m > 630 GeV, CL = 95% ($p\overline{p}$ direct search)
Mass m > 1162 GeV, CL = 95% (electroweak fit)

Z_χ of SO(10) $\rightarrow$ SU(5)$\times$U(1)$_\chi$ (with g_χ=e/cosθ_W)
Mass $m >$ 4800 GeV, CL = 95% ($p\,p$ direct search)
Z_ψ of E_6 $\rightarrow$ SO(10)$\times$U(1)$_\psi$ (with g_ψ=e/cosθ_W)
Mass $m >$ 4560 GeV, CL = 95% ($p\,p$ direct search)
Z_η of E_6 $\rightarrow$ SU(3)$\times$SU(2)$\times$U(1)$\times$U(1)$_\eta$ (with g_η=e/cosθ_W)
Mass $m >$ 3.900×10^3 GeV, CL = 95% ($p\,p$ direct search)

Scalar Leptoquarks

$m >$ 1800 GeV, CL = 95% (1st gen., pair prod., B($e\,q$)=1)
$m >$ 1755 GeV, CL = 95% (1st gen., single prod., B($e\,q$)=1)
$m >$ 1700 GeV, CL = 95% (2nd gen., pair prod., B($\mu\,q$)=1)
$m >$ 660 GeV, CL = 95% (2nd gen., single prod., B($\mu\,q$)=1)
$m >$ 1430 GeV, CL = 95% (3rd gen., pair prod., B($\tau\,t$)=1)
$m >$ 740 GeV, CL = 95% (3rd gen., single prod., B($\tau\,b$)=1)
(See the Particle Listings for assumptions on leptoquark quantum numbers and branching fractions.)

Diquarks

Mass $m >$ 7200 GeV, CL = 95% (E_6 diquark)

Axigluon

Mass $m >$ 6600 GeV, CL = 95%

Axions (A^0) and Other Very Light Bosons, Searches for

See the review on "Axions and other similar particles."

The best limit for the half-life of neutrinoless double beta decay with Majoron emission is $> 7.2 \times 10^{24}$ years (CL = 90%).

NOTES

[*a*] Theoretical value. A mass as large as a few MeV may not be precluded.

[*b*] This value does not include the AALTONEN 22 measurement by CDF. See the W mass section in the listings for details.

[*c*] ℓ indicates each type of lepton (e, μ, and τ), not sum over them.

[*d*] This represents the width for the decay of the W boson into a charged particle with momentum below detectability, p$<$ 200 MeV.

[*e*] The Z-boson mass listed here corresponds to a Breit-Wigner resonance parameter. It lies approximately 34 MeV above the real part of the position of the pole (in the energy-squared plane) in the Z-boson propagator.

[*f*] This partial width takes into account Z decays into $\nu\overline{\nu}$ and any other possible undetected modes.

[*g*] This ratio has not been corrected for the τ mass.

[*h*] Here $A \equiv 2g_V g_A/(g_V^2+g_A^2)$.

[*i*] This parameter is not directly used in the overall fit but is derived using the fit results; see the note "The Z boson" and ref. LEP-SLC 06 (Physics Reports (Physics Letters C) **427** 257 (2006)).

[*j*] Here ℓ indicates e or μ.

[*k*] The value is for the sum of the charge states or particle/antiparticle states indicated.

[*l*] This value is updated using the product of (i) the $Z \rightarrow b\overline{b}$ fraction from this listing and (ii) the b-hadron fraction in an unbiased sample of weakly decaying b-hadrons produced in Z-decays provided by the Heavy Flavor Averaging Group (HFLAV, http://www.slac.stanford.edu/xorg/hflav/osc/PDG_2009/#FRACZ).

[*n*] See the Z Particle Listings for the γ energy range used in this measurement.

[*o*] For $m_{\gamma\gamma} = (60 \pm 5)$ GeV.

LEPTONS

e

$J = \frac{1}{2}$

Mass $m = (548.579909065 \pm 0.000000016) \times 10^{-6}$ u
Mass $m = 0.51099895000 \pm 0.00000000015$ MeV
$\left|m_{e^+} - m_{e^-}\right|/m < 8 \times 10^{-9}$, CL = 90%
$\left|q_{e^+} + q_{e^-}\right|/e < 4 \times 10^{-8}$
Magnetic moment anomaly
$(g–2)/2 = (1159.65218062 \pm 0.00000012) \times 10^{-6}$
$(g_{e^+} - g_{e^-}) \,/\, g_{\mathrm{average}} = (-0.5 \pm 2.1) \times 10^{-12}$
Electric dipole moment $d < 0.11 \times 10^{-28}$ $e\,$cm, CL = 90%
Mean life $\tau > 6.6 \times 10^{28}$ yr, CL = 90% [a]

μ

$J = \frac{1}{2}$

Mass $m = 0.1134289259 \pm 0.0000000025$ u
Mass $m = 105.6583755 \pm 0.0000023$ MeV
Mean life $\tau = (2.1969811 \pm 0.0000022) \times 10^{-6}$ s
$\tau_{\mu^+}/\tau_{\mu^-} = 1.00002 \pm 0.00008$
$c\tau = 658.6384$ m
Magnetic moment anomaly $(g–2)/2 = (11659206 \pm 4) \times 10^{-10}$
$(g_{\mu^+} - g_{\mu^-}) \,/\, g_{\mathrm{average}} = (-0.11 \pm 0.12) \times 10^{-8}$
Electric dipole moment $\left|\mathrm{d}\right| < 1.8 \times 10^{-19}$ $e\,$cm, CL = 95%

Decay parameters [b]

$\rho = 0.74979 \pm 0.00026$
$\eta = 0.057 \pm 0.034$
$\delta = 0.75047 \pm 0.00034$
$\xi P_\mu = 1.0009^{+0.0016}_{-0.0007}$ [c]
$\xi P_\mu \delta/\rho = 1.0018^{+0.0016}_{-0.0007}$ [c]
$\xi' = 1.00 \pm 0.04$
$\xi'' = 0.98 \pm 0.04$
$\alpha/\mathrm{A} = (0 \pm 4) \times 10^{-3}$
$\alpha'/\mathrm{A} = (-10 \pm 20) \times 10^{-3}$
$\beta/\mathrm{A} = (4 \pm 6) \times 10^{-3}$
$\beta'/\mathrm{A} = (2 \pm 7) \times 10^{-3}$
$\overline{\eta} = 0.02 \pm 0.08$

μ^+ modes are charge conjugates of the modes below.

μ^- **DECAY MODES**		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$e^- \overline{\nu}_e \nu_\mu$		$\approx 100\%$		53
$e^- \overline{\nu}_e \nu_\mu \gamma$		[d] $(6.0\pm0.5) \times 10^{-8}$		53
$e^- \overline{\nu}_e \nu_\mu e^+ e^-$		[e] $(3.4\pm0.4) \times 10^{-5}$		53
Lepton Family number (*LF*) violating modes				
$e^- \nu_e \overline{\nu}_\mu$	*LF*	[f] < 1.2 %	90%	53
$e^- \gamma$	*LF*	$< 4.2 \times 10^{-13}$	90%	53
$e^- e^+ e^-$	*LF*	$< 1.0 \times 10^{-12}$	90%	53
$e^- 2\gamma$	*LF*	$< 7.2 \times 10^{-11}$	90%	53

τ

$J = \frac{1}{2}$

Mass $m = 1776.86 \pm 0.12$ MeV
$(m_{\tau^+} - m_{\tau^-})/m_{\text{average}} < 2.8 \times 10^{-4}$, CL = 90%
Mean life $\tau = (290.3 \pm 0.5) \times 10^{-15}$ s
$c\tau = 87.03$ μm
Magnetic moment anomaly > -0.052 and < 0.013, CL = 95%
Re(d_τ) $= -0.185$ to 0.061×10^{-16} e cm, CL = 95%
Im(d_τ) $= -0.103$ to 0.0230×10^{-16} e cm, CL = 95%

Weak dipole moment

Re(d_τ^w) $< 0.50 \times 10^{-17}$ e cm, CL = 95%
Im(d_τ^w) $< 1.1 \times 10^{-17}$ e cm, CL = 95%

Weak anomalous magnetic dipole moment

Re(α_τ^w) $< 1.1 \times 10^{-3}$, CL = 95%
Im(α_τ^w) $< 2.7 \times 10^{-3}$, CL = 95%
$\tau^\pm \to \pi^\pm K_S^0 \nu_\tau$ (RATE DIFFERENCE) / (RATE SUM) = $(-0.36 \pm 0.25)\%$

Decay parameters

See the τ Particle Listings for a note concerning τ-decay parameters.

$\rho(e \text{ or } \mu) = 0.745 \pm 0.008$
$\rho(e) = 0.747 \pm 0.010$
$\rho(\mu) = 0.763 \pm 0.020$
$\xi(e \text{ or } \mu) = 0.985 \pm 0.030$
$\xi(e) = 0.994 \pm 0.040$
$\xi(\mu) = 1.030 \pm 0.059$
$\eta(e \text{ or } \mu) = 0.013 \pm 0.020$
$\eta(\mu) = 0.094 \pm 0.073$

$(\delta\xi)(e \text{ or } \mu) = 0.746 \pm 0.021$
$(\delta\xi)(e) = 0.734 \pm 0.028$
$(\delta\xi)(\mu) = 0.778 \pm 0.037$
$\xi(\pi) = 0.993 \pm 0.022$
$\xi(\rho) = 0.994 \pm 0.008$
$\xi(a_1) = 1.001 \pm 0.027$
$\xi(\text{all hadronic modes}) = 0.995 \pm 0.007$
$\overline{\eta}(\mu) = -1.3 \pm 1.7$
$(\xi\kappa)(e \text{ or } \mu)$ PARAMETER $= 0.5 \pm 0.4$
$(\xi\kappa)(e) = -0.4 \pm 1.2$
$(\xi\kappa)(\mu) = 0.8 \pm 0.6$

τ^+ modes are charge conjugates of the modes below. "$h^\pm$" stands for $\pi^\pm$ or $K^\pm$. "ℓ" stands for e or μ. "Neutrals" stands for γ's and/or π^0's.

τ^- DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Modes with one charged particle				
particle$^-$ ≥ 0 neutrals $\geq 0K^0\nu_\tau$ ("1-prong")		(85.24 ± 0.06) %		–
particle$^-$ ≥ 0 neutrals $\geq 0K^0_L\nu_\tau$		(84.58 ± 0.06) %		–
$\mu^-\overline{\nu}_\mu\nu_\tau$	[g]	(17.39 ± 0.04) %		885
$\mu^-\overline{\nu}_\mu\nu_\tau\gamma$	[e]	$(3.67 \pm 0.08) \times 10^{-3}$		885
$e^-\overline{\nu}_e\nu_\tau$	[g]	(17.82 ± 0.04) %		888
$e^-\overline{\nu}_e\nu_\tau\gamma$	[e]	(1.83 ± 0.05) %		888
$h^- \geq 0K^0_L\ \nu_\tau$		(12.03 ± 0.05) %		883
$h^-\nu_\tau$		(11.51 ± 0.05) %		883
$\pi^-\nu_\tau$	[g]	(10.82 ± 0.05) %		883
$K^-\nu_\tau$	[g]	$(6.96 \pm 0.10) \times 10^{-3}$		820
$h^- \geq 1$ neutralsν_τ		(37.01 ± 0.09) %		–
$h^- \geq 1\pi^0\nu_\tau(\text{ex.}K^0)$		(36.51 ± 0.09) %		–
$h^-\pi^0\nu_\tau$		(25.93 ± 0.09) %		878
$\pi^-\pi^0\nu_\tau$	[g]	(25.49 ± 0.09) %		878
$\pi^-\pi^0$ non-$\rho(770)\nu_\tau$		$(3.0 \pm 3.2) \times 10^{-3}$		878
$K^-\pi^0\nu_\tau$	[g]	$(4.33 \pm 0.15) \times 10^{-3}$		814
$h^- \geq 2\pi^0\nu_\tau$		(10.81 ± 0.09) %		–
$h^-2\pi^0\nu_\tau$		(9.48 ± 0.10) %		862
$h^-2\pi^0\nu_\tau(\text{ex.}K^0)$		(9.32 ± 0.10) %		862
$\pi^-2\pi^0\nu_\tau(\text{ex.}K^0)$	[g]	(9.26 ± 0.10) %		862
$\pi^-2\pi^0\nu_\tau(\text{ex.}K^0)$, scalar		$< 9 \times 10^{-3}$	CL=95%	862
$\pi^-2\pi^0\nu_\tau(\text{ex.}K^0)$, vector		$< 7 \times 10^{-3}$	CL=95%	862
$K^-2\pi^0\nu_\tau(\text{ex.}K^0)$	[g]	$(6.5 \pm 2.2) \times 10^{-4}$		796

$h^- \geq 3\pi^0 \nu_\tau$		(1.34 ± 0.07) %		–
$h^- \geq 3\pi^0 \nu_\tau$ (ex. K^0)		(1.25 ± 0.07) %		–
$h^- 3\pi^0 \nu_\tau$		(1.18 ± 0.07) %		836
$\pi^- 3\pi^0 \nu_\tau$ (ex.K^0)	[g]	(1.04 ± 0.07) %		836
$K^- 3\pi^0 \nu_\tau$ (ex.K^0, η)	[g]	$(4.8 \pm 2.1) \times 10^{-4}$		765
$h^- 4\pi^0 \nu_\tau$ (ex.K^0)		$(1.6 \pm 0.4) \times 10^{-3}$		800
$h^- 4\pi^0 \nu_\tau$ (ex.K^0,η)	[g]	$(1.1 \pm 0.4) \times 10^{-3}$		800
$a_1(1260)\nu_\tau \to \pi^- \gamma \nu_\tau$		$(3.8 \pm 1.5) \times 10^{-4}$		–
$K^- \geq 0\pi^0 \geq 0K^0 \geq 0\gamma\ \nu_\tau$		(1.552 ± 0.029) %		820
$K^- \geq 1\ (\pi^0$ or K^0 or $\gamma)\ \nu_\tau$		$(8.59 \pm 0.28) \times 10^{-3}$		–

Modes with K^0's

K^0_S (particles)$^- \nu_\tau$		$(9.43 \pm 0.28) \times 10^{-3}$		–
$h^- \overline{K}^0 \nu_\tau$		$(9.87 \pm 0.14) \times 10^{-3}$		812
$\pi^- \overline{K}^0 \nu_\tau$	[g]	$(8.38 \pm 0.14) \times 10^{-3}$		812
$\pi^- \overline{K}^0$ (non-$K^*(892)^-$)ν_τ		$(5.4 \pm 2.1) \times 10^{-4}$		812
$K^- K^0 \nu_\tau$	[g]	$(1.486 \pm 0.034) \times 10^{-3}$		737
$K^- K^0 \geq 0\pi^0 \nu_\tau$		$(2.99 \pm 0.07) \times 10^{-3}$		737
$h^- \overline{K}^0 \pi^0 \nu_\tau$		$(5.32 \pm 0.13) \times 10^{-3}$		794
$\pi^- \overline{K}^0 \pi^0 \nu_\tau$	[g]	$(3.82 \pm 0.13) \times 10^{-3}$		794
$\overline{K}^0 \rho^- \nu_\tau$		$(2.2 \pm 0.5) \times 10^{-3}$		612
$K^- K^0 \pi^0 \nu_\tau$	[g]	$(1.50 \pm 0.07) \times 10^{-3}$		685
$\pi^- \overline{K}^0 \geq 1\pi^0 \nu_\tau$		$(4.08 \pm 0.25) \times 10^{-3}$		–
$\pi^- \overline{K}^0 \pi^0 \pi^0 \nu_\tau$ (ex.K^0)	[g]	$(2.6 \pm 2.3) \times 10^{-4}$		763
$K^- K^0 \pi^0 \pi^0 \nu_\tau$		$< 1.6 \times 10^{-4}$	CL=95%	619
$\pi^- K^0 \overline{K}^0 \nu_\tau$		$(1.55 \pm 0.24) \times 10^{-3}$		682
$\pi^- K^0_S K^0_S \nu_\tau$	[g]	$(2.35 \pm 0.06) \times 10^{-4}$		682
$\pi^- K^0_S K^0_L \nu_\tau$	[g]	$(1.08 \pm 0.24) \times 10^{-3}$		682
$\pi^- K^0_L K^0_L \nu_\tau$		$(2.35 \pm 0.06) \times 10^{-4}$		682
$\pi^- K^0 \overline{K}^0 \pi^0 \nu_\tau$		$(3.6 \pm 1.2) \times 10^{-4}$		614
$\pi^- K^0_S K^0_S \pi^0 \nu_\tau$	[g]	$(1.82 \pm 0.21) \times 10^{-5}$		614
$K^{*-} K^0 \pi^0 \nu_\tau \to \pi^- K^0_S K^0_S \pi^0 \nu_\tau$		$(1.08 \pm 0.21) \times 10^{-5}$		–
$f_1(1285)\pi^- \nu_\tau \to \pi^- K^0_S K^0_S \pi^0 \nu_\tau$		$(6.8 \pm 1.5) \times 10^{-6}$		–
$f_1(1420)\pi^- \nu_\tau \to \pi^- K^0_S K^0_S \pi^0 \nu_\tau$		$(2.4 \pm 0.8) \times 10^{-6}$		–
$\pi^- K^0_S K^0_L \pi^0 \nu_\tau$	[g]	$(3.2 \pm 1.2) \times 10^{-4}$		614
$\pi^- K^0_L K^0_L \pi^0 \nu_\tau$		$(1.82 \pm 0.21) \times 10^{-5}$		614
$K^- K^0_S K^0_S \nu_\tau$		$< 6.3 \times 10^{-7}$	CL=90%	466
$K^- K^0_S K^0_S \pi^0 \nu_\tau$		$< 4.0 \times 10^{-7}$	CL=90%	337
$K^0 h^+ h^- h^- \geq 0$ neutrals ν_τ		$< 1.7 \times 10^{-3}$	CL=95%	760

$K^0 h^+ h^- h^- \nu_\tau$	[g]	$(2.5 \pm 2.0) \times 10^{-4}$		760

Modes with three charged particles

$h^- h^- h^+ \geq 0$ neutrals $\geq 0 K_L^0 \nu_\tau$		(15.20 ± 0.06) %		861
$h^- h^- h^+ \geq 0$ neutrals ν_τ (ex. $K_S^0 \to \pi^+\pi^-$) ("3-prong")		(14.55 ± 0.06) %		861
$h^- h^- h^+ \nu_\tau$		(9.80 ± 0.05) %		861
$h^- h^- h^+ \nu_\tau$ (ex.K^0)		(9.46 ± 0.05) %		861
$h^- h^- h^+ \nu_\tau$ (ex.K^0,ω)		(9.43 ± 0.05) %		861
$\pi^- \pi^+ \pi^- \nu_\tau$		(9.31 ± 0.05) %		861
$\pi^- \pi^+ \pi^- \nu_\tau$ (ex.K^0)		(9.02 ± 0.05) %		861
$\pi^- \pi^+ \pi^- \nu_\tau$ (ex.K^0), non-axial vector		< 2.4 %	CL=95%	861
$\pi^- \pi^+ \pi^- \nu_\tau$ (ex.K^0,ω)	[g]	(8.99 ± 0.05) %		861
$h^- h^- h^+ \geq 1$ neutrals ν_τ		(5.29 ± 0.05) %		–
$h^- h^- h^+ \geq 1 \pi^0 \nu_\tau$ (ex. K^0)		(5.09 ± 0.05) %		–
$h^- h^- h^+ \pi^0 \nu_\tau$		(4.76 ± 0.05) %		834
$h^- h^- h^+ \pi^0 \nu_\tau$ (ex.K^0)		(4.57 ± 0.05) %		834
$h^- h^- h^+ \pi^0 \nu_\tau$ (ex. K^0, ω)		(2.79 ± 0.07) %		834
$\pi^- \pi^+ \pi^- \pi^0 \nu_\tau$		(4.62 ± 0.05) %		834
$\pi^- \pi^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0)		(4.49 ± 0.05) %		834
$\pi^- \pi^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0,ω)	[g]	(2.74 ± 0.07) %		834
$h^- h^- h^+ \geq 2\pi^0 \nu_\tau$ (ex. K^0)		$(5.17 \pm 0.31) \times 10^{-3}$		–
$h^- h^- h^+ 2\pi^0 \nu_\tau$		$(5.05 \pm 0.31) \times 10^{-3}$		797
$h^- h^- h^+ 2\pi^0 \nu_\tau$ (ex.K^0)		$(4.95 \pm 0.31) \times 10^{-3}$		797
$h^- h^- h^+ 2\pi^0 \nu_\tau$ (ex.K^0,ω,η)	[g]	$(10 \pm 4) \times 10^{-4}$		797
$h^- h^- h^+ 3\pi^0 \nu_\tau$		$(2.13 \pm 0.30) \times 10^{-4}$		749
$2\pi^- \pi^+ 3\pi^0 \nu_\tau$ (ex.K^0)		$(1.95 \pm 0.30) \times 10^{-4}$		749
$2\pi^- \pi^+ 3\pi^0 \nu_\tau$ (ex.K^0, η, $f_1(1285)$)		$(1.7 \pm 0.4) \times 10^{-4}$		–
$2\pi^- \pi^+ 3\pi^0 \nu_\tau$ (ex.K^0, η, ω, $f_1(1285)$)	[g]	$(1.4 \pm 2.7) \times 10^{-5}$		–
$K^- h^+ h^- \geq 0$ neutrals ν_τ		$(6.29 \pm 0.14) \times 10^{-3}$		794
$K^- h^+ \pi^- \nu_\tau$ (ex.K^0)		$(4.37 \pm 0.07) \times 10^{-3}$		794
$K^- h^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0)		$(8.6 \pm 1.2) \times 10^{-4}$		763
$K^- \pi^+ \pi^- \geq 0$ neutrals ν_τ		$(4.77 \pm 0.14) \times 10^{-3}$		794
$K^- \pi^+ \pi^- \geq 0\pi^0 \nu_\tau$ (ex.K^0)		$(3.73 \pm 0.13) \times 10^{-3}$		794
$K^- \pi^+ \pi^- \nu_\tau$		$(3.45 \pm 0.07) \times 10^{-3}$		794
$K^- \pi^+ \pi^- \nu_\tau$ (ex.K^0)		$(2.93 \pm 0.07) \times 10^{-3}$		794
$K^- \pi^+ \pi^- \nu_\tau$ (ex.K^0,ω)	[g]	$(2.93 \pm 0.07) \times 10^{-3}$		794
$K^- \rho^0 \nu_\tau \to K^- \pi^+ \pi^- \nu_\tau$		$(1.4 \pm 0.5) \times 10^{-3}$		–

$K^- \pi^+ \pi^- \pi^0 \nu_\tau$		$(1.31 \pm 0.12) \times 10^{-3}$		763
$K^- \pi^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0)		$(7.9 \pm 1.2) \times 10^{-4}$		763
$K^- \pi^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0,η)		$(7.6 \pm 1.2) \times 10^{-4}$		763
$K^- \pi^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0,ω)		$(3.7 \pm 0.9) \times 10^{-4}$		763
$K^- \pi^+ \pi^- \pi^0 \nu_\tau$ (ex.K^0,ω,η)	[g]	$(3.9 \pm 1.4) \times 10^{-4}$		763
$K^- \pi^+ K^- \geq 0$ neut. ν_τ		$< 9 \times 10^{-4}$	CL=95%	685
$K^- K^+ \pi^- \geq 0$ neut. ν_τ		$(1.496 \pm 0.033) \times 10^{-3}$		685
$K^- K^+ \pi^- \nu_\tau$	[g]	$(1.435 \pm 0.027) \times 10^{-3}$		685
$K^- K^+ \pi^- \pi^0 \nu_\tau$	[g]	$(6.1 \pm 1.8) \times 10^{-5}$		618
$K^- K^+ K^- \nu_\tau$		$(2.2 \pm 0.8) \times 10^{-5}$	S=5.4	472
$K^- K^+ K^- \nu_\tau$ (ex. ϕ)		$< 2.5 \times 10^{-6}$	CL=90%	–
$K^- K^+ K^- \pi^0 \nu_\tau$		$< 4.8 \times 10^{-6}$	CL=90%	345
$\pi^- K^+ \pi^- \geq 0$ neut. ν_τ		$< 2.5 \times 10^{-3}$	CL=95%	794
$e^- e^- e^+ \overline{\nu}_e \nu_\tau$		$(2.8 \pm 1.5) \times 10^{-5}$		888
$\mu^- e^- e^+ \overline{\nu}_\mu \nu_\tau$		$< 3.2 \times 10^{-5}$	CL=90%	885
$\pi^- e^- e^+ \nu_\tau$		seen		883
$\pi^- \mu^- \mu^+ \nu_\tau$		$< 1.14 \times 10^{-5}$	CL=90%	870

Modes with five charged particles

$3h^- 2h^+ \geq 0$ neutrals ν_τ (ex. $K^0_S \to \pi^- \pi^+$) ("5-prong")		$(9.9 \pm 0.4) \times 10^{-4}$		794
$3h^- 2h^+ \nu_\tau$ (ex.K^0)		$(8.29 \pm 0.31) \times 10^{-4}$		794
$3\pi^- 2\pi^+ \nu_\tau$ (ex.K^0, ω)		$(8.27 \pm 0.31) \times 10^{-4}$		794
$3\pi^- 2\pi^+ \nu_\tau$ (ex.K^0, ω, $f_1(1285)$)	[g]	$(7.75 \pm 0.30) \times 10^{-4}$		–
$K^- 2\pi^- 2\pi^+ \nu_\tau$ (ex.K^0)	[g]	$(6 \pm 12) \times 10^{-7}$		716
$K^+ 3\pi^- \pi^+ \nu_\tau$		$< 5.0 \times 10^{-6}$	CL=90%	716
$K^+ K^- 2\pi^- \pi^+ \nu_\tau$		$< 4.5 \times 10^{-7}$	CL=90%	528
$3h^- 2h^+ \pi^0 \nu_\tau$ (ex.K^0)		$(1.65 \pm 0.11) \times 10^{-4}$		746
$3\pi^- 2\pi^+ \pi^0 \nu_\tau$ (ex.K^0)		$(1.63 \pm 0.11) \times 10^{-4}$		746
$3\pi^- 2\pi^+ \pi^0 \nu_\tau$ (ex.K^0, η, $f_1(1285)$)		$(1.11 \pm 0.10) \times 10^{-4}$		–
$3\pi^- 2\pi^+ \pi^0 \nu_\tau$ (ex.K^0, η, ω, $f_1(1285)$)	[g]	$(3.8 \pm 0.9) \times 10^{-5}$		–
$K^- 2\pi^- 2\pi^+ \pi^0 \nu_\tau$ (ex.K^0)	[g]	$(1.1 \pm 0.6) \times 10^{-6}$		657
$K^+ 3\pi^- \pi^+ \pi^0 \nu_\tau$		$< 8 \times 10^{-7}$	CL=90%	657
$3h^- 2h^+ 2\pi^0 \nu_\tau$		$< 3.4 \times 10^{-6}$	CL=90%	687

Miscellaneous other allowed modes

$(5\pi)^- \nu_\tau$		$(7.8 \pm 0.5) \times 10^{-3}$		800
$4h^- 3h^+ \geq 0$ neutrals ν_τ ("7-prong")		$< 3.0 \times 10^{-7}$	CL=90%	682
$4h^- 3h^+ \nu_\tau$		$< 4.3 \times 10^{-7}$	CL=90%	682
$4h^- 3h^+ \pi^0 \nu_\tau$		$< 2.5 \times 10^{-7}$	CL=90%	612

$X^-(S{=}-1)\nu_\tau$		(2.92 ± 0.04) %			–
$K^*(892)^- \geq 0$ neutrals $\geq 0K^0_L\nu_\tau$		(1.42 ± 0.18) %		S=1.4	665
$K^*(892)^-\nu_\tau$		(1.20 ± 0.07) %		S=1.8	665
$K^*(892)^-\nu_\tau \to \pi^-\overline{K}^0\nu_\tau$		(7.82 ± 0.26) $\times 10^{-3}$			–
$K^*(892)^0 K^- \geq 0$ neutrals ν_τ		(3.2 ± 1.4) $\times 10^{-3}$			542
$K^*(892)^0 K^-\nu_\tau$		(2.1 ± 0.4) $\times 10^{-3}$			542
$\overline{K}^*(892)^0\pi^- \geq 0$ neutrals ν_τ		(3.8 ± 1.7) $\times 10^{-3}$			655
$\overline{K}^*(892)^0\pi^-\nu_\tau$		(2.2 ± 0.5) $\times 10^{-3}$			655
$(\overline{K}^*(892)\pi)^-\nu_\tau \to \pi^-\overline{K}^0\pi^0\nu_\tau$		(1.0 ± 0.4) $\times 10^{-3}$			–
$K_1(1270)^-\nu_\tau$		(4.7 ± 1.1) $\times 10^{-3}$			447
$K_1(1400)^-\nu_\tau$		(1.7 ± 2.6) $\times 10^{-3}$		S=1.7	335
$K^*(1410)^-\nu_\tau$		(1.5 $^{+1.4}_{-1.0}$) $\times 10^{-3}$			326
$K^*_0(1430)^-\nu_\tau$		< 5 $\times 10^{-4}$	CL=95%		317
$K^*_2(1430)^-\nu_\tau$		< 3 $\times 10^{-3}$	CL=95%		315
$\eta\pi^-\nu_\tau$		< 9.9 $\times 10^{-5}$	CL=95%		797
$\eta\pi^-\pi^0\nu_\tau$	[g]	(1.39 ± 0.07) $\times 10^{-3}$			778
$\eta\pi^-\pi^0\pi^0\nu_\tau$	[g]	(2.0 ± 0.4) $\times 10^{-4}$			746
$\eta K^-\nu_\tau$	[g]	(1.55 ± 0.08) $\times 10^{-4}$			719
$\eta K^*(892)^-\nu_\tau$		(1.38 ± 0.15) $\times 10^{-4}$			511
$\eta K^-\pi^0\nu_\tau$	[g]	(4.8 ± 1.2) $\times 10^{-5}$			665
$\eta K^-\pi^0(\text{non-}K^*(892))\nu_\tau$		< 3.5 $\times 10^{-5}$	CL=90%		–
$\eta\overline{K}^0\pi^-\nu_\tau$	[g]	(9.4 ± 1.5) $\times 10^{-5}$			661
$\eta\overline{K}^0\pi^-\pi^0\nu_\tau$		< 5.0 $\times 10^{-5}$	CL=90%		590
$\eta K^- K^0\nu_\tau$		< 9.0 $\times 10^{-6}$	CL=90%		430
$\eta\pi^+\pi^-\pi^- \geq 0$ neutrals ν_τ		< 3 $\times 10^{-3}$	CL=90%		744
$\eta\pi^-\pi^+\pi^-\nu_\tau(\text{ex.}K^0)$	[g]	(2.20 ± 0.13) $\times 10^{-4}$			744
$\eta\pi^-\pi^+\pi^-\nu_\tau(\text{ex.}K^0,f_1(1285))$		(9.9 ± 1.6) $\times 10^{-5}$			–
$\eta a_1(1260)^-\nu_\tau \to \eta\pi^-\rho^0\nu_\tau$		< 3.9 $\times 10^{-4}$	CL=90%		–
$\eta\eta\pi^-\nu_\tau$		< 7.4 $\times 10^{-6}$	CL=90%		637
$\eta\eta\pi^-\pi^0\nu_\tau$		< 2.0 $\times 10^{-4}$	CL=95%		559
$\eta\eta K^-\nu_\tau$		< 3.0 $\times 10^{-6}$	CL=90%		382
$\eta'(958)\pi^-\nu_\tau$		< 4.0 $\times 10^{-6}$	CL=90%		620
$\eta'(958)\pi^-\pi^0\nu_\tau$		< 1.2 $\times 10^{-5}$	CL=90%		591
$\eta'(958)K^-\nu_\tau$		< 2.4 $\times 10^{-6}$	CL=90%		495
$\phi\pi^-\nu_\tau$		(3.4 ± 0.6) $\times 10^{-5}$			585
$\phi K^-\nu_\tau$	[g]	(4.4 ± 1.6) $\times 10^{-5}$			445
$f_1(1285)\pi^-\nu_\tau$		(3.9 ± 0.5) $\times 10^{-4}$		S=1.9	408
$f_1(1285)\pi^-\nu_\tau \to \eta\pi^-\pi^+\pi^-\nu_\tau$		(1.18 ± 0.07) $\times 10^{-4}$		S=1.3	–
$f_1(1285)\pi^-\nu_\tau \to 3\pi^-2\pi^+\nu_\tau$	[g]	(5.2 ± 0.4) $\times 10^{-5}$			–

$\pi(1300)^- \nu_\tau \to (\rho\pi)^- \nu_\tau \to (3\pi)^- \nu_\tau$		< 1.0	$\times 10^{-4}$ CL=90%	–
$\pi(1300)^- \nu_\tau \to ((\pi\pi)_{S-\text{wave}}\, \pi)^- \nu_\tau \to (3\pi)^- \nu_\tau$		< 1.9	$\times 10^{-4}$ CL=90%	–
$h^- \omega \geq 0$ neutrals ν_τ		(2.40 ± 0.08) %		708
$h^- \omega \nu_\tau$		(1.99 ± 0.06) %		708
$\pi^- \omega \nu_\tau$	[g]	(1.95 ± 0.06) %		708
$K^- \omega \nu_\tau$	[g]	$(4.1 \pm 0.9) \times 10^{-4}$		610
$h^- \omega \pi^0 \nu_\tau$	[g]	$(4.1 \pm 0.4) \times 10^{-3}$		684
$h^- \omega 2\pi^0 \nu_\tau$		$(1.4 \pm 0.5) \times 10^{-4}$		644
$\pi^- \omega 2\pi^0 \nu_\tau$	[g]	$(7.2 \pm 1.6) \times 10^{-5}$		644
$h^- 2\omega \nu_\tau$		< 5.4	$\times 10^{-7}$ CL=90%	250
$2h^- h^+ \omega \nu_\tau$		$(1.20 \pm 0.22) \times 10^{-4}$		641
$2\pi^- \pi^+ \omega \nu_\tau$ (ex.K^0)	[g]	$(8.4 \pm 0.6) \times 10^{-5}$		641

Lepton Family number (*LF*), Lepton number (*L*), or Baryon number (*B*) violating modes

L means lepton number violation (*e.g.* $\tau^- \to e^+ \pi^- \pi^-$). Following common usage, *LF* means lepton family violation *and not* lepton number violation (*e.g.* $\tau^- \to e^- \pi^+ \pi^-$). *B* means baryon number violation.

$e^- \gamma$	*LF*	< 3.3	$\times 10^{-8}$ CL=90%	888
$e^- \gamma\gamma$		< 2.5	$\times 10^{-4}$ CL=90%	888
$\mu^- \gamma$	*LF*	< 4.2	$\times 10^{-8}$ CL=90%	885
$\mu^- \gamma\gamma$		< 5.8	$\times 10^{-4}$ CL=90%	885
$e^- \pi^0$	*LF*	< 8.0	$\times 10^{-8}$ CL=90%	883
$\mu^- \pi^0$	*LF*	< 1.1	$\times 10^{-7}$ CL=90%	880
$e^- K^0_S$	*LF*	< 2.6	$\times 10^{-8}$ CL=90%	819
$\mu^- K^0_S$	*LF*	< 2.3	$\times 10^{-8}$ CL=90%	815
$e^- \eta$	*LF*	< 9.2	$\times 10^{-8}$ CL=90%	804
$\mu^- \eta$	*LF*	< 6.5	$\times 10^{-8}$ CL=90%	800
$e^- \rho^0$	*LF*	< 1.8	$\times 10^{-8}$ CL=90%	719
$\mu^- \rho^0$	*LF*	< 1.2	$\times 10^{-8}$ CL=90%	715
$e^- \omega$	*LF*	< 4.8	$\times 10^{-8}$ CL=90%	716
$\mu^- \omega$	*LF*	< 4.7	$\times 10^{-8}$ CL=90%	711
$e^- K^*(892)^0$	*LF*	< 3.2	$\times 10^{-8}$ CL=90%	665
$\mu^- K^*(892)^0$	*LF*	< 5.9	$\times 10^{-8}$ CL=90%	659
$e^- \overline{K}^*(892)^0$	*LF*	< 3.4	$\times 10^{-8}$ CL=90%	665
$\mu^- \overline{K}^*(892)^0$	*LF*	< 7.0	$\times 10^{-8}$ CL=90%	659
$e^- \eta'(958)$	*LF*	< 1.6	$\times 10^{-7}$ CL=90%	630
$\mu^- \eta'(958)$	*LF*	< 1.3	$\times 10^{-7}$ CL=90%	625
$e^- f_0(980) \to e^- \pi^+ \pi^-$	*LF*	< 3.2	$\times 10^{-8}$ CL=90%	–
$\mu^- f_0(980) \to \mu^- \pi^+ \pi^-$	*LF*	< 3.4	$\times 10^{-8}$ CL=90%	–
$e^- \phi$	*LF*	< 3.1	$\times 10^{-8}$ CL=90%	596

$\mu^- \phi$	*LF*	$<$	8.4	$\times 10^{-8}$ CL=90%	590
$e^- e^+ e^-$	*LF*	$<$	2.7	$\times 10^{-8}$ CL=90%	888
$e^- \mu^+ \mu^-$	*LF*	$<$	2.7	$\times 10^{-8}$ CL=90%	882
$e^+ \mu^- \mu^-$	*LF*	$<$	1.7	$\times 10^{-8}$ CL=90%	882
$\mu^- e^+ e^-$	*LF*	$<$	1.8	$\times 10^{-8}$ CL=90%	885
$\mu^+ e^- e^-$	*LF*	$<$	1.5	$\times 10^{-8}$ CL=90%	885
$\mu^- \mu^+ \mu^-$	*LF*	$<$	2.1	$\times 10^{-8}$ CL=90%	873
$e^- \pi^+ \pi^-$	*LF*	$<$	2.3	$\times 10^{-8}$ CL=90%	877
$e^+ \pi^- \pi^-$	*L*	$<$	2.0	$\times 10^{-8}$ CL=90%	877
$\mu^- \pi^+ \pi^-$	*LF*	$<$	2.1	$\times 10^{-8}$ CL=90%	866
$\mu^+ \pi^- \pi^-$	*L*	$<$	3.9	$\times 10^{-8}$ CL=90%	866
$e^- \pi^+ K^-$	*LF*	$<$	3.7	$\times 10^{-8}$ CL=90%	813
$e^- \pi^- K^+$	*LF*	$<$	3.1	$\times 10^{-8}$ CL=90%	813
$e^+ \pi^- K^-$	*L*	$<$	3.2	$\times 10^{-8}$ CL=90%	813
$e^- K^0_S K^0_S$	*LF*	$<$	7.1	$\times 10^{-8}$ CL=90%	736
$e^- K^+ K^-$	*LF*	$<$	3.4	$\times 10^{-8}$ CL=90%	738
$e^+ K^- K^-$	*L*	$<$	3.3	$\times 10^{-8}$ CL=90%	738
$\mu^- \pi^+ K^-$	*LF*	$<$	8.6	$\times 10^{-8}$ CL=90%	800
$\mu^- \pi^- K^+$	*LF*	$<$	4.5	$\times 10^{-8}$ CL=90%	800
$\mu^+ \pi^- K^-$	*L*	$<$	4.8	$\times 10^{-8}$ CL=90%	800
$\mu^- K^0_S K^0_S$	*LF*	$<$	8.0	$\times 10^{-8}$ CL=90%	696
$\mu^- K^+ K^-$	*LF*	$<$	4.4	$\times 10^{-8}$ CL=90%	699
$\mu^+ K^- K^-$	*L*	$<$	4.7	$\times 10^{-8}$ CL=90%	699
$e^- \pi^0 \pi^0$	*LF*	$<$	6.5	$\times 10^{-6}$ CL=90%	878
$\mu^- \pi^0 \pi^0$	*LF*	$<$	1.4	$\times 10^{-5}$ CL=90%	867
$e^- \eta \eta$	*LF*	$<$	3.5	$\times 10^{-5}$ CL=90%	699
$\mu^- \eta \eta$	*LF*	$<$	6.0	$\times 10^{-5}$ CL=90%	653
$e^- \pi^0 \eta$	*LF*	$<$	2.4	$\times 10^{-5}$ CL=90%	798
$\mu^- \pi^0 \eta$	*LF*	$<$	2.2	$\times 10^{-5}$ CL=90%	784
$p e^- e^-$	*L,B*	$<$	3.0	$\times 10^{-8}$ CL=90%	641
$\overline{p} e^+ e^-$	*L,B*	$<$	3.0	$\times 10^{-8}$ CL=90%	641
$\overline{p} e^+ \mu^-$	*L,B*	$<$	2.0	$\times 10^{-8}$ CL=90%	635
$\overline{p} e^- \mu^+$	*L,B*	$<$	1.8	$\times 10^{-8}$ CL=90%	635
$p \mu^- \mu^-$	*L,B*	$<$	4.0	$\times 10^{-8}$ CL=90%	618
$\overline{p} \mu^+ \mu^-$	*L,B*	$<$	1.8	$\times 10^{-8}$ CL=90%	618
$\overline{p} \gamma$	*L,B*	$<$	3.5	$\times 10^{-6}$ CL=90%	641
$\overline{p} \pi^0$	*L,B*	$<$	1.5	$\times 10^{-5}$ CL=90%	632
$\overline{p} 2\pi^0$	*L,B*	$<$	3.3	$\times 10^{-5}$ CL=90%	604
$\overline{p} \eta$	*L,B*	$<$	8.9	$\times 10^{-6}$ CL=90%	475
$\overline{p} \pi^0 \eta$	*L,B*	$<$	2.7	$\times 10^{-5}$ CL=90%	360
$\Lambda \pi^-$	*L,B*	$<$	7.2	$\times 10^{-8}$ CL=90%	525
$\overline{\Lambda} \pi^-$	*L,B*	$<$	1.4	$\times 10^{-7}$ CL=90%	525
e^- light boson	*LF*	$<$	2.7	$\times 10^{-3}$ CL=95%	–
μ^- light boson	*LF*	$<$	5	$\times 10^{-3}$ CL=95%	–

Heavy Charged Lepton Searches

$L^{\pm}$ – charged lepton

Mass $m >$ 100.8 GeV, CL = 95% [h] Decay to νW.

$L^{\pm}$ – stable charged heavy lepton

Mass $m >$ 102.6 GeV, CL = 95%

Neutrino Properties

See the note on "Neutrino properties listings" in the Particle Listings.

Mass $m <$ 0.8 eV, CL = 90% (tritium decay)
Mean life/mass, $\tau/m >$ 300 s/eV, CL = 90% (reactor)
Mean life/mass, $\tau/m >$ 7×10^{9} s/eV (solar)
Mean life/mass, $\tau/m >$ 15.4 s/eV, CL = 90% (accelerator)
Magnetic moment $\mu <$ 0.064×10^{-10} μ_B, CL = 90% (solar + radiochemical)

Number of Neutrino Types

Number $N = 2.996 \pm 0.007$ (Standard Model fits to LEP-SLC data)
Number $N = 2.92 \pm 0.05$ (S = 1.2) (Direct measurement of invisible Z width)

Neutrino Mixing

The following values are obtained through data analyses based on the 3-neutrino mixing scheme described in the review "Neutrino Masses, Mixing, and Oscillations."

$\sin^2(\theta_{12}) = 0.307 \pm 0.013$
$\Delta m^2_{21} = (7.53 \pm 0.18) \times 10^{-5}$ eV^2
$\sin^2(\theta_{23}) = 0.534^{+0.021}_{-0.024}$ (Inverted order)
$\sin^2(\theta_{23}) = 0.547^{+0.018}_{-0.024}$ (Normal order)
$\Delta m^2_{32} = (-2.519 \pm 0.033) \times 10^{-3}$ eV^2 (Inverted order)
$\Delta m^2_{32} = (2.437 \pm 0.033) \times 10^{-3}$ eV^2 (Normal order)
$\sin^2(\theta_{13}) = (2.20 \pm 0.07) \times 10^{-2}$
δ, CP violating phase = 1.23 ± 0.21 π rad (S = 1.3)
$\langle \Delta m^2_{21} - \Delta \overline{m}^2_{21} \rangle < 1.1 \times 10^{-4}$ eV^2, CL = 99.7%
$\langle \Delta m^2_{32} - \Delta \overline{m}^2_{32} \rangle = (-0.12 \pm 0.25) \times 10^{-3}$ eV^2

NOTES

[*a*] This is the best limit for the mode $e^- \rightarrow \ \nu\gamma$.

[*b*] See the review on "Muon Decay Parameters" for definitions and details.

[*c*] P_μ is the longitudinal polarization of the muon from pion decay. For $V{-}A$ coupling, $P_\mu = 1$ and $\rho = \delta = 3/4$.

[*d*] This only includes events with energy of $e > 45$ MeV and energy of $\gamma > 40$ MeV. Since the $e^- \overline{\nu}_e \nu_\mu$ and $e^- \overline{\nu}_e \nu_\mu \gamma$ modes cannot be clearly separated, we regard the latter mode as a subset of the former.

[*e*] See the relevant Particle Listings for the energy limits used in this measurement.

[*f*] A test of additive vs. multiplicative lepton family number conservation.

[*g*] Basis mode for the τ.

[*h*] $L^\pm$ mass limit depends on decay assumptions; see the Full Listings.

QUARKS

The u-, d-, and s-quark masses are the $\overline{\mathrm{MS}}$ masses at the scale μ = 2 GeV. The c- and b-quark masses are the $\overline{\mathrm{MS}}$ masses renormalized at the $\overline{\mathrm{MS}}$ mass, i.e. $\overline{m} = \overline{m}(\mu = \overline{m})$. The t-quark mass is extracted from event kinematics (see the review "The Top Quark").

u

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

$m_u = 2.16^{+0.49}_{-0.26}$ MeV Charge = $\frac{2}{3}$ e $I_z = +\frac{1}{2}$

$m_u/m_d = 0.474^{+0.056}_{-0.074}$

d

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

$m_d = 4.67^{+0.48}_{-0.17}$ MeV Charge = $-\frac{1}{3}$ e $I_z = -\frac{1}{2}$

m_s/m_d = 17–22

$\overline{m} = (m_u+m_d)/2 = 3.45^{+0.35}_{-0.15}$ MeV

s

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

$m_s = 93.4^{+8.6}_{-3.4}$ MeV Charge = $-\frac{1}{3}$ e Strangeness = -1

m_s / $((m_u + m_d)/2) = 27.33^{+0.67}_{-0.77}$

c

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

$m_c = 1.27 \pm 0.02$ GeV Charge = $\frac{2}{3}$ e Charm = $+1$

$m_b - m_c = 3.45 \pm 0.05$ GeV

b

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

$m_b = 4.18^{+0.03}_{-0.02}$ GeV Charge = $-\frac{1}{3}$ e Bottom = -1

t

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

Charge $= \frac{2}{3}\ e$ Top $= +1$

Mass (direct measurements) $m = 172.69 \pm 0.30$ GeV [a,b] (S = 1.3)
Mass (from cross-section measurements) $m = 162.5^{+2.1}_{-1.5}$ GeV [a]
Mass (Pole from cross-section measurements) $m = 172.5 \pm 0.7$ GeV
$m_t - m_{\overline{t}} = -0.15 \pm 0.20$ GeV (S = 1.1)
Full width $\Gamma = 1.42^{+0.19}_{-0.15}$ GeV (S = 1.4)
$\Gamma(W\,b)/\Gamma(W\,q(q = b,\ s,\ d)) = 0.957 \pm 0.034$ (S = 1.5)

t-quark EW Couplings

$F_0 = 0.693 \pm 0.013$
$F_- = 0.315 \pm 0.010$
$F_+ = -0.005 \pm 0.007$
$F_{V+A} < 0.29$, CL = 95%

t DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$W\,q(q = b,\ s,\ d)$				–
$W\,b$				–
$e\nu_e\,b$		(11.10 ± 0.30) %		–
$\mu\nu_\mu\,b$		(11.40 ± 0.20) %		–
$\tau\nu_\tau\,b$		$(10.7\ \pm0.5\ )$ %		–
$q\overline{q}\,b$		$(66.5\ \pm1.4\ )$ %		–
$\gamma\,q(q=u,c)$		[c] $< 1.8 \times 10^{-4}$	95%	–
$\Delta T = 1$ weak neutral current (T1) modes				
$Z\,q(q=u,c)$	T1	[d] $< 5 \times 10^{-4}$	95%	–
$H\,u$	T1	$< 1.9 \times 10^{-4}$	95%	–
$H\,c$	T1	$< 7.3 \times 10^{-4}$	95%	–
$\ell^+\overline{q}\,\overline{q}'(q=d,s,b;\ q'=u,c)$	T1	$< 1.6 \times 10^{-3}$	95%	–
Lepton Family number (LF) violating modes				
$e^\pm\mu^\mp\,c$	LF	$< 8.9 \times 10^{-7}$		–
$e^\pm\mu^\mp\,u$	LF	$< 7 \times 10^{-8}$		–

b' (4^{th} Generation) Quark, Searches for

Mass $m >$ 190 GeV, CL = 95% ($p\overline{p}$, quasi-stable b')
Mass $m >$ 1390 GeV, CL = 95% (B($b' \to Z b$) = 1)
Mass $m >$ 1350 GeV, CL = 95% (B($b' \to W t$) = 1)
Mass $m >$ 1570 GeV, CL = 95% (B($b' \to H b$) = 1)
Mass $m >$ 46.0 GeV, CL = 95% ($e^+ e^-$, all decays)

t' (4^{th} Generation) Quark, Searches for

$m(t'(2/3)) >$ 1280 GeV, CL = 95% (B($t' \to Z t$) = 1)
$m(t'(2/3)) >$ 1295 GeV, CL = 95% (B($t' \to W b$) = 1)
$m(t'(2/3)) >$ 1310 GeV, CL = 95% (singlet t')
$m(t'(2/3)) >$ 1350 GeV, CL = 95% (t' in a weak isospin doublet (t',b'))
$m(t'(5/3)) >$ 1.350×10^3 GeV, CL = 95% ($t'(5/3) \to t W^+$)

Free Quark Searches

All searches since 1977 have had negative results.

NOTES

[a] A discussion of the definition of the top quark mass in these measurements can be found in the review "The Top Quark."

[b] Based on published top mass measurements using data from Tevatron Run-I and Run-II and LHC at $\sqrt{s} = 7$ TeV. Including the most recent unpublished results from Tevatron Run-II, the Tevatron Electroweak Working Group reports a top mass of 173.2 $\pm$ 0.9 GeV. See the note "The Top Quark' in the Quark Particle Listings of this *Review*.

[c] This limit is for $\Gamma(t \to \gamma q)/\Gamma(t \to W b)$.

[d] This limit is for $\Gamma(t \to Z q)/\Gamma(t \to W b)$.

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 $m = 139.57039 \pm 0.00018$ MeV (S = 1.8)
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 ±0.25) $\times 10^{-4}$		30
$e^+\nu_e$		[b]	(1.230 ±0.004) $\times 10^{-4}$		70
$e^+\nu_e\gamma$		[c]	(7.39 ±0.05) $\times 10^{-7}$		70
$e^+\nu_e\pi^0$			(1.036 ±0.006) $\times 10^{-8}$		4
$e^+\nu_e e^+ e^-$			(3.2 ±0.5) $\times 10^{-9}$		70
$\mu^+\nu_\mu\nu\overline{\nu}$			< 9 $\times 10^{-6}$	90%	30
$e^+\nu_e\nu\overline{\nu}$			< 1.6 $\times 10^{-7}$	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 $m = 134.9768 \pm 0.0005$ MeV (S = 1.1)

$m_{\pi^\pm} - m_{\pi^0} = 4.5936 \pm 0.0005$ MeV
Mean life $\tau = (8.43 \pm 0.13) \times 10^{-17}$ s (S = 1.2)
$c\tau = 25.3$ 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
invisible		$< 4.4 \times 10^{-9}$	CL=90%	–
$\nu_e \overline{\nu}_e$		$< 1.7 \times 10^{-6}$	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
$\gamma \nu \overline{\nu}$		$< 1.9 \times 10^{-7}$	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	$< 3.2 \times 10^{-10}$	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 $A_\phi = (-0.6 \pm 3.1) \times 10^{-2}$

Other decay parameters

$\pi^0\pi^0\pi^0$ Dalitz plot $\alpha = -0.0288 \pm 0.0012$ (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		(71.96 ± 0.30) %	S=1.3	–
2γ		(39.36 ± 0.18) %	S=1.1	274
$3\pi^0$		(32.57 ± 0.21) %	S=1.2	179
$\pi^0 2\gamma$		$(2.55\pm0.22)\times10^{-4}$		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		(28.04 ± 0.30) %	S=1.3	–
$\pi^+\pi^-\pi^0$		(23.02 ± 0.25) %	S=1.2	174
$\pi^+\pi^-\gamma$		(4.28 ± 0.07) %	S=1.1	236
$e^+e^-\gamma$		$(6.9\pm0.4)\times10^{-3}$	S=1.2	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
$\pi^+\pi^-\pi^0\gamma$		$< 6 \times10^{-4}$	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	[e] $< 9 \times10^{-5}$	CL=90%	257
$\pi^+\pi^-$	P,CP	$< 4.4 \times10^{-6}$	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

$f_0(500)$

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

also known as σ; was $f_0(600)$

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

Mass (T-Matrix Pole $\sqrt{s}$) = (400–550)$-i$(200–350) MeV
Mass (Breit-Wigner) = 400 to 800 MeV
Full width (Breit-Wigner) = 100 to 800 MeV

$f_0(500)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	–
$\gamma\gamma$	seen	–

$\rho(770)$

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

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

T-Matrix Pole $\sqrt{s}$ = (761–765) $- i$ (71–74) MeV
Mass (Breit-Wigner) = 775.26 $\pm$ 0.23 MeV
Full width (Breit-Wigner) = 149.1 $\pm$ 0.8 MeV

$\rho(770)$ 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
$\pi^{0}\gamma$		$(4.7 \pm 0.8) \times 10^{-4}$	S=1.7	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
$\mu^{+}\mu^{-}$	[g]	$(4.55 \pm 0.28) \times 10^{-5}$		373
$e^{+}e^{-}$	[g]	$(4.72 \pm 0.05) \times 10^{-5}$		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 $m = 782.66 \pm 0.13$ MeV (S = 2.0)
Full width $\Gamma = 8.68 \pm 0.13$ MeV

ω(782) DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi^+\pi^-\pi^0$		(89.2 ± 0.7) %		327
$\pi^0\gamma$		(8.35 ± 0.27) %	S=2.2	380
$\pi^+\pi^-$		$(1.53^{+0.11}_{-0.13})$ %	S=1.2	366
neutrals (excluding $\pi^0\gamma$)		$(7\ ^{+8}_{-4}) \times 10^{-3}$	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^-		$(7.38 \pm 0.22) \times 10^{-5}$	S=1.9	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	$< 2.1 \times 10^{-4}$	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 $\Gamma = 0.188 \pm 0.006$ MeV

η'(958) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\pi^+\pi^-\eta$	(42.5 ± 0.5) %		232
$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.5 ± 0.4) %		165
$\pi^0\pi^0\eta$	(22.4 ± 0.5) %		239
$\omega\gamma$	(2.52 ± 0.07) %		159
ωe^+e^-	$(2.0 \pm 0.4) \times 10^{-4}$		159
$\gamma\gamma$	(2.307 ± 0.033) %		479
$3\pi^0$	$(2.50 \pm 0.17) \times 10^{-3}$		430

$\mu^+\mu^-\gamma$			(1.13 ±0.28) × 10^{-4}		467
$\pi^+\pi^-\mu^+\mu^-$			(2.0 ±0.4) × 10^{-5}		401
$\pi^+\pi^-\pi^0$			(3.61 ±0.17) × 10^{-3}		428
$(\pi^+\pi^-\pi^0)$ S-wave			(3.8 ±0.5) × 10^{-3}		428
$\pi^{\mp}\rho^{\pm}$			(7.4 ±2.3) × 10^{-4}		106
$2(\pi^+\pi^-)$			(8.4 ±0.9) × 10^{-5}		372
$\pi^+\pi^-2\pi^0$			(1.8 ±0.4) × 10^{-4}		376
$2(\pi^+\pi^-)$ neutrals			< 1 %	95%	–
$2(\pi^+\pi^-)\pi^0$			< 1.8 × 10^{-3}	90%	298
$2(\pi^+\pi^-)2\pi^0$			< 1 %	95%	197
$3(\pi^+\pi^-)$			< 3.1 × 10^{-5}	90%	189
$K^{\pm}\pi^{\mp}$			< 4 × 10^{-5}	90%	334
$\pi^+\pi^-e^+e^-$			(2.42 ±0.10) × 10^{-3}		458
$\pi^+e^-\nu_e$ + c.c.			< 2.1 × 10^{-4}	90%	469
γe^+e^-			(4.91 ±0.27) × 10^{-4}		479
$\pi^0\gamma\gamma$			(3.20 ±0.24) × 10^{-3}		469
$\pi^0\gamma\gamma$(non resonant)			(6.2 ±0.9) × 10^{-4}		–
$\eta\gamma\gamma$			< 1.33 × 10^{-4}	90%	322
$4\pi^0$			< 4.94 × 10^{-5}	90%	380
e^+e^-			< 5.6 × 10^{-9}	90%	479
$e^+e^-e^+e^-$			(4.5 ±1.1) × 10^{-6}		479
invisible			< 6 × 10^{-4}	90%	–

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

$\pi^+\pi^-$	*P*,*CP*		< 1.8 × 10^{-5}	90%	458
$\pi^0\pi^0$	*P*,*CP*		< 4 × 10^{-4}	90%	459
$\pi^0e^+e^-$	*C*	[f]	< 1.4 × 10^{-3}	90%	469
$\pi^0\rho^0$	*C*		< 4 %	90%	111
ηe^+e^-	*C*	[f]	< 2.4 × 10^{-3}	90%	322
3γ	*C*		< 1.0 × 10^{-4}	90%	479
$\mu^+\mu^-\pi^0$	*C*	[f]	< 6.0 × 10^{-5}	90%	445
$\mu^+\mu^-\eta$	*C*	[f]	< 1.5 × 10^{-5}	90%	273
$e\mu$	*LF*		< 4.7 × 10^{-4}	90%	473

$f_0(980)$

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

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

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

$f_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi$	seen	476

$K\overline{K}$	seen	36
$\gamma\gamma$	seen	495

$a_0(980)$

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

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

T-matrix pole $\sqrt{s} = (960\text{–}1030) - i\ (20\text{–}70)$ MeV [h]
Mass $m = 980 \pm 20$ MeV [h]
Full width $\Gamma = 50$ to 100 MeV [h]

$a_0(980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	seen	319
$K\overline{K}$	seen	†
$\eta'\pi$	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^-	(49.1 ± 0.5) %	S=1.3	127
$K^0_L K^0_S$	(33.9 ± 0.4) %	S=1.2	110
$\rho\pi + \pi^+\pi^-\pi^0$	(15.4 ± 0.4) %	S=1.2	–
$\eta\gamma$	(1.301 ± 0.025) %	S=1.2	363
$\pi^0\gamma$	$(1.32 \pm 0.05) \times 10^{-3}$		501
$\ell^+\ell^-$	—		510
e^+e^-	$(2.979 \pm 0.033) \times 10^{-4}$	S=1.3	510
$\mu^+\mu^-$	$(2.85 \pm 0.19) \times 10^{-4}$		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
$\eta'(958)\gamma$		$(6.21 \pm 0.21) \times 10^{-5}$		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
$\eta U \to \eta e^+ e^-$		$< 1 \times 10^{-6}$	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 $m = 1166 \pm 6$ MeV
Full width $\Gamma = 375 \pm 35$ MeV

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

$b_1(1235)$

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

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 ± 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
$K^*(892)^\pm K^\mp$	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

$a_1(1260)$ [i]

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

T-Matrix Pole $\sqrt{s} = (1209 \pm 4^{+12}_{-9}) - i(288 \pm 6^{+45}_{-10})$ MeV
Mass (Breit-Wigner) = 1230 ± 40 MeV [h]
Full width (Breit-Wigner) = 250 to 600 MeV [h]

$a_1(1260)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
3π	seen	577
$(\rho\pi)_{S-\text{wave}}$, $\rho \to \pi\pi$	seen	353
$(\rho\pi)_{D-\text{wave}}$, $\rho \to \pi\pi$	seen	353
$(\rho(1450)\pi)_{S-\text{wave}}$, $\rho \to \pi\pi$	seen	†
$(\rho(1450)\pi)_{D-\text{wave}}$, $\rho \to \pi\pi$	seen	†
$f_0(500)\pi$, $f_0 \to \pi\pi$	seen	–
$f_0(980)\pi$, $f_0 \to \pi\pi$	seen	179
$f_0(1370)\pi$, $f_0 \to \pi\pi$	seen	†
$f_2(1270)\pi$, $f_2 \to \pi\pi$	seen	†
$\pi^+\pi^-\pi^0$	seen	576
$\pi^0\pi^0\pi^0$	not seen	577
$KK\pi$	seen	250
$K^*(892)K$	seen	†
$\pi\gamma$	seen	608

$f_2(1270)$

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

T-Matrix Pole $\sqrt{s} = (1260\text{–}1283) - i\ (90\text{–}110)$ MeV
Mass (Breit-Wigner) = 1275.4 ± 0.8 MeV (S = 1.1)
Full width (Breit-Wigner) = 186.6 ± 2.3 MeV (S = 1.5)

$f_2(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\pi\pi$	$(84.3\ ^{+2.9}_{-0.9})$ %	S=1.2	623
$\pi^+\pi^-2\pi^0$	$(7.7\ ^{+1.1}_{-3.2})$ %	S=1.2	563
$K\overline{K}$	(4.6 ± 0.4) %	S=2.7	404
$2\pi^+2\pi^-$	(2.8 ± 0.4) %	S=1.2	559
$\eta\eta$	$(4.0 \pm 0.8) \times 10^{-3}$	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	(32.7 ± 1.9) %	S=1.2	568
$\pi^0\pi^0\pi^+\pi^-$	(21.8 ± 1.3) %	S=1.2	566
$2\pi^+2\pi^-$	(10.9 ± 0.6) %	S=1.2	563
$\rho^0\pi^+\pi^-$	(10.9 ± 0.6) %	S=1.2	336
$\rho^0\rho^0$	seen		†
$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	568
$\eta\pi^+\pi^-$	(35 ± 15) %		479
$\eta\pi\pi$	(52.2 ± 2.0) %	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
$K\overline{K}\pi$	(9.0 ± 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
$\gamma\rho^0$	(6.1 ± 1.0) %	S=1.7	406
$\phi\gamma$	$(7.4\pm 2.6) \times 10^{-4}$		236
e^+e^-	$< 9.4 \times 10^{-9}$	CL=90%	641

$\eta(1295)$

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

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

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	–
$\sigma\eta$	seen	–
$K\overline{K}\pi$	seen	320

$\pi(1300)$

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

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

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

$a_2(1320)$

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

T-Matrix Pole $\sqrt{s} = (1305\text{–}1321) - i(52\text{–}58)$ MeV
Mass (Breit-Wigner) $= 1318.2 \pm 0.6$ MeV (S = 1.2)
Full width (Breit-Wigner) $= 107 \pm 5$ MeV [h]

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

$f_0(1370)$

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

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

$\pi_1(1400)$

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

Coupled channel analyses favor the existence of only one broad 1^{-+} isovector state consistent with $\pi_1(1600)$ in the 1400–1600 MeV region. See the review on "Spectroscopy of Light Meson Resonances." See also $\pi_1(1600)$.

T-Matrix Pole $\sqrt{s} = (1405 \pm 4^{+15}_{-18}) - i\ (314 \pm 14^{+18}_{-69})$ MeV
Mass (Breit-Wigner) = 1354 ± 25 MeV (S = 1.8)
Full width (Breit-Wigner) = 330 ± 35 MeV

π_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

$\eta(1405)$

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

See the review on "Spectroscopy of Light Meson Resonances." See also $\eta(1475)$.

Mass m = 1408.8 ± 2.0 MeV (S = 2.2)
Full width Γ = 50.1 ± 2.6 MeV (S = 1.7)

η(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
$\eta(\pi\pi)_{S\text{-wave}}$	seen		–
$f_0(980)\pi^0 \to \pi^+\pi^-\pi^0$	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

$h_1(1415)$ $\quad I^G(J^{PC}) = 0^-(1^{+-})$

was $h_1(1380)$

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

$f_1(1420)$ $\quad I^G(J^{PC}) = 0^+(1^{++})$

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

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

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

Mass $m = 1410 \pm 60$ MeV [h]
Full width $\Gamma = 290 \pm 190$ MeV [h]

ω(1420) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	480
$\omega\pi\pi$	seen	437
$b_1(1235)\pi$	seen	112
e^+e^-	seen	705

$a_0(1450)$ $\quad I^G(J^{PC}) = 1^-(0^{++})$

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

T-Matrix Pole $\sqrt{s}$ = (1290–1500) $- i$ (30–140) MeV
Mass (Breit-Wigner) = 1439 ± 34 MeV (S = 1.8)
Full width (Breit-Wigner) = 258 ± 14 MeV

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

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

ρ(1450)

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

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

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

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

ρ(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	55
$K\overline{K}$	seen	541
K^+K^-	seen	541
$K\overline{K}^*(892)+$ c.c.	possibly seen	229
$\pi^0\gamma$	seen	726
$\eta\gamma$	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

η(1475)

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

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

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

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

η(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

$f_0(1500)$

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

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

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

f_0(1500) DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\pi\pi$	(34.5±2.2) %	1.2	749
$\pi^+\pi^-$	seen		748
$2\pi^0$	seen		749
4π	(48.9±3.3) %	1.2	700
$4\pi^0$	seen		700
$2\pi^+2\pi^-$	seen		696
$2(\pi\pi)_{S\text{-wave}}$	seen		–
$\rho\rho$	seen		†
$\pi(1300)\pi$	seen		163
$a_1(1260)\pi$	seen		234
$\eta\eta$	(6.0±0.9) %	1.1	528
$\eta\eta'(958)$	(2.2±0.8) %	1.4	107
$K\overline{K}$	(8.5±1.0) %	1.1	579
$\gamma\gamma$	not seen		761

$f'_2(1525)$

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

Mass m = 1517.4 ± 2.5 MeV (S = 2.8)
Full width Γ = 86 ± 5 MeV (S = 2.2)

f'_2(1525) DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$K\overline{K}$	(87.6±2.2) %	1.1	576
$\eta\eta$	(11.6±2.2) %	1.1	525

$\pi\pi$	$(8.3\pm1.6)\times10^{-3}$		747
$\gamma\gamma$	$(9.5\pm1.1)\times10^{-7}$	1.1	759

$\pi_1(1600)$

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

See the review on "Spectroscopy of Light Meson Resonances" and a note in PDG 06, Journal of Physics **G33** 1 (2006). See also $\pi_1(1400)$.

Mass (T-Matrix Pole $\sqrt{s}$) = (1480–1680) $- i$ (150–300) MeV
Mass (Breit-Wigner) = 1661^{+15}_{-11} MeV (S = 1.2)
Full width (Breit-Wigner) = 240 ± 50 MeV (S = 1.7)

π_1(1600) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\pi\pi\pi$	seen	803
$\rho^0\pi^-$	seen	641
$f_2(1270)\pi^-$	not seen	318
$b_1(1235)\pi$	seen	357
$\eta'(958)\pi^-$	seen	543
$\eta\pi$	seen	734
$f_1(1285)\pi$	seen	314

$a_1(1640)$

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

Mass m = 1655 ± 16 MeV (S = 1.2)
Full width Γ = 254 ± 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 ± 5 MeV
Full width Γ = 181 ± 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	†

$\omega(1650)$ [k]

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

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

$\omega(1650)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi$	seen	647
$\rho(1450)\pi$	seen	145
$\omega\pi\pi$	seen	617
$\omega\eta$	seen	500
e^+e^-	seen	835
$\pi^0\gamma$	not seen	830

$\omega_3(1670)$

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

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

$\omega_3(1670)$ 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 (S = 1.3)
Full width $\Gamma = 258^{+8}_{-9}$ MeV (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) %		–
$\pi(\pi\pi)_{S\text{-wave}}$	(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
$\pi^{\pm}\gamma$	$(7.0\pm1.2) \times 10^{-4}$		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		291

$\phi(1680)$

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

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

$\phi(1680)$ 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
$f'_2(1525)\gamma$	not seen	155

$\rho_3(1690)$

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

Mass $m = 1688.8 \pm 2.1$ MeV
Full width $\Gamma = 161 \pm 10$ MeV (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		307
$\rho\rho$	seen		335

$\rho(1700)$

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

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

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

Full width $\Gamma = 250 \pm 100$ MeV [h] ($\eta\rho^0$ 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	450
$\pi(1300)\pi$	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
$\pi^0\gamma$	not seen	855
$f_0(1500)\gamma$	not seen	187

$a_2(1700)$

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

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

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

Full width $\Gamma = 378^{+60}_{-50}$ MeV (S = 3.9)

$a_2(1700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\pi$	(2.5±0.6) %	758
$\eta'\pi$	seen	574

$\gamma\gamma$	$(7.9\pm1.7)\times10^{-7}$	853
$\rho\pi$	seen	669
$f_2(1270)\pi$	seen	357
$K\overline{K}$	(1.3 ± 0.8) %	695
$\omega\pi^-\pi^0$	seen	639
$\omega\rho$	seen	347

$f_0(1710)$

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

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

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

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

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

$f_0(1710)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\overline{K}$	seen	712
$\eta\eta$	seen	671
$\pi\pi$	seen	856
$\gamma\gamma$	seen	866
$\omega\omega$	seen	372

$\pi(1800)$

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

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	232
$\rho\pi^-$	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	232
$\eta\eta'(958)\pi^-$	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)
$\eta\pi\pi$	seen	816
$a_2(1320)\pi$	seen	434
$f_2(1270)\eta$	seen	119
$a_0(980)\pi$	seen	651
$\gamma\gamma$	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)

$\pi_2(1880)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\eta\eta\pi^-$	seen	702
$a_0(980)\eta$	seen	528
$a_2(1320)\eta$	seen	76
$f_0(1500)\pi$	seen	294
$f_1(1285)\pi$	seen	485
$\omega\pi^-\pi^0$	seen	744

$f_2(1950)$

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

T-Matrix Pole $\sqrt{s} = (1830–2020) - i\ (110–220)$ MeV
Mass (Breit-Wigner) = 1936 ± 12 MeV (S = 1.3)
Full width (Breit-Wigner) = 464 ± 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

$a_4(1970)$

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

was $a_4(2040)$

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

$f_0(2020)$

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

T-Matrix Pole $\sqrt{s} = (1870–2080) - i\,(120–240)$ MeV
Mass (Breit-Wigner) $= 1982^{+54.1}_{-\ \ 3.0}$ MeV
Full width (Breit-Wigner) $= 436 \pm 50$ MeV

$f_0(2020)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\rho\pi\pi$	seen	814
$\pi^0\pi^0$	seen	982
$\rho\rho$	seen	617
$\omega\omega$	seen	608
$\eta\eta$	seen	826
$\eta'\eta'$	seen	254

$f_4(2050)$

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

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
$\gamma\gamma$	seen	1009
$a_2(1320)\pi$	seen	567

$\phi(2170)$

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

Mass $m = 2163 \pm 7$ MeV [h] (S = 1.1)
Full width $\Gamma = 103^{+28}_{-21}$ MeV [h] (S = 2.2)

$\phi(2170)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	seen	1082
$\phi\eta$	seen	727
$\omega\eta$	seen	848
$\phi\eta'$	seen	438

$\phi f_0(980)$	seen	400
$K^+ K^- f_0(980) \to K^+ K^- \pi^+ \pi^-$	seen	–
$K^+ K^- f_0(980) \to K^+ K^- \pi^0 \pi^0$	seen	–
$K^{*0} K^\pm \pi^\mp$	not seen	762
$K^*(892)^0 \overline{K}^*(892)^0$	not seen	612

$f_2(2300)$

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

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
$\Lambda\overline{\Lambda}$	seen	273

$f_2(2340)$

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

Mass $m = 2346^{+21}_{-10}$ MeV
Full width $\Gamma = 331^{+27}_{-18}$ MeV

$f_2(2340)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\phi\phi$	seen	580
$\eta\eta$	seen	1037
$\eta'\eta'$	seen	677

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

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

$K^\pm$

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

Mass $m = 493.677 \pm 0.016$ MeV [l] (S = 2.8)
Mean life $\tau = (1.2380 \pm 0.0020) \times 10^{-8}$ s (S = 1.8)
$c\tau = 3.711$ m

CPT violation parameters (Δ = rate difference/sum)

$\Delta(K^\pm \rightarrow \mu^\pm \nu_\mu) = (-0.27 \pm 0.21)\%$
$\Delta(K^\pm \rightarrow \pi^\pm \pi^0) = (0.4 \pm 0.6)\%$ [n]

CP violation parameters (Δ = rate difference/sum)

$\Delta(K^\pm \rightarrow \pi^\pm e^+ e^-) = (-2.2 \pm 1.6) \times 10^{-2}$
$\Delta(K^\pm \rightarrow \pi^\pm \mu^+ \mu^-) = 0.010 \pm 0.023$
$\Delta(K^\pm \rightarrow \pi^\pm \pi^0 \gamma) = (0.0 \pm 1.2) \times 10^{-3}$
$\Delta(K^\pm \rightarrow \pi^\pm \pi^+ \pi^-) = (0.04 \pm 0.06)\%$
$\Delta(K^\pm \rightarrow \pi^\pm \pi^0 \pi^0) = (-0.02 \pm 0.28)\%$

T violation parameters

$K^+ \rightarrow \pi^0 \mu^+ \nu_\mu$ $P_T = (-1.7 \pm 2.5) \times 10^{-3}$

$K^+ \rightarrow \mu^+ \nu_\mu \gamma$ $P_T = (-0.6 \pm 1.9) \times 10^{-2}$

$K^+ \rightarrow \pi^0 \mu^+ \nu_\mu$ $\mathrm{Im}(\xi) = -0.006 \pm 0.008$

Slope parameter *g* [o]

(See Particle Listings for quadratic coefficients and alternative parametrization related to $\pi\pi$ scattering)

$K^\pm \rightarrow \pi^\pm \pi^+ \pi^-$ $g = -0.21134 \pm 0.00017$
$(g_+ - g_-)\ /\ (g_+ + g_-) = (-1.5 \pm 2.2) \times 10^{-4}$
$K^\pm \rightarrow \pi^\pm \pi^0 \pi^0$ $g = 0.626 \pm 0.007$
$(g_+ - g_-)\ /\ (g_+ + g_-) = (1.8 \pm 1.8) \times 10^{-4}$

$K^\pm$ decay form factors [a,p]

Assuming μ-e universality

$\lambda_+(K^+_{\mu 3}) = \lambda_+(K^+_{e3}) = (2.959 \pm 0.025) \times 10^{-2}$

$\lambda_0(K^+_{\mu 3}) = (1.76 \pm 0.25) \times 10^{-2}$ (S = 2.7)

Not assuming μ-e universality

$\lambda_+(K^+_{e3}) = (2.956 \pm 0.025) \times 10^{-2}$

$\lambda_+(K^+_{\mu 3}) = (3.09 \pm 0.25) \times 10^{-2}$ (S = 1.5)

$\lambda_0(K^+_{\mu 3}) = (1.73 \pm 0.27) \times 10^{-2}$ (S = 2.6)

K_{e3} form factor quadratic fit

λ'_+ $(K^\pm_{e3})$ linear coeff. $= (2.59 \pm 0.04) \times 10^{-2}$
$\lambda''_+(K^\pm_{e3})$ quadratic coeff. $= (0.186 \pm 0.021) \times 10^{-2}$

λ'_+ (LINEAR $K^\pm_{\mu 3}$ FORM FACTOR FROM QUADRATIC FIT)
$= (24 \pm 4) \times 10^{-3}$

λ''_+ (QUADRATIC $K^{\pm}_{\mu 3}$ FORM FACTOR) = $(1.8 \pm 1.5) \times 10^{-3}$

M_V (VECTOR POLE MASS FOR $K^{\pm}_{e3}$ DECAY) = 890.3 ± 2.8 MeV

M_V (VECTOR POLE MASS FOR $K^{\pm}_{\mu 3}$ DECAY) = 878 ± 12 MeV

M_S (SCALAR POLE MASS FOR $K^{\pm}_{\mu 3}$ DECAY) = 1215 ± 50 MeV

Λ_+ (DISPERSIVE VECTOR FORM FACTOR IN $K^{\pm}_{e3}$ DECAY) = $(2.460 \pm 0.017) \times 10^{-2}$

Λ_+ (DISPERSIVE VECTOR FORM FACTOR IN $K^{\pm}_{\mu 3}$ DECAY) = $(25.4 \pm 0.9) \times 10^{-3}$

ln(C) (DISPERSIVE SCALAR FORM FACTOR in $K^{\pm}_{\mu 3}$ decays) = $(182 \pm 16) \times 10^{-3}$

K^+_{e3} $\left|f_S/f_+\right| = (-0.08^{+0.34}_{-0.40}) \times 10^{-2}$

K^+_{e3} $\left|f_T/f_+\right| = (-1.2^{+1.3}_{-1.1}) \times 10^{-2}$

$K^+_{\mu 3}$ $\left|f_S/f_+\right| = (0.2 \pm 0.6) \times 10^{-2}$

$K^+_{\mu 3}$ $\left|f_T/f_+\right| = (-0.1 \pm 0.7) \times 10^{-2}$

$K^+ \rightarrow e^+ \nu_e \gamma$ $\left|F_A + F_V\right| = 0.133 \pm 0.008$ (S = 1.3)

$K^+ \rightarrow \mu^+ \nu_\mu \gamma$ $\left|F_A + F_V\right| = 0.165 \pm 0.013$

$K^+ \rightarrow e^+ \nu_e \gamma$ $\left|F_A - F_V\right| < 0.49$, CL = 90%

$K^+ \rightarrow \mu^+ \nu_\mu \gamma$ $\left|F_A - F_V\right| = -0.153 \pm 0.033$ (S = 1.1)

Charge radius

$\langle r \rangle = 0.560 \pm 0.031$ fm

Forward-backward asymmetry

$\mathrm{A}_{FB}(K^{\pm}_{\pi\mu\mu}) = \frac{\Gamma(cos(\theta_{K\mu})>0)-\Gamma(cos(\theta_{K\mu})<0)}{\Gamma(cos(\theta_{K\mu})>0)+\Gamma(cos(\theta_{K\mu})<0)} < 0.9 \times 10^{-2}$, CL = 90%

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

K^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Leptonic and semileptonic modes			
$e^+ \nu_e$	$(1.582 \pm 0.007) \times 10^{-5}$		247
$\mu^+ \nu_\mu$	(63.56 ± 0.11) %	S=1.2	236
$\pi^0 e^+ \nu_e$	(5.07 ± 0.04) %	S=2.1	228
Called K^+_{e3}.			
$\pi^0 \mu^+ \nu_\mu$	(3.352 ± 0.033) %	S=1.9	215
Called $K^+_{\mu 3}$.			
$\pi^0 \pi^0 e^+ \nu_e$	$(2.55 \pm 0.04) \times 10^{-5}$	S=1.1	206

$\pi^+\pi^- e^+\nu_e$			$(4.247\pm0.024)\times10^{-5}$		203
$\pi^+\pi^-\mu^+\nu_\mu$			$(1.4\pm0.9)\times10^{-5}$		151
$\pi^0\pi^0\pi^0 e^+\nu_e$			$<3.5\times10^{-6}$	CL=90%	135

Hadronic modes

$\pi^+\pi^0$			(20.67 ± 0.08) %	S=1.2	205
$\pi^+\pi^0\pi^0$			(1.760 ± 0.023) %	S=1.1	133
$\pi^+\pi^+\pi^-$			(5.583 ± 0.024) %		125

Leptonic and semileptonic modes with photons

$\mu^+\nu_\mu\gamma$		[q,r]	$(6.2\pm0.8)\times10^{-3}$		236
$\mu^+\nu_\mu\gamma(\mathrm{SD}^+)$		[a,s]	$(1.33\pm0.22)\times10^{-5}$		–
$\mu^+\nu_\mu\gamma(\mathrm{SD}^+\mathrm{INT})$		[a,s]	$<2.7\times10^{-5}$	CL=90%	–
$\mu^+\nu_\mu\gamma(\mathrm{SD}^- + \mathrm{SD}^-\mathrm{INT})$		[a,s]	$<2.6\times10^{-4}$	CL=90%	–
$e^+\nu_e\gamma$			$(9.9\pm1.0)\times10^{-6}$		247
$\pi^0 e^+\nu_e\gamma$		[q,r]	$(2.66\pm0.09)\times10^{-4}$		228
$\pi^0 e^+\nu_e\gamma(\mathrm{SD})$		[a,s]	$<5.3\times10^{-5}$	CL=90%	228
$\pi^0\mu^+\nu_\mu\gamma$		[q,r]	$(1.25\pm0.25)\times10^{-5}$		215
$\pi^0\pi^0 e^+\nu_e\gamma$			$<5\times10^{-6}$	CL=90%	206

Hadronic modes with photons or $\ell\overline{\ell}$ pairs

$\pi^+\pi^0\gamma(\mathrm{INT})$			$(-4.2\pm0.9)\times10^{-6}$		–
$\pi^+\pi^0\gamma(\mathrm{DE})$		[q,t]	$(6.0\pm0.4)\times10^{-6}$		205
$\pi^+\pi^0 e^+e^-$			$(4.24\pm0.14)\times10^{-6}$		205
$\pi^+\pi^0\pi^0\gamma$		[q,r]	$(7.6\,^{+6.0}_{-3.0})\times10^{-6}$		133
$\pi^+\pi^+\pi^-\gamma$		[q,r]	$(7.1\pm0.5)\times10^{-6}$		125
$\pi^+\gamma\gamma$		[q]	$(1.01\pm0.06)\times10^{-6}$		227
$\pi^+3\gamma$		[q]	$<1.0\times10^{-4}$	CL=90%	227
$\pi^+e^+e^-\gamma$			$(1.19\pm0.13)\times10^{-8}$		227

Leptonic modes with $\ell\overline{\ell}$ pairs

$e^+\nu_e\nu\overline{\nu}$			$<6\times10^{-5}$	CL=90%	247
$\mu^+\nu_\mu\nu\overline{\nu}$			$<1.0\times10^{-6}$	CL=90%	236
$e^+\nu_e e^+e^-$			$(2.48\pm0.20)\times10^{-8}$		247
$\mu^+\nu_\mu e^+e^-$			$(7.06\pm0.31)\times10^{-8}$		236
$e^+\nu_e\mu^+\mu^-$			$(1.7\pm0.5)\times10^{-8}$		223
$\mu^+\nu_\mu\mu^+\mu^-$			$<4.1\times10^{-7}$	CL=90%	185

Lepton family number (LF), Lepton number (L), $\Delta S = \Delta Q$ (SQ) violating modes, or $\Delta S = 1$ weak neutral current ($S1$) modes

$\pi^+\pi^+e^-\overline{\nu}_e$	*SQ*		$<1.3\times10^{-8}$	CL=90%	203
$\pi^+\pi^+\mu^-\overline{\nu}_\mu$	*SQ*		$<3.0\times10^{-6}$	CL=95%	151
$\pi^+e^+e^-$	*S1*		$(3.00\pm0.09)\times10^{-7}$		227
$\pi^+\mu^+\mu^-$	*S1*		$(9.17\pm0.14)\times10^{-8}$	S=1.8	172
$\pi^+\nu\overline{\nu}$	*S1*		$(1.14\,^{+0.40}_{-0.33})\times10^{-10}$		227

$\pi^+ \pi^0 \nu \overline{\nu}$	*S1*		$<$	4.3	$\times 10^{-5}$	CL=90%	205
$\mu^- \nu e^+ e^+$	*LF*		$<$	2.1	$\times 10^{-8}$	CL=90%	236
$\mu^+ \nu_e$	*LF*	[d]	$<$	4	$\times 10^{-3}$	CL=90%	236
$\pi^+ \mu^+ e^-$	*LF*		$<$	1.3	$\times 10^{-11}$	CL=90%	214
$\pi^+ \mu^- e^+$	*LF*		$<$	6.6	$\times 10^{-11}$	CL=90%	214
$\pi^- \mu^+ e^+$	*L*		$<$	4.2	$\times 10^{-11}$	CL=90%	214
$\pi^- e^+ e^+$	*L*		$<$	5.3	$\times 10^{-11}$	CL=90%	227
$\pi^- \mu^+ \mu^+$	*L*		$<$	4.2	$\times 10^{-11}$	CL=90%	172
$\pi^- \pi^0 e^+ e^+$	*L*		$<$	8.5	$\times 10^{-10}$	CL=90%	205
$\mu^+ \overline{\nu}_e$	*L*	[d]	$<$	3.3	$\times 10^{-3}$	CL=90%	236
$\pi^0 e^+ \overline{\nu}_e$	*L*		$<$	3	$\times 10^{-3}$	CL=90%	228
$\pi^+ \gamma$		[u]	$<$	2.3	$\times 10^{-9}$	CL=90%	227

K^0

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

50% K_S, 50% K_L

Mass $m = 497.611 \pm 0.013$ MeV (S = 1.2)

$m_{K^0} - m_{K^\pm} = 3.934 \pm 0.020$ MeV (S = 1.6)

Mean square charge radius

$\langle r^2 \rangle = -0.077 \pm 0.010$ fm^2

T-violation parameters in K^0-$\overline{K}^0$ mixing [p]

Asymmetry A_T in K^0-$\overline{K}^0$ mixing $= (6.6 \pm 1.6) \times 10^{-3}$

CP-violation parameters

Re(ϵ) $= (1.596 \pm 0.013) \times 10^{-3}$

CPT-violation parameters [p]

Re $\delta = (2.5 \pm 2.3) \times 10^{-4}$

Im $\delta = (-1.5 \pm 1.6) \times 10^{-5}$

Re(y), K_{e3} parameter $= (0.4 \pm 2.5) \times 10^{-3}$

Re(x$_-$), K_{e3} parameter $= (-2.9 \pm 2.0) \times 10^{-3}$

$\left| m_{K^0} - m_{\overline{K}^0} \right| / m_{\text{average}} < 6 \times 10^{-19}$, CL = 90% [v]

$(\Gamma_{K^0} - \Gamma_{\overline{K}^0})/m_{\text{average}} = (8 \pm 8) \times 10^{-18}$

Tests of $\Delta S = \Delta Q$

Re(x$_+$), K_{e3} parameter $= (-0.9 \pm 3.0) \times 10^{-3}$

K^0_S

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

Mean life $\tau = (0.8954 \pm 0.0004) \times 10^{-10}$ s (S = 1.1) Assuming *CPT*

Mean life $\tau = (0.89564 \pm 0.00033) \times 10^{-10}$ s Not assuming *CPT*

$c\tau = 2.6844$ cm Assuming *CPT*

CP-violation parameters [x]

$\text{Im}(\eta_{+-0})$ $= -0.002 \pm 0.009$

$\text{Im}(\eta_{000})$ $= -0.001 \pm 0.016$

$\left|\eta_{000}\right| = \left|A(K^0_S \to 3\pi^0)/A(K^0_L \to 3\pi^0)\right| < 0.0088$, CL = 90%

CP asymmetry *A* in $\pi^+\pi^- e^+ e^-$ $= (-0.4 \pm 0.8)\%$

K^0_S DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic modes				
$\pi^0\pi^0$		(30.69 ± 0.05) %		209
$\pi^+\pi^-$		(69.20 ± 0.05) %		206
$\pi^+\pi^-\pi^0$		$(3.5\ {}^{+1.1}_{-0.9}) \times 10^{-7}$		133
Modes with photons or $\ell\overline{\ell}$ pairs				
$\pi^+\pi^-\gamma$	[r,y]	$(1.79\pm0.05) \times 10^{-3}$		206
$\pi^+\pi^- e^+ e^-$		$(4.79\pm0.15) \times 10^{-5}$		206
$\pi^0\gamma\gamma$	[y]	$(4.9\ \pm1.8\ ) \times 10^{-8}$		230
$\gamma\gamma$		$(2.63\pm0.17) \times 10^{-6}$	S=3.1	249
Semileptonic modes				
$\pi^\pm e^\mp \nu_e$	[z]	$(7.04\pm0.08) \times 10^{-4}$		229
***CP* violating (*CP*) and $\Delta S = 1$ weak neutral current (*S1*) modes**				
$3\pi^0$	*CP*	$< 2.6 \times 10^{-8}$	CL=90%	139
$\mu^+\mu^-$	*S1*	$< 2.1 \times 10^{-10}$	CL=90%	225
e^+e^-	*S1*	$< 9 \times 10^{-9}$	CL=90%	249
$\pi^0 e^+ e^-$	*S1* [y]	$(3.0\ {}^{+1.5}_{-1.2}) \times 10^{-9}$		230
$\pi^0\mu^+\mu^-$	*S1*	$(2.9\ {}^{+1.5}_{-1.2}) \times 10^{-9}$		177

K^0_L

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

$m_{K_L} - m_{K_S}$

$= (0.5293 \pm 0.0009) \times 10^{10}\ \hbar\ \text{s}^{-1}$ (S = 1.3) Assuming *CPT*

$= (3.484 \pm 0.006) \times 10^{-12}$ MeV Assuming *CPT*

$= (0.5289 \pm 0.0010) \times 10^{10}\ \hbar\ \text{s}^{-1}$ Not assuming *CPT*

Mean life $\tau = (5.116 \pm 0.021) \times 10^{-8}$ s (S = 1.1)

$c\tau = 15.34$ m

Slope parameters [o]

(See Particle Listings for other linear and quadratic coefficients)

$K^0_L \to \pi^+\pi^-\pi^0$: $g = 0.678 \pm 0.008$ (S = 1.5)
$K^0_L \to \pi^+\pi^-\pi^0$: $h = 0.076 \pm 0.006$
$K^0_L \to \pi^+\pi^-\pi^0$: $k = 0.0099 \pm 0.0015$
$K^0_L \to \pi^0\pi^0\pi^0$: $h = (0.6 \pm 1.2) \times 10^{-3}$

K_L decay form factors [p]

Linear parametrization assuming μ-e universality

$\lambda_+(K^0_{\mu 3}) = \lambda_+(K^0_{e3}) = (2.82 \pm 0.04) \times 10^{-2}$ (S = 1.1)
$\lambda_0(K^0_{\mu 3}) = (1.38 \pm 0.18) \times 10^{-2}$ (S = 2.2)

Quadratic parametrization assuming μ-e universality

$\lambda'_+(K^0_{\mu 3}) = \lambda'_+(K^0_{e3}) = (2.40 \pm 0.12) \times 10^{-2}$ (S = 1.2)
$\lambda''_+(K^0_{\mu 3}) = \lambda''_+(K^0_{e3}) = (0.20 \pm 0.05) \times 10^{-2}$ (S = 1.2)
$\lambda_0(K^0_{\mu 3}) = (1.16 \pm 0.09) \times 10^{-2}$ (S = 1.2)

Pole parametrization assuming μ-e universality

$M^\mu_V\ (K^0_{\mu 3}) = M^e_V\ (K^0_{e3}) = 878 \pm 6$ MeV (S = 1.1)
$M^\mu_S\ (K^0_{\mu 3}) = 1252 \pm 90$ MeV (S = 2.6)

Dispersive parametrization assuming μ-e universality

$\Lambda_+ = (2.51 \pm 0.06) \times 10^{-2}$ (S = 1.5)
$\ln(C) = (1.75 \pm 0.18) \times 10^{-1}$ (S = 2.0)

K^0_{e3} $|f_S/f_+| = (1.5^{+1.4}_{-1.6}) \times 10^{-2}$
K^0_{e3} $|f_T/f_+| = (5^{+4}_{-5}) \times 10^{-2}$
$K^0_{\mu 3}$ $|f_T/f_+| = (12 \pm 12) \times 10^{-2}$
$K_L \to \ell^+\ell^-\gamma$, $K_L \to \ell^+\ell^-\ell'^+\ell'^-$: $\alpha_{K^*} = -0.205 \pm 0.022$ (S = 1.8)
$K^0_L \to \ell^+\ell^-\gamma$, $K^0_L \to \ell^+\ell^-\ell'^+\ell'^-$: $\alpha_{DIP} = -1.69 \pm 0.08$ (S = 1.7)
$K_L \to \pi^+\pi^-e^+e^-$: $a_1/a_2 = -0.737 \pm 0.014\ \text{GeV}^2$
$K_L \to \pi^0 2\gamma$: $a_V = -0.43 \pm 0.06$ (S = 1.5)

CP-violation parameters [x]

$A_L = (0.332 \pm 0.006)\%$
$|\eta_{00}| = (2.220 \pm 0.011) \times 10^{-3}$ (S = 1.8)
$|\eta_{+-}| = (2.232 \pm 0.011) \times 10^{-3}$ (S = 1.8)

$\left|\epsilon\right| = (2.228 \pm 0.011) \times 10^{-3}$ (S = 1.8)

$\left|\eta_{00}/\eta_{+-}\right| = 0.9950 \pm 0.0007$ [aa] (S = 1.6)

$\mathrm{Re}(\epsilon'/\epsilon) = (1.66 \pm 0.23) \times 10^{-3}$ [aa] (S = 1.6)

Assuming *CPT*

$\phi_{+-} = (43.51 \pm 0.05)^\circ$ (S = 1.2)

$\phi_{00} = (43.52 \pm 0.05)^\circ$ (S = 1.3)

$\phi_\epsilon = \phi_{\mathrm{SW}} = (43.52 \pm 0.05)^\circ$ (S = 1.2)

$\mathrm{Im}(\epsilon'/\epsilon) = -(\phi_{00} - \phi_{+-})/3 = (-0.002 \pm 0.005)^\circ$ (S = 1.7)

Not assuming *CPT*

$\phi_{+-} = (43.4 \pm 0.5)^\circ$ (S = 1.2)

$\phi_{00} = (43.7 \pm 0.6)^\circ$ (S = 1.2)

$\phi_\epsilon = (43.5 \pm 0.5)^\circ$ (S = 1.3)

CP asymmetry A in $K^0_L \rightarrow \pi^+\pi^- e^+ e^- = (13.7 \pm 1.5)\%$

β_{CP} from $K^0_L \rightarrow e^+ e^- e^+ e^- = -0.19 \pm 0.07$

γ_{CP} from $K^0_L \rightarrow e^+ e^- e^+ e^- = 0.01 \pm 0.11$ (S = 1.6)

j for $K^0_L \rightarrow \pi^+\pi^-\pi^0 = 0.0012 \pm 0.0008$

f for $K^0_L \rightarrow \pi^+\pi^-\pi^0 = 0.004 \pm 0.006$

$\left|\eta_{+-\gamma}\right| = (2.35 \pm 0.07) \times 10^{-3}$

$\phi_{+-\gamma} = (44 \pm 4)^\circ$

$\left|\epsilon'_{+-\gamma}\right|/\epsilon < 0.3$, CL = 90%

$\left|\mathrm{g}_{E1}\right|$ for $K^0_L \rightarrow \pi^+\pi^-\gamma < 0.21$, CL = 90%

T-violation parameters

$\mathrm{Im}(\xi)$ in $K^0_{\mu 3} = -0.007 \pm 0.026$

CPT invariance tests

$\phi_{00} - \phi_{+-} = (0.34 \pm 0.32)^\circ$

$\mathrm{Re}(\frac{2}{3}\eta_{+-} + \frac{1}{3}\eta_{00}) - \frac{A_L}{2} = (-3 \pm 35) \times 10^{-6}$

$\Delta S = -\Delta Q$ in $K^0_{\ell 3}$ decay

Re $x = -0.002 \pm 0.006$

Im $x = 0.0012 \pm 0.0021$

K^0_L DECAY MODES			Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Semileptonic modes					
$\pi^\pm e^\mp \nu_e$		[z]	(40.55 ± 0.11) %	S=1.7	229
Called K^0_{e3}.					
$\pi^\pm \mu^\mp \nu_\mu$		[z]	(27.04 ± 0.07) %	S=1.1	216
Called $K^0_{\mu3}$.					
$(\pi\mu\,\text{atom})\nu$			$(1.05 \pm 0.11) \times 10^{-7}$		188
$\pi^0\pi^\pm e^\mp \nu$		[z]	$(5.20 \pm 0.11) \times 10^{-5}$		207
$\pi^\pm e^\mp \nu e^+ e^-$		[z]	$(1.26 \pm 0.04) \times 10^{-5}$		229
Hadronic modes, including Charge conjugation×Parity Violating (*CPV*) modes					
$3\pi^0$			(19.52 ± 0.12) %	S=1.6	139
$\pi^+\pi^-\pi^0$			(12.54 ± 0.05) %		133
$\pi^+\pi^-$	*CPV*	[bb]	$(1.967 \pm 0.010) \times 10^{-3}$	S=1.5	206
$\pi^0\pi^0$	*CPV*		$(8.64 \pm 0.06) \times 10^{-4}$	S=1.8	209
Semileptonic modes with photons					
$\pi^\pm e^\mp \nu_e \gamma$		[r,z,cc]	$(3.79 \pm 0.06) \times 10^{-3}$		229
$\pi^\pm \mu^\mp \nu_\mu \gamma$			$(5.65 \pm 0.23) \times 10^{-4}$		216
Hadronic modes with photons or $\ell\overline{\ell}$ pairs					
$\pi^0\pi^0\gamma$			$< 2.43 \times 10^{-7}$	CL=90%	209
$\pi^+\pi^-\gamma$		[r,cc]	$(4.15 \pm 0.15) \times 10^{-5}$	S=2.8	206
$\pi^+\pi^-\gamma$(DE)			$(2.84 \pm 0.11) \times 10^{-5}$	S=2.0	206
$\pi^0 2\gamma$		[cc]	$(1.273 \pm 0.033) \times 10^{-6}$		230
$\pi^0\gamma e^+ e^-$			$(1.62 \pm 0.17) \times 10^{-8}$		230
Other modes with photons or $\ell\overline{\ell}$ pairs					
2γ			$(5.47 \pm 0.04) \times 10^{-4}$	S=1.1	249
3γ			$< 7.4 \times 10^{-8}$	CL=90%	249
$e^+e^-\gamma$			$(9.4 \pm 0.4) \times 10^{-6}$	S=2.0	249
$\mu^+\mu^-\gamma$			$(3.59 \pm 0.11) \times 10^{-7}$	S=1.3	225
$e^+e^-\gamma\gamma$		[cc]	$(5.95 \pm 0.33) \times 10^{-7}$		249
$\mu^+\mu^-\gamma\gamma$		[cc]	$(1.0\ ^{+0.8}_{-0.6}) \times 10^{-8}$		225
Charge conjugation × Parity (*CP*) or Lepton Family number (*LF*) violating modes, or $\Delta S = 1$ weak neutral current (*S1*) modes					
$\mu^+\mu^-$	*S1*		$(6.84 \pm 0.11) \times 10^{-9}$		225
e^+e^-	*S1*		$(9\ ^{+6}_{-4}) \times 10^{-12}$		249
$\pi^+\pi^- e^+ e^-$	*S1*	[cc]	$(3.11 \pm 0.19) \times 10^{-7}$		206
$\pi^0\pi^0 e^+ e^-$	*S1*		$< 6.6 \times 10^{-9}$	CL=90%	209
$\pi^0\pi^0\mu^+\mu^-$	*S1*		$< 9.2 \times 10^{-11}$	CL=90%	57
$\mu^+\mu^- e^+ e^-$	*S1*		$(2.69 \pm 0.27) \times 10^{-9}$		225

$e^+ e^- e^+ e^-$	S1	(3.56 ±0.21)	$\times 10^{-8}$		249
$\pi^0 \mu^+ \mu^-$	CP,S1[dd]	< 3.8	$\times 10^{-10}$	CL=90%	177
$\pi^0 e^+ e^-$	CP,S1[dd]	< 2.8	$\times 10^{-10}$	CL=90%	230
$\pi^0 \nu \overline{\nu}$	CP,S1 [ee]	< 3.0	$\times 10^{-9}$	CL=90%	230
$\pi^0 \pi^0 \nu \overline{\nu}$	S1	< 8.1	$\times 10^{-7}$	CL=90%	209
$e^{\pm} \mu^{\mp}$	LF [z]	< 4.7	$\times 10^{-12}$	CL=90%	238
$e^{\pm} e^{\pm} \mu^{\mp} \mu^{\mp}$	LF [z]	< 4.12	$\times 10^{-11}$	CL=90%	225
$\pi^0 \mu^{\pm} e^{\mp}$	LF [z]	< 7.6	$\times 10^{-11}$	CL=90%	217
$\pi^0 \pi^0 \mu^{\pm} e^{\mp}$	LF	< 1.7	$\times 10^{-10}$	CL=90%	159
Lorentz invariance violating modes					
$\pi^0 \gamma$		< 1.7	$\times 10^{-7}$	CL=90%	230

$K_0^*(700)$

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

also known as κ; was $K_0^*(800)$

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

Mass (T-Matrix Pole $\sqrt{s}$) = (630–730) − i (260–340) MeV
Mass (Breit-Wigner) = 845 ± 17 MeV
Full width (Breit-Wigner) = 468 ± 30 MeV

$K_0^*(700)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	100 %	256

$K^*(892)$

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

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

$K^*(892)$ DECAY MODES	Fraction (Γ_i/Γ)		Confidence level	p (MeV/c)
$K\pi$	∼ 100	%		289
$K^0\gamma$	(2.46±0.21)	$\times 10^{-3}$		307
$K^{\pm}\gamma$	(9.8 ±0.9)	$\times 10^{-4}$		309
$K\pi\pi$	< 7	$\times 10^{-4}$	95%	223

$K_1(1270)$

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

Mass $m = 1253 \pm 7$ MeV (S = 2.2)
Full width $\Gamma = 90 \pm 20$ MeV [h]

$K_1(1270)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$K\rho$	(38 ± 13) %	2.2	†
$K_0^*(1430)\pi$	(28 ± 4) %		†
$K^*(892)\pi$	(21 ± 10) %	2.2	286
$K\omega$	(11.0 ± 2.0) %		†
$K f_0(1370)$	(3.0 ± 2.0) %		†
γK^0	seen		528

$K_1(1400)$

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

Mass $m = 1403 \pm 7$ MeV
Full width $\Gamma = 174 \pm 13$ MeV (S = 1.6)

$K_1(1400)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	(94 ± 6) %	402
$K\rho$	(3.0 ± 3.0) %	293
$K f_0(1370)$	(2.0 ± 2.0) %	†
$K\omega$	(1.0 ± 1.0) %	284
$K_0^*(1430)\pi$	not seen	†
γK^0	seen	613
$K\phi$	seen	†

$K^*(1410)$

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

Mass $m = 1414 \pm 15$ MeV (S = 1.3)
Full width $\Gamma = 232 \pm 21$ MeV (S = 1.1)

$K^*(1410)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K^*(892)\pi$	> 40 %	95%	410
$K\pi$	(6.6 ± 1.3) %		612
$K\rho$	< 7 %	95%	305
γK^0	$< 2.3 \times 10^{-4}$	90%	619
$K\phi$	seen		†

$K_0^*(1430)$

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

Mass $m = 1425 \pm 50$ MeV [h]
Full width $\Gamma = 270 \pm 80$ MeV [h]

$K_0^*(1430)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(93 ± 10) %	619
$K\eta$	$(8.6^{+2.7}_{-3.4})$ %	486
$K\eta'(958)$	seen	†

$K_2^*(1430)$

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

$K_2^*(1430)^{\pm}$ mass $m = 1427.3 \pm 1.5$ MeV (S = 1.3)
$K_2^*(1430)^0$ mass $m = 1432.4 \pm 1.3$ MeV
$K_2^*(1430)^{\pm}$ full width $\Gamma = 100.0 \pm 2.1$ MeV
$K_2^*(1430)^0$ full width $\Gamma = 109 \pm 5$ MeV (S = 1.9)

$K_2^*(1430)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$K\pi$	(49.9 ± 1.2) %		620
$K^*(892)\pi$	(24.7 ± 1.5) %		420
$K^*(892)\pi\pi$	(13.4 ± 2.2) %		373
$K\rho$	(8.7 ± 0.8) %	S=1.2	320
$K\omega$	(2.9 ± 0.8) %		313
$K^+\gamma$	$(2.4 \pm 0.5) \times 10^{-3}$	S=1.1	628
$K\eta$	$(1.5^{+3.4}_{-1.0}) \times 10^{-3}$	S=1.3	488
$K\omega\pi$	$< 7.2 \times 10^{-4}$	CL=95%	106
$K^0\gamma$	$< 9 \times 10^{-4}$	CL=90%	627

$K(1460)$

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

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

$K_1(1650)$

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

Mass $m = 1650 \pm 50$ MeV
Full width $\Gamma = 150 \pm 50$ MeV

$K^*(1680)$

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

Mass $m = 1718 \pm 18$ MeV
Full width $\Gamma = 322 \pm 110$ MeV (S = 4.2)

$K^*(1680)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(38.7 ± 2.5) %	782
$K\rho$	$(31.4^{+5.0}_{-2.1})$ %	571
$K^*(892)\pi$	$(29.9^{+2.2}_{-5.0})$ %	618
$K\phi$	seen	387
$K\eta$	$(1.4^{+1.0}_{-0.8})$ %	683

$K_2(1770)$ [ff]

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

Mass $m = 1773 \pm 8$ MeV
Full width $\Gamma = 186 \pm 14$ MeV

$K_2(1770)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi\pi$		794
$K_2^*(1430)\pi$	seen	287
$K^*(892)\pi$	seen	654
$K f_2(1270)$	seen	53
$K\phi$	seen	441
$K\omega$	seen	607

$K_3^*(1780)$

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

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

$K_3^*(1780)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$K\rho$	(31 ± 9) %		616
$K^*(892)\pi$	(20 ± 5) %		657

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

$K_2(1820)$ [ff]

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

Mass $m = 1819 \pm 12$ MeV
Full width $\Gamma = 264 \pm 34$ MeV

$K_2(1820)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi\pi$	seen	819
$K_2^*(1430)\pi$	seen	328
$K^*(892)\pi$	seen	683
$K f_2(1270)$	seen	191
$K\omega$	seen	640
$K\phi$	seen	483

$K_2^*(1980)$

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

Mass $m = 1994^{+60}_{-50}$ MeV (S = 2.8)
Full width $\Gamma = 348^{+50}_{-30}$ MeV (S = 1.3)

$K_2^*(1980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K^*(892)\pi$	possibly seen	791
$K\rho$	possibly seen	762
$K f_2(1270)$	possibly seen	424
$K\phi$	seen	627
$K\eta$	seen	850

$K_4^*(2045)$

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

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

$K_4^*(2045)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$K\pi$	(9.9 ± 1.2) %	960
$K^*(892)\pi\pi$	$(9\ \pm 5\ )$ %	804
$K^*(892)\pi\pi\pi$	$(7\ \pm 5\ )$ %	770
$\rho K\pi$	(5.7 ± 3.2) %	744

$\omega K \pi$	(5.0 ± 3.0) %	740
$\phi K \pi$	(2.8 ± 1.4) %	597
$\phi K^*(892)$	(1.4 ± 0.7) %	368

CHARMED MESONS
$(C = \pm1)$

$D^+ = c\overline{d}$, $D^0 = c\overline{u}$, $\overline{D}^0 = \overline{c}\,u$, $D^- = \overline{c}\,d$, similarly for D^*'s

$D^\pm$

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

Mass $m = 1869.66 \pm 0.05$ MeV
Mean life $\tau = (1033 \pm 5) \times 10^{-15}$ s
$c\tau = 309.8\ \mu$m

c-quark decays

$\Gamma(c \to \ \ell^+ \text{anything})/\Gamma(c \to \ \text{anything}) = 0.096 \pm 0.004$ [gg]
$\Gamma(c \to \ D^*(2010)^+ \text{anything})/\Gamma(c \to \ \text{anything}) = 0.255 \pm 0.017$

CP-violation decay-rate asymmetries

$A_{CP}(\mu^\pm \nu) = (8 \pm 8)\%$
$A_{CP}(K^0_L e^\pm \nu) = (-0.6 \pm 1.6)\%$
$A_{CP}(K^0_S \pi^\pm) = (-0.41 \pm 0.09)\%$
$A_{CP}(K^0_L K^\pm)$ in $D^\pm \to \ K^0_L K^\pm = (-4.2 \pm 3.4) \times 10^{-2}$
$A_{CP}(K^\mp 2\pi^\pm) = (-0.18 \pm 0.16)\%$
$A_{CP}(K^\mp \pi^\pm \pi^\pm \pi^0) = (-0.3 \pm 0.7)\%$
$A_{CP}(K^0_S \pi^\pm \pi^0) = (-0.1 \pm 0.7)\%$
$A_{CP}(K^0_S \pi^\pm \eta)$ in $D^\pm \to \ K^0_S \pi^\pm \eta = (-0.9 \pm 3.1) \times 10^{-2}$
$A_{CP}(K^0_S \pi^\pm \pi^+ \pi^-) = (0.0 \pm 1.2)\%$
$A_{CP}(K^\pm \pi^+ \pi^- \pi^0)$ in $D^\pm \to \ K^\pm \pi^+ \pi^- \pi^0 = -0.04 \pm 0.06$
$A_{CP}(\pi^\pm \pi^0) = (0.4 \pm 1.3)\%$ (S = 1.7)
$A_{CP}(\pi^\pm \eta) = (0.3 \pm 0.8)\%$ (S = 1.2)
$A_{CP}(\pi^\pm \pi^0 \eta)$ in $D^\pm \to \ \pi^\pm \pi^0 \eta = (-6 \pm 7) \times 10^{-2}$
$A_{CP}(\pi^\pm \eta\eta)$ in $D^\pm \to \ \pi^\pm \eta\eta = (8 \pm 9) \times 10^{-2}$
$A_{CP}(\pi^\pm \eta'(958)) = (-0.6 \pm 0.7)\%$
$A_{CP}(\overline{K}^0 / K^0 K^\pm) = (0.11 \pm 0.17)\%$
$A_{CP}(K^0_S K^\pm) = (-0.01 \pm 0.07)\%$
$A_{CP}(K^0_S K^\pm \pi^0)$ in $D^\pm \to \ K^0_S K^\pm \pi^0 = (1 \pm 4) \times 10^{-2}$
$A_{CP}(K^0_L K^\pm \pi^0)$ in $D^\pm \to \ K^0_L K^\pm \pi^0 = (-1 \pm 4) \times 10^{-2}$
$A_{CP}(K^+ K^- \pi^\pm) = (0.37 \pm 0.29)\%$
$A_{CP}(K^\pm K^{*0}) = (-0.3 \pm 0.4)\%$

$A_{CP}(\phi\pi^{\pm}) = (0.01 \pm 0.09)\%$ (S = 1.8)
$A_{CP}(K^{\pm}K_0^*(1430)^0) = (8^{+7}_{-6})\%$
$A_{CP}(K^{\pm}K_2^*(1430)^0) = (43^{+20}_{-26})\%$
$A_{CP}(K^{\pm}K_0^*(700)) = (-12^{+18}_{-13})\%$
$A_{CP}(a_0(1450)^0\pi^{\pm}) = (-19^{+14}_{-16})\%$
$A_{CP}(\phi(1680)\pi^{\pm}) = (-9 \pm 26)\%$
$A_{CP}(\pi^{\pm}2\pi^0)$ in $D^{\pm} \to \pi^{\pm}2\pi^0 = (5.6 \pm 2.7)\%$
$A_{CP}(\pi^+\pi^-\pi^{\pm}) = (0.5 \pm 2.0)\%$
$A_{CP}(2\pi^{\pm}\pi^{\mp}\pi^0)$ in $D^{\pm} \to 2\pi^{\pm}\pi^{\mp}\pi^0 = (0.3 \pm 2.0)\%$
$A_{CP}(2\pi^{\pm}\pi^{\mp}2\pi^0)$ in $D^{\pm} \to 2\pi^{\pm}\pi^{\mp}2\pi^0 = (-4 \pm 4)\%$
$A_{CP}(\pi^+\pi^-\pi^{\pm}\eta)$ in $D^{\pm} \to \pi^+\pi^-\pi^{\pm}\eta = (3 \pm 5) \times 10^{-2}$
$A_{CP}(K_S^0K^{\pm}\pi^+\pi^-) = (-4 \pm 7)\%$
$A_{CP}(K^{\pm}\pi^0) = (-3 \pm 5)\%$
$A_{CP}(K^{\pm}\eta)$ in $D^{\pm} \to K^{\pm}\eta = (-6 \pm 11) \times 10^{-2}$

χ^2 tests of *CP*-violation (*CPV*)

Local *CPV* in $D^{\pm} \to \pi^+\pi^-\pi^{\pm} = 78.1\%$
Local *CPV* in $D^{\pm} \to K^+K^-\pi^{\pm} = 31\%$

CP violating asymmetries of *P*-odd (*T*-odd) moments

$A_T(K_S^0K^{\pm}\pi^+\pi^-) = (-12 \pm 11) \times 10^{-3}$ [hh]

D^+ form factors

$f_+(0)|V_{cs}|$ in $\overline{K}^0\ell^+\nu_\ell = 0.719 \pm 0.011$ (S = 1.6)
$r_1 \equiv a_1/a_0$ in $\overline{K}^0\ell^+\nu_\ell = -2.13 \pm 0.14$
$r_2 \equiv a_2/a_0$ in $\overline{K}^0\ell^+\nu_\ell = -3 \pm 12$ (S = 1.5)
$f_+(0)|V_{cd}|$ in $\pi^0\ell^+\nu_\ell = 0.1407 \pm 0.0025$
$r_1 \equiv a_1/a_0$ in $\pi^0\ell^+\nu_\ell = -2.00 \pm 0.13$
$r_2 \equiv a_2/a_0$ in $\pi^0\ell^+\nu_\ell = -4 \pm 5$
$f_+(0)|V_{cd}|$ in $D^+ \to \eta\ell^+\nu_\ell$ ($\ell = e$ or ν) $= (8.4 \pm 0.4) \times 10^{-2}$
$r_1 \equiv a_1/a_0$ in $D^+ \to \eta e^+\nu_e = -5.3 \pm 2.7$ (S = 1.9)
$r_v \equiv V(0)/A_1(0)$ in $D^+ \to \omega e^+\nu_e = 1.24 \pm 0.11$
$r_2 \equiv A_2(0)/A_1(0)$ in $D^+ \to \omega e^+\nu_e = 1.06 \pm 0.16$
$r_v \equiv V(0)/A_1(0)$ in D^+,$D^0 \to \rho e^+\nu_e = 1.64 \pm 0.10$ (S = 1.2)
$r_2 \equiv A_2(0)/A_1(0)$ in D^+,$D^0 \to \rho e^+\nu_e = 0.84 \pm 0.06$
$r_v \equiv V(0)/A_1(0)$ in $\overline{K}^*(892)^0\ell^+\nu_\ell = 1.49 \pm 0.05$ (S = 2.1)
$r_2 \equiv A_2(0)/A_1(0)$ in $\overline{K}^*(892)^0\ell^+\nu_\ell = 0.802 \pm 0.021$
$r_3 \equiv A_3(0)/A_1(0)$ in $\overline{K}^*(892)^0\ell^+\nu_\ell = 0.0 \pm 0.4$
Γ_L/Γ_T in $\overline{K}^*(892)^0\ell^+\nu_\ell = 1.13 \pm 0.08$
Γ_+/Γ_- in $\overline{K}^*(892)^0\ell^+\nu_\ell = 0.22 \pm 0.06$ (S = 1.6)

Most decay modes (other than the semileptonic modes) that involve a neutral K meson are now given as K^0_S modes, not as $\overline{K}^0$ modes. Nearly always it is a K^0_S that is measured, and interference between Cabibbo-allowed and doubly Cabibbo-suppressed modes can invalidate the assumption that $2\,\Gamma(K^0_S) = \Gamma(\overline{K}^0)$.

D^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Inclusive modes			
e^+ semileptonic	(16.07 ± 0.30) %		–
μ^+ anything	(17.6 ± 3.2) %		–
K^- anything	(25.7 ± 1.4) %		–
$\overline{K}^0$ anything + K^0 anything	(61 ± 5) %		–
K^+ anything	(5.9 ± 0.8) %		–
$K^*(892)^-$ anything	(6 ± 5) %		–
$\overline{K}^*(892)^0$ anything	(23 ± 5) %		–
$K^*(892)^0$ anything	< 6.6 %	CL=90%	–
η anything	(6.3 ± 0.7) %		–
η' anything	(1.04 ± 0.18) %		–
ϕ anything	(1.12 ± 0.04) %		–
Leptonic and semileptonic modes			
$e^+\nu_e$	< 8.8 $\times 10^{-6}$	CL=90%	935
$\gamma e^+\nu_e$	< 3.0 $\times 10^{-5}$	CL=90%	935
$\mu^+\nu_\mu$	(3.74 ± 0.17) $\times 10^{-4}$		932
$\tau^+\nu_\tau$	(1.20 ± 0.27) $\times 10^{-3}$		90
$\overline{K}^0 e^+\nu_e$	(8.72 ± 0.09) %		869
$\overline{K}^0 \mu^+\nu_\mu$	(8.76 ± 0.19) %		865
$K^-\pi^+ e^+\nu_e$	(4.02 ± 0.18) %	S=3.2	864
$\quad\overline{K}^*(892)^0 e^+\nu_e$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(3.77 ± 0.17) %		722
$\quad(K^-\pi^+)_{[0.8\text{–}1.0]\text{GeV}}\, e^+\nu_e$	(3.39 ± 0.09) %		864
$\quad(K^-\pi^+)_{S-wave}\, e^+\nu_e$	(2.28 ± 0.11) $\times 10^{-3}$		–
$\quad\overline{K}^*(1410)^0 e^+\nu_e$, $\overline{K}^*(1410)^0 \to K^-\pi^+$	< 6 $\times 10^{-3}$	CL=90%	–
$\quad\overline{K}^*_2(1430)^0 e^+\nu_e$, $\overline{K}^*_2(1430)^0 \to K^-\pi^+$	< 5 $\times 10^{-4}$	CL=90%	–
$\quad K^-\pi^+ e^+\nu_e$ nonresonant	< 7 $\times 10^{-3}$	CL=90%	864
$\overline{K}^*(892)^0 e^+\nu_e$	(5.40 ± 0.10) %	S=1.1	722
$K^-\pi^+\mu^+\nu_\mu$	(3.65 ± 0.34) %		851
$\quad\overline{K}^*(892)^0 \mu^+\nu_\mu$, $\overline{K}^*(892)^0 \to K^-\pi^+$	(3.52 ± 0.10) %		717
$\quad K^-\pi^+\mu^+\nu_\mu$ nonresonant	(1.9 ± 0.5) $\times 10^{-3}$		851
$\overline{K}^*(892)^0 \mu^+\nu_\mu$	(5.27 ± 0.15) %		717

$K^-\pi^+\pi^0\mu^+\nu_\mu$		$<$ 1.5	$\times 10^{-3}$	CL=90%	825
$\overline{K}_1(1270)^0 e^+\nu_e$, $\overline{K}_1^0 \to K^-\pi^+\pi^0$		(1.06 $\pm$ 0.15)	$\times 10^{-3}$		–
$\overline{K}_0^*(1430)^0\mu^+\nu_\mu$		$<$ 2.3	$\times 10^{-4}$	CL=90%	380
$\overline{K}^*(1680)^0\mu^+\nu_\mu$		$<$ 1.5	$\times 10^{-3}$	CL=90%	105
$\pi^0 e^+\nu_e$		(3.72 $\pm$ 0.17)	$\times 10^{-3}$	S=2.0	930
$\pi^0\mu^+\nu_\mu$		(3.50 $\pm$ 0.15)	$\times 10^{-3}$		927
$\eta e^+\nu_e$		(1.11 $\pm$ 0.07)	$\times 10^{-3}$		855
$\eta\mu^+\nu_\mu$		(1.04 $\pm$ 0.11)	$\times 10^{-3}$		851
$\pi^-\pi^+e^+\nu_e$		(2.49 $\pm$ 0.11)	$\times 10^{-3}$	S=1.2	924
$f_0(500)^0 e^+\nu_e$, $f_0(500)^0 \to \pi^+\pi^-$		(6.4 $\pm$ 0.6)	$\times 10^{-4}$		–
$\rho^0 e^+\nu_e$		(1.90 $\pm$ 0.10)	$\times 10^{-3}$	S=1.2	774
$\rho^0\mu^+\nu_\mu$		(2.4 $\pm$ 0.4)	$\times 10^{-3}$		770
$\omega e^+\nu_e$		(1.69 $\pm$ 0.11)	$\times 10^{-3}$		771
$\omega\mu^+\nu_\mu$		(1.77 $\pm$ 0.21)	$\times 10^{-3}$		767
$\eta'(958) e^+\nu_e$		(2.0 $\pm$ 0.4)	$\times 10^{-4}$		690
$a(980)^0 e^+\nu_e$, $a(980)^0 \to \eta\pi^0$		(1.7 $^{+0.8}_{-0.7}$)	$\times 10^{-4}$		–
$b_1(1235)^0 e^+\nu_e$, $b_1^0 \to \omega\pi^0$		$<$ 1.75	$\times 10^{-4}$	CL=90%	–
$\phi e^+\nu_e$		$<$ 1.3	$\times 10^{-5}$	CL=90%	657
$D^0 e^+\nu_e$		$<$ 1.0	$\times 10^{-4}$	CL=90%	5

Hadronic modes with a $\overline{K}$ or $\overline{K}K\overline{K}$

$K_S^0\pi^+$		(1.562 $\pm$ 0.031)	%	S=1.7	863
$K_L^0\pi^+$		(1.46 $\pm$ 0.05)	%		863
$K^-2\pi^+$	[ii]	(9.38 $\pm$ 0.16)	%	S=1.6	846
$(K^-\pi^+)_{S-\text{wave}}\pi^+$		(7.52 $\pm$ 0.17)	%		846
$\overline{K}_0^*(1430)^0\pi^+$, $\overline{K}_0^*(1430)^0 \to K^-\pi^+$	[jj]	(1.25 $\pm$ 0.06)	%		382
$\overline{K}^*(892)^0\pi^+$, $\overline{K}^*(892)^0 \to K^-\pi^+$		(1.04 $\pm$ 0.12)	%		714
$\overline{K}^*(1410)^0\pi^+$, $\overline{K}^{*0} \to K^-\pi^+$		not seen			381
$\overline{K}_2^*(1430)^0\pi^+$, $\overline{K}_2^*(1430)^0 \to K^-\pi^+$	[jj]	(2.3 $\pm$ 0.7)	$\times 10^{-4}$		371
$\overline{K}^*(1680)^0\pi^+$, $\overline{K}^*(1680)^0 \to K^-\pi^+$	[jj]	(2.2 $\pm$ 1.1)	$\times 10^{-4}$		58
$K^-(2\pi^+)_{I=2}$		(1.45 $\pm$ 0.26)	%		–
$K_S^0\pi^+\pi^0$	[ii]	(7.36 $\pm$ 0.21)	%		845
$K_S^0\rho^+$		(6.14 $^{+0.60}_{-0.35}$)	%		677
$K_S^0\rho(1450)^+$, $\rho^+ \to \pi^+\pi^0$		(1.5 $^{+1.2}_{-1.4}$)	$\times 10^{-3}$		–
$\overline{K}^*(892)^0\pi^+$, $\overline{K}^*(892)^0 \to K_S^0\pi^0$		(2.64 $\pm$ 0.32)	$\times 10^{-3}$		714

$\overline{K}^*_0(1430)^0\pi^+$, $\overline{K}^{*0}_0 \to K^0_S\pi^0$		$(2.7 \pm 0.9) \times 10^{-3}$		–
$\overline{K}^*_0(1680)^0\pi^+$, $\overline{K}^{*0}_0 \to K^0_S\pi^0$		$(10 {}^{+7}_{-10}) \times 10^{-4}$		–
$\overline{\kappa}^0\pi^+$, $\overline{\kappa}^0 \to K^0_S\pi^0$		$(6 {}^{+5}_{-4}) \times 10^{-3}$		–
$K^0_S\pi^+\pi^0$ nonresonant		$(3 \pm 4) \times 10^{-3}$		845
$K^0_S\pi^+\pi^0$ nonresonant and $\overline{\kappa}^0\pi^+$		$(1.37 {}^{+0.21}_{-0.40})$ %		–
$(K^0_S\pi^0)_{S-\text{wave}}\pi^+$		$(1.27 {}^{+0.27}_{-0.33})$ %		845
$K^0_S\pi^+\omega$		$(7.1 \pm 0.5) \times 10^{-3}$		606
$K^0_S\pi^+\eta$		(1.31 ± 0.05) %		722
$K^0_S\pi^+\eta'(958)$		$(1.90 \pm 0.21) \times 10^{-3}$		481
$K^-2\pi^+\pi^0$	[kk]	(6.25 ± 0.18) %		817
$K^0_S2\pi^+\pi^-$	[kk]	(3.10 ± 0.09) %		814
$K^0_S\pi^+2\pi^0$		(2.90 ± 0.11) %		817
$K^-2\pi^+\eta$		$(1.35 \pm 0.12) \times 10^{-3}$		657
$K^0_S\pi^+\pi^0\eta$		$(1.22 \pm 0.25) \times 10^{-3}$		657
$K^-3\pi^+\pi^-$	[ii]	$(5.7 \pm 0.5) \times 10^{-3}$	S=1.1	772
$\overline{K}^*(892)^0 2\pi^+\pi^-$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(1.2 \pm 0.4) \times 10^{-3}$		645
$\overline{K}^*(892)^0\rho^0\pi^+$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(2.3 \pm 0.4) \times 10^{-3}$		239
$\overline{K}^*(892)^0 a_1(1260)^+$	[ll]	$(9.3 \pm 1.9) \times 10^{-3}$		†
$K^-\rho^0 2\pi^+$		$(1.72 \pm 0.28) \times 10^{-3}$		524
$K^-3\pi^+\pi^-$ nonresonant		$(4.0 \pm 2.9) \times 10^{-4}$		772
$K^0_S2\pi^+\pi^-\pi^0$		(1.53 ± 0.08) %		773
$K^0_S\pi^+3\pi^0$		$(5.5 \pm 0.5) \times 10^{-3}$		776
$K^-2\pi^+2\pi^0$		$(4.95 \pm 0.32) \times 10^{-3}$		776
$K^+2K^0_S$		$(2.54 \pm 0.13) \times 10^{-3}$		545
$K^+K^-K^0_S\pi^+$		$(2.4 \pm 0.5) \times 10^{-4}$		436

Pionic modes

$\pi^+\pi^0$		$(1.247 \pm 0.033) \times 10^{-3}$		925
$2\pi^+\pi^-$		$(3.27 \pm 0.09) \times 10^{-3}$		909
$\rho^0\pi^+$		$(8.3 \pm 1.4) \times 10^{-4}$		767
$\pi^+(\pi^+\pi^-)_{S-\text{wave}}$		$(1.83 \pm 0.14) \times 10^{-3}$		909
$\sigma\pi^+$, $\sigma \to \pi^+\pi^-$		$(1.38 \pm 0.10) \times 10^{-3}$		–
$f_0(980)\pi^+$, $f_0(980) \to \pi^+\pi^-$		$(1.57 \pm 0.32) \times 10^{-4}$		669
$f_0(1370)\pi^+$, $f_0(1370) \to \pi^+\pi^-$		$(8 \pm 4) \times 10^{-5}$		–

$f_2(1270)\pi^+$, $f_2(1270) \to \pi^+\pi^-$		(5.0 ± 0.8) $\times 10^{-4}$			485
$\rho(1450)^0\pi^+$, $\rho(1450)^0 \to \pi^+\pi^-$		< 8	$\times 10^{-5}$	CL=95%	338
$f_0(1500)\pi^+$, $f_0(1500) \to \pi^+\pi^-$		(1.1 ± 0.4) $\times 10^{-4}$			–
$f_0(1710)\pi^+$, $f_0(1710) \to \pi^+\pi^-$		< 5	$\times 10^{-5}$	CL=95%	–
$f_0(1790)\pi^+$, $f_0(1790) \to \pi^+\pi^-$		< 7	$\times 10^{-5}$	CL=95%	–
$(\pi^+\pi^+)_{S-\text{wave}}\pi^-$		< 1.2	$\times 10^{-4}$	CL=95%	909
$2\pi^+\pi^-$ nonresonant		< 1.1	$\times 10^{-4}$	CL=95%	909
$\pi^+2\pi^0$		(4.61 ± 0.15) $\times 10^{-3}$			910
$2\pi^+\pi^-\pi^0$		(1.165± 0.030) %			883
$\pi^+3\pi^0$		(4.17 ± 0.26) $\times 10^{-3}$			885
$\pi^+4\pi^0$		(1.9 ± 0.4) $\times 10^{-3}$			851
$2\pi^+\pi^-2\pi^0$		(1.07 ± 0.05) %			848
$3\pi^+2\pi^-$		(1.66 ± 0.16) $\times 10^{-3}$		S=1.1	845
$2\pi^+\pi^-3\pi^0$		(3.42 ± 0.35) $\times 10^{-3}$			803
$3\pi^+2\pi^-\pi^0$		(2.34 ± 0.27) $\times 10^{-3}$			799
$\eta\pi^+$		(3.77 ± 0.09) $\times 10^{-3}$			848
$\eta\pi^+\pi^0$		(2.05 ± 0.35) $\times 10^{-3}$		S=2.2	831
$\eta 2\pi^+\pi^-$		(3.41 ± 0.20) $\times 10^{-3}$			798
$\eta\pi^+2\pi^0$		(3.20 ± 0.33) $\times 10^{-3}$			801
$\eta\pi^+3\pi^0$		(2.9 ± 0.5) $\times 10^{-3}$			759
$\eta 2\pi^+\pi^-\pi^0$		(3.88 ± 0.34) $\times 10^{-3}$			755
$\eta\eta\pi^+$		(2.96 ± 0.26) $\times 10^{-3}$			700
$\omega\pi^+$		(2.8 ± 0.6) $\times 10^{-4}$			764
$\omega\pi^+\pi^0$		(3.9 ± 0.9) $\times 10^{-3}$			742
$\eta'(958)\pi^+$		(4.97 ± 0.19) $\times 10^{-3}$			681
$\eta'(958)\pi^+\pi^0$		(1.6 ± 0.5) $\times 10^{-3}$			654

Hadronic modes with a $K\overline{K}$ pair

$K^0_S K^+$		(3.04 ± 0.09) $\times 10^{-3}$		S=2.2	793
$K^0_L K^+$		(3.21 ± 0.16) $\times 10^{-3}$			793
$K^0_S K^+\pi^0$		(5.07 ± 0.30) $\times 10^{-3}$			744
$K^*(892)^+ K^0_S$, $K^{*+} \to K^+\pi^0$		(2.89 ± 0.30) $\times 10^{-3}$			612
$\overline{K}^*(892)^0 K^+$, $\overline{K}^{*0} \to K^0_S\pi^0$		(5.2 ± 1.4) $\times 10^{-4}$			613
$K^0_L K^+\pi^0$		(5.24 ± 0.31) $\times 10^{-3}$			744
$K^+K^-\pi^+$	[ii]	(9.68 ± 0.18) $\times 10^{-3}$			744
$K^+\overline{K}^*(892)^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		($2.49\ {}^{+\ 0.08}_{-\ 0.13}$) $\times 10^{-3}$			613

$K^+\overline{K}{}^*_0(1430)^0$, $\overline{K}{}^*_0(1430)^0 \to K^-\pi^+$	$(1.82 \pm 0.35) \times 10^{-3}$		–
$K^+\overline{K}{}^*_2(1430)^0$, $\overline{K}{}^*_2 \to K^-\pi^+$	$(1.6 {}^{+1.2}_{-0.8}) \times 10^{-4}$		–
$K^+\overline{K}{}^*_0(700)$, $\overline{K}{}^*_0 \to K^-\pi^+$	$(6.8 {}^{+3.5}_{-2.1}) \times 10^{-4}$		–
$a_0(1450)^0\pi^+$, $a_0^0 \to K^+K^-$	$(4.5 {}^{+7.0}_{-1.8}) \times 10^{-4}$		–
$\phi(1680)\pi^+$, $\phi \to K^+K^-$	$(4.9 {}^{+4.0}_{-1.9}) \times 10^{-5}$		–
$\phi\pi^+$, $\phi \to K^+K^-$	$(2.69 {}^{+0.07}_{-0.08}) \times 10^{-3}$		647
$\phi\pi^+$	$(5.70 \pm 0.14) \times 10^{-3}$		647
$K^+K^-\pi^+\pi^0$	$(6.62 \pm 0.32) \times 10^{-3}$		682
$K^0_S K^0_S \pi^+$	$(2.70 \pm 0.13) \times 10^{-3}$		741
$K^0_S K^0_S \pi^+\pi^0$	$(1.34 \pm 0.21) \times 10^{-3}$		679
$K^0_S K^+\eta$	$(1.8 \pm 0.5) \times 10^{-4}$		516
$K^+K^0_S\pi^+\pi^-$	$(1.89 \pm 0.13) \times 10^{-3}$		678
$K^0_S K^+\pi^0\pi^0$	$(5.8 \pm 1.3) \times 10^{-4}$		683
$K^0_S K^- 2\pi^+$	$(2.27 \pm 0.13) \times 10^{-3}$		678
$K^+K^-2\pi^+\pi^-$	$(2.3 \pm 1.2) \times 10^{-4}$		601

A few poorly measured branching fractions:

$\phi\pi^+\pi^0$	(2.3 ± 1.0) %		619
$\phi\rho^+$	< 1.5 %	CL=90%	260
$K^+K^-\pi^+\pi^0$ non-ϕ	$(1.5 {}^{+0.7}_{-0.6})$ %		682

Doubly Cabibbo-suppressed modes

$K^+\pi^0$	$(2.08 \pm 0.21) \times 10^{-4}$	S=1.4	864
$K^+\eta$	$(1.25 \pm 0.16) \times 10^{-4}$	S=1.1	776
$K^+\eta'(958)$	$(1.85 \pm 0.20) \times 10^{-4}$		571
$K^+2\pi^0$	$(2.1 \pm 0.4) \times 10^{-4}$		847
$K^*(892)^+\pi^0$	$(3.4 \pm 1.4) \times 10^{-4}$		714
$K^+\pi^+\pi^-$	$(4.91 \pm 0.09) \times 10^{-4}$		846
$K^+\rho^0$	$(1.9 \pm 0.5) \times 10^{-4}$		679
$K^+\eta\pi^0$	$(2.1 \pm 0.5) \times 10^{-4}$		726
$K^*(892)^+\eta$	$(4.4 {}^{+1.8}_{-1.5}) \times 10^{-4}$		586
$K^*(892)^0\pi^+$, $K^*(892)^0 \to K^+\pi^-$	$(2.3 \pm 0.4) \times 10^{-4}$		714
$K^+f_0(980)$, $f_0(980) \to \pi^+\pi^-$	$(4.4 \pm 2.6) \times 10^{-5}$		–
$K^*_2(1430)^0\pi^+$, $K^*_2(1430)^0 \to K^+\pi^-$	$(3.9 \pm 2.7) \times 10^{-5}$		–

$K^+\pi^+\pi^-$ nonresonant			not seen	846
$K^+\pi^+\pi^-\pi^0$			$(1.21 \pm 0.09) \times 10^{-3}$	817
$K^+\pi^+\pi^-\pi^0$ nonresonant			$(1.10 \pm 0.07) \times 10^{-3}$	817
$K^+\omega$			$(5.7 {}^{+2.5}_{-2.1}) \times 10^{-5}$	675
$2K^+K^-$			$(6.14 \pm 0.11) \times 10^{-5}$	550
$\phi(1020)^0 K^+$			$< 2.1 \times 10^{-5}$ CL=90%	–
$K^+\phi(1020)$, $\phi \to K^+K^-$			$(4.4 \pm 0.6) \times 10^{-6}$	–
$K^+(K^+K^-)_{S-wave}$			$(5.77 \pm 0.12) \times 10^{-5}$	550

$\Delta C = 1$ weak neutral current (*C1*) modes, or Lepton Family number (*LF*), or Lepton number (*L*), or Baryon number (B) violating modes

$\pi^+e^+e^-$	*C1*		$< 1.1 \times 10^{-6}$ CL=90%	930
$\pi^+\pi^0e^+e^-$			$< 1.4 \times 10^{-5}$ CL=90%	925
$\pi^+\phi$, $\phi \to e^+e^-$		[*nn*]	$(1.7 {}^{+1.4}_{-0.9}) \times 10^{-6}$	–
$\pi^+\mu^+\mu^-$	*C1*		$< 6.7 \times 10^{-8}$ CL=90%	918
$\pi^+\phi$, $\phi \to \mu^+\mu^-$		[*nn*]	$(1.8 \pm 0.8) \times 10^{-6}$	–
$\rho^+\mu^+\mu^-$	*C1*		$< 5.6 \times 10^{-4}$ CL=90%	757
$K^+e^+e^-$		[*oo*]	$< 8.5 \times 10^{-7}$ CL=90%	870
$K^+\pi^0e^+e^-$			$< 1.5 \times 10^{-5}$ CL=90%	864
$K^0_S\pi^+e^+e^-$			$< 2.6 \times 10^{-5}$ CL=90%	–
$K^0_S K^+e^+e^-$			$< 1.1 \times 10^{-5}$ CL=90%	792
$K^+\mu^+\mu^-$		[*oo*]	$< 5.4 \times 10^{-8}$ CL=90%	856
$\pi^+e^+\mu^-$	*LF*		$< 2.1 \times 10^{-7}$ CL=90%	927
$\pi^+e^-\mu^+$	*LF*		$< 2.2 \times 10^{-7}$ CL=90%	927
$K^+e^+\mu^-$	*LF*		$< 7.5 \times 10^{-8}$ CL=90%	866
$K^+e^-\mu^+$	*LF*		$< 1.0 \times 10^{-7}$ CL=90%	866
π^-2e^+	*L*		$< 5.3 \times 10^{-7}$ CL=90%	930
$\pi^-2\mu^+$	*L*		$< 1.4 \times 10^{-8}$ CL=90%	918
$\pi^-e^+\mu^+$	*L*		$< 1.3 \times 10^{-7}$ CL=90%	927
$\rho^-2\mu^+$	*L*		$< 5.6 \times 10^{-4}$ CL=90%	757
K^-2e^+	*L*		$< 9 \times 10^{-7}$ CL=90%	870
$K^0_S\pi^-2e^+$			$< 3.3 \times 10^{-6}$ CL=90%	863
$K^-\pi^0 2e^+$			$< 8.5 \times 10^{-6}$ CL=90%	864
$K^-2\mu^+$	*L*		$< 1.0 \times 10^{-5}$ CL=90%	856
$K^-e^+\mu^+$	*L*		$< 1.9 \times 10^{-6}$ CL=90%	866
$K^*(892)^-2\mu^+$	*L*		$< 8.5 \times 10^{-4}$ CL=90%	703
Λe^+	*L,B*		$< 1.1 \times 10^{-6}$ CL=90%	602
$\overline{\Lambda} e^+$	*L,B*		$< 6.5 \times 10^{-7}$ CL=90%	602
$\Sigma^0 e^+$	*L,B*		$< 1.7 \times 10^{-6}$ CL=90%	554
$\overline{\Sigma}^0 e^+$	*L,B*		$< 1.3 \times 10^{-6}$ CL=90%	554
$\overline{n} e^+$			$< 1.43 \times 10^{-5}$ CL=90%	699
$n e^+$			$< 2.91 \times 10^{-5}$ CL=90%	699

D^0

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

Mass $m = 1864.84 \pm 0.05$ MeV
$m_{D^\pm} - m_{D^0} = 4.822 \pm 0.015$ MeV
Mean life $\tau = (410.3 \pm 1.0) \times 10^{-15}$ s
$c\tau = 123.01\ \mu$m

Mixing and related parameters

$\left|m_{D_1^0} - m_{D_2^0}\right| = (0.997 \pm 0.116) \times 10^{10}\ \hbar\ \mathrm{s}^{-1}$
$(\Gamma_{D_1^0} - \Gamma_{D_2^0})/\Gamma = 2y = (1.394 \pm 0.056) \times 10^{-2}$
$\left|\mathrm{q/p}\right| = 0.995 \pm 0.016$
$\mathrm{A}_\Gamma = (0.089 \pm 0.113) \times 10^{-3}$
$\phi^{K_S^0 \pi\pi} = 0.02^{+0.04}_{-0.05}$
$K^+\pi^-$ relative strong phase: $\cos\delta = 0.990 \pm 0.025$
$K^-\pi^+\pi^0$ coherence factor $R_{K\pi\pi^0} = 0.792 \pm 0.033$
$K^-\pi^+\pi^0$ average relative strong phase $\delta^{K\pi\pi^0} = (198 \pm 10)^\circ$
$K^-\pi^-2\pi^+$ coherence factor $R_{K3\pi} = 0.52^{+0.10}_{-0.09}$
$K^-\pi^-2\pi^+$ average relative strong phase $\delta^{K3\pi} = (149^{+26}_{-16})^\circ$ (S = 1.4)
$D^0 \to K^-\pi^-2\pi^+$, $R_{K3\pi}$ (y $\cos\delta^{K3\pi}$ − x $\sin\delta^{K3\pi}$) $= (-3.0 \pm 0.7) \times 10^{-3}$ TeV^{-1}
$K_S^0 K^+\pi^-$ coherence factor $\mathrm{R}_{K_S^0 K\pi} = 0.70 \pm 0.08$
$K_S^0 K^+\pi^-$ average relative strong phase $\delta^{K_S^0 K\pi} = (0 \pm 16)^\circ$
$K^* K$ coherence factor $\mathrm{R}_{K^* K} = 0.94 \pm 0.12$
$K^* K$ average relative strong phase $\delta^{K^* K} = (-17 \pm 18)^\circ$

CP-even fractions (labeled by the D^0 decay)

CP-even fraction in $D^0 \to K_S^0\pi^+\pi^-\pi^0$ decays $= (23.8 \pm 1.7)\%$
CP-even fraction in $D^0 \to \pi^+\pi^-\pi^0$ decays $= (97.3 \pm 1.7)\%$
CP-even fraction in $D^0 \to \pi^+\pi^-\pi^+\pi^-$ decays $= (74.6 \pm 1.6)\%$ (S = 1.2)
CP-even fraction in $D^0 \to \pi^+\pi^-2\pi^0$ decays $= 0.68 \pm 0.08$
CP-even fraction in $D^0 \to 2\pi^+2\pi^-\pi^0$ decays $= 0.44 \pm 0.10$
CP-even fraction in $D^0 \to \pi^+\pi^-3\pi^0$ decays $= 0.52^{+0.34}_{-0.27}$
CP-even fraction in $D^0 \to 2\pi^+2\pi^-2\pi^0$ decays $= 0.79 \pm 0.26$
CP-even fraction in $D^0 \to K^+K^-\pi^0$ decays $= (73 \pm 6)\%$
CP-even fraction in $D^0 \to K^+K^-\pi^+\pi^-$ decays $= (75 \pm 4)\%$

CP-violation decay-rate asymmetries (labeled by the D^0 decay)

$A_{CP}(K^+K^-) = (-0.07 \pm 0.11)\%$

$A_{CP}(2K^0_S) = (-1.9 \pm 1.1)\%$ (S = 1.1)
$A_{CP}(\pi^+\pi^-) = (0.13 \pm 0.14)\%$
$A_{CP}(\pi^0\pi^0) = (0.0 \pm 0.6)\%$
$A_{CP}(\rho\gamma) = (6 \pm 15) \times 10^{-2}$
$A_{CP}(\phi\gamma) = (-9 \pm 7) \times 10^{-2}$
$A_{CP}(\overline{K}^*(892)^0\gamma) = (-0.3 \pm 2.0) \times 10^{-2}$
$A_{CP}(\pi^+\pi^-\pi^0) = (0.4 \pm 0.4)\%$
$A_{CP}(\eta\pi^+\pi^-)$ in D^0, $\overline{D}^0 \to \eta\pi^+\pi^- = (0.9 \pm 1.3) \times 10^{-2}$
$A_{CP}(\rho(770)^+\pi^- \to \pi^+\pi^-\pi^0) = (1.2 \pm 0.9)\%$ [pp]
$A_{CP}(\rho(770)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-3.1 \pm 3.0)\%$ [pp]
$A_{CP}(\rho(770)^-\pi^+ \to \pi^+\pi^-\pi^0) = (-1.0 \pm 1.7)\%$ [pp]
$A_{CP}(\rho(1450)^+\pi^- \to \pi^+\pi^-\pi^0) = (0 \pm 70)\%$ [pp]
$A_{CP}(\rho(1450)^0\pi^0 \to \pi^+\pi^-\pi^0) = (-20 \pm 40)\%$ [pp]
$A_{CP}(\rho(1450)^-\pi^+ \to \pi^+\pi^-\pi^0) = (6 \pm 9)\%$ [pp]
$A_{CP}(\rho(1700)^+\pi^- \to \pi^+\pi^-\pi^0) = (-5 \pm 14)\%$ [pp]
$A_{CP}(\rho(1700)^0\pi^0 \to \pi^+\pi^-\pi^0) = (13 \pm 9)\%$ [pp]
$A_{CP}(\rho(1700)^-\pi^+ \to \pi^+\pi^-\pi^0) = (8 \pm 11)\%$ [pp]
$A_{CP}(f_0(980)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 35)\%$ [pp]
$A_{CP}(f_0(1370)\pi^0 \to \pi^+\pi^-\pi^0) = (25 \pm 18)\%$ [pp]
$A_{CP}(f_0(1500)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 18)\%$ [pp]
$A_{CP}(f_0(1710)\pi^0 \to \pi^+\pi^-\pi^0) = (0 \pm 24)\%$ [pp]
$A_{CP}(f_2(1270)\pi^0 \to \pi^+\pi^-\pi^0) = (-4 \pm 6)\%$ [pp]
$A_{CP}(\sigma(400)\pi^0 \to \pi^+\pi^-\pi^0) = (6 \pm 8)\%$ [pp]
$A_{CP}(\text{nonresonant } \pi^+\pi^-\pi^0) = (-13 \pm 23)\%$ [pp]
$A_{CP}(\pi^+\pi^-2\pi^0)$ in D^0, $\overline{D}^0 \to \pi^+\pi^-2\pi^0 = (-2.5 \pm 2.0)\%$
$A_{CP}(a_1(1260)^+\pi^- \to 2\pi^+2\pi^-) = (5 \pm 6)\%$
$A_{CP}(a_1(1260)^-\pi^+ \to 2\pi^+2\pi^-) = (14 \pm 18)\%$
$A_{CP}(\pi(1300)^+\pi^- \to 2\pi^+2\pi^-) = (-2 \pm 15)\%$
$A_{CP}(\pi(1300)^-\pi^+ \to 2\pi^+2\pi^-) = (-6 \pm 30)\%$
$A_{CP}(a_1(1640)^+\pi^- \to 2\pi^+2\pi^-) = (9 \pm 26)\%$
$A_{CP}(\pi_2(1670)^+\pi^- \to 2\pi^+2\pi^-) = (7 \pm 18)\%$
$A_{CP}(\sigma f_0(1370) \to 2\pi^+2\pi^-) = (-15 \pm 19)\%$
$A_{CP}(\sigma\rho(770)^0 \to 2\pi^+2\pi^-) = (3 \pm 27)\%$
$A_{CP}(2\rho(770)^0 \to 2\pi^+2\pi^-) = (-6 \pm 6)\%$
$A_{CP}(2f_2(1270) \to 2\pi^+2\pi^-) = (-28 \pm 24)\%$
$A_{CP}(\pi^+\pi^-\pi^0\eta)$ in D^0, $\overline{D}^0 \to \pi^+\pi^-\pi^0\eta = (-6 \pm 6) \times 10^{-2}$
$A_{CP}(K^+K^-\pi^0) = (-1.0 \pm 1.7)\%$
$A_{CP}(K^*(892)^+K^- \to K^+K^-\pi^0) = (-0.9 \pm 1.3)\%$ [pp]
$A_{CP}(K^*(1410)^+K^- \to K^+K^-\pi^0) = (-21 \pm 24)\%$ [pp]
$A_{CP}((K^+\pi^0)_{S-wave}K^- \to K^+K^-\pi^0) = (7 \pm 15)\%$ [pp]
$A_{CP}(\phi(1020)\pi^0 \to K^+K^-\pi^0) = (1.1 \pm 2.2)\%$ [pp]
$A_{CP}(f_0(980)\pi^0 \to K^+K^-\pi^0) = (-3 \pm 19)\%$ [pp]

$A_{CP}(a_0(980)^0\pi^0 \to K^+K^-\pi^0) = (-5 \pm 16)\%$ [pp]
$A_{CP}(f'_2(1525)\pi^0 \to K^+K^-\pi^0) = (0 \pm 160)\%$ [pp]
$A_{CP}(K^*(892)^-K^+ \to K^+K^-\pi^0) = (-5 \pm 4)\%$ [pp]
$A_{CP}(K^*(1410)^-K^+ \to K^+K^-\pi^0) = (-17 \pm 29)\%$ [pp]
$A_{CP}((K^-\pi^0)_{S-wave}K^+ \to K^+K^-\pi^0) = (-10 \pm 40)\%$ [pp]
$A_{CP}(K^+K^-\eta)$ in D^0, $\overline{D}^0 \to K^+K^-\eta = (-1.4 \pm 3.5) \times 10^{-2}$
$A_{CP}(\phi(1020)\eta \to K^+K^-\eta)$ in D^0, $\overline{D}^0 \to \phi(1020)\eta = (-2 \pm 4) \times 10^{-2}$
$A_{CP}(K^0_S\pi^0) = (-0.20 \pm 0.17)\%$
$A_{CP}(K^0_S\eta) = (0.5 \pm 0.5)\%$
$A_{CP}(K^0_S\eta') = (1.0 \pm 0.7)\%$
$A_{CP}(K^0_S\phi) = (-3 \pm 9)\%$
$A_{CP}(K^-\pi^+) = (0.2 \pm 0.5)\%$
$A_{CP}(K^+\pi^-) = (-0.9 \pm 1.4)\%$
$A_{CP}(D_{CP(\pm1)} \to K^\mp\pi^\pm) = (13.1 \pm 1.0)\%$
$A_{CP}(K^-\pi^+\pi^0) = (0.1 \pm 0.5)\%$
$A_{CP}(K^+\pi^-\pi^0) = (0 \pm 5)\%$
$A_{CP}(K^0_S\pi^+\pi^-) = (-0.1 \pm 0.8)\%$
$A_{CP}(K^\mp\pi^\pm\eta)$ in D^0, $\overline{D}^0 \to K^\mp\pi^\pm\eta = (-1.9 \pm 1.6) \times 10^{-2}$
$A_{CP}(K^0_S\pi^0\eta)$ in D^0, $\overline{D}^0 \to K^0_S\pi^0\eta = (-3.9 \pm 3.3) \times 10^{-2}$
$A_{CP}(K^\mp\pi^\pm\pi^0\eta)$ in D^0, $\overline{D}^0 \to K^\mp\pi^\pm\pi^0\eta = (-8 \pm 5) \times 10^{-2}$
$A_{CP}(K^*(892)^-\pi^+ \to K^0_S\pi^+\pi^-) = (0.4 \pm 0.5)\%$
$A_{CP}(K^*(892)^+\pi^- \to K^0_S\pi^+\pi^-) = (1 \pm 6)\%$
$A_{CP}(\overline{K}^0\rho^0 \to K^0_S\pi^+\pi^-) = (-0.1 \pm 0.5)\%$
$A_{CP}(\overline{K}^0\omega \to K^0_S\pi^+\pi^-) = (-13 \pm 7)\%$
$A_{CP}(\overline{K}^0 f_0(980) \to K^0_S\pi^+\pi^-) = (-0.4 \pm 2.7)\%$
$A_{CP}(\overline{K}^0 f_2(1270) \to K^0_S\pi^+\pi^-) = (-4 \pm 5)\%$
$A_{CP}(\overline{K}^0 f_0(1370) \to K^0_S\pi^+\pi^-) = (-1 \pm 9)\%$
$A_{CP}(\overline{K}^0\rho^0(1450) \to K^0_S\pi^+\pi^-) = (-4 \pm 10)\%$
$A_{CP}(\overline{K}^0 f_0(600) \to K^0_S\pi^+\pi^-) = (-3 \pm 5)\%$
$A_{CP}(K^*(1410)^-\pi^+ \to K^0_S\pi^+\pi^-) = (-2 \pm 9)\%$
$A_{CP}(K^*_0(1430)^-\pi^+ \to K^0_S\pi^+\pi^-) = (4 \pm 4)\%$
$A_{CP}(K^*_0(1430)^+\pi^- \to K^0_S\pi^+\pi^-) = (12 \pm 15)\%$
$A_{CP}(K^*_2(1430)^-\pi^+ \to K^0_S\pi^+\pi^-) = (3 \pm 6)\%$
$A_{CP}(K^*_2(1430)^+\pi^- \to K^0_S\pi^+\pi^-) = (-10 \pm 32)\%$
$A_{CP}(K^-\pi^+\pi^+\pi^-) = (0.2 \pm 0.5)\%$
$A_{CP}(K^+\pi^-\pi^+\pi^-) = (-2 \pm 4)\%$
$A_{CP}(K^+K^-\pi^+\pi^-) = (1.3 \pm 1.7)\%$
$A_{CP}(K^*_1(1270)^+K^- \to K^+K^-\pi^+\pi^-) = (-2.3 \pm 1.7)\%$
$A_{CP}(K^*_1(1270)^+K^- \to K^{*0}\pi^+K^-) = (-1 \pm 10)\%$
$A_{CP}(K^*_1(1270)^-K^+ \to \overline{K}^{*0}\pi^-K^+) = (-10 \pm 32)\%$
$A_{CP}(K^*_1(1270)^-K^+ \to K^+K^-\pi^+\pi^-) = (1.7 \pm 3.5)\%$

$A_{CP}(K_1^*(1270)^+ K^- \to \rho^0 K^+ K^-) = (-7 \pm 17)\%$
$A_{CP}(K_1^*(1270)^- K^+ \to \rho^0 K^- K^+) = (10 \pm 13)\%$
$A_{CP}(K_1(1400)^+ K^- \to K^+ K^- \pi^+ \pi^-) = (-4.4 \pm 2.1)\%$
$A_{CP}(K^*(1410)^+ K^- \to K^{*0} \pi^+ K^-) = (-20 \pm 17)\%$
$A_{CP}(K^*(1410)^- K^+ \to \overline{K}^{*0} \pi^- K^+) = (-1 \pm 14)\%$
$A_{CP}(K^*(1680)^+ K^- \to K^+ K^- \pi^+ \pi^-) = (-17 \pm 29)\%$
$A_{CP}(K^{*0} \overline{K}^{*0})$ in D^0, $\overline{D}^0 \to K^{*0} \overline{K}^{*0} = (-5 \pm 14)\%$
$A_{CP}(K^{*0} \overline{K}^{*0}$ S-wave$) = (-3.9 \pm 2.2)\%$
$A_{CP}(\phi \rho^0)$ in D^0, $\overline{D}^0 \to \phi \rho^0 = (1 \pm 9)\%$
$A_{CP}(\phi \rho^0$ S-wave$) = (-3 \pm 5)\%$
$A_{CP}(\phi \rho^0$ D-wave$) = (-37 \pm 19)\%$
$A_{CP}(\phi (\pi^+ \pi^-)_{S-wave}) = (6 \pm 6)\%$
$A_{CP}(K^*(892)^0 (K^- \pi^+)_{S-wave}) = (-10 \pm 40)\%$
$A_{CP}(K^+ K^- \pi^+ \pi^-$ non-resonant$) = (8 \pm 20)\%$
$A_{CP}((K^- \pi^+)_{P-wave} (K^+ \pi^-)_{S-wave}) = (3 \pm 11)\%$
$A_{CP}(K^+ K^- \mu^+ \mu^-)$ in D^0, $\overline{D}^0 \to K^+ K^- \mu^+ \mu^- = (-2 \pm 6)\%$
$A_{CP}(\pi^+ \pi^- \mu^+ \mu^-)$ in D^0, $\overline{D}^0 \to \pi^+ \pi^- \mu^+ \mu^- = (2.9 \pm 2.1)\%$

CP-violation asymmetry difference

$\Delta A_{CP} = A_{CP}(K^+ K^-) - A_{CP}(\pi^+ \pi^-) = (-0.154 \pm 0.029)\%$

χ^2 tests of *CP*-violation (*CPV*) p-values

Local *CPV* in D^0, $\overline{D}^0 \to \pi^+ \pi^- \pi^0 = 4.9\%$
Local *CPV* in D^0, $\overline{D}^0 \to \pi^+ \pi^- \pi^+ \pi^- = (0.6 \pm 0.2)\%$
Local *CPV* in D^0, $\overline{D}^0 \to K_S^0 \pi^+ \pi^- = 96\%$
Local *CPV* in D^0, $\overline{D}^0 \to K^+ K^- \pi^0 = 16.6\%$
Local *CPV* in D^0, $\overline{D}^0 \to K^+ K^- \pi^+ \pi^- = 9.1\%$

T-violation decay-rate asymmetry

$A_T(K^+ K^- \pi^+ \pi^-) = (2.9 \pm 2.2) \times 10^{-3}$ [hh]
$A_{\text{Tviol}}(K_S \pi^+ \pi^- \pi^0)$ in D^0, $\overline{D}^0 \to K_S \pi^+ \pi^- \pi^0 = (-0.3^{+1.4}_{-1.6}) \times 10^{-3}$

CPT-violation decay-rate asymmetry

$A_{CPT}(K^\mp \pi^\pm) = 0.008 \pm 0.008$

Form factors

$r_V \equiv V(0)/A_1(0)$ in $D^0 \to K^*(892)^- \ell^+ \nu_\ell = 1.46 \pm 0.07$
$r_2 \equiv A_2(0)/A_1(0)$ in $D^0 \to K^*(892)^- \ell^+ \nu_\ell = 0.68 \pm 0.06$
$f_+(0)$ in $D^0 \to K^- \ell^+ \nu_\ell = 0.736 \pm 0.004$
$f_+(0)|V_{cs}|$ in $D^0 \to K^- \ell^+ \nu_\ell = 0.7166 \pm 0.0030$
$r_1 \equiv a_1/a_0$ in $D^0 \to K^- \ell^+ \nu_\ell = -2.40 \pm 0.16$
$r_2 \equiv a_2/a_0$ in $D^0 \to K^- \ell^+ \nu_\ell = 5 \pm 4$
$f_+(0)$ in $D^0 \to \pi^- \ell^+ \nu_\ell = 0.637 \pm 0.009$
$f_+(0)|V_{cd}|$ in $D^0 \to \pi^- \ell^+ \nu_\ell = 0.1436 \pm 0.0026$ (S = 1.5)
$r_1 \equiv a_1/a_0$ in $D^0 \to \pi^- \ell^+ \nu_\ell = -1.97 \pm 0.28$ (S = 1.4)
$r_2 \equiv a_1/a_0$ in $D^0 \to \pi^- \ell^+ \nu_\ell = -0.2 \pm 2.2$ (S = 1.7)

Most decay modes (other than the semileptonic modes) that involve a neutral K meson are now given as K^0_S modes, not as $\overline{K}^0$ modes. Nearly always it is a K^0_S that is measured, and interference between Cabibbo-allowed and doubly Cabibbo-suppressed modes can invalidate the assumption that $2\,\Gamma(K^0_S) = \Gamma(\overline{K}^0)$.

D^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Topological modes				
0-prongs	[qq]	(15 ± 6) %		–
2-prongs		(71 ± 6) %		–
4-prongs	[rr]	(14.6 ± 0.5) %		–
6-prongs	[ss]	(6.5 ± 1.3) $\times 10^{-4}$		–
Inclusive modes				
e^+ anything	[tt]	(6.49 ± 0.11) %		–
μ^+ anything		(6.8 ± 0.6) %		–
K^- anything		(54.7 ± 2.8) %	S=1.3	–
$\overline{K}^0$ anything + K^0 anything		(47 ± 4) %		–
K^+ anything		(3.4 ± 0.4) %		–
$K^*(892)^-$ anything		(15 ± 9) %		–
$\overline{K}^*(892)^0$ anything		(9 ± 4) %		–
$K^*(892)^+$ anything		< 3.6 %	CL=90%	–
$K^*(892)^0$ anything		(2.8 ± 1.3) %		–
η anything		(9.5 ± 0.9) %		–
η' anything		(2.48 ± 0.27) %		–
ϕ anything		(1.08 ± 0.04) %		–
invisibles		< 9.4 $\times 10^{-5}$	CL=90%	–
Semileptonic modes				
$K^- e^+ \nu_e$		(3.549 ± 0.026) %	S=1.2	867
$K^- \mu^+ \nu_\mu$		(3.41 ± 0.04) %		864
$K^*(892)^- e^+ \nu_e$		(2.15 ± 0.16) %		719
$K^*(892)^- \mu^+ \nu_\mu$		(1.89 ± 0.24) %		714
$K^- \pi^0 e^+ \nu_e$		(1.6 $^{+1.3}_{-0.5}$) %		861
$\overline{K}^0 \pi^- e^+ \nu_e$		(1.44 ± 0.04) %		860
$(\overline{K}^0 \pi^-)_{S-wave}\, e^+ \nu_e$		(7.9 ± 1.7) $\times 10^{-4}$		860
$K^- \pi^+ \pi^- e^+ \nu_e$		(2.8 $^{+1.4}_{-1.1}$) $\times 10^{-4}$		843
$\quad K_1(1270)^- e^+ \nu_e$		(1.01 ± 0.18) $\times 10^{-3}$		511
$K^- \pi^+ \pi^- \mu^+ \nu_\mu$		< 1.3 $\times 10^{-3}$	CL=90%	821
$\quad (\overline{K}^*(892)\pi)^- \mu^+ \nu_\mu$		< 1.5 $\times 10^{-3}$	CL=90%	692
$\pi^- e^+ \nu_e$		(2.91 ± 0.04) $\times 10^{-3}$		927
$\pi^- \mu^+ \nu_\mu$		(2.67 ± 0.12) $\times 10^{-3}$	S=1.3	924
$\pi^- \pi^0 e^+ \nu_e$		(1.45 ± 0.07) $\times 10^{-3}$		922

$\rho^- e^+ \nu_e$		$(1.50 \pm 0.12) \times 10^{-3}$	S=1.9	771
$\rho^- \mu^+ \nu_\mu$		$(1.35 \pm 0.13) \times 10^{-3}$		767
$a(980)^- e^+ \nu_e$, $a^- \to \eta\pi^-$		$(1.33 {}^{+0.34}_{-0.30}) \times 10^{-4}$		–
$b_1(1235)^- e^+ \nu_e$, $b_1^- \to \omega\pi^-$		$< 1.12 \times 10^{-4}$	CL=90%	–
Hadronic modes with one $\overline{K}$				
$K^- \pi^+$		(3.947 ± 0.030) %	S=1.2	861
$K^0_S \pi^0$		(1.240 ± 0.022) %		860
$K^0_L \pi^0$		$(9.76 \pm 0.32) \times 10^{-3}$		860
$K^0_L \eta$		$(4.34 \pm 0.16) \times 10^{-3}$		772
$K^0_L \eta'$		$(8.12 \pm 0.35) \times 10^{-3}$	S=1.3	565
$K^0_L \omega$		(1.16 ± 0.04) %		670
$K^0_S \pi^+ \pi^-$	[ii]	(2.80 ± 0.18) %	S=1.1	842
$K^0_S \rho^0$		$(6.3 {}^{+0.6}_{-0.8}) \times 10^{-3}$		674
$K^0_S \omega$, $\omega \to \pi^+\pi^-$		$(2.0 \pm 0.6) \times 10^{-4}$		670
$K^0_S (\pi^+\pi^-)_{S-wave}$		$(3.3 \pm 0.8) \times 10^{-3}$		842
$K^0_S f_0(980)$, $f_0 \to \pi^+\pi^-$		$(1.20 {}^{+0.40}_{-0.23}) \times 10^{-3}$		549
$K^0_S f_0(1370)$, $f_0 \to \pi^+\pi^-$		$(2.8 {}^{+0.9}_{-1.3}) \times 10^{-3}$		†
$K^0_S f_2(1270)$, $f_2 \to \pi^+\pi^-$		$(9 {}^{+10}_{-6}) \times 10^{-5}$		262
$K^*(892)^- \pi^+$, $K^{*-} \to K^0_S \pi^-$		$(1.64 {}^{+0.14}_{-0.17})$ %		711
$K^*_0(1430)^- \pi^+$, $K^{*-}_0 \to K^0_S \pi^-$		$(2.67 {}^{+0.40}_{-0.33}) \times 10^{-3}$		378
$K^*_2(1430)^- \pi^+$, $K^{*-}_2 \to K^0_S \pi^-$		$(3.4 {}^{+1.9}_{-1.0}) \times 10^{-4}$		367
$K^*(1680)^- \pi^+$, $K^{*-} \to K^0_S \pi^-$		$(4.4 \pm 3.5) \times 10^{-4}$		46
$K^*(892)^+ \pi^-$, $K^{*+} \to K^0_S \pi^+$	[uu]	$(1.13 {}^{+0.60}_{-0.34}) \times 10^{-4}$		711
$K^*_0(1430)^+ \pi^-$, $K^{*+}_0 \to K^0_S \pi^+$	[uu]	$< 1.4 \times 10^{-5}$	CL=95%	–
$K^*_2(1430)^+ \pi^-$, $K^{*+}_2 \to K^0_S \pi^+$	[uu]	$< 3.4 \times 10^{-5}$	CL=95%	–
$K^0_S \pi^+ \pi^-$ nonresonant		$(2.5 {}^{+6.0}_{-1.6}) \times 10^{-4}$		842
$K^- \pi^+ \pi^0$	[ii]	(14.4 ± 0.6) %	S=2.2	844
$K^- \rho^+$		(11.2 ± 0.7) %		675
$K^- \rho(1700)^+$, $\rho^+ \to \pi^+\pi^0$		$(8.2 \pm 1.8) \times 10^{-3}$		†

$K^*(892)^-\pi^+$, $K^*(892)^- \to K^-\pi^0$		$(2.31\ ^{+\ 0.40}_{-\ 0.20})\ \%$		711
$\overline{K}^*(892)^0\pi^0$, $\overline{K}^*(892)^0 \to K^-\pi^+$		$(1.95 \pm 0.25)\ \%$		711
$K_0^*(1430)^-\pi^+$, $K_0^{*-} \to K^-\pi^0$		$(4.8 \pm 2.2) \times 10^{-3}$		378
$\overline{K}_0^*(1430)^0\pi^0$, $\overline{K}_0^{*0} \to K^-\pi^+$		$(5.9\ ^{+\ 5.0}_{-\ 1.6}) \times 10^{-3}$		379
$K^*(1680)^-\pi^+$, $K^{*-} \to K^-\pi^0$		$(1.9 \pm 0.7) \times 10^{-3}$		46
$K^-\pi^+\pi^0$ nonresonant		$(1.15\ ^{+\ 0.60}_{-\ 0.20})\ \%$		844
$K_S^0 2\pi^0$		$(9.1 \pm 1.1) \times 10^{-3}$	S=2.2	843
$K_L^0\pi^0\pi^0$		$(1.26 \pm 0.06)\ \%$		843
$K_S^0(2\pi^0)_{S-wave}$		$(2.6 \pm 0.7) \times 10^{-3}$		–
$\overline{K}^*(892)^0\pi^0$, $\overline{K}^{*0} \to K_S^0\pi^0$		$(8.1 \pm 0.7) \times 10^{-3}$		711
$\overline{K}^*(1430)^0\pi^0$, $\overline{K}^{*0} \to K_S^0\pi^0$		$(4 \pm 23) \times 10^{-5}$		–
$\overline{K}^*(1680)^0\pi^0$, $\overline{K}^{*0} \to K_S^0\pi^0$		$(1.0 \pm 0.4) \times 10^{-3}$		–
$K_S^0 f_2(1270)$, $f_2 \to 2\pi^0$		$(2.3 \pm 1.1) \times 10^{-4}$		–
$2K_S^0$, one $K_S^0 \to 2\pi^0$		$(3.2 \pm 1.1) \times 10^{-4}$		–
$K_S^0 3\pi^0$		$(7.6 \pm 0.4) \times 10^{-3}$		815
$K^- 2\pi^+\pi^-$	[ii]	$(8.22 \pm 0.14)\ \%$	S=1.1	813
$K^-\pi^+\rho^0$ total		$(6.87 \pm 0.31)\ \%$		609
$K^-\pi^+\rho^0$ 3-body		$(6.1 \pm 1.6) \times 10^{-3}$		609
$\overline{K}^*(892)^0\rho^0$, $\overline{K}^{*0} \to K^-\pi^+$		$(1.01 \pm 0.05)\ \%$		416
$\overline{K}^*(892)^0\rho^0$ transverse, $\overline{K}^{*0} \to K^-\pi^+$		$(1.2 \pm 0.4)\ \%$		417
$K^- a_1(1260)^+$, $a_1^+ \to \rho^0\pi^+$		$(4.32 \pm 0.32)\ \%$		327
$K_1(1270)^-\pi^+$, $K_1^- \to K^-\pi^+\pi^-$ total		$(3.9 \pm 0.4) \times 10^{-3}$		–
$K_1(1270)^-\pi^+$, $K_1^- \to \overline{K}^*(892)^0\pi^-$, $\overline{K}^{*0} \to K^-\pi^+$		$(6.6 \pm 2.3) \times 10^{-4}$		484
$K^- 2\pi^+\pi^-$ nonresonant		$(1.81 \pm 0.07)\ \%$		813
$K_S^0\pi^+\pi^-\pi^0$	[vv]	$(5.2 \pm 0.6)\ \%$		813
$K_S^0\eta$, $\eta \to \pi^+\pi^-\pi^0$		$(1.17 \pm 0.03) \times 10^{-3}$		772
$K_S^0\omega$, $\omega \to \pi^+\pi^-\pi^0$		$(9.9 \pm 0.6) \times 10^{-3}$		670
$K^-\pi^+ 2\pi^0$		$(8.86 \pm 0.23)\ \%$		815
$K^-\pi^+ 3\pi^0$		$(9.5 \pm 0.4) \times 10^{-3}$		774
$K^-\pi^+\pi^- 2\pi^0$		$(1.27 \pm 0.06)\ \%$		773

$K^- 2\pi^+ \pi^- \pi^0$	(4.3 ± 0.4) %		771
$\overline{K}^*(892)^0 \pi^+ \pi^- \pi^0$, $\overline{K}^{*0} \to K^- \pi^+$	(1.3 ± 0.6) %		643
$\overline{K}^*(892)^0 \omega$, $\overline{K}^{*0} \to K^- \pi^+$, $\omega \to \pi^+ \pi^- \pi^0$	(6.5 ± 3.0) $\times 10^{-3}$		410
$K^- \pi^+ \omega$	(3.39 ± 0.10) %		605
$\overline{K}^*(892)^0 \omega$	(1.1 ± 0.5) %		410
$K^0_S \pi^0 \omega$	(8.5 ± 0.6) $\times 10^{-3}$		605
$K^0_S \eta \pi^0$	(1.01 ± 0.05) %		721
$K^0_S a_0(980)$, $a_0 \to \eta \pi^0$	(1.20 ± 0.28) %		–
$\overline{K}^*(892)^0 \eta$, $\overline{K}^{*0} \to K^0_S \pi^0$	(2.9 ± 0.7) $\times 10^{-3}$		–
$K^- \pi^+ \eta$	(1.88 ± 0.05) %	S=1.4	721
$K^*(892)^0 \eta$, $K^{*0} \to K^- \pi^+$	(8.9 $^{+0.8}_{-0.6}$) $\times 10^{-3}$		–
$a_0(980)^+ K^-$, $a_0^+ \to \eta \pi^+$	(7.4 $^{+0.9}_{-0.7}$) $\times 10^{-3}$		–
$K_2^*(1980)^- \pi^+$, $K_2^{*-} \to K^- \eta$	(2.2 $^{+1.7}_{-1.9}$) $\times 10^{-4}$		–
$K^- \pi^+ \pi^0 \eta$	(4.49 ± 0.27) $\times 10^{-3}$		656
$K^0_S \pi^+ \pi^- \eta$	(2.80 ± 0.21) $\times 10^{-3}$		651
$K^0_S 2\pi^0 \eta$	(1.76 ± 0.26) $\times 10^{-3}$		656
$K^0_S 2\pi^+ 2\pi^-$	(2.66 ± 0.30) $\times 10^{-3}$		768
$K^0_S \rho^0 \pi^+ \pi^-$, no $K^*(892)^-$	(1.1 ± 0.7) $\times 10^{-3}$		–
$K^*(892)^- 2\pi^+ \pi^-$, $K^*(892)^- \to K^0_S \pi^-$, no ρ^0	(5 ± 7) $\times 10^{-4}$		642
$K^*(892)^- \rho^0 \pi^+$, $K^*(892)^- \to K^0_S \pi^-$	(1.6 ± 0.6) $\times 10^{-3}$		230
$K^0_S 2\pi^+ 2\pi^-$ nonresonant	< 1.2 $\times 10^{-3}$	CL=90%	768
$K^- 3\pi^+ 2\pi^-$	(2.2 ± 0.6) $\times 10^{-4}$		713

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes. These nine modes below are all corrected for unseen decays of the resonances.

$K^0_S \eta$	(5.09 ± 0.13) $\times 10^{-3}$		772
$K^0_S \omega$	(1.11 ± 0.06) %		670
$K^0_S \eta'(958)$	(9.49 ± 0.32) $\times 10^{-3}$		565
$\overline{K}^*(892)^0 \pi^+ \pi^- \pi^0$	(1.9 ± 0.9) %		643
$\overline{K}^*(892)^0 \eta$	(1.41 ± 0.12) %		583
$K^- \pi^+ \eta'(958)$	(6.43 ± 0.34) $\times 10^{-3}$		479
$K^0_S \eta'(958) \pi^0$	(2.52 ± 0.27) $\times 10^{-3}$		479
$\overline{K}^*(892)^0 \eta'(958)$	< 1.0 $\times 10^{-3}$	CL=90%	119

Hadronic modes with three K's

$K^0_S K^+ K^-$	$(4.42 \pm 0.32) \times 10^{-3}$		544
$K^0_S a_0(980)^0$, $a^0_0 \to K^+ K^-$	$(2.9 \pm 0.4) \times 10^{-3}$		–
$K^- a_0(980)^+$, $a^+_0 \to K^+ K^0_S$	$(5.9 \pm 1.8) \times 10^{-4}$		–
$K^+ a_0(980)^-$, $a^-_0 \to K^- K^0_S$	$< 1.1 \times 10^{-4}$	CL=95%	–
$K^0_S f_0(980)$, $f_0 \to K^+ K^-$	$< 9 \times 10^{-5}$	CL=95%	–
$K^0_S \phi$, $\phi \to K^+ K^-$	$(2.03 \pm 0.15) \times 10^{-3}$		520
$K^0_L \phi$	$(4.14 \pm 0.23) \times 10^{-3}$		521
$K^0_S f_0(1370)$, $f_0 \to K^+ K^-$	$(1.7 \pm 1.1) \times 10^{-4}$		–
$3K^0_S$	$(7.5 \pm 0.7) \times 10^{-4}$	S=1.4	539
$K^+ 2K^- \pi^+$	$(2.25 \pm 0.32) \times 10^{-4}$		434
$K^+ K^- \overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^- \pi^+$	$(4.5 \pm 1.8) \times 10^{-5}$		†
$K^- \pi^+ \phi$, $\phi \to K^+ K^-$	$(4.0 \pm 1.7) \times 10^{-5}$		422
$\phi \overline{K}^*(892)^0$, $\phi \to K^+ K^-$, $\overline{K}^{*0} \to K^- \pi^+$	$(1.08 \pm 0.21) \times 10^{-4}$		†
$K^+ 2K^- \pi^+$ nonresonant	$(3.4 \pm 1.5) \times 10^{-5}$		434
$2K^0_S K^\pm \pi^\mp$	$(5.9 \pm 1.3) \times 10^{-4}$		427

Pionic modes

$\pi^+ \pi^-$	$(1.454 \pm 0.024) \times 10^{-3}$	S=1.4	922
$2\pi^0$	$(8.26 \pm 0.25) \times 10^{-4}$		923
$\pi^+ \pi^- \pi^0$	(1.49 ± 0.07) %	S=2.3	907
$\rho^+ \pi^-$	(1.01 ± 0.05) %		764
$\rho^0 \pi^0$	$(3.86 \pm 0.24) \times 10^{-3}$		764
$\rho^- \pi^+$	$(5.15 \pm 0.26) \times 10^{-3}$		764
$\rho(1450)^+ \pi^-$, $\rho^+ \to \pi^+ \pi^0$	$(1.6 \pm 2.1) \times 10^{-5}$		–
$\rho(1450)^0 \pi^0$, $\rho^0 \to \pi^+ \pi^-$	$(4.5 \pm 2.0) \times 10^{-5}$		–
$\rho(1450)^- \pi^+$, $\rho^- \to \pi^- \pi^0$	$(2.7 \pm 0.4) \times 10^{-4}$		–
$\rho(1700)^+ \pi^-$, $\rho^+ \to \pi^+ \pi^0$	$(6.1 \pm 1.5) \times 10^{-4}$		–
$\rho(1700)^0 \pi^0$, $\rho^0 \to \pi^+ \pi^-$	$(7.4 \pm 1.8) \times 10^{-4}$		–
$\rho(1700)^- \pi^+$, $\rho^- \to \pi^- \pi^0$	$(4.8 \pm 1.1) \times 10^{-4}$		–
$f_0(980) \pi^0$, $f_0 \to \pi^+ \pi^-$	$(3.7 \pm 0.9) \times 10^{-5}$		–
$f_0(500) \pi^0$, $f_0 \to \pi^+ \pi^-$	$(1.22 \pm 0.22) \times 10^{-4}$		–
$f_0(1370) \pi^0$, $f_0 \to \pi^+ \pi^-$	$(5.5 \pm 2.1) \times 10^{-5}$		–
$f_0(1500) \pi^0$, $f_0 \to \pi^+ \pi^-$	$(5.8 \pm 1.6) \times 10^{-5}$		–
$f_0(1710) \pi^0$, $f_0 \to \pi^+ \pi^-$	$(4.6 \pm 1.6) \times 10^{-5}$		–
$f_2(1270) \pi^0$, $f_2 \to \pi^+ \pi^-$	$(1.97 \pm 0.21) \times 10^{-4}$		–
$\pi^+ \pi^- \pi^0$ nonresonant	$(1.3 \pm 0.4) \times 10^{-4}$		907
$3\pi^0$	$(2.0 \pm 0.5) \times 10^{-4}$		908
$2\pi^+ 2\pi^-$	$(7.56 \pm 0.20) \times 10^{-3}$		880

$a_1(1260)^+\pi^-$, $a_1^+ \to 2\pi^+\pi^-$ total		$(4.53 \pm 0.31) \times 10^{-3}$		–
$a_1(1260)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ S-wave		$(3.13 \pm 0.21) \times 10^{-3}$		–
$a_1(1260)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ D-wave		$(1.9 \pm 0.5) \times 10^{-4}$		–
$a_1(1260)^+\pi^-$, $a_1^+ \to \sigma\pi^+$		$(6.4 \pm 0.7) \times 10^{-4}$		–
$a_1(1260)^-\pi^+$, $a_1^- \to \rho^0\pi^-$ S-wave		$(2.3 \pm 0.9) \times 10^{-4}$		–
$a_1(1260)^-\pi^+$, $a_1^- \to \sigma\pi^-$		$(6.0 \pm 3.4) \times 10^{-5}$		–
$\pi(1300)^+\pi^-$, $\pi(1300)^+ \to \sigma\pi^+$		$(5.1 \pm 2.7) \times 10^{-4}$		–
$\pi(1300)^-\pi^+$, $\pi(1300)^- \to \sigma\pi^-$		$(2.3 \pm 2.2) \times 10^{-4}$		–
$a_1(1640)^+\pi^-$, $a_1^+ \to \rho^0\pi^+$ D-wave		$(3.2 \pm 1.6) \times 10^{-4}$		–
$a_1(1640)^+\pi^-$, $a_1^+ \to \sigma\pi^+$		$(1.8 \pm 1.4) \times 10^{-4}$		–
$\pi_2(1670)^+\pi^-$, $\pi_2^+ \to f_2(1270)^0\pi^+$, $f_2^0 \to \pi^+\pi^-$		$(2.0 \pm 0.9) \times 10^{-4}$		–
$\pi_2(1670)^+\pi^-$, $\pi_2^+ \to \sigma\pi^+$		$(2.6 \pm 1.0) \times 10^{-4}$		–
$2\rho^0$ total		$(1.85 \pm 0.13) \times 10^{-3}$		518
$2\rho^0$, parallel helicities		$(8.3 \pm 3.2) \times 10^{-5}$		–
$2\rho^0$, perpendicular helicities		$(4.8 \pm 0.6) \times 10^{-4}$		–
$2\rho^0$, longitudinal helicities		$(1.27 \pm 0.10) \times 10^{-3}$		–
$2\rho(770)^0$, S-wave		$(1.8 \pm 1.3) \times 10^{-4}$		–
$2\rho(770)^0$, P-wave		$(5.3 \pm 1.3) \times 10^{-4}$		–
$2\rho(770)^0$, D-wave		$(6.2 \pm 3.0) \times 10^{-4}$		–
Resonant $(\pi^+\pi^-)\pi^+\pi^-$ 3-body total		$(1.51 \pm 0.12) \times 10^{-3}$		–
$\sigma\pi^+\pi^-$		$(6.2 \pm 0.9) \times 10^{-4}$		–
$\sigma\rho(770)^0$		$(5.0 \pm 2.5) \times 10^{-4}$		–
$f_0(980)\pi^+\pi^-$, $f_0 \to \pi^+\pi^-$		$(1.8 \pm 0.5) \times 10^{-4}$		–
$f_2(1270)\pi^+\pi^-$, $f_2 \to \pi^+\pi^-$		$(3.7 \pm 0.6) \times 10^{-4}$		–
$2f_2(1270)$, $f_2 \to \pi^+\pi^-$		$(1.6 \pm 1.8) \times 10^{-4}$		–
$f_0(1370)\sigma$, $f_0 \to \pi^+\pi^-$		$(1.6 \pm 0.5) \times 10^{-3}$		–
$\pi^+\pi^-2\pi^0$		(1.002 ± 0.031) %		882
$4\pi^0$		$(7.6 \pm 1.1) \times 10^{-4}$		883
$\eta\pi^0$	[xx]	$(6.3 \pm 0.6) \times 10^{-4}$	S=1.1	846
$\omega\pi^0$	[xx]	$(1.17 \pm 0.35) \times 10^{-4}$		761

$\omega\eta$		$(1.98 \pm 0.18) \times 10^{-3}$	S=1.1	648
$2\pi^+2\pi^-\pi^0$		$(3.46 \pm 0.21) \times 10^{-3}$		844
$\pi^+\pi^-3\pi^0$		$(1.53 \pm 0.21) \times 10^{-3}$		847
$2\pi^+2\pi^-2\pi^0$		$(4.8 \pm 0.4) \times 10^{-3}$		798
$\eta\pi^+\pi^-$	[xx]	$(1.16 \pm 0.07) \times 10^{-3}$		827
$\omega\pi^+\pi^-$	[xx]	$(1.33 \pm 0.20) \times 10^{-3}$		738
$\omega\pi^0\pi^0$		$< 1.10 \times 10^{-3}$	CL=90%	740
$\eta 2\pi^0$		$(3.8 \pm 1.3) \times 10^{-4}$		829
$\pi^+\pi^-\pi^0\eta$		$(3.23 \pm 0.22) \times 10^{-3}$		797
$\eta 3\pi^0$		$(2.36 \pm 0.28) \times 10^{-3}$		799
$\eta 2\pi^+2\pi^-$		$(6.0 \pm 1.2) \times 10^{-4}$		751
$3\pi^+3\pi^-$		$(4.3 \pm 1.2) \times 10^{-4}$		795
$\eta'(958)\pi^0$		$(9.2 \pm 1.0) \times 10^{-4}$		678
$\eta'(958)\pi^+\pi^-$		$(4.5 \pm 1.7) \times 10^{-4}$		650
2η		$(2.11 \pm 0.19) \times 10^{-3}$	S=2.2	754
$2\eta\pi^0$		$(7.3 \pm 2.2) \times 10^{-4}$		699
$2\eta\pi^+\pi^-$		$(8.5 \pm 1.4) \times 10^{-4}$		623
3η		$< 1.3 \times 10^{-4}$	CL=90%	421
$\eta\eta'(958)$		$(1.01 \pm 0.19) \times 10^{-3}$		537

Hadronic modes with a $K\overline{K}$ pair

K^+K^-	$(4.08 \pm 0.06) \times 10^{-3}$	S=1.6	791
$2K^0_S$	$(1.41 \pm 0.05) \times 10^{-4}$	S=1.1	789
$K^0_S K^-\pi^+$	$(3.3 \pm 0.5) \times 10^{-3}$	S=1.1	739
$\overline{K}^*(892)^0 K^0_S$, $\overline{K}^{*0} \to K^-\pi^+$	$(8.2 \pm 1.6) \times 10^{-5}$		608
$K^*(892)^+ K^-$, $K^{*+} \to K^0_S\pi^+$	$(1.89 \pm 0.30) \times 10^{-3}$		–
$\overline{K}^*(1410)^0 K^0_S$, $\overline{K}^{*0} \to K^-\pi^+$	$(1.3 \pm 1.9) \times 10^{-4}$		–
$K^*(1410)^+ K^-$, $K^{*+} \to K^0_S\pi^+$	$(3.2 \pm 1.9) \times 10^{-4}$		–
$(K^-\pi^+)_{S-wave} K^0_S$	$(6.0 \pm 2.9) \times 10^{-4}$		739
$(K^0_S\pi^+)_{S-wave} K^-$	$(3.9 \pm 1.0) \times 10^{-4}$		739
$a_0(980)^-\pi^+$, $a_0^- \to K^0_S K^-$	$(1.3 \pm 1.4) \times 10^{-4}$		–
$a_0(1450)^-\pi^+$, $a_0^- \to K^0_S K^-$	$(2.5 \pm 2.0) \times 10^{-5}$		–
$a_2(1320)^-\pi^+$, $a_2^- \to K^0_S K^-$	$(5 \pm 5) \times 10^{-6}$		–
$\rho(1450)^-\pi^+$, $\rho^- \to K^0_S K^-$	$(4.6 \pm 2.5) \times 10^{-5}$		–
$K^0_S K^+\pi^-$	$(2.17 \pm 0.34) \times 10^{-3}$	S=1.1	739
$K^*(892)^0 K^0_S$, $K^{*0} \to K^+\pi^-$	$(1.12 \pm 0.21) \times 10^{-4}$		608

$K^*(892)^- K^+$, $K^{*-} \to K^0_S \pi^-$	$(6.2 \pm 1.0) \times 10^{-4}$		–
$K^*(1410)^0 K^0_S$, $K^{*0} \to K^+ \pi^+$	$(5 \pm 8) \times 10^{-5}$		–
$K^*(1410)^- K^+$, $K^{*-} \to K^0_S \pi^-$	$(2.6 \pm 2.0) \times 10^{-4}$		–
$(K^+ \pi^-)_{S-wave} K^0_S$	$(3.7 \pm 1.9) \times 10^{-4}$		739
$(K^0_S \pi^-)_{S-wave} K^+$	$(1.4 \pm 0.6) \times 10^{-4}$		739
$a_0(980)^+ \pi^-$, $a_0^+ \to K^0_S K^+$	$(6 \pm 4) \times 10^{-4}$		–
$a_0(1450)^+ \pi^-$, $a_0^+ \to K^0_S K^+$	$(3.2 \pm 2.5) \times 10^{-5}$		–
$\rho(1700)^+ \pi^-$, $\rho^+ \to K^0_S K^+$	$(1.1 \pm 0.6) \times 10^{-5}$		–
$K^+ K^- \pi^0$	$(3.42 \pm 0.15) \times 10^{-3}$		743
$K^*(892)^+ K^-$, $K^*(892)^+ \to K^+ \pi^0$	$(1.52 \pm 0.08) \times 10^{-3}$		–
$K^*(892)^- K^+$, $K^*(892)^- \to K^- \pi^0$	$(5.4 \pm 0.4) \times 10^{-4}$		–
$(K^+ \pi^0)_{S-wave} K^-$	$(2.43 \pm 0.18) \times 10^{-3}$		743
$(K^- \pi^0)_{S-wave} K^+$	$(1.3 \pm 0.5) \times 10^{-4}$		743
$f_0(980) \pi^0$, $f_0 \to K^+ K^-$	$(3.6 \pm 0.6) \times 10^{-4}$		–
$\phi \pi^0$, $\phi \to K^+ K^-$	$(6.6 \pm 0.4) \times 10^{-4}$		–
$2K^0_S \pi^0$	$< 1.45 \times 10^{-4}$	CL=90%	740
$K^+ K^- \eta$	$(5.9 \pm 1.9) \times 10^{-5}$		514
$\phi(1020) \eta$	$(1.84 \pm 0.12) \times 10^{-4}$		489
$K^+ K^- \eta$ nonresonant	$(9.9 {}^{+0.9}_{-0.8}) \times 10^{-5}$		514
$2K^0_S \eta$	$(1.3 \pm 0.6) \times 10^{-4}$		508
$K^+ K^- \pi^0 \pi^0$	$(6.9 \pm 0.8) \times 10^{-4}$		681
$K^+ K^- \pi^+ \pi^-$	$(2.47 \pm 0.11) \times 10^{-3}$		677
$\phi(\pi^+ \pi^-)_{S-wave}$, $\phi \to K^+ K^-$	$(10 \pm 5) \times 10^{-5}$		614
$(\phi \rho^0)_{S-wave}$, $\phi \to K^+ K^-$	$(6.9 \pm 0.6) \times 10^{-4}$		250
$(\phi \rho^0)_{P-wave}$, $\phi \to K^+ K^-$	$(4.0 \pm 1.9) \times 10^{-5}$		–
$(\phi \rho^0)_{D-wave}$, $\phi \to K^+ K^-$	$(4.2 \pm 1.4) \times 10^{-5}$		–
$(K^*(892)^0 \overline{K}^*(892)^0)_{S-wave}$, $K^{*0} \to K^\pm \pi^\mp$	$(2.24 \pm 0.13) \times 10^{-4}$		–
$(K^*(892)^0 \overline{K}^*(892)^0)_{P-wave}$, $K^* \to K^\pm \pi^\mp$	$(1.20 \pm 0.08) \times 10^{-4}$		–
$(K^*(892)^0 \overline{K}^*(892)^0)_{D-wave}$, $K^* \to K^\pm \pi^\mp$	$(4.7 \pm 0.4) \times 10^{-5}$		–
$K^*(892)^0 (K^- \pi^+)_{S-wave}$ 3-body, $K^{*0} \to K^+ \pi^-$	$(1.4 \pm 0.6) \times 10^{-4}$		–
$K_1(1270)^+ K^-$, $K_1^+ \to K^{*0} \pi^+$	$(1.4 \pm 0.9) \times 10^{-4}$		–

$K_1(1270)^+ K^-$, $K_1^+ \to K^*(1430)^0 \pi^+$, $K^{*0} \to K^+ \pi^-$		$(1.5 \pm 0.5) \times 10^{-4}$		–
$K_1(1270)^+ K^-$, $K_1^+ \to \rho^0 K^+$		$(2.2 \pm 0.6) \times 10^{-4}$		–
$K_1(1270)^+ K^-$, $K_1^+ \to \omega(782) K^+$, $\omega \to \pi^+ \pi^-$		$(1.5 \pm 1.2) \times 10^{-5}$		–
$K_1(1270)^- K^+$, $K_1^- \to \rho^0 K^-$		$(1.3 \pm 0.4) \times 10^{-4}$		–
$K_1(1400)^+ K^-$, $K_1^+ \to K^*(892)^0 \pi^+$, $K^{*0} \to K^+ \pi^-$		$(4.6 \pm 0.4) \times 10^{-4}$		–
$K^*(1410)^- K^+$, $K^{*-} \to \overline{K}^{*0} \pi^-$		$(7.0 \pm 1.1) \times 10^{-5}$		–
$K_1(1680)^+ K^-$, $K_1^+ \to K^{*0} \pi^+$, $K^{*0} \to K^+ \pi^-$		$(8.9 \pm 3.2) \times 10^{-5}$		–
$K^+ K^- \pi^+ \pi^-$ non-resonant		$(2.7 \pm 0.6) \times 10^{-4}$		–
$2K_S^0 \pi^+ \pi^-$		$(5.3 \pm 0.9) \times 10^{-4}$		673
$K_S^0 K^- \pi^+ \pi^0$		$(1.32 \pm 0.16) \times 10^{-3}$		677
$K_S^0 K^+ \pi^- \pi^0$		$(6.5 \pm 0.7) \times 10^{-4}$		677
$K_S^0 K^- 2\pi^+ \pi^-$		$< 1.4 \times 10^{-4}$	CL=90%	595
$K^+ K^- \pi^+ \pi^- \pi^0$		$(3.1 \pm 2.0) \times 10^{-3}$		600

Other $K\overline{K}X$ modes. They include all decay modes of the ϕ, η, and ω.

$\phi\pi^0$		$(1.17 \pm 0.04) \times 10^{-3}$		645
$\phi\eta$		$(1.8 \pm 0.5) \times 10^{-4}$		489
$\phi\omega$		$(6.5 \pm 1.0) \times 10^{-4}$		238

Radiative modes

$\rho^0\gamma$		$(1.82 \pm 0.32) \times 10^{-5}$		771
$\omega\gamma$		$< 2.4 \times 10^{-4}$	CL=90%	768
$\phi\gamma$		$(2.81 \pm 0.19) \times 10^{-5}$		654
$\overline{K}^*(892)^0\gamma$		$(4.1 \pm 0.7) \times 10^{-4}$		719

Doubly Cabibbo suppressed (*DC*) modes or $\Delta C = 2$ forbidden via mixing (*C2M*) modes

$K^+ \ell^- \overline{\nu}_\ell$ via $\overline{D}^0$	[yy]	$< 2.2 \times 10^{-5}$	CL=90%	–
K^+ or $K^*(892)^+ e^- \overline{\nu}_e$ via $\overline{D}^0$		$< 6 \times 10^{-5}$	CL=90%	–
$K^+ \pi^-$	*DC*	$(1.50 \pm 0.07) \times 10^{-4}$	S=3.0	861
$K^+ \pi^-$ via DCS		$(1.363 \pm 0.025) \times 10^{-4}$		–
$K^+ \pi^-$ via $\overline{D}^0$		$< 1.6 \times 10^{-5}$	CL=95%	861
$K_S^0 \pi^+ \pi^-$ in $D^0 \to \overline{D}^0$		$< 1.8 \times 10^{-4}$	CL=95%	–
$K^*(892)^+ \pi^-$, $K^{*+} \to K_S^0 \pi^+$	*DC*	$(1.13 {}^{+0.60}_{-0.34}) \times 10^{-4}$		711

$K_0^*(1430)^+\pi^-$, $K_0^{*+} \to K_S^0\pi^+$	DC	$<$	1.4	$\times 10^{-5}$		–
$K_2^*(1430)^+\pi^-$, $K_2^{*+} \to K_S^0\pi^+$	DC	$<$	3.4	$\times 10^{-5}$		–
$K^+\pi^-\pi^0$	DC		(3.06 $\pm$ 0.16)	$\times 10^{-4}$	S=1.4	844
$K^+\pi^-\pi^0$ via $\overline{D}^0$			(7.6 $^{+0.5}_{-0.6}$)	$\times 10^{-4}$		–
$K^+\pi^-2\pi^0$		$<$	3.6	$\times 10^{-4}$	CL=90%	815
$K^+\pi^+2\pi^-$ via DCS			(2.49 $\pm$ 0.07)	$\times 10^{-4}$		–
$K^+\pi^+2\pi^-$	DC		(2.65 $\pm$ 0.06)	$\times 10^{-4}$		813
$K^+\pi^+2\pi^-$ via $\overline{D}^0$			(7.9 $\pm$ 3.0)	$\times 10^{-6}$		812
μ^- anything via $\overline{D}^0$		$<$	4	$\times 10^{-4}$	CL=90%	–

$\Delta C = 1$ weak neutral current (*C1*) modes, Lepton Family number (*LF*) violating modes, Lepton (*L*) or Baryon (*B*) number violating modes

$\gamma\gamma$	C1	$<$	8.5	$\times 10^{-7}$	CL=90%	932
e^+e^-	C1	$<$	7.9	$\times 10^{-8}$	CL=90%	932
$\mu^+\mu^-$	C1	$<$	6.2	$\times 10^{-9}$	CL=90%	926
$\pi^0 e^+e^-$	C1	$<$	4	$\times 10^{-6}$	CL=90%	928
$\pi^0\mu^+\mu^-$	C1	$<$	1.8	$\times 10^{-4}$	CL=90%	915
$\pi^0\nu\overline{\nu}$		$<$	2.1	$\times 10^{-4}$	CL=90%	928
ηe^+e^-	C1	$<$	3	$\times 10^{-6}$	CL=90%	852
$\eta\mu^+\mu^-$	C1	$<$	5.3	$\times 10^{-4}$	CL=90%	838
$\pi^+\pi^-e^+e^-$	C1	$<$	7	$\times 10^{-6}$	CL=90%	922
$\rho^0 e^+e^-$	C1	$<$	1.0	$\times 10^{-4}$	CL=90%	771
$\pi^+\pi^-\mu^+\mu^-$	C1		(9.6 $\pm$ 1.2)	$\times 10^{-7}$		894
$\pi^+\pi^-\mu^+\mu^-$ (non-res)		$<$	5.5	$\times 10^{-7}$	CL=90%	–
$\rho^0\mu^+\mu^-$	C1	$<$	2.2	$\times 10^{-5}$	CL=90%	754
ωe^+e^-	C1	$<$	6	$\times 10^{-6}$	CL=90%	768
$\omega\mu^+\mu^-$	C1	$<$	8.3	$\times 10^{-4}$	CL=90%	751
$K^-K^+e^+e^-$	C1	$<$	1.1	$\times 10^{-5}$	CL=90%	791
ϕe^+e^-	C1	$<$	5.2	$\times 10^{-5}$	CL=90%	654
$K^-K^+\mu^+\mu^-$	C1		(1.54 $\pm$ 0.32)	$\times 10^{-7}$		710
$K^-K^+\mu^+\mu^-$ (non-res)		$<$	3.3	$\times 10^{-5}$	CL=90%	–
$\phi\mu^+\mu^-$	C1	$<$	3.1	$\times 10^{-5}$	CL=90%	631
$\overline{K}^0 e^+e^-$		[oo] $<$	2.4	$\times 10^{-5}$	CL=90%	866
$\overline{K}^0\mu^+\mu^-$		[oo] $<$	2.6	$\times 10^{-4}$	CL=90%	852
$K^-\pi^+e^+e^-$, $675 < m_{ee} < 875$ MeV			(4.0 $\pm$ 0.5)	$\times 10^{-6}$		–
$K^-\pi^+e^+e^-$, $1.005 < m_{ee} < 1.035$ GeV		$<$	5	$\times 10^{-7}$	CL=90%	–
$\overline{K}^*(892)^0 e^+e^-$		[oo] $<$	4.7	$\times 10^{-5}$	CL=90%	719
$K^-\pi^+\mu^+\mu^-$	C1	$<$	3.59	$\times 10^{-4}$	CL=90%	829

$K^- \pi^+ \mu^+ \mu^-$, 675 < $m_{\mu\mu}$ < 875 MeV			(4.2 ± 0.4)	$\times 10^{-6}$		–
$\overline{K}^*(892)^0 \mu^+ \mu^-$		[oo] <	2.4	$\times 10^{-5}$	CL=90%	700
$\pi^+ \pi^- \pi^0 \mu^+ \mu^-$	C1	<	8.1	$\times 10^{-4}$	CL=90%	863
$\mu^\pm e^\mp$	LF	[z] <	1.3	$\times 10^{-8}$	CL=90%	929
$\pi^0 e^\pm \mu^\mp$	LF	[z] <	8.0	$\times 10^{-7}$	CL=90%	924
$\eta e^\pm \mu^\mp$	LF	[z] <	2.25	$\times 10^{-6}$	CL=90%	848
$\pi^+ \pi^- e^\pm \mu^\mp$	LF	[z] <	1.71	$\times 10^{-6}$	CL=90%	911
$\rho^0 e^\pm \mu^\mp$	LF	[z] <	5.0	$\times 10^{-7}$	CL=90%	767
$\omega e^\pm \mu^\mp$	LF	[z] <	1.71	$\times 10^{-6}$	CL=90%	764
$K^- K^+ e^\pm \mu^\mp$	LF	[z] <	1.00	$\times 10^{-6}$	CL=90%	754
$\phi e^\pm \mu^\mp$	LF	[z] <	5.1	$\times 10^{-7}$	CL=90%	648
$\overline{K}^0 e^\pm \mu^\mp$	LF	[z] <	1.74	$\times 10^{-6}$	CL=90%	863
$K^- \pi^+ e^\pm \mu^\mp$	LF	[z] <	1.90	$\times 10^{-6}$	CL=90%	848
$\overline{K}^*(892)^0 e^\pm \mu^\mp$	LF	[z] <	1.25	$\times 10^{-6}$	CL=90%	714
$2\pi^- 2e^+$	L	<	9.1	$\times 10^{-7}$	CL=90%	922
$2\pi^- 2\mu^+$	L	<	1.52	$\times 10^{-6}$	CL=90%	894
$K^- \pi^- 2e^+$	L	<	5.0	$\times 10^{-7}$	CL=90%	861
$K^- \pi^- 2\mu^+$	L	<	5.3	$\times 10^{-7}$	CL=90%	829
$2K^- 2e^+$	L	<	3.4	$\times 10^{-7}$	CL=90%	791
$2K^- 2\mu^+$	L	<	1.0	$\times 10^{-7}$	CL=90%	710
$\pi^- \pi^- e^+ \mu^+$	L	<	3.06	$\times 10^{-6}$	CL=90%	911
$K^- \pi^- e^+ \mu^+$	L	<	2.10	$\times 10^{-6}$	CL=90%	848
$2K^- e^+ \mu^+$	L	<	5.8	$\times 10^{-7}$	CL=90%	754
$p e^-$	L,B	<	2.2	$\times 10^{-6}$	CL=90%	696
$\overline{p} e^+$	L,B	<	1.2	$\times 10^{-6}$	CL=90%	696

$D^*(2007)^0$

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

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

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

$D^*(2007)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 \pi^0$	(64.7 ±0.9) %	43
$D^0 \gamma$	(35.3 ±0.9) %	137
$D^0 e^+ e^-$	(3.91±0.33) $\times 10^{-3}$	137

$D^*(2010)^{\pm}$

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

Mass $m = 2010.26 \pm 0.05$ MeV
$m_{D^*(2010)^+} - m_{D^+} = 140.603 \pm 0.015$ MeV
$m_{D^*(2010)^+} - m_{D^0} = 145.4258 \pm 0.0017$ MeV
Full width $\Gamma = 83.4 \pm 1.8$ keV

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

$D^*(2010)^{\pm}$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0\pi^+$	(67.7 ± 0.5) %	39
$D^+\pi^0$	(30.7 ± 0.5) %	38
$D^+\gamma$	$(\ 1.6\pm0.4)$ %	136

$D_0^*(2300)$

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

was $D_0^*(2400)$

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

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

$D_1(2420)$

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

Mass $m = 2422.1 \pm 0.6$ MeV (S = 1.7)
$m_{D_1(2420)^0} - m_{D^{*+}} = 411.8 \pm 0.6$ MeV (S = 1.7)
$m_{D_1(2420)^{\pm}} - m_{D_1(2420)^0} = 4 \pm 4$ MeV
Full width $\Gamma = 31.3 \pm 1.9$ MeV (S = 2.8)

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

$D_1(2420)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^*(2007)^0\pi$	seen	359

$D_1(2430)^0$

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

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

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

$D_2^*(2460)$

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

Mass $m = 2461.1^{+0.7}_{-0.8}$ MeV (S = 6.2)
$m_{D_2^*(2460)^0} - m_{D^+} = 591.5^{+0.7}_{-0.8}$ MeV (S = 5.9)
$m_{D_2^*(2460)^0} - m_{D^{*+}} = 450.9^{+0.7}_{-0.8}$ MeV (S = 5.9)
$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0} = 2.4 \pm 1.7$ MeV
Full width $\Gamma = 47.3 \pm 0.8$ MeV (S = 1.5)

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

$D_2^*(2460)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D\pi^-$	seen	509
$D^*(2010)\pi^-$	seen	389

$D_3^*(2750)$

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

Mass $m = 2763.1 \pm 3.2$ MeV (S = 2.1)
Full width $\Gamma = 66 \pm 5$ MeV

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

CHARMED, STRANGE MESONS ($C = \pm1$, $S = \pm1$) (including possibly non-$q\overline{q}$ states)

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

$D_s^\pm$

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

Mass $m = 1968.35 \pm 0.07$ MeV
$m_{D_s^\pm} - m_{D^\pm} = 98.69 \pm 0.05$ MeV
Mean life $\tau = (504 \pm 4) \times 10^{-15}$ s (S = 1.2)
$c\tau = 151.2\ \mu$m

CP-violating decay-rate asymmetries

$A_{CP}(\mu^\pm\nu) = (-0.2 \pm 2.5)\%$
$A_{CP}(\tau^\pm\nu)$ in $D_s^+ \to \tau^+\nu_\tau$, $D_s^- \to \tau^-\overline{\nu}_\tau = (3 \pm 5)\%$
$A_{CP}(K^\pm K_S^0) = (0.09 \pm 0.26)\%$
$A_{CP}(K^\pm K_L^0)$ in $D_s^\pm \to K^\pm K_L^0 = (-1.1 \pm 2.7) \times 10^{-2}$
$A_{CP}(K^+K^-\pi^\pm) = (-0.5 \pm 0.9)\%$
$A_{CP}(\phi\pi^\pm) = (-0.38 \pm 0.27)\%$
$A_{CP}(K^\pm K_S^0\pi^0) = (-2 \pm 6)\%$
$A_{CP}(2K_S^0\pi^\pm) = (3 \pm 5)\%$
$A_{CP}(K^+K^-\pi^\pm\pi^0) = (0.0 \pm 3.0)\%$
$A_{CP}(K^\pm K_S^0\pi^+\pi^-) = (-6 \pm 5)\%$
$A_{CP}(K_S^0K^\mp 2\pi^\pm) = (4.1 \pm 2.8)\%$
$A_{CP}(\pi^+\pi^-\pi^\pm) = (-0.7 \pm 3.1)\%$
$A_{CP}(\pi^\pm\eta) = (0.3 \pm 0.4)\%$
$A_{CP}(\pi^\pm\eta') = (-0.9 \pm 0.5)\%$
$A_{CP}(\eta\pi^\pm\pi^0) = (-1 \pm 4)\%$
$A_{CP}(\eta'\pi^\pm\pi^0) = (0 \pm 8)\%$
$A_{CP}(K^\pm\pi^0) = (2 \pm 4)\%$ (S = 1.2)
$A_{CP}(\overline{K}^0/K^0\pi^\pm) = (0.4 \pm 0.5)\%$
$A_{CP}(K_S^0\pi^\pm) = (0.20 \pm 0.18)\%$
$A_{CP}(K^\pm\pi^+\pi^-) = (3.7 \pm 2.7)\%$
$A_{CP}(K_S^0\pi^+\pi^0)$ in $D_s^\pm \to K_S^0\pi^+\pi^0 = (3 \pm 6)\%$
$A_{CP}(K^\pm\pi^+\pi^-\pi^0)$ in $D_s^\pm \to K^\pm\pi^+\pi^-\pi^0 = (7 \pm 5) \times 10^{-2}$
$A_{CP}(K^\pm\eta) = (1.8 \pm 1.9)\%$
$A_{CP}(K^\pm\eta'(958)) = (6 \pm 19)\%$

CP violating asymmetries of *P*-odd (*T*-odd) moments

$A_T(K^0_S K^\pm \pi^+ \pi^-) = (-14 \pm 8) \times 10^{-3}$ [hh]

$D^+_s \to \phi \ell^+ \nu_\ell$ form factors

$r_2 = 0.84 \pm 0.11 \quad (S = 2.4)$

$r_v = 1.80 \pm 0.08$

$\Gamma_L/\Gamma_T = 0.72 \pm 0.18$

$f_+(0)\,|V_{cs}|$ in $D^+_s \to \eta e^+ \nu_e = 0.446 \pm 0.007$

$f_+(0)\,|V_{cs}|$ in $D^+_s \to \eta' e^+ \nu_e = 0.48 \pm 0.05$

$f_+(0)|V_{cd}|$ in $D^+_s \to K^0 e^+ \nu_e = 0.162 \pm 0.019$

$r_v \equiv V(0)/A_1(0)$ in $D^+_s \to K^*(892)^0 e^+ \nu_e = 1.7 \pm 0.4$

$r_2 \equiv A_2(0)/A_1(0)$ in $D^+_s \to K^*(892)^0 e^+ \nu_e = 0.77 \pm 0.29$

$f_{D^+_s}\,|V_{cs}|$ in $D^+_s \to \mu^+ \nu_\mu = 243 \pm 5$ MeV

$f_{D^+_s}\,|V_{cs}|$ in $D^+_s \to \tau^+ \nu_\tau = 245.3 \pm 3.0$ MeV

Unless otherwise noted, the branching fractions for modes with a resonance in the final state include all the decay modes of the resonance. D^-_s modes are charge conjugates of the modes below.

D^+_s DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Inclusive modes				
e^+ semileptonic	[zz]	$(6.33 \pm 0.15)\,\%$		–
π^+ anything		$(119.3 \pm 1.4)\,\%$		–
π^- anything		$(43.2 \pm 0.9)\,\%$		–
π^0 anything		$(123 \pm 7)\,\%$		–
K^- anything		$(18.7 \pm 0.5)\,\%$		–
K^+ anything		$(28.9 \pm 0.7)\,\%$		–
K^0_S anything		$(19.0 \pm 1.1)\,\%$		–
η anything	[aaa]	$(29.9 \pm 2.8)\,\%$		–
ω anything		$(6.1 \pm 1.4)\,\%$		–
η' anything	[bbb]	$(10.3 \pm 1.4)\,\%$	S=1.1	–
$f_0(980)$ anything, $f_0 \to \pi^+\pi^-$		$< 1.3\,\%$	CL=90%	–
ϕ anything		$(15.7 \pm 1.0)\,\%$		–
K^+K^- anything		$(15.8 \pm 0.7)\,\%$		–
$K^0_S K^+$ anything		$(5.8 \pm 0.5)\,\%$		–
$K^0_S K^-$ anything		$(1.9 \pm 0.4)\,\%$		–
$2K^0_S$ anything		$(1.70 \pm 0.32)\,\%$		–
$2K^+$ anything		$< 2.6 \times 10^{-3}$	CL=90%	–
$2K^-$ anything		$< 6 \times 10^{-4}$	CL=90%	–

Leptonic and semileptonic modes

$e^+ \nu_e$		$<$ 8.3 $\times 10^{-5}$	CL=90%		984
$\mu^+ \nu_\mu$		(5.43 $\pm$0.15) $\times 10^{-3}$			981
$\tau^+ \nu_\tau$		(5.32 $\pm$0.11) %			182
$\gamma e^+ \nu_e$		$<$ 1.3 $\times 10^{-4}$	CL=90%		984
$K^+ K^- e^+ \nu_e$		—			851
$K^0_S K^0_S e^+ \nu_e$		$<$ 3.8 $\times 10^{-4}$	CL=90%		849
$\phi e^+ \nu_e$	[ccc]	(2.39 $\pm$0.16) %		S=1.3	720
$\phi \mu^+ \nu_\mu$		(1.9 $\pm$0.5) %			715
$\eta e^+ \nu_e$ + $\eta'(958) e^+ \nu_e$	[ccc]	(3.03 $\pm$0.24) %			–
$\eta e^+ \nu_e$	[ccc]	(2.32 $\pm$0.08) %			908
$\eta'(958) e^+ \nu_e$	[ccc]	(8.0 $\pm$0.7) $\times 10^{-3}$			751
$\eta \mu^+ \nu_\mu$		(2.4 $\pm$0.5) %			905
$\eta'(958) \mu^+ \nu_\mu$		(1.1 $\pm$0.5) %			747
$\omega e^+ \nu_e$	[ddd]	$<$ 2.0 $\times 10^{-3}$	CL=90%		829
$K^0 e^+ \nu_e$		(3.4 $\pm$0.4) $\times 10^{-3}$			921
$K^*(892)^0 e^+ \nu_e$	[ccc]	(2.15 $\pm$0.28) $\times 10^{-3}$		S=1.1	782
$f_0(500) e^+ \nu_e$, $f_0 \rightarrow \pi^0 \pi^0$		$<$ 7.3 $\times 10^{-4}$	CL=90%		–
$f_0(980) e^+ \nu_e$, $f_0 \rightarrow \pi^0 \pi^0$		(7.9 $\pm$1.5) $\times 10^{-4}$			–
$a_0(980)^0 e^+ \nu_e$, $a_0(980)^0 \rightarrow \pi^0 \eta$		$<$ 1.2 $\times 10^{-4}$	CL=90%		–
$\pi^0 e^+ \nu_e$		$<$ 6.4 $\times 10^{-5}$	CL=90%		980

Hadronic modes with a $K\overline{K}$ pair

$K^+ K^0_S$		(1.450$\pm$0.035) %		850
$K^+ K^0_L$		(1.49 $\pm$0.06) %		850
$K^+ \overline{K}^0$		(2.95 $\pm$0.14) %		850
$K^+ K^- \pi^+$	[ii]	(5.37 $\pm$0.10) %	S=1.1	805
$\phi \pi^+$	[ccc,eee]	(4.5 $\pm$0.4) %		712
$\phi \pi^+$, $\phi \rightarrow K^+ K^-$	[eee]	(2.21 $\pm$0.06) %		712
$K^+ \overline{K}^*(892)^0$		(12.7 $^{+4.0}_{-3.1}$) %		685
$K^+ \overline{K}^*(892)^0$, $\overline{K}^{*0} \rightarrow K^- \pi^+$		(2.58 $\pm$0.06) %		416
$K^+ \overline{K}^*(892)^0$, $\overline{K}^{*0} \rightarrow K^0_S \pi^0$		(4.8 $\pm$0.5) $\times 10^{-3}$		–
$f_0(980) \pi^+$, $f_0 \rightarrow K^+ K^-$		(1.11 $\pm$0.19) %		732
$f_0(1370) \pi^+$, $f_0 \rightarrow K^+ K^-$		(7.1 $\pm$2.9) $\times 10^{-4}$		–
$f_0(1710) \pi^+$, $f_0 \rightarrow K^+ K^-$		(6.7 $\pm$2.8) $\times 10^{-4}$		198
$a_0(980)^+ \pi^0$, $a_0^+ \rightarrow K^+ K^0_S$		(1.1 $\pm$0.4) $\times 10^{-3}$		–
$a_0(1710)^+ \pi^0$, $a_0^+ \rightarrow K^+ K^0_S$		(3.5 $\pm$0.6) $\times 10^{-3}$		–
$K^+ \overline{K}^*_0(1430)^0$, $\overline{K}^*_0 \rightarrow K^- \pi^+$		(1.76 $\pm$0.25) $\times 10^{-3}$		218

$K^+ \overline{K}^*(1410)^0$, $\overline{K}^*_0 \to K^0_S \pi^0$		$(\ 8.8\ \pm 2.8\ ) \times 10^{-4}$		–
$K^+ K^0_S \pi^0$		$(\ 1.47\ \pm 0.07\ )$ %		805
$2K^0_S \pi^+$		$(\ 7.1\ \pm 0.4\ ) \times 10^{-3}$	S=1.3	802
$f_0(980)\pi^+$, $f_0 \to K^0_S K^0_S$		$< 1.8 \times 10^{-4}$	CL=90%	–
$f_0(1710)\pi^+$, $f_0 \to K^0_S K^0_S$		$(\ 3.3\ \pm 0.4\ ) \times 10^{-3}$		–
$K^0 \overline{K}^0 \pi^+$		—		802
$K^*(892)^+ \overline{K}^0$	[ccc]	$(\ 5.4\ \pm 1.2\ )$ %		683
$K^*(892)^+ K^0_S$		$(\ 3.09\ \pm 0.33\ ) \times 10^{-3}$		683
$K^*(892)^+ K^0_S$, $K^{*+} \to K^+ \pi^0$		$(\ 2.04\ \pm 0.33\ ) \times 10^{-3}$		–
$K^+ K^- \pi^+ \pi^0$		$(\ 5.50\ \pm 0.24\ )$ %	S=1.3	748
$\phi \rho^+$	[ccc]	$(\ 5.59\ \pm 0.34\ )$ %		401
$\overline{K}_1(1270)^0 K^+$, $\overline{K}_1(1270)^0 \to K^- \rho^+$		$(\ 5.7\ \pm 0.6\ ) \times 10^{-3}$		–
$\overline{K}_1(1270)^0 K^+$, $\overline{K}_1(1270)^0 \to K^*(892)\pi$		$(\ 1.31\ \pm 0.25\ )$ %		–
$\overline{K}_1(1400)^0 K^+$, $\overline{K}_1(1400)^0 \to K^*(892)\pi$		$(\ 2.0\ \pm 0.4\ )$ %		–
$a_0(980)^0 \rho^+$, $a_0(980)^0 \to K^+ K^-$		$(\ 1.9\ \pm 0.4\ ) \times 10^{-3}$		–
$f_1(1420)^0 \pi^+$, $f_1(1420)^0 \to K^*(892)^{\mp} K^{\pm}$		$(\ 3.9\ \pm 0.7\ ) \times 10^{-3}$		–
$f_1(1420)^0 \pi^+$, $f_1(1420)^0 \to a_0(980)^0 \pi^0$, $a_0(980)^0 \to K^+ K^-$		$(\ 4.0\ \pm 1.4\ ) \times 10^{-4}$		–
$\eta(1475)\pi^+$, $\eta(1475) \to a_0(980)^0 \pi^0$, $a_0(980)^0 \to K^+ K^-$		$(\ 7.0\ \pm 2.8\ ) \times 10^{-4}$		–
$K^0_S K^- 2\pi^+$		$(\ 1.53\ \pm 0.08\ )$ %	S=1.5	744
$K^*(892)^+ \overline{K}^*(892)^0$	[ccc]	$(\ 5.64\ \pm 0.35\ )$ %		417
$\eta(1475) K^0_S$, $\eta \to K^*(892)^0 \pi^+$, $K^{*0} \to K^- \pi^+$		$(\ 3.4\ \pm 1.0\ ) \times 10^{-4}$		–
$\eta(1475)\pi^+$, $\eta \to \overline{K}^*(892)^+ K^-$, $\overline{K}^{*+} \to K^0_S \pi^+$		$(\ 3.4\ \pm 1.0\ ) \times 10^{-4}$		–
$\eta(1475)\pi^+$, $\eta \to a_0(980)^- \pi^+$, $a_0^- \to K^0_S K^-$		$(\ 1.7\ \pm 0.9\ ) \times 10^{-3}$		–
$f_1(1285)\pi^+$, $f_1 \to a_0(980)^- \pi^+$, $a_0^- \to K^0_S K^-$		$(\ 3.4\ \pm 0.8\ ) \times 10^{-4}$		–

$K^+ K^0_S \pi^+ \pi^-$		$(9.5 \pm 0.8) \times 10^{-3}$	S=1.1	744
$K^+ K^- 2\pi^+ \pi^-$		$(6.6 \pm 0.6) \times 10^{-3}$		673
$\phi 2\pi^+ \pi^-$	[ccc]	$(1.21 \pm 0.16) \%$		640
$\phi \rho^0 \pi^+$, $\phi \to K^+ K^-$		$(4.9 \pm 0.7) \times 10^{-3}$		181
$\phi a_1(1260)^+$, $\phi \to K^+ K^-$, $a_1^+ \to \rho^0 \pi^+$		$(7.4 \pm 1.2) \times 10^{-3}$		†
$\phi 2\pi^+ \pi^-$ non-ρ, $\phi \to K^+ K^-$		$(1.4 \pm 0.5) \times 10^{-3}$		–
$K^+ K^- \rho^0 \pi^+$ non-ϕ		$< 2.0 \times 10^{-4}$	CL=90%	249
$K^+ K^- 2\pi^+ \pi^-$ nonresonant		$(1.0 \pm 0.4) \times 10^{-3}$		673
$2K^0_S 2\pi^+ \pi^-$		$(7.8 \pm 3.3) \times 10^{-4}$		669

Hadronic modes without K's

$\pi^+ \pi^0$		$< 1.2 \times 10^{-4}$	CL=90%	975
$2\pi^+ \pi^-$		$(1.08 \pm 0.04) \%$		959
$\rho^0 \pi^+$		$(1.2 \pm 0.6) \times 10^{-4}$		825
$\pi^+ (\pi^+ \pi^-)_{S-\text{wave}}$	[fff]	$(9.0 \pm 0.4) \times 10^{-3}$		959
$f_2(1270) \pi^+$, $f_2 \to \pi^+ \pi^-$		$(1.11 \pm 0.12) \times 10^{-3}$		559
$\rho(1450)^0 \pi^+$, $\rho^0 \to \pi^+ \pi^-$		$(1.6 \pm 0.7) \times 10^{-4}$		421
$\pi^+ 2\pi^0$		$(5.2 \pm 0.5) \times 10^{-3}$	S=1.1	961
$f_0(980) \pi^+$, $f_0 \to \pi^0 \pi^0$		$(2.9 \pm 0.6) \times 10^{-3}$		–
$f_0(1370) \pi^+$, $f_0 \to \pi^0 \pi^0$		$(1.3 \pm 0.6) \times 10^{-3}$		–
$f_2(1270) \pi^+$, $f_2 \to \pi^0 \pi^0$		$(5.0 \pm 3.5) \times 10^{-4}$		–
$2\pi^+ \pi^- \pi^0$		—		935
$\eta \pi^+$	[ccc]	$(1.67 \pm 0.09) \%$	S=1.1	902
$\omega \pi^+$	[ccc]	$(1.92 \pm 0.30) \times 10^{-3}$		822
$3\pi^+ 2\pi^-$		$(7.8 \pm 0.8) \times 10^{-3}$		899
$2\pi^+ \pi^- 2\pi^0$		—		902
$\eta \rho^+$	[ccc]	$(8.9 \pm 0.8) \%$		724
$\eta \pi^+ \pi^0$		$(9.5 \pm 0.5) \%$		885
$\eta (\pi^+ \pi^0)_{P-wave}$		$(5.1 \pm 3.1) \times 10^{-3}$		885
$a_0(980)^{+0} \pi^{0+}$, $a_0(980)^{+0} \to \eta \pi^{+0}$		$(2.2 \pm 0.4) \%$		–
$\omega \pi^+ \pi^0$	[ccc]	$(2.8 \pm 0.7) \%$		802
$2\pi^+ \pi^- \eta$		$(3.12 \pm 0.16) \%$		855
$a_1(1260)^+ \eta$, $a_1^+ \to \rho(770)^0 \pi^+$, $\rho^0 \to \pi^+ \pi^-$		$(1.73 \pm 0.16) \%$		–
$a_1(1260)^+ \eta$, $a_1^+ \to f_0(500) \pi^+$, $f_0 \to \pi^+ \pi^-$		$(2.5 \pm 0.9) \times 10^{-3}$		–
$a_0(980)^+ \rho(770)^0$, $a_0^+ \to \eta \pi^+$		$(2.1 \pm 0.9) \times 10^{-3}$		–

$\eta(1405)\pi^+$, $\eta(1405) \to a_0(980)^-\pi^+$, $a_0^- \to \eta\pi^-$		$(2.2 \pm 0.7) \times 10^{-4}$			–
$\eta(1405)\pi^+$, $\eta(1405) \to a_0(980)^+\pi^-$, $a_0^+ \to \eta\pi^+$		$(2.2 \pm 0.7) \times 10^{-4}$			–
$f_1(1420)\pi^+$, $f_1 \to a_0(980)^-\pi^+$, $a_0^- \to \eta\pi^-$		$(5.9 \pm 1.8) \times 10^{-4}$			–
$f_1(1420)\pi^+$, $f_1 \to a_0(980)^+\pi^-$, $a_0^+ \to \eta\pi^+$		$(5.3 \pm 1.8) \times 10^{-4}$			–
$3\pi^+ 2\pi^- \pi^0$		(4.9 ± 3.2) %			856
$\omega 2\pi^+ \pi^-$	[ccc]	(1.6 ± 0.5) %			766
$\eta'(958)\pi^+$	[bbb,ccc]	(3.94 ± 0.25) %			743
$3\pi^+ 2\pi^- 2\pi^0$		—			803
$\omega\eta\pi^+$	[ccc]	< 2.13	%	CL=90%	654
$\eta'(958)\rho^+$	[bbb,ccc]	(5.8 ± 1.5) %			465
$\eta'(958)\pi^+\pi^0$		(6.08 ± 0.29) %			720
$\eta'(958)\pi^+\pi^0$ nonresonant		< 5.1	%	CL=90%	720

Modes with one or three K's

$K^+\pi^0$		$(7.4 \pm 0.5) \times 10^{-4}$			917
$K^0_S\pi^+$		$(1.09 \pm 0.05) \times 10^{-3}$			916
$K^+\eta$	[ccc]	$(1.73 \pm 0.08) \times 10^{-3}$			835
$K^+\omega$	[ccc]	$(9.9 \pm 1.5) \times 10^{-4}$			741
$K^+\eta'(958)$	[ccc]	$(2.64 \pm 0.24) \times 10^{-3}$			646
$K^+\pi^+\pi^-$		$(6.20 \pm 0.19) \times 10^{-3}$			900
$K^+\rho^0$		$(2.17 \pm 0.25) \times 10^{-3}$			745
$K^+\rho(1450)^0$, $\rho^0 \to \pi^+\pi^-$		$(7.2 \pm 1.7) \times 10^{-4}$			–
$K^+ f_0(500)$, $f_0 \to \pi^+\pi^-$		$(4.5 \pm 3.0) \times 10^{-4}$			–
$K^+ f_0(980)$, $f_0 \to \pi^+\pi^-$		$(2.8 \pm 1.1) \times 10^{-4}$			–
$K^+ f_0(1370)$, $f_0 \to \pi^+\pi^-$		$(1.2 \pm 0.6) \times 10^{-3}$			–
$K^*(892)^0\pi^+$, $K^{*0} \to K^+\pi^-$		$(1.67 \pm 0.26) \times 10^{-3}$			775
$K^*(1410)^0\pi^+$, $K^{*0} \to K^+\pi^-$		$(6 \pm 4) \times 10^{-4}$			–
$K^*(1430)^0\pi^+$, $K^{*0} \to K^+\pi^-$		$(9.3 \pm 3.1) \times 10^{-4}$			–
$K^+\pi^+\pi^-$ nonresonant		$(9.9 \pm 3.2) \times 10^{-4}$			900
$K^0\pi^+\pi^0$		(1.08 ± 0.06) %			899
$K^0_S 2\pi^+\pi^-$		$(2.8 \pm 1.0) \times 10^{-3}$			870
$K^+\pi^+\pi^-\pi^0$		$(9.7 \pm 0.6) \times 10^{-3}$			873
$K^*(892)^0\rho^+$, $K^{*0} \to K^+\pi^-$		$(3.9 \pm 0.4) \times 10^{-3}$			–

$K^*(892)^+ \rho^0$, $K^{*+} \to K^+ \pi^0$		$(4.2 \pm 1.2) \times 10^{-4}$		–
$K_1(1270)^0 \pi^+$, $K_1^0 \to K^+ \rho^-$		$(3.9 \pm 1.3) \times 10^{-4}$		†
$K_1(1400)^0 \pi^+$, $K_1^0 \to K^*(890)^+ \pi^-$, $K^{*+} \to K^+ \pi^0$		$(5.4 \pm 0.9) \times 10^{-4}$		–
$K_1(1400)^0 \pi^+$, $K_1^0 \to K^*(890)^0 \pi^0$, $K^{*0} \to K^+ \pi^-$		$(5.9 \pm 1.0) \times 10^{-4}$		–
$K^+ a_1(1260)^0$, $a_1 \to \rho^+ \pi^-$		$(1.8 \pm 1.1) \times 10^{-4}$		–
$K^+ a_1(1260)^0$, $a_1 \to \rho^- \pi^+$		$(1.8 \pm 1.1) \times 10^{-4}$		–
$K^+ \pi^+ \pi^- \pi^0$ nonresonant		$(9.2 \pm 2.4) \times 10^{-4}$		873
$(K^+ \pi^0)_{P-wave} \rho^0$		$(1.01 \pm 0.21) \times 10^{-3}$		688
$K^+ \omega \pi^0$	[ccc]	$< 8.2 \times 10^{-3}$	CL=90%	684
$K^+ \omega \pi^+ \pi^-$	[ccc]	$< 5.4 \times 10^{-3}$	CL=90%	603
$K^+ \omega \eta$	[ccc]	$< 7.9 \times 10^{-3}$	CL=90%	366
$2K^+ K^-$		$(2.15 \pm 0.20) \times 10^{-4}$		628
ϕK^+, $\phi \to K^+ K^-$		$(8.8 \pm 2.0) \times 10^{-5}$		–

Doubly Cabibbo-suppressed modes

$2K^+ \pi^-$		$(1.274 \pm 0.031) \times 10^{-4}$		805
$K^+ K^*(892)^0$, $K^{*0} \to K^+ \pi^-$		$(6.0 \pm 3.4) \times 10^{-5}$		–

Baryon-antibaryon mode

$p \overline{n}$		$(1.22 \pm 0.11) \times 10^{-3}$		295
$p \overline{p} e^+ \nu_e$		$< 2.0 \times 10^{-4}$	CL=90%	296

$\Delta C = 1$ weak neutral current (*C1*) modes, Lepton family number (*LF*), or Lepton number (*L*) violating modes

$\pi^+ e^+ e^-$		[oo]	$< 5.5 \times 10^{-6}$	CL=90%	979
$\pi^+ \phi$, $\phi \to e^+ e^-$		[nn]	$(6 ^{+8}_{-4}) \times 10^{-6}$		–
$\pi^+ \mu^+ \mu^-$		[oo]	$< 1.8 \times 10^{-7}$	CL=90%	968
$K^+ e^+ e^-$	C1		$< 3.7 \times 10^{-6}$	CL=90%	922
$K^+ \mu^+ \mu^-$	C1		$< 1.4 \times 10^{-7}$	CL=90%	909
$K^*(892)^+ \mu^+ \mu^-$	C1		$< 1.4 \times 10^{-3}$	CL=90%	765
$\pi^+ e^+ \mu^-$	LF		$< 1.1 \times 10^{-6}$	CL=90%	976
$\pi^+ e^- \mu^+$	LF		$< 9.4 \times 10^{-7}$	CL=90%	976
$K^+ e^+ \mu^-$	LF		$< 7.9 \times 10^{-7}$	CL=90%	919
$K^+ e^- \mu^+$	LF		$< 5.6 \times 10^{-7}$	CL=90%	919
$\pi^- 2e^+$	L		$< 1.4 \times 10^{-6}$	CL=90%	979
$\pi^- 2\mu^+$	L		$< 8.6 \times 10^{-8}$	CL=90%	968
$\pi^- e^+ \mu^+$	L		$< 6.3 \times 10^{-7}$	CL=90%	976
$K^- 2e^+$	L		$< 7.7 \times 10^{-7}$	CL=90%	922

$K^- 2\mu^+$	L	$<$	2.6	$\times 10^{-8}$ CL=90%	909
$K^- e^+ \mu^+$	L	$<$	2.6	$\times 10^{-7}$ CL=90%	919
$K^*(892)^- 2\mu^+$	L	$<$	1.4	$\times 10^{-3}$ CL=90%	765

$D_s^{*\pm}$

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

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

Mass $m = 2112.2 \pm 0.4$ MeV
$m_{D_s^{*\pm}} - m_{D_s^\pm} = 143.8 \pm 0.4$ MeV
Full width $\Gamma < 1.9$ MeV, CL = 90%

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

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

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

$I(J^P) = 0(0^+)$
J, P need confirmation.

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

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

Mass $m = 2317.8 \pm 0.5$ MeV
$m_{D_{s0}^*(2317)^\pm} - m_{D_s^\pm} = 349.4 \pm 0.5$ MeV
Full width $\Gamma < 3.8$ MeV, CL = 95%

$D_{s0}^*(2317)^-$ modes are charge conjugates of modes below.

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

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

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

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

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

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

$m_{D_{s1}(2460)^{\pm}} - m_{D_s^{\pm}} = 491.1 \pm 0.6$ MeV (S = 1.1)

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

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

$D_{s1}(2460)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D_s^{*+}\pi^0$	(48 ± 11) %		297
$D_s^+\gamma$	(18 ± 4) %		442
$D_s^+\pi^+\pi^-$	(4.3 ± 1.3) %	S=1.1	363
$D_s^{*+}\gamma$	< 8 %	CL=90%	323
$D_{s0}^*(2317)^+\gamma$	$(3.7^{+5.0}_{-2.4})$ %		138

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

$I(J^P) = 0(1^+)$
J, P need confirmation.

Mass $m = 2535.11 \pm 0.06$ MeV

$m_{D_{s1}(2536)^{\pm}} - m_{D_s^*(2111)} = 422.9 \pm 0.4$ MeV

$m_{D_{s1}(2536)^{\pm}} - m_{D^*(2010)^{\pm}} = 524.85 \pm 0.04$ MeV

$m_{D_{s1}(2536)^{\pm}} - m_{D^*(2007)^0} = 528.26 \pm 0.05$ MeV (S = 1.2)

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

Branching fractions are given relative to the one **DEFINED AS 1**.
$D_{s1}(2536)^-$ modes are charge conjugates of the modes below.

$D_{s1}(2536)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D^*(2010)^+K^0$	0.85 ± 0.12		149
$(D^*(2010)^+K^0)_{S-wave}$	0.61 ± 0.09		149
$D^+\pi^-K^+$	0.028 ± 0.005		176
$D^*(2007)^0K^+$	**DEFINED AS 1**		167
D^+K^0	<0.34	90%	381
D^0K^+	<0.12	90%	391
$D_s^{*+}\gamma$	possibly seen		388
$D_s^+\pi^+\pi^-$	seen		437

$D_{s2}^*(2573)$

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

Mass $m = 2569.1 \pm 0.8$ MeV (S = 2.4)
$m_{D_{s2}^*(2573)} - m_{D^0} = 704 \pm 3.2$ MeV
Full width $\Gamma = 16.9 \pm 0.7$ MeV

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

$D_{s2}^*(2573)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	431
$D^*(2007)^0 K^+$	not seen	238
$D^+ K_S^0$	seen	422
$D^{*+} K_S^0$	seen	225

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

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

Mass $m = 2714 \pm 5$ MeV (S = 1.5)
Full width $\Gamma = 122 \pm 10$ MeV

$D_{s1}^*(2700)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	579
$D^+ K_S^0$	seen	573
$D^{*0} K^+$	seen	438
$D^{*+} K_S^0$	seen	431

$D_{s3}^*(2860)^\pm$

$I(J^P) = 0(3^-)$

Mass $m = 2860 \pm 7$ MeV
Full width $\Gamma = 53 \pm 10$ MeV

$D_{s3}^*(2860)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 K^+$	seen	710
$D^+ K_S^0$	seen	704
$D^{*0} K^+$	seen	589
$D^{*+} K_S^0$	seen	584

BOTTOM MESONS
($B = \pm 1$)

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

B-particle organization

Many measurements of B decays involve admixtures of B hadrons. Previously we arbitrarily included such admixtures in the $B^\pm$ section, but because of their importance we have created two new sections: "$B^\pm/B^0$ Admixture" for $\Upsilon(4S)$ results and "$B^\pm/B^0/B^0_s/b$-baryon Admixture" for results at higher energies. Most inclusive decay branching fractions and χ_b at high energy are found in the Admixture sections. B^0-$\overline{B}^0$ mixing data are found in the B^0 section, while B^0_s-$\overline{B}^0_s$ mixing data and B-$\overline{B}$ mixing data for a B^0/B^0_s admixture are found in the B^0_s section. CP-violation data are found in the $B^\pm$, B^0, and $B^\pm$ B^0 Admixture sections. b-baryons are found near the end of the Baryon section.

The organization of the B sections is now as follows, where bullets indicate particle sections and brackets indicate reviews.

- $B^\pm$

  mass, mean life, CP violation, branching fractions
- B^0

  mass, mean life, B^0-$\overline{B}^0$ mixing, CP violation,

  branching fractions
- $B^\pm/B^0$ Admixtures

  CP violation, branching fractions
- $B^\pm/B^0/B^0_s/b$-baryon Admixtures

  mean life, production fractions, branching fractions
- B^*, $B_1(5721)$, $B^*_2(5747)$, $B_J(5970)$

  mass, width
- B^0_s

  mass, mean life, B^0_s-$\overline{B}^0_s$ mixing, CP violation,

  branching fractions
- B^*_s, $B_{s1}(5830)^0$, $B^*_{s2}(5840)^0$

  mass, width

- $B_c^{\pm}$
  mass, mean life, branching fractions
- $B_c(2S)^{\pm}$
  mass

At the end of Baryon Listings:

- Λ_b
  mass, mean life, branching fractions
- $\Lambda_b(5912)^0$, $\Lambda_b(5920)^0$, $\Lambda_b(6070)^0$, $\Lambda_b(6146)^0$, $\Lambda_b(6152)^0$
  mass, width
- Σ_b
  mass
- Σ_b^*, $\Sigma_b(6097)^+$, $\Sigma_b(6097)^-$
  mass, width
- Ξ_b^0, Ξ_b^-
  mass, mean life, branching fractions
- $\Xi_b'(5935)^-$, $\Xi_b(5945)^0$, $\Xi_b(5955)^-$, $\Xi_b(6100)^-$, $\Xi_b(6227)^-$, $\Xi_b(6227)^0$, $\Xi_b(6327)^0$, $\Xi_b(6333)^0$
  mass, width
- Ω_b^-
  mass, mean life, branching fractions
- $\Omega_b(6316)^-$, $\Omega_b(6330)^-$, $\Omega_b(6340)^-$, $\Omega_b(6350)^-$
  mass
- *b*-baryon Admixture
  mean life, branching fractions

$B^{\pm}$

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m_{B^{\pm}} = 5279.34 \pm 0.12$ MeV
Mean life $\tau_{B^{\pm}} = (1.638 \pm 0.004) \times 10^{-12}$ s
$c\tau = 491.1$ μm

CP violation

$A_{CP}(B^+ \to J/\psi(1S)K^+) = (1.8 \pm 3.0) \times 10^{-3}$ (S = 1.5)
$A_{CP}(B^+ \to J/\psi(1S)\pi^+) = (1.8 \pm 1.2) \times 10^{-2}$ (S = 1.3)

$A_{CP}(B^+ \to J/\psi\,\rho^+) = -0.05 \pm 0.05$
$A_{CP}(B^+ \to J/\psi\,K^*(892)^+) = -0.048 \pm 0.033$
$A_{CP}(B^+ \to \eta_c\,K^+) = 0.01 \pm 0.07 \quad (S = 2.2)$
$A_{CP}(B^+ \to \psi(2S)\pi^+) = 0.03 \pm 0.06$
$A_{CP}(B^+ \to \psi(2S)\,K^+) = 0.012 \pm 0.020 \quad (S = 1.5)$
$A_{CP}(B^+ \to \psi(2S)\,K^*(892)^+) = 0.08 \pm 0.21$
$A_{CP}(B^+ \to \chi_{c1}(1P)\pi^+) = 0.07 \pm 0.18$
$A_{CP}(B^+ \to \chi_{c0}\,K^+) = -0.20 \pm 0.18 \quad (S = 1.5)$
$A_{CP}(B^+ \to \chi_{c1}\,K^+) = -0.009 \pm 0.033$
$A_{CP}(B^+ \to \chi_{c1}\,K^*(892)^+) = 0.5 \pm 0.5$
$A_{CP}(B^+ \to D^0\,\ell^+\,\nu_\ell) = (-0.14 \pm 0.20) \times 10^{-2}$
$A_{CP}(B^+ \to \overline{D}^0\,\pi^+) = (-3 \pm 5) \times 10^{-3}$
$A_{CP}(B^+ \to D_{CP(+1)}\,\pi^+) = -0.0080 \pm 0.0024$
$A_{CP}(B^+ \to D_{CP(-1)}\,\pi^+) = 0.017 \pm 0.026$
$A_{CP}([K^\mp\pi^\pm\pi^+\pi^-]_D\,\pi^+) = 0.02 \pm 0.05$
$A_{CP}(B^+ \to [\pi^+\pi^+\pi^-\pi^-]_D\,K^+) = 0.10 \pm 0.04$
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^+\pi^-]_D\,K^*(892)^+) = 0.02 \pm 0.11$
$A_{CP}(B^+ \to \overline{D}^0\,K^+) = -0.017 \pm 0.005$
$A_{CP}([K^\mp\pi^\pm\pi^+\pi^-]_D\,K^+) = -0.31 \pm 0.11$
$A_{CP}(B^+ \to [\pi^+\pi^+\pi^-\pi^-]_D\,\pi^+) = (-4 \pm 8) \times 10^{-3}$
$A_{CP}(B^+ \to [K^-\pi^+]_D\,K^+) = -0.58 \pm 0.21$
$A_{CP}(B^+ \to [K^-\pi^+\pi^0]_D\,K^+) = -0.27 \pm 0.27 \quad (S = 2.4)$
$A_{CP}(B^+ \to [K^+\pi^-\pi^0]_D\,K^+) = -0.024 \pm 0.013$
$A_{CP}(B^+ \to [K^+K^-\pi^0]_D\,K^+) = 0.07 \pm 0.07$
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D\,K^+) = 0.11 \pm 0.04$
$A_{CP}(B^+ \to \overline{D}^0\,K^*(892)^+) = -0.007 \pm 0.019$
$A_{CP}(B^+ \to [K^-\pi^+]_{\overline{D}}\,K^*(892)^+) = -0.75 \pm 0.16$
$A_{CP}(B^+ \to [K^-\pi^+\pi^-\pi^+]_{\overline{D}}\,K^*(892)^+) = -0.45 \pm 0.25$
$A_{CP}(B^+ \to [K^-\pi^+]_D\,\pi^+) = 0.00 \pm 0.09$
$A_{CP}(B^+ \to [K^-\pi^+\pi^0]_D\,\pi^+) = 0.08 \pm 0.09$
$A_{CP}(B^+ \to [K^+K^-\pi^0]_D\,\pi^+) = -0.001 \pm 0.019$
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D\,\pi^+) = 0.001 \pm 0.010$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\pi)}\,\pi^+) = -0.09 \pm 0.27$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\gamma)}\,\pi^+) = -0.7 \pm 0.6$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\pi)}\,K^+) = 0.8 \pm 0.4$
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\gamma)}\,K^+) = 0.4 \pm 1.0$
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D\,K^+) = -0.02 \pm 0.15$
$A_{CP}(B^+ \to [K^0_S\,K^+\pi^-]_D\,K^+) = 0.10 \pm 0.09$
$A_{CP}(B^+ \to [K^0_S\,K^-\pi^+]_D\,K^+) = -0.04 \pm 0.08$
$A_{CP}(B^+ \to [K^0_S\,K^-\pi^+]_D\,\pi^+) = 0.003 \pm 0.015$
$A_{CP}(B^+ \to [K^0_S\,K^+\pi^-]_D\,\pi^+) = -0.034 \pm 0.020$

$A_{CP}(B^+ \to [K^*(892)^- K^+]_D K^+) = 0.08 \pm 0.05$
$A_{CP}(B^+ \to [K^*(892)^+ K^-]_D K^+) = 0.02 \pm 0.10$
$A_{CP}(B^+ \to [K^*(892)^+ K^-]_D \pi^+) = 0.007 \pm 0.017$
$A_{CP}(B^+ \to [K^*(892)^- K^+]_D \pi^+) = -0.020 \pm 0.011$
$\boldsymbol{A_{CP}(B^+ \to D_{CP(+1)} K^+)} = 0.132 \pm 0.015$ (S = 1.8)
$A_{ADS}(B^+ \to D K^+) = -0.451 \pm 0.026$
$A_{ADS}(B^+ \to D \pi^+) = 0.129 \pm 0.014$
$A_{ADS}(B^+ \to D^*(D\gamma) K^+) = -0.6 \pm 1.3$
$A_{ADS}(B^+ \to D^*(D\pi^0) K^+) = 0.72 \pm 0.29$
$A_{ADS}(B^+ \to D^*(D\gamma) \pi^+) = 0.08 \pm 0.13$
$A_{ADS}(B^+ \to D^*(D\pi^0) \pi^+) = -0.14 \pm 0.06$
$A_{ADS}(B^+ \to [K^- \pi^+]_D K^+ \pi^- \pi^+) = -0.33 \pm 0.35$
$A_{ADS}(B^+ \to [K^- \pi^+]_D \pi^+ \pi^- \pi^+) = -0.01 \pm 0.09$
$A_{CP}(B^+ \to D_{CP(-1)} K^+) = -0.10 \pm 0.07$
$A_{CP}(B^+ \to [K^+ K^-]_D K^+ \pi^- \pi^+) = -0.04 \pm 0.06$
$A_{CP}(B^+ \to [\pi^+ \pi^-]_D K^+ \pi^- \pi^+) = -0.05 \pm 0.10$
$A_{CP}(B^+ \to [K^- \pi^+]_D K^+ \pi^- \pi^+) = 0.013 \pm 0.023$
$A_{CP}(B^+ \to [K^+ K^-]_D \pi^+ \pi^- \pi^+) = -0.019 \pm 0.015$
$A_{CP}(B^+ \to [\pi^+ \pi^-]_D \pi^+ \pi^- \pi^+) = -0.013 \pm 0.019$
$A_{CP}(B^+ \to [K^- \pi^+]_D \pi^+ \pi^- \pi^+) = -0.002 \pm 0.011$
$A_{CP}(B^+ \to \overline{D}^{*0} \pi^+) = -0.0004 \pm 0.0021$ (S = 1.1)
$A_{CP}(B^+ \to D^{*0}_{CP(+1)} \pi^+) = 0.010 \pm 0.007$
$A_{CP}(B^+ \to D^{*0}_{CP(-1)} \pi^+) = -0.09 \pm 0.05$
$A_{CP}(B^+ \to D^{*0} K^+) = 0.012 \pm 0.010$ (S = 1.5)
$A_{CP}(B^+ \to D^{*0}_{CP(+1)} K^+) = -0.09 \pm 0.05$ (S = 2.6)
$A_{CP}(B^+ \to D^{*}_{CP(-1)} K^+) = 0.07 \pm 0.10$
$A_{CP}(B^+ \to D_{CP(+1)} K^*(892)^+) = 0.08 \pm 0.06$
$A_{CP}(B^+ \to D_{CP(-1)} K^*(892)^+) = -0.23 \pm 0.22$
$A_{CP}(B^+ \to D_s^+ \phi) = 0.0 \pm 0.4$
$A_{CP}(B^+ \to D_s^+ \overline{D}^0) = (-0.4 \pm 0.7)\%$
$A_{CP}(B^+ \to D^{*+} \overline{D}^{*0}) = -0.15 \pm 0.11$
$A_{CP}(B^+ \to D^{*+} \overline{D}^0) = -0.06 \pm 0.13$
$A_{CP}(B^+ \to D^+ \overline{D}^{*0}) = 0.13 \pm 0.18$
$A_{CP}(B^+ \to D^+ \overline{D}^0) = 0.016 \pm 0.025$
$A_{CP}(B^+ \to K^0_S \pi^+) = -0.017 \pm 0.016$
$A_{CP}(B^+ \to K^+ \pi^0) = 0.030 \pm 0.013$
$A_{CP}(B^+ \to \eta' K^+) = 0.004 \pm 0.011$
$A_{CP}(B^+ \to \eta' K^*(892)^+) = -0.26 \pm 0.27$
$A_{CP}(B^+ \to \eta' K^*_0(1430)^+) = 0.06 \pm 0.20$
$A_{CP}(B^+ \to \eta' K^*_2(1430)^+) = 0.15 \pm 0.13$

$A_{CP}(B^+ \to \eta K^+)$ $= -0.37 \pm 0.08$
$A_{CP}(B^+ \to \eta K^*(892)^+) = 0.02 \pm 0.06$
$A_{CP}(B^+ \to \eta K_0^*(1430)^+) = 0.05 \pm 0.13$
$A_{CP}(B^+ \to \eta K_2^*(1430)^+) = -0.45 \pm 0.30$
$A_{CP}(B^+ \to \omega K^+) = -0.02 \pm 0.04$
$A_{CP}(B^+ \to \omega K^{*+}) = 0.29 \pm 0.35$
$A_{CP}(B^+ \to \omega (K\pi)_0^{*+}) = -0.10 \pm 0.09$
$A_{CP}(B^+ \to \omega K_2^*(1430)^+) = 0.14 \pm 0.15$
$A_{CP}(B^+ \to K^{*0}\pi^+) = -0.04 \pm 0.09$ (S = 2.1)
$A_{CP}(B^+ \to K^*(892)^+\pi^0) = -0.39 \pm 0.21$ (S = 1.6)
$A_{CP}(B^+ \to K^+\pi^-\pi^+)$ $= 0.027 \pm 0.008$
$A_{CP}(B^+ \to K^+K^-K^+$ nonresonant$) = 0.06 \pm 0.05$
$A_{CP}(B^+ \to f(980)^0 K^+) = -0.08 \pm 0.09$
$A_{CP}(B^+ \to f_2(1270) K^+)$ $= -0.68^{+0.19}_{-0.17}$
$A_{CP}(B^+ \to f_0(1500) K^+) = 0.28 \pm 0.30$
$A_{CP}(B^+ \to f_2'(1525)^0 K^+) = -0.08^{+0.05}_{-0.04}$
$A_{CP}(B^+ \to \rho^0 K^+)$ $= 0.37 \pm 0.10$
$A_{CP}(B^+ \to K^0\pi^+\pi^0) = 0.07 \pm 0.06$
$A_{CP}(B^+ \to K_0^*(1430)^0\pi^+) = 0.061 \pm 0.032$
$A_{CP}(B^+ \to K_0^*(1430)^+\pi^0) = 0.26^{+0.18}_{-0.14}$
$A_{CP}(B^+ \to K_2^*(1430)^0\pi^+) = 0.05^{+0.29}_{-0.24}$
$A_{CP}(B^+ \to K^+\pi^0\pi^0) = -0.06 \pm 0.07$
$A_{CP}(B^+ \to K^0\rho^+) = -0.03 \pm 0.15$
$A_{CP}(B^+ \to K^{*+}\pi^+\pi^-) = 0.07 \pm 0.08$
$A_{CP}(B^+ \to \rho^0 K^*(892)^+) = 0.31 \pm 0.13$
$A_{CP}(B^+ \to K^*(892)^+ f_0(980)) = -0.15 \pm 0.12$
$A_{CP}(B^+ \to a_1^+ K^0) = 0.12 \pm 0.11$
$A_{CP}(B^+ \to b_1^+ K^0) = -0.03 \pm 0.15$
$A_{CP}(B^+ \to K^*(892)^0\rho^+) = -0.01 \pm 0.16$
$A_{CP}(B^+ \to b_1^0 K^+) = -0.46 \pm 0.20$
$A_{CP}(B^+ \to K^0 K^+) = 0.04 \pm 0.14$
$A_{CP}(B^+ \to K_S^0 K^+) = -0.21 \pm 0.14$
$A_{CP}(B^+ \to K^+ K_S^0 K_S^0) = 0.025 \pm 0.031$
$A_{CP}(B^+ \to K^+K^-\pi^+)$ $= -0.122 \pm 0.021$
$A_{CP}(B^+ \to K^+K^-\pi^+$ nonresonant$) = -0.11 \pm 0.06$
$A_{CP}(B^+ \to K^+\overline{K}^*(892)^0) = 0.12 \pm 0.10$
$A_{CP}(B^+ \to K^+\overline{K}_0^*(1430)^0) = 0.10 \pm 0.17$
$A_{CP}(B^+ \to \phi\pi^+) = 0.1 \pm 0.5$
$A_{CP}(B^+ \to \pi^+(K^+K^-)_{S-wave}) = -0.66 \pm 0.04$
$A_{CP}(B^+ \to K^+K^-K^+)$ $= -0.033 \pm 0.008$
$A_{CP}(B^+ \to \phi K^+) = 0.024 \pm 0.028$ (S = 2.3)

$A_{CP}(B^+ \to X_0(1550) K^+) = -0.04 \pm 0.07$
$A_{CP}(B^+ \to K^{*+} K^+ K^-) = 0.11 \pm 0.09$
$A_{CP}(B^+ \to \phi K^*(892)^+) = -0.01 \pm 0.08$
$A_{CP}(B^+ \to \phi (K\pi)^{*+}_0) = 0.04 \pm 0.16$
$A_{CP}(B^+ \to \phi K_1(1270)^+) = 0.15 \pm 0.20$
$A_{CP}(B^+ \to \phi K^*_2(1430)^+) = -0.23 \pm 0.20$
$A_{CP}(B^+ \to K^+ \phi\phi) = -0.08 \pm 0.07$
$A_{CP}(B^+ \to K^+ [\phi\phi]_{\eta_c}) = 0.10 \pm 0.08$
$A_{CP}(B^+ \to K^*(892)^+ \gamma) = 0.014 \pm 0.018$
$A_{CP}(B^+ \to X_s \gamma) = 0.028 \pm 0.019$
$A_{CP}(B^+ \to \eta K^+ \gamma) = -0.12 \pm 0.07$
$A_{CP}(B^+ \to \phi K^+ \gamma) = -0.13 \pm 0.11$ (S = 1.1)
$A_{CP}(B^+ \to \rho^+ \gamma) = -0.11 \pm 0.33$
$A_{CP}(B^+ \to \pi^+ \pi^0) = 0.03 \pm 0.04$
$\boldsymbol{A_{CP}(B^+ \to \pi^+ \pi^- \pi^+)} = 0.057 \pm 0.013$
$A_{CP}(B^+ \to \rho^0 \pi^+) = 0.009 \pm 0.019$
$A_{CP}(B^+ \to f_2(1270) \pi^+) = 0.40 \pm 0.06$
$A_{CP}(B^+ \to \rho^0(1450) \pi^+) = -0.11 \pm 0.05$
$A_{CP}(B^+ \to \rho_3(1690) \pi^+) = -0.80 \pm 0.28$
$\boldsymbol{A_{CP}(B^+ \to f_0(1370) \pi^+)} = 0.72 \pm 0.22$
$A_{CP}(B^+ \to \pi^+ \pi^- \pi^+ \text{ nonresonant}) = -0.14^{+0.23}_{-0.16}$
$A_{CP}(B^+ \to \rho^+ \pi^0) = 0.02 \pm 0.11$
$A_{CP}(B^+ \to \rho^+ \rho^0) = -0.05 \pm 0.05$
$A_{CP}(B^+ \to \omega \pi^+) = -0.04 \pm 0.05$
$A_{CP}(B^+ \to \omega \rho^+) = -0.20 \pm 0.09$
$A_{CP}(B^+ \to \eta \pi^+) = -0.14 \pm 0.07$ (S = 1.4)
$A_{CP}(B^+ \to \eta \rho^+) = 0.11 \pm 0.11$
$A_{CP}(B^+ \to \eta' \pi^+) = 0.06 \pm 0.16$
$A_{CP}(B^+ \to \eta' \rho^+) = 0.26 \pm 0.17$
$A_{CP}(B^+ \to b^0_1 \pi^+) = 0.05 \pm 0.16$
$A_{CP}(B^+ \to p \overline{p} \pi^+) = 0.00 \pm 0.04$
$A_{CP}(B^+ \to p \overline{p} K^+) = 0.00 \pm 0.04$ (S = 2.2)
$A_{CP}(B^+ \to p \overline{p} K^*(892)^+) = 0.21 \pm 0.16$ (S = 1.4)
$A_{CP}(B^+ \to p \overline{\Lambda} \gamma) = 0.17 \pm 0.17$
$A_{CP}(B^+ \to p \overline{\Lambda} \pi^0) = 0.01 \pm 0.17$
$A_{CP}(B^+ \to K^+ \ell^+ \ell^-) = -0.02 \pm 0.08$
$A_{CP}(B^+ \to K^+ e^+ e^-) = 0.14 \pm 0.14$
$A_{CP}(B^+ \to K^+ \mu^+ \mu^-) = 0.011 \pm 0.017$
$A_{CP}(B^+ \to \pi^+ \mu^+ \mu^-) = -0.11 \pm 0.12$
$A_{CP}(B^+ \to K^{*+} \ell^+ \ell^-) = -0.09 \pm 0.14$
$A_{CP}(B^+ \to K^* e^+ e^-) = -0.14 \pm 0.23$
$A_{CP}(B^+ \to K^* \mu^+ \mu^-) = -0.12 \pm 0.24$

$\boldsymbol{\gamma} = (65.9^{+3.3}_{-3.5})^\circ$
$\mathbf{r}_{\boldsymbol{B}}\boldsymbol{(B^+ \to D^0 K^+)} = 0.0994 \pm 0.0026$
$\boldsymbol{\delta_B(B^+ \to D^0 K^+)} = (127.7^{+3.6}_{-3.9})^\circ$
$\mathbf{r}_{\boldsymbol{B}}\boldsymbol{(B^+ \to D^0 K^{*+})} = 0.101^{+0.016}_{-0.034}$
$\boldsymbol{\delta_B(B^+ \to D^0 K^{*+})} = (48^{+59}_{-16})^\circ$
$\mathbf{r}_{\boldsymbol{B}}\boldsymbol{(B^+ \to D^{*0} K^+)} = 0.104^{+0.013}_{-0.014}$
$\boldsymbol{\delta_B(B^+ \to D^{*0} K^+)} = (314.8^{+7.9}_{-9.9})^\circ$

B^- modes are charge conjugates of the modes below. Modes which do not identify the charge state of the B are listed in the $B^\pm/B^0$ ADMIXTURE section.

The branching fractions listed below assume 50% $B^0\overline{B}^0$ and 50% B^+B^- production at the $\Upsilon(4S)$. We have attempted to bring older measurements up to date by rescaling their assumed $\Upsilon(4S)$ production ratio to 50:50 and their assumed D, D_s, D^*, and ψ branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

For inclusive branching fractions, *e.g.*, $B \to D^\pm X$, the values usually are multiplicities, not branching fractions. They can be greater than one.

$\boldsymbol{B^+}$ **DECAY MODES**		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
		Semileptonic and leptonic modes		
$\ell^+\nu_\ell X$	[ggg]	(10.99 ± 0.28) %		–
$e^+\nu_e X_c$		(10.8 ± 0.4) %		–
$\ell^+\nu_\ell X_u$		$(1.65 \pm 0.21) \times 10^{-3}$		–
$D\ell^+\nu_\ell X$		(9.6 ± 0.7) %		–
$\overline{D}^0\ell^+\nu_\ell$	[ggg]	(2.30 ± 0.09) %		2310
$\overline{D}^0\tau^+\nu_\tau$		$(7.7 \pm 2.5) \times 10^{-3}$		1911
$\overline{D}^*(2007)^0\ell^+\nu_\ell$	[ggg]	(5.58 ± 0.22) %		2258
$\overline{D}^*(2007)^0\tau^+\nu_\tau$		(1.88 ± 0.20) %		1839
$D^-\pi^+\ell^+\nu_\ell$		$(4.4 \pm 0.4) \times 10^{-3}$		2306
$\overline{D}_0^*(2420)^0\ell^+\nu_\ell$, $\overline{D}_0^{*0} \to D^-\pi^+$		$(2.5 \pm 0.5) \times 10^{-3}$		–
$\overline{D}_2^*(2460)^0\ell^+\nu_\ell$, $\overline{D}_2^{*0} \to D^-\pi^+$		$(1.53 \pm 0.16) \times 10^{-3}$		2065
$D^{(*)}n\pi\ell^+\nu_\ell (n \geq 1)$		(1.85 ± 0.25) %		–
$D^{*-}\pi^+\ell^+\nu_\ell$		$(6.0 \pm 0.4) \times 10^{-3}$		2254
$\overline{D}_1(2420)^0\ell^+\nu_\ell$, $\overline{D}_1^0 \to D^{*-}\pi^+$		$(3.03 \pm 0.20) \times 10^{-3}$		2084

$\overline{D}'_1(2430)^0 \ell^+ \nu_\ell$, $\overline{D}'^0_1 \to D^{*-}\pi^+$		$(2.7 \pm 0.6) \times 10^{-3}$		–
$\overline{D}^*_2(2460)^0 \ell^+ \nu_\ell$, $\overline{D}^{*0}_2 \to D^{*-}\pi^+$		$(1.01 \pm 0.24) \times 10^{-3}$	S=2.0	2065
$\overline{D}^0 \pi^+ \pi^- \ell^+ \nu_\ell$		$(1.6 \pm 0.4) \times 10^{-3}$		2301
$\overline{D}^{*0} \pi^+ \pi^- \ell^+ \nu_\ell$		$(8 \pm 5) \times 10^{-4}$		2248
$D_s^{(*)-} K^+ \ell^+ \nu_\ell$		$(6.1 \pm 1.0) \times 10^{-4}$		–
$D_s^- K^+ \ell^+ \nu_\ell$		$(3.0 {}^{+1.4}_{-1.2}) \times 10^{-4}$		2242
$D_s^{*-} K^+ \ell^+ \nu_\ell$		$(2.9 \pm 1.9) \times 10^{-4}$		2185
$\pi^0 \ell^+ \nu_\ell$		$(7.80 \pm 0.27) \times 10^{-5}$		2638
$\eta \ell^+ \nu_\ell$		$(3.5 \pm 0.4) \times 10^{-5}$		2611
$\eta' \ell^+ \nu_\ell$		$(2.4 \pm 0.7) \times 10^{-5}$		2553
$\omega \ell^+ \nu_\ell$	[ggg]	$(1.19 \pm 0.09) \times 10^{-4}$		2582
$\rho^0 \ell^+ \nu_\ell$	[ggg]	$(1.58 \pm 0.11) \times 10^{-4}$		2583
$\pi^+ \pi^- \ell^+ \nu_\ell$		$(2.3 \pm 0.4) \times 10^{-4}$		2636
$p \overline{p} \ell^+ \nu_\ell$		$(5.8 {}^{+2.6}_{-2.3}) \times 10^{-6}$		2467
$p \overline{p} \mu^+ \nu_\mu$		$(5.32 \pm 0.34) \times 10^{-6}$		2446
$p \overline{p} e^+ \nu_e$		$(8.2 {}^{+4.0}_{-3.3}) \times 10^{-6}$		2467
$e^+ \nu_e$		$< 9.8 \times 10^{-7}$	CL=90%	2640
$\mu^+ \nu_\mu$		$< 8.6 \times 10^{-7}$	CL=90%	2639
$\tau^+ \nu_\tau$		$(1.09 \pm 0.24) \times 10^{-4}$	S=1.2	2341
$\ell^+ \nu_\ell \gamma$		$< 3.0 \times 10^{-6}$	CL=90%	2640
$e^+ \nu_e \gamma$		$< 4.3 \times 10^{-6}$	CL=90%	2640
$\mu^+ \nu_\mu \gamma$		$< 3.4 \times 10^{-6}$	CL=90%	2639
$\mu^+ \mu^- \mu^+ \nu_\mu$		$< 1.6 \times 10^{-8}$	CL=95%	2634

Inclusive modes

$D^0 X$		(8.6 ± 0.7) %		–
$\overline{D}^0 X$		(79 ± 4) %		–
$D^+ X$		(2.5 ± 0.5) %		–
$D^- X$		(9.9 ± 1.2) %		–
$D_s^+ X$		$(7.9 {}^{+1.4}_{-1.3})$ %		–
$D_s^- X$		$(1.10 {}^{+0.40}_{-0.32})$ %		–
$\Lambda_c^+ X$		$(2.1 {}^{+0.9}_{-0.6})$ %		–
$\overline{\Lambda}_c^- X$		$(2.8 {}^{+1.1}_{-0.9})$ %		–
$\overline{c} X$		(97 ± 4) %		–
$c X$		$(23.4 {}^{+2.2}_{-1.8})$ %		–
$c / \overline{c} X$		(120 ± 6) %		–

D, D^*, or D_s modes

$\overline{D}^0 \pi^+$		$(4.61 \pm 0.10) \times 10^{-3}$		2308
$D_{CP(+1)} \pi^+$	[hhh]	$(2.03 \pm 0.19) \times 10^{-3}$		–
$D_{CP(-1)} \pi^+$	[hhh]	$(2.0 \pm 0.4) \times 10^{-3}$		–
$\overline{D}^0 \rho^+$		(1.34 ± 0.18) %		2237
$\overline{D}^0 K^+$		$(3.64 \pm 0.15) \times 10^{-4}$		2281
$D_{CP(+1)} K^+$	[hhh]	$(1.80 \pm 0.08) \times 10^{-4}$		–
$D_{CP(-1)} K^+$	[hhh]	$(1.96 \pm 0.18) \times 10^{-4}$		–
$D^0 K^+$		$(3.60 \pm 0.24) \times 10^{-6}$		2281
$[K^- \pi^+]_D K^+$	[iii]	$< 2.8 \times 10^{-7}$	CL=90%	–
$[K^+ \pi^-]_D K^+$	[iii]	$< 2.0 \times 10^{-5}$	CL=90%	–
$[K^- \pi^+ \pi^0]_D K^+$		seen		–
$[K^+ \pi^- \pi^0]_D K^+$		seen		–
$[K^- \pi^+ \pi^+ \pi^-]_D K^+$		seen		–
$[K^+ \pi^- \pi^+ \pi^-]_D K^+$		seen		–
$[K^- \pi^+]_D \pi^+$	[iii]	$(6.3 \pm 1.1) \times 10^{-7}$		–
$[K^+ \pi^-]_D \pi^+$		$(1.7 \pm 0.4) \times 10^{-4}$		–
$[K^- \pi^+ \pi^0]_D \pi^+$		seen		–
$[K^+ \pi^- \pi^0]_D \pi^+$		seen		–
$[K^- \pi^+ \pi^+ \pi^-]_D \pi^+$		seen		–
$[K^+ \pi^- \pi^+ \pi^-]_D \pi^+$		seen		–
$[\pi^+ \pi^- \pi^0]_D K^-$		$(4.6 \pm 0.9) \times 10^{-6}$		–
$[K^0_S K^+ \pi^-]_D K^+$		seen		–
$[K^0_S K^- \pi^+]_D K^+$		seen		–
$[K^*(892)^+ K^-]_D K^+$		seen		–
$[K^0_S K^- \pi^+]_D \pi^+$		seen		–
$[K^*(892)^+ K^-]_D \pi^+$		seen		–
$[K^0_S K^+ \pi^-]_D \pi^+$		seen		–
$[K^*(892)^- K^+]_D \pi^+$		seen		–
$\overline{D}^0 K^*(892)^+$		$(5.3 \pm 0.4) \times 10^{-4}$		2213
$D_{CP(-1)} K^*(892)^+$	[hhh]	$(2.7 \pm 0.8) \times 10^{-4}$		–
$D_{CP(+1)} K^*(892)^+$	[hhh]	$(6.2 \pm 0.7) \times 10^{-4}$		–
$D^0 K^*(892)^+$		$(5.4 {}^{+1.8}_{-4.0}) \times 10^{-6}$		2213
$\overline{D}^0 K^+ \pi^+ \pi^-$		$(5.2 \pm 2.1) \times 10^{-4}$		2237
$\overline{D}^0 K^+ \overline{K}^0$		$(5.5 \pm 1.6) \times 10^{-4}$		2189
$\overline{D}^0 K^+ \overline{K}^*(892)^0$		$(7.5 \pm 1.7) \times 10^{-4}$		2072
$\overline{D}^0 \pi^+ \pi^+ \pi^-$		$(5.5 \pm 2.0) \times 10^{-3}$	S=3.6	2289
$\overline{D}^0 \pi^+ \pi^+ \pi^-$ nonresonant		$(5 \pm 4) \times 10^{-3}$		2289
$\overline{D}^0 \pi^+ \rho^0$		$(4.2 \pm 3.0) \times 10^{-3}$		2208
$\overline{D}^0 a_1(1260)^+$		$(4 \pm 4) \times 10^{-3}$		2123
$\overline{D}^0 \omega \pi^+$		$(4.1 \pm 0.9) \times 10^{-3}$		2206
$D^*(2010)^- \pi^+ \pi^+$		$(1.35 \pm 0.22) \times 10^{-3}$		2247

$D^*(2010)^- K^+ \pi^+$		(8.2 ± 1.4) $\times 10^{-5}$			2206
$\overline{D}_1(2420)^0 \pi^+$, $\overline{D}_1^0 \to D^*(2010)^- \pi^+$		(8.4 ± 1.5) $\times 10^{-4}$			2081
$D^- \pi^+ \pi^+$		(1.07 ± 0.05) $\times 10^{-3}$			2299
$D^- K^+ \pi^+$		(7.7 ± 0.5) $\times 10^{-5}$			2260
$D_0^*(2300)^0 K^+$, $D_0^{*0} \to D^- \pi^+$		(6.1 ± 2.4) $\times 10^{-6}$			–
$D_2^*(2460)^0 K^+$, $D_2^{*0} \to D^- \pi^+$		(2.32 ± 0.23) $\times 10^{-5}$			–
$D_1^*(2760)^0 K^+$, $D_1^{*0} \to D^- \pi^+$		(3.6 ± 1.2) $\times 10^{-6}$			–
$D^+ K^0$		< 2.9 $\times 10^{-6}$	CL=90%		2278
$D^+ K^+ \pi^-$		(5.6 ± 1.1) $\times 10^{-6}$			2260
$D_2^*(2460)^0 K^+$, $D_2^{*0} \to D^+ \pi^-$		< 6.3 $\times 10^{-7}$	CL=90%		–
$D^+ K^{*0}$		< 4.9 $\times 10^{-7}$	CL=90%		2211
$D^+ \overline{K}^{*0}$		< 1.4 $\times 10^{-6}$	CL=90%		2211
$\overline{D}^*(2007)^0 \pi^+$		(5.17 ± 0.15) $\times 10^{-3}$			2256
$\overline{D}^{*0}_{CP(+1)} \pi^+$	[jjj]	(2.9 ± 0.6) $\times 10^{-3}$			–
$D^{*0}_{CP(-1)} \pi^+$	[jjj]	(2.6 ± 1.0) $\times 10^{-3}$			–
$\overline{D}^*(2007)^0 \omega \pi^+$		(4.5 ± 1.2) $\times 10^{-3}$			2149
$\overline{D}^*(2007)^0 \rho^+$		(9.8 ± 1.7) $\times 10^{-3}$			2181
$\overline{D}^*(2007)^0 K^+$		(4.19 $^{+0.31}_{-0.28}$) $\times 10^{-4}$			2227
$\overline{D}^{*0}_{CP(+1)} K^+$	[jjj]	(2.75 ± 0.35) $\times 10^{-4}$			–
$\overline{D}^{*0}_{CP(-1)} K^+$	[jjj]	(2.31 ± 0.31) $\times 10^{-4}$			–
$D^*(2007)^0 K^+$		(4.5 ± 1.2) $\times 10^{-6}$			2227
$\overline{D}^*(2007)^0 K^*(892)^+$		(8.1 ± 1.4) $\times 10^{-4}$			2156
$\overline{D}^*(2007)^0 K^+ \overline{K}^0$		< 1.06 $\times 10^{-3}$	CL=90%		2132
$\overline{D}^*(2007)^0 K^+ \overline{K}^*(892)^0$		(1.5 ± 0.4) $\times 10^{-3}$			2009
$\overline{D}^*(2007)^0 \pi^+ \pi^+ \pi^-$		(1.03 ± 0.12) %			2236
$\overline{D}^*(2007)^0 a_1(1260)^+$		(1.9 ± 0.5) %			2063
$\overline{D}^*(2007)^0 \pi^- \pi^+ \pi^+ \pi^0$		(1.8 ± 0.4) %			2219
$\overline{D}^{*0} 3\pi^+ 2\pi^-$		(5.7 ± 1.2) $\times 10^{-3}$			2196
$D^*(2010)^+ \pi^0$		< 3.6 $\times 10^{-6}$			2255
$D^*(2010)^+ K^0$		< 9.0 $\times 10^{-6}$	CL=90%		2225
$D^*(2010)^- \pi^+ \pi^+ \pi^0$		(1.5 ± 0.7) %			2235
$D^*(2010)^- \pi^+ \pi^+ \pi^+ \pi^-$		(2.6 ± 0.4) $\times 10^{-3}$			2217
$\overline{D}^{**0} \pi^+$	[kkk]	(5.6 ± 1.2) $\times 10^{-3}$			–
$\overline{D}_1^*(2420)^0 \pi^+$		(1.5 ± 0.6) $\times 10^{-3}$		S=1.3	2081
$\overline{D}_1(2420)^0 \pi^+ \times$ B($\overline{D}_1^0 \to \overline{D}^0 \pi^+ \pi^-$)		(2.5 $^{+1.6}_{-1.4}$) $\times 10^{-4}$		S=3.8	2081

$\overline{D}_1(2420)^0 \pi^+ \times$ B($\overline{D}{}_1^0 \to \overline{D}{}^0 \pi^+ \pi^-$ (nonresonant))	$(2.2 \pm 0.9) \times 10^{-4}$		2081
$\overline{D}_1(2430)^0 \pi^+$, $\overline{D}{}_1^0 \to D^*(2010)^- \pi^+$	$(3.5 \pm 0.6) \times 10^{-4}$		2079
$\overline{D}(2550)^0 \pi^+$, $\overline{D}{}^0 \to D^*(2010)^- \pi^+$	$(7.2 \pm 1.4) \times 10^{-5}$		–
$\overline{D}{}^*_J(2600)^0 \pi^+$, $\overline{D}{}^{*0}_J \to D^*(2010)^- \pi^+$	$(6.8 \pm 1.3) \times 10^{-5}$		–
$\overline{D}{}^*_2(2462)^0 \pi^+$, $\overline{D}{}^{*0}_2 \to D^- \pi^+$	$(3.56 \pm 0.24) \times 10^{-4}$		–
$\overline{D}{}^*_2(2462)^0 \pi^+$, $\overline{D}{}^{*0}_2 \to \overline{D}{}^0 \pi^- \pi^+$	$(2.2 \pm 1.0) \times 10^{-4}$		–
$\overline{D}{}^*_2(2462)^0 \pi^+$, $\overline{D}{}^{*0}_2 \to \overline{D}{}^0 \pi^- \pi^+$(nonresonant)	$< 1.6 \times 10^{-4}$	CL=90%	–
$\overline{D}{}^*_2(2462)^0 \pi^+$, $\overline{D}{}^{*0}_2 \to D^*(2010)^- \pi^+$	$(2.1 \pm 1.0) \times 10^{-4}$		–
$\overline{D}{}^*_0(2400)^0 \pi^+ \times$ B($\overline{D}{}^*_0(2400)^0 \to D^- \pi^+$)	$(6.4 \pm 1.4) \times 10^{-4}$		2136
$\overline{D}_1(2421)^0 \pi^+$, $\overline{D}{}_1^0 \to D^{*-} \pi^+$	$(7.4 \pm 1.0) \times 10^{-4}$		–
$\overline{D}{}^*_2(2462)^0 \pi^+$, $\overline{D}{}^{*0}_2 \to D^{*-} \pi^+$	$(1.98 \pm 0.30) \times 10^{-4}$		–
$\overline{D}{}'_1(2427)^0 \pi^+$, $\overline{D}{}'^0_1 \to D^{*-} \pi^+$	$(3.5 \pm 0.9) \times 10^{-4}$	S=1.5	–
$\overline{D}_1(2420)^0 \pi^+ \times$B($\overline{D}{}_1^0 \to \overline{D}{}^{*0} \pi^+ \pi^-$)	$< 6 \times 10^{-6}$	CL=90%	2081
$\overline{D}{}^*_1(2420)^0 \rho^+$	$< 1.4 \times 10^{-3}$	CL=90%	1996
$\overline{D}{}^*_2(2460)^0 \pi^+$	$< 1.3 \times 10^{-3}$	CL=90%	2063
$\overline{D}{}^*_2(2460)^0 \pi^+ \times$B($\overline{D}{}^{*0}_2 \to \overline{D}{}^{*0} \pi^+ \pi^-$)	$< 2.2 \times 10^{-5}$	CL=90%	2063
$\overline{D}{}^*_1(2680)^0 \pi^+$, $\overline{D}{}^*_1(2680)^0 \to D^- \pi^+$	$(8.4 \pm 2.1) \times 10^{-5}$		–
$\overline{D}(2740)^0 \pi^+$, $\overline{D}{}^0 \to D^*(2010)^- \pi^+$	$(3.3 \pm 1.5) \times 10^{-5}$		–
$\overline{D}{}^*_3(2750)^0 \pi^+$, $\overline{D}{}^{*0}_3 \to D^*(2010)^- \pi^+$	$(1.10 \pm 0.32) \times 10^{-5}$		1913
$\overline{D}{}^*_3(2760)^0 \pi^+$, $\overline{D}{}^*_3(2760)^0 \pi^+ \to D^- \pi^+$	$(1.00 \pm 0.22) \times 10^{-5}$		–
$\overline{D}{}^*_2(3000)^0 \pi^+$, $\overline{D}{}^*_2(3000)^0 \pi^+ \to D^- \pi^+$	$(2.0 \pm 1.4) \times 10^{-6}$		–
$\overline{D}{}^*_2(2460)^0 \rho^+$	$< 4.7 \times 10^{-3}$	CL=90%	1977
$\overline{D}{}^0 D_s^+$	$(9.0 \pm 0.9) \times 10^{-3}$		1815
$D^*_{s0}(2317)^+ \overline{D}{}^0$, $D^{*+}_{s0} \to D_s^+ \pi^0$	$(8.0 {}^{+1.6}_{-1.3}) \times 10^{-4}$		1605

$D_{s0}(2317)^+ \overline{D}^0 \times$ B$(D_{s0}(2317)^+ \to D_s^{*+}\gamma)$	$<$ 7.6	$\times 10^{-4}$	CL=90%	1605
$D_{s0}(2317)^+ \overline{D}^*(2007)^0 \times$ B$(D_{s0}(2317)^+ \to D_s^+\pi^0)$	(9 $\pm$ 7	) $\times 10^{-4}$		1511
$D_{sJ}(2457)^+ \overline{D}^0$	(3.1 $^{+1.0}_{-0.9}$	) $\times 10^{-3}$		–
$D_{sJ}(2457)^+ \overline{D}^0 \times$ B$(D_{sJ}(2457)^+ \to D_s^+\gamma)$	(4.6 $^{+1.3}_{-1.1}$	) $\times 10^{-4}$		–
$D_{sJ}(2457)^+ \overline{D}^0 \times$ B$(D_{sJ}(2457)^+ \to D_s^+\pi^+\pi^-)$	$<$ 2.2	$\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ \overline{D}^0 \times$ B$(D_{sJ}(2457)^+ \to D_s^+\pi^0)$	$<$ 2.7	$\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ \overline{D}^0 \times$ B$(D_{sJ}(2457)^+ \to D_s^{*+}\gamma)$	$<$ 9.8	$\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ \overline{D}^*(2007)^0$	(1.20 $\pm$ 0.30	) %		–
$D_{sJ}(2457)^+ \overline{D}^*(2007)^0 \times$ B$(D_{sJ}(2457)^+ \to D_s^+\gamma)$	(1.4 $^{+0.7}_{-0.6}$	) $\times 10^{-3}$		–
$\overline{D}^0 D_{s1}(2536)^+ \times$ B$(D_{s1}(2536)^+ \to D^*(2007)^0 K^+ + D^*(2010)^+ K^0)$	(4.0 $\pm$ 1.0	) $\times 10^{-4}$		1447
$\overline{D}^0 D_{s1}(2536)^+ \times$ B$(D_{s1}(2536)^+ \to D^*(2007)^0 K^+)$	(2.2 $\pm$ 0.7	) $\times 10^{-4}$		1447
$\overline{D}^*(2007)^0 D_{s1}(2536)^+ \times$ B$(D_{s1}(2536)^+ \to D^*(2007)^0 K^+)$	(5.5 $\pm$ 1.6	) $\times 10^{-4}$		1339
$\overline{D}^0 D_{s1}(2536)^+ \times$ B$(D_{s1}(2536)^+ \to D^{*+} K^0)$	(2.3 $\pm$ 1.1	) $\times 10^{-4}$		1447
$\overline{D}^0 D_{sJ}(2700)^+ \times$ B$(D_{sJ}(2700)^+ \to D^0 K^+)$	(5.6 $\pm$ 1.8	) $\times 10^{-4}$	S=1.7	–
$\overline{D}^{*0} D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*+} K^0$	(3.9 $\pm$ 2.6	) $\times 10^{-4}$		1339
$\overline{D}^0 D_{sJ}(2573)^+$, $D_{sJ}^+ \to D^0 K^+$	(8 $\pm$15	) $\times 10^{-6}$		–
$\overline{D}^{*0} D_{sJ}(2573)$, $D_{sJ}^+ \to D^0 K^+$	$<$ 2	$\times 10^{-4}$	CL=90%	1306
$\overline{D}^*(2007)^0 D_{sJ}(2573)$, $D_{sJ}^+ \to D^0 K^+$	$<$ 5	$\times 10^{-4}$	CL=90%	1306
$\overline{D}^0 D_s^{*+}$	(7.6 $\pm$ 1.6	) $\times 10^{-3}$		1734
$\overline{D}^*(2007)^0 D_s^+$	(8.2 $\pm$ 1.7	) $\times 10^{-3}$		1737

$\overline{D}^*(2007)^0 D_s^{*+}$	(1.71 ± 0.24) %			1651
$D_s^{(*)+} \overline{D}^{**0}$	(2.7 ± 1.2) %			–
$\overline{D}^*(2007)^0 D^*(2010)^+$	(8.1 ± 1.7) $\times 10^{-4}$			1713
$\overline{D}^0 D^*(2010)^+ + \overline{D}^*(2007)^0 D^+$	< 1.30	%	CL=90%	1792
$\overline{D}^0 D^*(2010)^+$	(3.9 ± 0.5) $\times 10^{-4}$			1792
$\overline{D}^0 D^+$	(3.8 ± 0.4) $\times 10^{-4}$			1866
$\overline{D}^0 D^+ K^0$	(1.55 ± 0.21) $\times 10^{-3}$			1571
$D^+ \overline{D}^*(2007)^0$	(6.3 ± 1.7) $\times 10^{-4}$			1791
$\overline{D}^*(2007)^0 D^+ K^0$	(2.1 ± 0.5) $\times 10^{-3}$			1475
$\overline{D}^0 D^*(2010)^+ K^0$	(3.8 ± 0.4) $\times 10^{-3}$			1476
$\overline{D}^*(2007)^0 D^*(2010)^+ K^0$	(9.2 ± 1.2) $\times 10^{-3}$			1362
$\overline{D}^0 D^0 K^+$	(1.45 ± 0.33) $\times 10^{-3}$		S=2.6	1577
$\overline{D}^*(2007)^0 D^0 K^+$	(2.26 ± 0.23) $\times 10^{-3}$			1481
$\overline{D}^0 D^*(2007)^0 K^+$	(6.3 ± 0.5) $\times 10^{-3}$			1481
$\overline{D}^*(2007)^0 D^*(2007)^0 K^+$	(1.12 ± 0.13) %			1368
$D^- D^+ K^+$	(2.2 ± 0.7) $\times 10^{-4}$			1571
$X_0(2900) D^+$, $X_0 \to D^- K^+$	(1.2 ± 0.5) $\times 10^{-5}$			–
$X_1(2900) D^+$, $X_1 \to D^- K^+$	(6.7 ± 2.3) $\times 10^{-5}$			–
$D^- D^+ K^+$ nonresonant	(5.3 ± 1.8) $\times 10^{-5}$			1571
$D^- D^*(2010)^+ K^+$	(6.3 ± 1.1) $\times 10^{-4}$			1475
$D^*(2010)^- D^+ K^+$	(6.0 ± 1.3) $\times 10^{-4}$			1475
$D^*(2010)^- D^*(2010)^+ K^+$	(1.32 ± 0.18) $\times 10^{-3}$			1363
$(\overline{D}+\overline{D}^*)(D+D^*)K$	(4.05 ± 0.30) %			–
$D_s^+ \pi^0$	(1.6 ± 0.5) $\times 10^{-5}$			2270
$D_s^{*+} \pi^0$	< 2.6	$\times 10^{-4}$	CL=90%	2215
$D_s^+ \eta$	< 4	$\times 10^{-4}$	CL=90%	2235
$D_s^{*+} \eta$	< 6	$\times 10^{-4}$	CL=90%	2178
$D_s^+ \rho^0$	< 3.0	$\times 10^{-4}$	CL=90%	2197
$D_s^{*+} \rho^0$	< 4	$\times 10^{-4}$	CL=90%	2138
$D_s^+ \omega$	< 4	$\times 10^{-4}$	CL=90%	2195
$D_s^{*+} \omega$	< 6	$\times 10^{-4}$	CL=90%	2136
$D_s^+ a_1(1260)^0$	< 1.8	$\times 10^{-3}$	CL=90%	2079
$D_s^{*+} a_1(1260)^0$	< 1.3	$\times 10^{-3}$	CL=90%	2015
$D_s^+ K^+ K^-$	(7.2 ± 1.1) $\times 10^{-6}$			2149
$D_s^+ \phi$	< 4.2	$\times 10^{-7}$	CL=90%	2141
$D_s^{*+} \phi$	< 1.2	$\times 10^{-5}$	CL=90%	2079
$D_s^+ \overline{K}^0$	< 8	$\times 10^{-4}$	CL=90%	2242
$D_s^{*+} \overline{K}^0$	< 9	$\times 10^{-4}$	CL=90%	2185
$D_s^+ \overline{K}^*(892)^0$	< 4.4	$\times 10^{-6}$	CL=90%	2172

$D_s^+ K^{*0}$	$<$ 3.5	$\times 10^{-6}$	CL=90%	2172
$D_s^{*+} \overline{K}^*(892)^0$	$<$ 3.5	$\times 10^{-4}$	CL=90%	2112
$D_s^- \pi^+ K^+$	(1.80 $\pm$ 0.22)	$\times 10^{-4}$		2222
$D_s^{*-} \pi^+ K^+$	(1.45 $\pm$ 0.24)	$\times 10^{-4}$		2164
$D_s^- \pi^+ K^*(892)^+$	$<$ 5	$\times 10^{-3}$	CL=90%	2138
$D_s^{*-} \pi^+ K^*(892)^+$	$<$ 7	$\times 10^{-3}$	CL=90%	2076
$D_s^- K^+ K^+$	(9.7 $\pm$ 2.1)	$\times 10^{-6}$		2149
$D_s^{*-} K^+ K^+$	$<$ 1.5	$\times 10^{-5}$	CL=90%	2088

Charmonium modes

$\eta_c K^+$	(1.08 $\pm$ 0.08)	$\times 10^{-3}$	S=1.1	1751
$\eta_c K^+$, $\eta_c \to K_S^0 K^\mp \pi^\pm$	(2.7 $\pm$ 0.6)	$\times 10^{-5}$		–
$\eta_c K^*(892)^+$	(1.2 $^{+0.5}_{-0.4}$)	$\times 10^{-3}$		1646
$\eta_c K^+ \pi^+ \pi^-$	$<$ 3.9	$\times 10^{-4}$	CL=90%	1684
$\eta_c K^+ \omega(782)$	$<$ 5.3	$\times 10^{-4}$	CL=90%	1475
$\eta_c K^+ \eta$	$<$ 2.2	$\times 10^{-4}$	CL=90%	1588
$\eta_c K^+ \pi^0$	$<$ 6.2	$\times 10^{-5}$	CL=90%	1723
$\eta_c(2S) K^+$	(4.4 $\pm$ 1.0)	$\times 10^{-4}$		1320
$\eta_c(2S) K^+$, $\eta_c \to p\overline{p}$	(3.5 $\pm$ 0.8)	$\times 10^{-8}$		–
$\eta_c(2S) K^+$, $\eta_c \to K_S^0 K^\mp \pi^\pm$	(3.4 $^{+2.3}_{-1.6}$)	$\times 10^{-6}$		–
$\eta_c(2S) K^+$, $\eta_c \to p\overline{p}\pi^+\pi^-$	(1.12 $\pm$ 0.18)	$\times 10^{-6}$		–
$h_c(1P) K^+$, $h_c \to J/\psi \pi^+ \pi^-$	$<$ 3.4	$\times 10^{-6}$	CL=90%	1401
$X(3730)^0 K^+$, $X^0 \to \eta_c \eta$	$<$ 4.6	$\times 10^{-5}$	CL=90%	–
$X(3730)^0 K^+$, $X^0 \to \eta_c \pi^0$	$<$ 5.7	$\times 10^{-6}$	CL=90%	–
$\eta_{c2}(1D) K^+$, $\eta_{c2} \to h_c \gamma$	$<$ 3.7	$\times 10^{-5}$	CL=90%	–
$\eta_{c2}(1D) \pi^+ K_S^0$, $\eta_{c2} \to h_c \gamma$	$<$ 1.1	$\times 10^{-4}$	CL=90%	–
$\psi_2(3823) K^+$, $\psi_2 \to J/\psi \pi^+ \pi^-$	(2.8 $\pm$ 0.6)	$\times 10^{-7}$		–
$\psi_2(3823) K^+$, $\psi_2 \to J/\psi \eta$	(1.2 $^{+0.7}_{-0.5}$)	$\times 10^{-6}$		–
$\psi_3(3842) K^+$, $\psi_3 \to J/\psi \eta$	$<$ 6.1	$\times 10^{-7}$	CL=90%	–
$\chi_{c1}(3872) K^+$	(2.1 $\pm$ 0.7)	$\times 10^{-4}$		1141
$\chi_{c0}(3915) K^+$	$<$ 2.8	$\times 10^{-4}$	CL=90%	1101
$\chi_{c0}(3915) K^+$, $\chi_{c0} \to D^+ D^-$	(8.1 $\pm$ 3.3)	$\times 10^{-6}$		–
$\chi_{c0}(3915) K^+$, $\chi_{c0} \to \eta_c \eta$	$<$ 4.7	$\times 10^{-5}$	CL=90%	–
$(Xchi)_{c0}(3915) K^+$, $\chi_{c0} \to \eta_c \pi^0$	$<$ 1.7	$\times 10^{-5}$	CL=90%	–
$X(4014)^0 K^+$, $X^0 \to \eta_c \eta$	$<$ 3.9	$\times 10^{-5}$	CL=90%	–
$X(4014)^0 K^+$, $X^0 \to \eta_c \pi^0$	$<$ 1.2	$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^0 K^+$, $Z_c^0 \to \eta_c \pi^+ \pi^-$	$<$ 4.7	$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^0 K^+$, $Z_c^0 \to J/\psi \eta$	$<$ 4.3	$\times 10^{-7}$	CL=90%	–

$X(4020)^0 K^+$, $X^0 \to \eta_c \pi^+ \pi^-$		$<$ 1.6	$\times 10^{-5}$	CL=90%	–
$\chi_{c1}(3872) K^*(892)^+$		$<$ 6	$\times 10^{-4}$	CL=90%	940
$\chi_{c1}(3872)^+ K^0$, $\chi_{c1}^+ \to J/\psi(1S)\pi^+\pi^0$	[lll]	$<$ 6.1	$\times 10^{-6}$	CL=90%	–
$\chi_{c1}(3872) K^0 \pi^+$		(2.8 $\pm$ 1.2)	$\times 10^{-4}$		1085
$Z_c(4430)^+ K^0$, $Z_c^+ \to J/\psi \pi^+$		$<$ 1.5	$\times 10^{-5}$	CL=95%	–
$Z_c(4430)^+ K^0$, $Z_c^+ \to \psi(2S)\pi^+$		$<$ 4.7	$\times 10^{-5}$	CL=95%	–
$Z_c(4430)^0 K^+$, $Z_c^0 \to J/\psi \eta$		$<$ 1.27	$\times 10^{-6}$	CL=90%	–
$\psi(4230)^0 K^+$, $\psi^0 \to J/\psi \pi^+ \pi^-$		$<$ 1.56	$\times 10^{-5}$	CL=95%	–
$\psi(4230) K^+$, $\psi \to J/\psi \eta$		$<$ 3.9	$\times 10^{-7}$	CL=90%	–
$\psi(4360) K^+$, $\psi \to J/\psi \eta$		$<$ 1.24	$\times 10^{-6}$	CL=90%	–
$\psi(4390) K^+$, $\psi \to J/\psi \eta$		$<$ 2.41	$\times 10^{-6}$	CL=90%	–
$\chi_{c0}(3915) K^+$, $\chi_{c0} \to J/\psi \gamma$		$<$ 1.4	$\times 10^{-5}$	CL=90%	–
$\chi_{c0}(3915) K^+$, $\chi_{c0} \to \chi_{c1}(1P)\pi^0$		$<$ 3.8	$\times 10^{-5}$	CL=90%	–
$X(3930)^0 K^+$, $X^0 \to J/\psi \gamma$		$<$ 2.5	$\times 10^{-6}$	CL=90%	–
$J/\psi(1S) K^+$		(1.020 $\pm$ 0.019)	$\times 10^{-3}$		1684
$J/\psi(1S) K^0 \pi^+$		(1.14 $\pm$ 0.11)	$\times 10^{-3}$		1651
$J/\psi(1S) K^+ \pi^+ \pi^-$		(8.1 $\pm$ 1.3)	$\times 10^{-4}$	S=2.5	1612
$J/\psi(1S) K^+ K^- K^+$		(3.37 $\pm$ 0.29)	$\times 10^{-5}$		1252
$\chi_{c0}(3915) K^+$, $\chi_{c0} \to p\overline{p}$		$<$ 7.1	$\times 10^{-8}$	CL=95%	–
$J/\psi(1S) K^*(892)^+$		(1.43 $\pm$ 0.08)	$\times 10^{-3}$		1571
$J/\psi(1S) K(1270)^+$		(1.8 $\pm$ 0.5)	$\times 10^{-3}$		1402
$J/\psi(1S) K(1400)^+$		$<$ 5	$\times 10^{-4}$	CL=90%	1308
$J/\psi(1S) \eta K^+$		(1.24 $\pm$ 0.14)	$\times 10^{-4}$		1510
$\chi_{c1-odd}(3872) K^+$, $\chi_{c1-odd} \to J/\psi \eta$		$<$ 3.8	$\times 10^{-6}$	CL=90%	–
$\psi(4160) K^+$, $\psi \to J/\psi \eta$		$<$ 8.7	$\times 10^{-7}$	CL=90%	–
$J/\psi(1S) \eta' K^+$		$<$ 8.8	$\times 10^{-5}$	CL=90%	1273
$J/\psi(1S) \phi K^+$		(5.0 $\pm$ 0.4)	$\times 10^{-5}$		1227
$J/\psi(1S) K_1(1650)$, $K_1 \to \phi K^+$		(6 $^{+10}_{-6}$)	$\times 10^{-6}$		–
$J/\psi(1S) K^*(1680)^+$, $K^* \to \phi K^+$		(3.4 $^{+1.9}_{-2.2}$)	$\times 10^{-6}$		–
$J/\psi(1S) K_2^*(1980)$, $K_2^* \to \phi K^+$		(1.5 $^{+0.9}_{-0.5}$)	$\times 10^{-6}$		–
$J/\psi(1S) K(1830)^+$, $K(1830)^+ \to \phi K^+$		(1.3 $^{+1.3}_{-1.1}$)	$\times 10^{-6}$		–

$\chi_{c1}(4140) K^+$, $\chi_{c1} \to J/\psi(1S)\phi$	$(10 \pm 4) \times 10^{-6}$			–
$\chi_{c1}(4274) K^+$, $\chi_{c1} \to J/\psi(1S)\phi$	$(3.6 {}^{+2.2}_{-1.8}) \times 10^{-6}$			–
$\chi_{c0}(4500) K^+$, $\chi_{c0} \to J/\psi(1S)\phi$	$(3.3 {}^{+2.1}_{-1.7}) \times 10^{-6}$			–
$\chi_{c0}(4700) K^+$, $\chi_{c0} \to J/\psi(1S)\phi$	$(6 {}^{+5}_{-4}) \times 10^{-6}$			–
$J/\psi(1S)\omega K^+$	$(3.20 {}^{+0.60}_{-0.32}) \times 10^{-4}$			1388
$\chi_{c0}(3915) K^+$, $\chi_{c0} \to J/\psi\omega$	$(3.0 {}^{+0.9}_{-0.7}) \times 10^{-5}$			1103
$J/\psi(1S)\pi^+$	$(3.92 \pm 0.08) \times 10^{-5}$			1728
$J/\psi(1S)\pi^+\pi^+\pi^+\pi^-\pi^-$	$(1.17 \pm 0.13) \times 10^{-5}$			1635
$\psi(2S)\pi^+\pi^+\pi^-$	$(1.9 \pm 0.4) \times 10^{-5}$			1304
$J/\psi(1S)\rho^+$	$(4.1 \pm 0.5) \times 10^{-5}$		S=1.4	1611
$J/\psi(1S)\pi^+\pi^0$ nonresonant	$< 7.3 \times 10^{-6}$		CL=90%	1717
$J/\psi(1S) a_1(1260)^+$	$< 1.2 \times 10^{-3}$		CL=90%	1415
$J/\psi(1S) p\overline{p}\pi^+$	$< 5.0 \times 10^{-7}$		CL=90%	643
$J/\psi(1S) p\overline{\Lambda}$	$(1.46 \pm 0.12) \times 10^{-5}$			567
$J/\psi(1S)\overline{\Sigma}^0 p$	$< 1.1 \times 10^{-5}$		CL=90%	–
$J/\psi(1S) D^+$	$< 1.2 \times 10^{-4}$		CL=90%	871
$J/\psi(1S)\overline{D}^0\pi^+$	$< 2.5 \times 10^{-5}$		CL=90%	665
$\psi(2S)\pi^+$	$(2.44 \pm 0.30) \times 10^{-5}$			1347
$\psi(2S) K^+$	$(6.24 \pm 0.20) \times 10^{-4}$			1284
$\psi(2S) K^*(892)^+$	$(6.7 \pm 1.4) \times 10^{-4}$		S=1.3	1116
$\psi(2S) K^+\pi^+\pi^-$	$(4.3 \pm 0.5) \times 10^{-4}$			1179
$\psi(2S)\phi(1020) K^+$	$(4.0 \pm 0.7) \times 10^{-6}$			418
$\psi(3770) K^+$	$(4.3 \pm 1.1) \times 10^{-4}$			1218
$\psi(3770) K+, \psi \to D^0\overline{D}^0$	$(1.5 \pm 0.5) \times 10^{-4}$		S=1.4	1218
$\psi(3770) K+, \psi \to D^+ D^-$	$(9.4 \pm 3.5) \times 10^{-5}$			1218
$\psi(3770) K^+$, $\psi \to p\overline{p}$	$< 2 \times 10^{-7}$		CL=95%	–
$\psi(3770) K^+$, $\psi \to J/\psi\eta$	$< 4.6 \times 10^{-7}$		CL=90%	–
$\psi(4040) K^+$	$(1.6 \pm 0.5) \times 10^{-3}$			1003
$\psi(4040) K^+$, $\psi \to D^+ D^-$	$(1.1 \pm 0.5) \times 10^{-5}$			–
$\psi(4160) K^+$	$(5.1 \pm 2.7) \times 10^{-4}$			868
$\psi(4160) K^+$, $\psi \to \overline{D}^0 D^0$	$(8 \pm 5) \times 10^{-5}$			–
$\psi(4160) K^+$, $\psi \to D^+ D^-$	$(1.5 \pm 0.6) \times 10^{-5}$			–
$\psi(4415) K^+$, $\psi \to D^+ D^-$	$(2.0 \pm 0.8) \times 10^{-5}$			–
$\psi(4415) K^+$, $\psi \to J/\psi\eta$	$< 9.6 \times 10^{-7}$		CL=90%	–
$\chi_{c0}\pi^+$, $\chi_{c0} \to \pi^+\pi^-$	$< 1 \times 10^{-7}$		CL=90%	1531
$\chi_{c0} K^+$	$(1.51 {}^{+0.15}_{-0.13}) \times 10^{-4}$			1478
$\chi_{c0} K^*(892)^+$	$< 2.1 \times 10^{-4}$		CL=90%	1341

$\chi_{c1}(1P)\pi^+$	$(2.2 \pm 0.5) \times 10^{-5}$			1468
$\chi_{c1}(1P)K^+$	$(4.74 \pm 0.22) \times 10^{-4}$			1412
$\chi_{c1}(1P)K^*(892)^+$	$(3.0 \pm 0.6) \times 10^{-4}$	S=1.1		1265
$\chi_{c1}(1P)K^0\pi^+$	$(5.8 \pm 0.4) \times 10^{-4}$			1370
$\chi_{c1}(1P)K^+\pi^0$	$(3.29 \pm 0.35) \times 10^{-4}$			1373
$\chi_{c1}(1P)K^+\pi^+\pi^-$	$(3.74 \pm 0.30) \times 10^{-4}$			1319
$\chi_{c1}(2P)K^+$, $\chi_{c1}(2P) \to \pi^+\pi^-\chi_{c1}(1P)$	$< 1.1 \times 10^{-5}$		CL=90%	–
$\chi_{c2}K^+$	$(1.1 \pm 0.4) \times 10^{-5}$			1379
$\chi_{c2}K^+$, $\chi_{c2} \to p\overline{p}\pi^+\pi^-$	$< 1.9 \times 10^{-7}$			–
$\chi_{c2}K^*(892)^+$	$< 1.2 \times 10^{-4}$		CL=90%	1228
$\chi_{c2}K^0\pi^+$	$(1.16 \pm 0.25) \times 10^{-4}$			1336
$\chi_{c2}K^+\pi^0$	$< 6.2 \times 10^{-5}$		CL=90%	1339
$\chi_{c2}K^+\pi^+\pi^-$	$(1.34 \pm 0.19) \times 10^{-4}$			1284
$\chi_{c2}(3930)K^+$, $\chi_{c2} \to D^+D^-$	$(1.6 \pm 0.6) \times 10^{-5}$			–
$\chi_{c2}(3930)\pi^+$, $\chi_{c2} \to \pi^+\pi^-$	$< 1 \times 10^{-7}$		CL=90%	1437
$h_c(1P)K^+$	$(3.7 \pm 1.2) \times 10^{-5}$			1401
$h_c(1P)K^+$, $h_c \to p\overline{p}$	$< 6.4 \times 10^{-8}$		CL=95%	–

K or *K** modes

$K^0\pi^+$	$(2.37 \pm 0.08) \times 10^{-5}$			2614
$K^+\pi^0$	$(1.29 \pm 0.05) \times 10^{-5}$			2615
$\eta' K^+$	$(7.04 \pm 0.25) \times 10^{-5}$			2528
$\eta' K^*(892)^+$	$(4.8 {}^{+1.8}_{-1.6}) \times 10^{-6}$			2472
$\eta' K_0^*(1430)^+$	$(5.2 \pm 2.1) \times 10^{-6}$			–
$\eta' K_2^*(1430)^+$	$(2.8 \pm 0.5) \times 10^{-5}$			2346
ηK^+	$(2.4 \pm 0.4) \times 10^{-6}$	S=1.7		2588
$\eta K^*(892)^+$	$(1.93 \pm 0.16) \times 10^{-5}$			2534
$\eta K_0^*(1430)^+$	$(1.8 \pm 0.4) \times 10^{-5}$			–
$\eta K_2^*(1430)^+$	$(9.1 \pm 3.0) \times 10^{-6}$			2414
$\eta(1295)K^+ \times$ B($\eta(1295) \to \eta\pi\pi$)	$(2.9 {}^{+0.8}_{-0.7}) \times 10^{-6}$			2455
$\eta(1405)K^+ \times$ B($\eta(1405) \to \eta\pi\pi$)	$< 1.3 \times 10^{-6}$		CL=90%	2425
$\eta(1405)K^+ \times$ B($\eta(1405) \to K^*K$)	$< 1.2 \times 10^{-6}$		CL=90%	2425
$\eta(1475)K^+ \times$ B($\eta(1475) \to K^*K$)	$(1.38 {}^{+0.21}_{-0.18}) \times 10^{-5}$			2407
$f_1(1285)K^+$	$< 2.0 \times 10^{-6}$		CL=90%	2458
$f_1(1420)K^+ \times$ B($f_1(1420) \to \eta\pi\pi$)	$< 2.9 \times 10^{-6}$		CL=90%	2420
$f_1(1420)K^+ \times$ B($f_1(1420) \to K^*K$)	$< 4.1 \times 10^{-6}$		CL=90%	2420

$\phi(1680) K^+ \times$ B($\phi(1680) \to K^* K$)	$<$ 3.4	$\times 10^{-6}$	CL=90%	2344
$f_0(1500) K^+$	(3.7 ± 2.2)	$\times 10^{-6}$		2393
ωK^+	(6.5 ± 0.4)	$\times 10^{-6}$		2558
$\omega K^*(892)^+$	$<$ 7.4	$\times 10^{-6}$	CL=90%	2503
$\omega (K\pi)^{*+}_0$	(2.8 ± 0.4)	$\times 10^{-5}$		–
$\omega K^*_0(1430)^+$	(2.4 ± 0.5)	$\times 10^{-5}$		–
$\omega K^*_2(1430)^+$	(2.1 ± 0.4)	$\times 10^{-5}$		2379
$a_0(980)^+ K^0 \times$B($a_0(980)^+ \to \eta\pi^+$)	$<$ 3.9	$\times 10^{-6}$	CL=90%	–
$a_0(980)^0 K^+ \times$B($a_0(980)^0 \to \eta\pi^0$)	$<$ 2.5	$\times 10^{-6}$	CL=90%	–
$K^*(892)^0 \pi^+$	(1.01 ± 0.08)	$\times 10^{-5}$		2562
$K^*(892)^+ \pi^0$	(6.8 ± 0.9)	$\times 10^{-6}$		2563
$K^+ \pi^- \pi^+$	(5.10 ± 0.29)	$\times 10^{-5}$		2609
$K^+ \pi^- \pi^+$ nonresonant	$(1.63 {}^{+0.21}_{-0.15})$	$\times 10^{-5}$		2609
$\omega(782) K^+$	(6 ± 9)	$\times 10^{-6}$		2558
$K^+ f_0(980) \times$ B($f_0(980) \to \pi^+\pi^-$)	$(9.4 {}^{+1.0}_{-1.2})$	$\times 10^{-6}$		2522
$f_2(1270)^0 K^+$	(1.07 ± 0.27)	$\times 10^{-6}$		–
$f_0(1370)^0 K^+ \times$ B($f_0(1370)^0 \to \pi^+\pi^-$)	$<$ 1.07	$\times 10^{-5}$	CL=90%	–
$\rho^0(1450) K^+ \times$ B($\rho^0(1450) \to \pi^+\pi^-$)	$<$ 1.17	$\times 10^{-5}$	CL=90%	–
$f'_2(1525) K^+ \times$ B($f'_2(1525) \to \pi^+\pi^-$)	$<$ 3.4	$\times 10^{-6}$	CL=90%	2394
$K^+ \rho^0$	(3.7 ± 0.5)	$\times 10^{-6}$		2559
$K^*_0(1430)^0 \pi^+$	$(3.9 {}^{+0.6}_{-0.5})$	$\times 10^{-5}$	S=1.4	2445
$K^*_2(1430)^0 \pi^+$	$(5.6 {}^{+2.2}_{-1.5})$	$\times 10^{-6}$		2445
$K^*(1410)^0 \pi^+$	$<$ 4.5	$\times 10^{-5}$	CL=90%	2448
$K^*(1680)^0 \pi^+$	$<$ 1.2	$\times 10^{-5}$	CL=90%	2358
$K^+ \pi^0 \pi^0$	(1.62 ± 0.19)	$\times 10^{-5}$		2610
$f_0(980) K^+ \times$ B($f_0 \to \pi^0\pi^0$)	(2.8 ± 0.8)	$\times 10^{-6}$		2522
$K^- \pi^+ \pi^+$	$<$ 4.6	$\times 10^{-8}$	CL=90%	2609
$K^- \pi^+ \pi^+$ nonresonant	$<$ 5.6	$\times 10^{-5}$	CL=90%	2609
$K_1(1270)^0 \pi^+$	$<$ 4.0	$\times 10^{-5}$	CL=90%	2489
$K_1(1400)^0 \pi^+$	$<$ 3.9	$\times 10^{-5}$	CL=90%	2451
$K^0 \pi^+ \pi^0$	$<$ 6.6	$\times 10^{-5}$	CL=90%	2609
$K^*_0(1430)^+ \pi^0$	$(1.19 {}^{+0.20}_{-0.23})$	$\times 10^{-5}$		–
$K^0 \rho^+$	$(7.3 {}^{+1.0}_{-1.2})$	$\times 10^{-6}$		2558

$K^*(892)^+\pi^+\pi^-$	(	7.5	$\pm$ 1.0	) $\times 10^{-5}$		2557
$K^*(892)^+\rho^0$	(	4.6	$\pm$ 1.1	) $\times 10^{-6}$		2504
$K^*(892)^+f_0(980)$	(	4.2	$\pm$ 0.7	) $\times 10^{-6}$		2466
$a_1^+K^0$	(	3.5	$\pm$ 0.7	) $\times 10^{-5}$		–
$b_1^+K^0\times$ B($b_1^+\to\omega\pi^+$)	(	9.6	$\pm$ 1.9	) $\times 10^{-6}$		–
$K^*(892)^0\rho^+$	(	9.2	$\pm$ 1.5	) $\times 10^{-6}$		2504
$K_1(1400)^+\rho^0$	<	7.8		$\times 10^{-4}$	CL=90%	2388
$K_2^*(1430)^+\rho^0$	<	1.5		$\times 10^{-3}$	CL=90%	2381
$b_1^0K^+\times$ B($b_1^0\to\omega\pi^0$)	(	9.1	$\pm$ 2.0	) $\times 10^{-6}$		–
$b_1^+K^{*0}\times$ B($b_1^+\to\omega\pi^+$)	<	5.9		$\times 10^{-6}$	CL=90%	–
$b_1^0K^{*+}\times$ B($b_1^0\to\omega\pi^0$)	<	6.7		$\times 10^{-6}$	CL=90%	–
$K^+\overline{K}^0$	(	1.31	$\pm$ 0.17	) $\times 10^{-6}$	S=1.2	2593
$\overline{K}^0K^+\pi^0$	<	2.4		$\times 10^{-5}$	CL=90%	2578
$K^+K_S^0K_S^0$	(	1.05	$\pm$ 0.04	) $\times 10^{-5}$		2521
$f_0(980)K^+$, $f_0\to K_S^0K_S^0$	(	1.47	$\pm$ 0.33	) $\times 10^{-5}$		–
$f_0(1710)K^+$, $f_0\to K_S^0K_S^0$	(	4.8	$^{+4.0}_{-2.6}$	) $\times 10^{-7}$		–
$K^+K_S^0K_S^0$ nonresonant	(	2.0	$\pm$ 0.4	) $\times 10^{-5}$		2521
$K_S^0K_S^0\pi^+$	<	5.1		$\times 10^{-7}$	CL=90%	2577
$K^+K^-\pi^+$	(	5.2	$\pm$ 0.4	) $\times 10^{-6}$		2578
$K^+K^-\pi^+$ nonresonant	(	1.68	$\pm$ 0.26	) $\times 10^{-6}$		2578
$K^+\overline{K}^*(892)^0$	(	5.9	$\pm$ 0.8	) $\times 10^{-7}$		2540
$K^+\overline{K}_0^*(1430)^0$	(	3.8	$\pm$ 1.3	) $\times 10^{-7}$		2421
$\pi^+(K^+K^-)_{S-wave}$	(	8.5	$\pm$ 0.9	) $\times 10^{-7}$		2578
$K^+K^+\pi^-$	<	1.1		$\times 10^{-8}$	CL=90%	2578
$K^+K^+\pi^-$ nonresonant	<	8.79		$\times 10^{-5}$	CL=90%	2578
$f_2'(1525)K^+$	(	1.8	$\pm$ 0.5	) $\times 10^{-6}$	S=1.1	2394
$K^{*+}\pi^+K^-$	<	1.18		$\times 10^{-5}$	CL=90%	2524
$K^*(892)^+K^*(892)^0$	(	9.1	$\pm$ 2.9	) $\times 10^{-7}$		2485
$K^{*+}K^+\pi^-$	<	6.1		$\times 10^{-6}$	CL=90%	2524
$K^+K^-K^+$	(	3.40	$\pm$ 0.14	) $\times 10^{-5}$	S=1.4	2523
$K^+\phi$	(	8.8	$^{+0.7}_{-0.6}$	) $\times 10^{-6}$	S=1.1	2516
$f_0(980)K^+\times$ B($f_0(980)\to K^+K^-$)	(	9.4	$\pm$ 3.2	) $\times 10^{-6}$		2522
$a_2(1320)K^+\times$ B($a_2(1320)\to K^+K^-$)	<	1.1		$\times 10^{-6}$	CL=90%	2449
$X_0(1550)K^+\times$ B($X_0(1550)\to K^+K^-$)	(	4.3	$\pm$ 0.7	) $\times 10^{-6}$		–
$\phi(1680)K^+\times$ B($\phi(1680)\to K^+K^-$)	<	8		$\times 10^{-7}$	CL=90%	2344
$f_0(1710)K^+\times$ B($f_0(1710)\to K^+K^-$)	(	1.1	$\pm$ 0.6	) $\times 10^{-6}$		2327

$K^+ K^- K^+$ nonresonant	$(2.38 \ {}^{+0.28}_{-0.50}) \times 10^{-5}$		2523
$K^*(892)^+ K^+ K^-$	$(3.6 \pm 0.5) \times 10^{-5}$		2466
$K^*(892)^+ \phi$	$(10.0 \pm 2.0) \times 10^{-6}$	S=1.7	2460
$\phi (K\pi)^{*+}_0$	$(8.3 \pm 1.6) \times 10^{-6}$		–
$\phi K_1(1270)^+$	$(6.1 \pm 1.9) \times 10^{-6}$		2380
$\phi K_1(1400)^+$	$< 3.2 \times 10^{-6}$	CL=90%	2339
$\phi K^*(1410)^+$	$< 4.3 \times 10^{-6}$	CL=90%	–
$\phi K^*_0(1430)^+$	$(7.0 \pm 1.6) \times 10^{-6}$		–
$\phi K^*_2(1430)^+$	$(8.4 \pm 2.1) \times 10^{-6}$		2332
$\phi K^*_2(1770)^+$	$< 1.50 \times 10^{-5}$	CL=90%	–
$\phi K^*_2(1820)^+$	$< 1.63 \times 10^{-5}$	CL=90%	–
$a_1^+ K^{*0}$	$< 3.6 \times 10^{-6}$	CL=90%	–
$K^+ \phi\phi$	$(4.2 \pm 0.8) \times 10^{-6}$	S=2.2	2306
$\eta' \eta' K^+$	$< 2.5 \times 10^{-5}$	CL=90%	2338
$\omega \phi K^+$	$< 1.9 \times 10^{-6}$	CL=90%	2374
$X(1812) K^+ \times$ B$(X \to \omega\phi)$	$< 3.2 \times 10^{-7}$	CL=90%	–
$K^*(892)^+ \gamma$	$(3.92 \pm 0.22) \times 10^{-5}$	S=1.7	2564
$K_1(1270)^+ \gamma$	$(4.4 \ {}^{+0.7}_{-0.6}) \times 10^{-5}$		2491
$\eta K^+ \gamma$	$(7.9 \pm 0.9) \times 10^{-6}$		2588
$\eta' K^+ \gamma$	$(2.9 \ {}^{+1.0}_{-0.9}) \times 10^{-6}$		2528
$\phi K^+ \gamma$	$(2.7 \pm 0.4) \times 10^{-6}$	S=1.2	2516
$K^+ \pi^- \pi^+ \gamma$	$(2.58 \pm 0.15) \times 10^{-5}$	S=1.3	2609
$K^*(892)^0 \pi^+ \gamma$	$(2.33 \pm 0.12) \times 10^{-5}$		2562
$K^+ \rho^0 \gamma$	$(8.2 \pm 0.9) \times 10^{-6}$		2559
$(K^+ \pi^-)_{\rm NR} \pi^+ \gamma$	$(9.9 \ {}^{+1.7}_{-2.0}) \times 10^{-6}$		2609
$K^0 \pi^+ \pi^0 \gamma$	$(4.6 \pm 0.5) \times 10^{-5}$		2609
$K_1(1400)^+ \gamma$	$(10 \ {}^{+5}_{-4}) \times 10^{-6}$		2453
$K^*(1410)^+ \gamma$	$(2.7 \ {}^{+0.8}_{-0.6}) \times 10^{-5}$		–
$K^*_0(1430)^0 \pi^+ \gamma$	$(1.32 \ {}^{+0.26}_{-0.32}) \times 10^{-6}$		2445
$K^*_2(1430)^+ \gamma$	$(1.4 \pm 0.4) \times 10^{-5}$		2447
$K^*(1680)^+ \gamma$	$(6.7 \ {}^{+1.7}_{-1.4}) \times 10^{-5}$		2360
$K^*_3(1780)^+ \gamma$	$< 3.9 \times 10^{-5}$	CL=90%	2340
$K^*_4(2045)^+ \gamma$	$< 9.9 \times 10^{-3}$	CL=90%	2242

Light unflavored meson modes

$\rho^+ \gamma$	$(9.8 \pm 2.5) \times 10^{-7}$		2583
$\pi^+ \pi^0$	$(5.5 \pm 0.4) \times 10^{-6}$	S=1.2	2636
$\pi^+ \pi^+ \pi^-$	$(1.52 \pm 0.14) \times 10^{-5}$		2630
$\rho^0 \pi^+$	$(8.3 \pm 1.2) \times 10^{-6}$		2581

$\pi^+ f_0(980)$, $f_0 \to \pi^+\pi^-$	< 1.5	$\times 10^{-6}$	CL=90%	2545
$\pi^+ f_2(1270)$	$(2.2\ ^{+\ 0.7}_{-\ 0.4})$	$\times 10^{-6}$		2484
$\rho(1450)^0\pi^+$, $\rho^0 \to \pi^+\pi^-$	$(1.4\ ^{+\ 0.6}_{-\ 0.9})$	$\times 10^{-6}$		2434
$\rho(1450)^0\pi^+$, $\rho^0 \to K^+K^-$	(1.60 ± 0.14)	$\times 10^{-6}$		–
$f_0(1370)\pi^+$, $f_0 \to \pi^+\pi^-$	< 4.0	$\times 10^{-6}$	CL=90%	2460
$f_0(500)\pi^+$, $f_0 \to \pi^+\pi^-$	< 4.1	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^-\pi^+$ nonresonant	$(5.3\ ^{+\ 1.5}_{-\ 1.1})$	$\times 10^{-6}$		2630
$\pi^+\pi^0\pi^0$	< 8.9	$\times 10^{-4}$	CL=90%	2631
$\rho^+\pi^0$	(1.09 ± 0.14)	$\times 10^{-5}$		2581
$\pi^+\pi^-\pi^+\pi^0$	< 4.0	$\times 10^{-3}$	CL=90%	2622
$\rho^+\rho^0$	(2.40 ± 0.19)	$\times 10^{-5}$		2523
$\rho^+ f_0(980)$, $f_0 \to \pi^+\pi^-$	< 2.0	$\times 10^{-6}$	CL=90%	2486
$a_1(1260)^+\pi^0$	(2.6 ± 0.7)	$\times 10^{-5}$		2494
$a_1(1260)^0\pi^+$	(2.0 ± 0.6)	$\times 10^{-5}$		2494
$\omega\pi^+$	(6.9 ± 0.5)	$\times 10^{-6}$		2580
$\omega\rho^+$	(1.59 ± 0.21)	$\times 10^{-5}$		2522
$\eta\pi^+$	(4.02 ± 0.27)	$\times 10^{-6}$		2609
$\eta\rho^+$	(7.0 ± 2.9)	$\times 10^{-6}$	S=2.8	2553
$\eta'\pi^+$	(2.7 ± 0.9)	$\times 10^{-6}$	S=1.9	2551
$\eta'\rho^+$	(9.7 ± 2.2)	$\times 10^{-6}$		2492
$\phi\pi^+$	(3.2 ± 1.5)	$\times 10^{-8}$		2539
$\phi\rho^+$	< 3.0	$\times 10^{-6}$	CL=90%	2480
$a_0(980)^0\pi^+$, $a_0^0 \to \eta\pi^0$	< 5.8	$\times 10^{-6}$	CL=90%	–
$a_0(980)^+\pi^0$, $a_0^+ \to \eta\pi^+$	< 1.4	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^+\pi^+\pi^-\pi^-$	< 8.6	$\times 10^{-4}$	CL=90%	2608
$\rho^0 a_1(1260)^+$	< 6.2	$\times 10^{-4}$	CL=90%	2433
$\rho^0 a_2(1320)^+$	< 7.2	$\times 10^{-4}$	CL=90%	2410
$b_1^0\pi^+$, $b_1^0 \to \omega\pi^0$	(6.7 ± 2.0)	$\times 10^{-6}$		–
$b_1^+\pi^0$, $b_1^+ \to \omega\pi^+$	< 3.3	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0$	< 6.3	$\times 10^{-3}$	CL=90%	2592
$b_1^+\rho^0$, $b_1^+ \to \omega\pi^+$	< 5.2	$\times 10^{-6}$	CL=90%	–
$a_1(1260)^+ a_1(1260)^0$	< 1.3	%	CL=90%	2336
$b_1^0\rho^+$, $b_1^0 \to \omega\pi^0$	< 3.3	$\times 10^{-6}$	CL=90%	–

Charged particle ($h^\pm$) modes

$h^\pm = K^\pm$ or $\pi^\pm$

$h^+\pi^0$	$(1.6\ ^{+\ 0.7}_{-\ 0.6})$	$\times 10^{-5}$		2636
ωh^+	$(1.38\ ^{+\ 0.27}_{-\ 0.24})$	$\times 10^{-5}$		2580
h^+X^0 (Familon)	< 4.9	$\times 10^{-5}$	CL=90%	–
K^+X^0, $X^0 \to \mu^+\mu^-$	< 1	$\times 10^{-7}$	CL=95%	–

Baryon modes

$p\overline{p}\pi^+$		$(1.62 \pm 0.20) \times 10^{-6}$		2439
$p\overline{p}\pi^+$ nonresonant		$< 5.3 \times 10^{-5}$	CL=90%	2439
$p\overline{p}\pi^+\pi^0$		$(4.6 \pm 1.3) \times 10^{-6}$		2407
$p\overline{p}K^+$		$(5.9 \pm 0.5) \times 10^{-6}$	S=1.5	2348
$\Theta(1710)^{++}\overline{p}$, $\Theta^{++} \to pK^+$	[nnn]	$< 9.1 \times 10^{-8}$	CL=90%	–
$f_J(2220)K^+$, $f_J \to p\overline{p}$	[nnn]	$< 4.1 \times 10^{-7}$	CL=90%	2135
$p\overline{\Lambda}(1520)$		$(3.1 \pm 0.6) \times 10^{-7}$		2322
$p\overline{p}K^+$ nonresonant		$< 8.9 \times 10^{-5}$	CL=90%	2348
$p\overline{p}K^*(892)^+$		$(3.6 {}^{+0.8}_{-0.7}) \times 10^{-6}$		2215
$f_J(2220)K^{*+}$, $f_J \to p\overline{p}$		$< 7.7 \times 10^{-7}$	CL=90%	2059
$p\overline{\Lambda}$		$(2.4 {}^{+1.0}_{-0.9}) \times 10^{-7}$		2430
$p\overline{\Lambda}\gamma$		$(2.4 {}^{+0.5}_{-0.4}) \times 10^{-6}$		2430
$p\overline{\Lambda}\pi^0$		$(3.0 {}^{+0.7}_{-0.6}) \times 10^{-6}$		2402
$p\overline{\Sigma}(1385)^0$		$< 4.7 \times 10^{-7}$	CL=90%	2362
$\Delta^+\overline{\Lambda}$		$< 8.2 \times 10^{-7}$	CL=90%	–
$p\overline{\Sigma}\gamma$		$< 4.6 \times 10^{-6}$	CL=90%	2413
$p\overline{\Lambda}\pi^+\pi^-$		$(1.13 \pm 0.13) \times 10^{-5}$		2367
$p\overline{\Lambda}\pi^+\pi^-$ nonresonant		$(5.9 \pm 1.1) \times 10^{-6}$		2367
$p\overline{\Lambda}\rho^0$, $\rho^0 \to \pi^+\pi^-$		$(4.8 \pm 0.9) \times 10^{-6}$		2214
$p\overline{\Lambda}f_2(1270)$, $f_2 \to \pi^+\pi^-$		$(2.0 \pm 0.8) \times 10^{-6}$		2026
$p\overline{\Lambda}K^+K^-$		$(4.1 \pm 0.7) \times 10^{-6}$		2132
$p\overline{\Lambda}\phi$		$(8.0 \pm 2.2) \times 10^{-7}$		2119
$\overline{p}\Lambda K^+K^-$		$(3.7 \pm 0.6) \times 10^{-6}$		2132
$\Lambda\overline{\Lambda}\pi^+$		$< 9.4 \times 10^{-7}$	CL=90%	2358
$\Lambda\overline{\Lambda}K^+$		$(3.4 \pm 0.6) \times 10^{-6}$		2251
$\Lambda\overline{\Lambda}K^{*+}$		$(2.2 {}^{+1.2}_{-0.9}) \times 10^{-6}$		2098
$\Lambda(1520)\overline{\Lambda}K^+$		$(2.2 \pm 0.7) \times 10^{-6}$		2126
$\Lambda\overline{\Lambda}(1520)K^+$		$< 2.08 \times 10^{-6}$		2126
$\overline{\Delta}^0 p$		$< 1.38 \times 10^{-6}$	CL=90%	2403
$\Delta^{++}\overline{p}$		$< 1.4 \times 10^{-7}$	CL=90%	2403
$D^+ p\overline{p}$		$< 1.5 \times 10^{-5}$	CL=90%	1860
$D^*(2010)^+ p\overline{p}$		$< 1.5 \times 10^{-5}$	CL=90%	1786
$\overline{D}^0 p\overline{p}\pi^+$		$(3.72 \pm 0.27) \times 10^{-4}$		1789
$\overline{D}^{*0} p\overline{p}\pi^+$		$(3.73 \pm 0.32) \times 10^{-4}$		1709
$D^- p\overline{p}\pi^+\pi^-$		$(1.66 \pm 0.30) \times 10^{-4}$		1705
$D^{*-} p\overline{p}\pi^+\pi^-$		$(1.86 \pm 0.25) \times 10^{-4}$		1621
$p\overline{\Lambda}^0\overline{D}^0$		$(1.43 \pm 0.32) \times 10^{-5}$		–
$p\overline{\Lambda}^0\overline{D}^*(2007)^0$		$< 5 \times 10^{-5}$	CL=90%	–
$\overline{\Lambda}_c^- p\pi^+$		$(2.3 \pm 0.4) \times 10^{-4}$	S=2.4	1980

$\overline{\Lambda}_c^- \Delta(1232)^{++}$		$< 1.9 \times 10^{-5}$	CL=90%	1928
$\overline{\Lambda}_c^- \Delta_X(1600)^{++}$		$(4.7 \pm 1.0) \times 10^{-5}$		–
$\overline{\Lambda}_c^- \Delta_X(2420)^{++}$		$(3.8 \pm 0.8) \times 10^{-5}$		–
$(\overline{\Lambda}_c^- p)_s \pi^+$	[ooo]	$(3.1 \pm 0.7) \times 10^{-5}$		–
$\overline{\Sigma}_c(2520)^0 p$		$< 3 \times 10^{-6}$	CL=90%	1904
$\overline{\Sigma}_c(2800)^0 p$		$(2.7 \pm 0.9) \times 10^{-5}$		–
$\overline{\Lambda}_c^- p \pi^+ \pi^0$		$(1.8 \pm 0.6) \times 10^{-3}$		1935
$\overline{\Lambda}_c^- p \pi^+ \pi^+ \pi^-$		$(2.2 \pm 0.7) \times 10^{-3}$		1880
$\overline{\Lambda}_c^- p \pi^+ \pi^+ \pi^- \pi^0$		< 1.34 %	CL=90%	1823
$\Lambda_c^+ \Lambda_c^- K^+$		$(4.9 \pm 0.7) \times 10^{-4}$		739
$\Xi_c(2930) \Lambda_c^+$, $\Xi_c \to K^+ \Lambda_c^-$		$(1.7 \pm 0.5) \times 10^{-4}$		–
$\overline{\Sigma}_c(2455)^0 p$		$(3.0 \pm 0.7) \times 10^{-5}$		1938
$\overline{\Sigma}_c(2455)^0 p \pi^0$		$(3.5 \pm 1.1) \times 10^{-4}$		1896
$\overline{\Sigma}_c(2455)^0 p \pi^- \pi^+$		$(3.5 \pm 1.1) \times 10^{-4}$		1845
$\overline{\Sigma}_c(2455)^{--} p \pi^+ \pi^+$		$(2.38 \pm 0.19) \times 10^{-4}$		1845
$\overline{\Lambda}_c(2593)^- / \overline{\Lambda}_c(2625)^- p \pi^+$		$< 1.9 \times 10^{-4}$	CL=90%	–
$\overline{\Xi}_c^0 \Lambda_c^+$		$(9.5 \pm 2.3) \times 10^{-4}$		1144
$\overline{\Xi}_c^0 \Lambda_c^+$, $\overline{\Xi}_c^0 \to \overline{\Xi}^+ \pi^-$		$(1.76 \pm 0.29) \times 10^{-5}$		1144
$\overline{\Xi}_c^0 \Lambda_c^+$, $\overline{\Xi}_c^0 \to \Lambda K^+ \pi^-$		$(1.14 \pm 0.26) \times 10^{-5}$		1144
$\overline{\Xi}_c^0 \Lambda_c^+$, $\overline{\Xi}_c^0 \to p K^- K^- \pi^+$		$(5.5 \pm 1.9) \times 10^{-6}$		–
$\Lambda_c^+ \overline{\Xi}_c^{\prime 0}$		$< 6.5 \times 10^{-4}$	CL=90%	1023
$\Lambda_c^+ \overline{\Xi}_c(2645)^0$		$< 7.9 \times 10^{-4}$	CL=90%	–
$\Lambda_c^+ \overline{\Xi}_c(2790)^0$		$(1.1 \pm 0.4) \times 10^{-3}$		–

Lepton Family number (*LF*) or Lepton number (*L*) or Baryon number (*B*) violating modes, or/and $\Delta B = 1$ weak neutral current (*B1*) modes

$\pi^+ \ell^+ \ell^-$	B1		$< 4.9 \times 10^{-8}$	CL=90%	2638
$\pi^+ e^+ e^-$	B1		$< 8.0 \times 10^{-8}$	CL=90%	2638
$\pi^+ \mu^+ \mu^-$	B1		$(1.78 \pm 0.23) \times 10^{-8}$		2634
$\pi^+ \nu \overline{\nu}$	B1		$< 1.4 \times 10^{-5}$	CL=90%	2638
$K^+ \ell^+ \ell^-$	B1	[ggg]	$(4.7 \pm 0.5) \times 10^{-7}$	S=2.3	2617
$K^+ e^+ e^-$	B1		$(5.6 \pm 0.6) \times 10^{-7}$		2617
$K^+ \mu^+ \mu^-$	B1		$(4.53 \pm 0.35) \times 10^{-7}$	S=1.8	2612
$K^+ \mu^+ \mu^-$ nonresonant	B1		$(4.37 \pm 0.27) \times 10^{-7}$		2612
$K^+ \tau^+ \tau^-$	B1		$< 2.25 \times 10^{-3}$	CL=90%	1687
$K^+ \overline{\nu} \nu$	B1		$< 1.6 \times 10^{-5}$	CL=90%	2617
$\rho^+ \nu \overline{\nu}$	B1		$< 3.0 \times 10^{-5}$	CL=90%	2583
$K^*(892)^+ \ell^+ \ell^-$	B1	[ggg]	$(1.01 \pm 0.11) \times 10^{-6}$	S=1.1	2564
$K^*(892)^+ e^+ e^-$	B1		$(1.55 {}^{+0.40}_{-0.31}) \times 10^{-6}$		2564
$K^*(892)^+ \mu^+ \mu^-$	B1		$(9.6 \pm 1.0) \times 10^{-7}$		2560
$K^*(892)^+ \nu \overline{\nu}$	B1		$< 4.0 \times 10^{-5}$	CL=90%	2564

$K^+ \pi^+ \pi^- \mu^+ \mu^-$	B1	(	4.3	$\pm$ 0.4	) $\times 10^{-7}$		2593
$\phi K^+ \mu^+ \mu^-$	B1	(	7.9	$^{+2.1}_{-1.7}$	) $\times 10^{-8}$		2490
$\overline{\Lambda} p \nu \overline{\nu}$		<	3.0		$\times 10^{-5}$	CL=90%	2430
$\pi^+ e^+ \mu^-$	LF	<	6.4		$\times 10^{-3}$	CL=90%	2637
$\pi^+ e^- \mu^+$	LF	<	6.4		$\times 10^{-3}$	CL=90%	2637
$\pi^+ e^\pm \mu^\mp$	LF	<	1.7		$\times 10^{-7}$	CL=90%	2637
$\pi^+ e^+ \tau^-$	LF	<	7.4		$\times 10^{-5}$	CL=90%	2338
$\pi^+ e^- \tau^+$	LF	<	2.0		$\times 10^{-5}$	CL=90%	2338
$\pi^+ e^\pm \tau^\mp$	LF	<	7.5		$\times 10^{-5}$	CL=90%	2338
$\pi^+ \mu^+ \tau^-$	LF	<	6.2		$\times 10^{-5}$	CL=90%	2334
$\pi^+ \mu^- \tau^+$	LF	<	4.5		$\times 10^{-5}$	CL=90%	2334
$\pi^+ \mu^\pm \tau^\mp$	LF	<	7.2		$\times 10^{-5}$	CL=90%	2334
$K^+ e^+ \mu^-$	LF	<	7.0		$\times 10^{-9}$	CL=90%	2616
$K^+ e^- \mu^+$	LF	<	6.4		$\times 10^{-9}$	CL=90%	2616
$K^+ e^\pm \mu^\mp$	LF	<	9.1		$\times 10^{-8}$	CL=90%	2616
$K^+ e^+ \tau^-$	LF	<	4.3		$\times 10^{-5}$	CL=90%	2312
$K^+ e^- \tau^+$	LF	<	1.5		$\times 10^{-5}$	CL=90%	2312
$K^+ e^\pm \tau^\mp$	LF	<	3.0		$\times 10^{-5}$	CL=90%	2312
$K^+ \mu^+ \tau^-$	LF	<	4.5		$\times 10^{-5}$	CL=90%	2298
$K^+ \mu^- \tau^+$	LF	<	2.8		$\times 10^{-5}$	CL=90%	2298
$K^+ \mu^\pm \tau^\mp$	LF	<	4.8		$\times 10^{-5}$	CL=90%	2298
$K^*(892)^+ e^+ \mu^-$	LF	<	1.3		$\times 10^{-6}$	CL=90%	2563
$K^*(892)^+ e^- \mu^+$	LF	<	9.9		$\times 10^{-7}$	CL=90%	2563
$K^*(892)^+ e^\pm \mu^\mp$	LF	<	1.4		$\times 10^{-6}$	CL=90%	2563
$\pi^- e^+ e^+$	L	<	2.3		$\times 10^{-8}$	CL=90%	2638
$\pi^- \mu^+ \mu^+$	L	<	4.0		$\times 10^{-9}$	CL=95%	2634
$\pi^- e^+ \mu^+$	L	<	1.5		$\times 10^{-7}$	CL=90%	2637
$\rho^- e^+ e^+$	L	<	1.7		$\times 10^{-7}$	CL=90%	2583
$\rho^- \mu^+ \mu^+$	L	<	4.2		$\times 10^{-7}$	CL=90%	2578
$\rho^- e^+ \mu^+$	L	<	4.7		$\times 10^{-7}$	CL=90%	2582
$K^- e^+ e^+$	L	<	3.0		$\times 10^{-8}$	CL=90%	2617
$K^- \mu^+ \mu^+$	L	<	4.1		$\times 10^{-8}$	CL=90%	2612
$K^- e^+ \mu^+$	L	<	1.6		$\times 10^{-7}$	CL=90%	2616
$K^*(892)^- e^+ e^+$	L	<	4.0		$\times 10^{-7}$	CL=90%	2564
$K^*(892)^- \mu^+ \mu^+$	L	<	5.9		$\times 10^{-7}$	CL=90%	2560
$K^*(892)^- e^+ \mu^+$	L	<	3.0		$\times 10^{-7}$	CL=90%	2563
$D^- e^+ e^+$	L	<	2.6		$\times 10^{-6}$	CL=90%	2309
$D^- e^+ \mu^+$	L	<	1.8		$\times 10^{-6}$	CL=90%	2307
$D^- \mu^+ \mu^+$	L	<	6.9		$\times 10^{-7}$	CL=95%	2303
$D^{*-} \mu^+ \mu^+$	L	<	2.4		$\times 10^{-6}$	CL=95%	2251
$D_s^- \mu^+ \mu^+$	L	<	5.8		$\times 10^{-7}$	CL=95%	2267
$\overline{D}^0 \pi^- \mu^+ \mu^+$	L	<	1.5		$\times 10^{-6}$	CL=95%	2295
$\Lambda^0 \mu^+$	L,B	<	6		$\times 10^{-8}$	CL=90%	–

$\Lambda^0 e^+$	L,B	$<$	3.2	$\times 10^{-8}$	CL=90%	–
$\overline{\Lambda}^0 \mu^+$	L,B	$<$	6	$\times 10^{-8}$	CL=90%	–
$\overline{\Lambda}^0 e^+$	L,B	$<$	8	$\times 10^{-8}$	CL=90%	–

B^0

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m_{B^0} = 5279.66 \pm 0.12$ MeV
$m_{B^0} - m_{B^\pm} = 0.32 \pm 0.05$ MeV
Mean life $\tau_{B^0} = (1.519 \pm 0.004) \times 10^{-12}$ s
$c\tau = 455.4\ \mu$m
$\tau_{B^+}/\tau_{B^0} = 1.076 \pm 0.004$ (direct measurements)

B^0-$\overline{B}^0$ mixing parameters

χ_d (B^0-$\overline{B}^0$ mixing probability) $= 0.1858 \pm 0.0011$
$\Delta m_{B^0} = m_{B^0_H} - m_{B^0_L} = (0.5065 \pm 0.0019) \times 10^{12}\ \hbar\ \mathrm{s}^{-1}$
$= (3.334 \pm 0.013) \times 10^{-10}$ MeV
$x_d = \Delta m_{B^0}/\Gamma_{B^0} = 0.769 \pm 0.004$
$\mathrm{Re}(\lambda_{CP} / |\lambda_{CP}|)\ \mathrm{Re}(z) = 0.047 \pm 0.022$
$\Delta\Gamma\ \mathrm{Re}(z) = -0.007 \pm 0.004\ \mathrm{ps}^{-1}$
$\mathrm{Re}(z) = (-4 \pm 4) \times 10^{-2}$ (S = 1.4)
$\mathrm{Im}(z) = (-0.8 \pm 0.4) \times 10^{-2}$

CP violation parameters

$\mathrm{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2) = (-0.5 \pm 0.4) \times 10^{-3}$
$A_{T/CP}(B^0 \leftrightarrow \overline{B}^0) = 0.005 \pm 0.018$
$A_{CP}(B^0 \to D^*(2010)^+ D^-) = 0.013 \pm 0.014$
$A_{CP}(B^0 \to \overline{D}^0 \pi^0) = (0.4 \pm 2.4) \times 10^{-2}$
$A_{CP}(B^0 \to [K^+ K^-]_D K^*(892)^0) = -0.05 \pm 0.10$
$A_{CP}(B^0 \to [K^+ \pi^-]_D K^*(892)^0) = 0.047 \pm 0.029$
$A_{CP}(B^0 \to [K^+ \pi^- \pi^+ \pi^-]_D K^*(892)^0) = 0.037 \pm 0.034$
$A_{CP}(B^0 \to [K^- \pi^+]_D K^*(892)^0) = 0.19 \pm 0.19$
$A_{CP}(B^0 \to [K^- \pi^+ \pi^+ \pi^-]_D K^*(892)^0) = -0.01 \pm 0.24$
$R_d^+ = \Gamma(B^0 \to [\pi^+ K^-]_D K^{*0}) / \Gamma(B^0 \to [\pi^- K^+]_D K^{*0}) = 0.064 \pm 0.021$
$R_d^- = \Gamma(\overline{B}^0 \to [\pi^- K^+]_D K^{*0}) / \Gamma(\overline{B}^0 \to [\pi^+ K^-]_D K^{*0}) = 0.095 \pm 0.021$
$A_{CP}(B^0 \to [\pi^+ \pi^-]_D K^*(892)^0) = -0.18 \pm 0.14$
$A_{CP}(B^0 \to [\pi^+ \pi^- \pi^+ \pi^-]_D K^*(892)^0) = -0.03 \pm 0.15$

$R_d^+ = \Gamma(B^0 \to [\pi^+ K^- \pi^+ \pi^-]_D K^{*0}) / \Gamma(B^0 \to [\pi^- K^+ \pi^+ \pi^-]_D K^{*0}) = 0.074 \pm 0.026$
$R_d^- = \Gamma(\overline{B}^0 \to [\pi^- K^+ \pi^+ \pi^-]_D K^{*0}) / \Gamma(\overline{B}^0 \to [\pi^+ K^- \pi^+ \pi^-]_D K^{*0}) = 0.072 \pm 0.025$
$\boldsymbol{A_{CP} (B^0 \to K^+ \pi^-)} = -0.0834 \pm 0.0032$
$A_{CP}(B^0 \to \eta' K^*(892)^0) = -0.07 \pm 0.18$
$A_{CP}(B^0 \to \eta' K_0^*(1430)^0) = -0.19 \pm 0.17$
$A_{CP}(B^0 \to \eta' K_2^*(1430)^0) = 0.14 \pm 0.18$
$\boldsymbol{A_{CP}(B^0 \to \eta K^*(892)^0)} = 0.19 \pm 0.05$
$A_{CP}(B^0 \to \eta K_0^*(1430)^0) = 0.06 \pm 0.13$
$A_{CP}(B^0 \to \eta K_2^*(1430)^0) = -0.07 \pm 0.19$
$A_{CP}(B^0 \to b_1 K^+) = -0.07 \pm 0.12$
$A_{CP}(B^0 \to \omega K^{*0}) = 0.45 \pm 0.25$
$A_{CP}(B^0 \to \omega (K\pi)_0^{*0}) = -0.07 \pm 0.09$
$A_{CP}(B^0 \to \omega K_2^*(1430)^0) = -0.37 \pm 0.17$
$A_{CP}(B^0 \to K^+ \pi^- \pi^0) = (0 \pm 6) \times 10^{-2}$
$A_{CP}(B^0 \to \rho^- K^+) = 0.20 \pm 0.11$
$A_{CP}(B^0 \to \rho(1450)^- K^+) = -0.10 \pm 0.33$
$A_{CP}(B^0 \to \rho(1700)^- K^+) = -0.4 \pm 0.6$
$A_{CP}(B^0 \to K^+ \pi^- \pi^0 \text{ nonresonant}) = 0.10 \pm 0.18$
$A_{CP}(B^0 \to K^0 \pi^+ \pi^-) = -0.01 \pm 0.05$
$\boldsymbol{A_{CP}(B^0 \to K^*(892)^+ \pi^-)} = -0.27 \pm 0.04$
$A_{CP}(B^0 \to (K\pi)_0^{*+} \pi^-) = 0.02 \pm 0.04$
$A_{CP}(B^0 \to K_2^*(1430)^+ \pi^-) = -0.29 \pm 0.24$
$A_{CP}(B^0 \to K^*(1680)^+ \pi^-) = -0.07 \pm 0.14$
$A_{CP}(B^0 \to f_0(980) K_S^0) = 0.28 \pm 0.31$
$A_{CP}(B^0 \to (K\pi)_0^{*0} \pi^0) = -0.15 \pm 0.11$
$A_{CP}(B^0 \to K^{*0} \pi^0) = -0.15 \pm 0.13$
$A_{CP}(B^0 \to K^*(892)^0 \pi^+ \pi^-) = 0.07 \pm 0.05$
$A_{CP}(B^0 \to K^*(892)^0 \rho^0) = -0.06 \pm 0.09$
$A_{CP}(B^0 \to K^{*0} f_0(980)) = 0.07 \pm 0.10$
$A_{CP}(B^0 \to K^{*+} \rho^-) = 0.21 \pm 0.15$
$A_{CP}(B^0 \to K^*(892)^0 K^+ K^-) = 0.01 \pm 0.05$
$A_{CP}(B^0 \to a_1^- K^+) = -0.16 \pm 0.12$
$A_{CP}(B^0 \to K^0 K^0) = -0.6 \pm 0.7$
$A_{CP}(B^0 \to K^*(892)^0 \phi) = 0.00 \pm 0.04$
$A_{CP}(B^0 \to K^*(892)^0 K^- \pi^+) = 0.2 \pm 0.4$
$A_{CP}(B^0 \to \phi (K\pi)_0^{*0}) = 0.12 \pm 0.08$
$A_{CP}(B^0 \to \phi K_2^*(1430)^0) = -0.11 \pm 0.10$
$A_{CP}(B^0 \to K^*(892)^0 \gamma) = -0.006 \pm 0.011$
$A_{CP}(B^0 \to K_2^*(1430)^0 \gamma) = -0.08 \pm 0.15$
$A_{CP}(B^0 \to X_s \gamma) = -0.009 \pm 0.018$

$A_{CP}(B^0 \rightarrow \rho^+\pi^-) = 0.13 \pm 0.06$ (S = 1.1)
$A_{CP}(B^0 \rightarrow \rho^-\pi^+) = -0.08 \pm 0.08$
$A_{CP}(B^0 \rightarrow a_1(1260)^\pm\pi^\mp) = -0.07 \pm 0.06$
$A_{CP}(B^0 \rightarrow b_1^-\pi^+) = -0.05 \pm 0.10$
$A_{CP}(B^0 \rightarrow p\overline{p}K^*(892)^0) = 0.05 \pm 0.12$
$A_{CP}(B^0 \rightarrow p\overline{\Lambda}\pi^-) = 0.04 \pm 0.07$
$A_{CP}(B^0 \rightarrow K^{*0}\ell^+\ell^-) = -0.05 \pm 0.10$
$A_{CP}(B^0 \rightarrow K^{*0}e^+e^-) = -0.21 \pm 0.19$
$A_{CP}(B^0 \rightarrow K^{*0}\mu^+\mu^-) = -0.034 \pm 0.024$
$C_{D^{*-}D^+}(B^0 \rightarrow D^*(2010)^-D^+) = -0.02 \pm 0.08$
$\boldsymbol{S_{D^{*-}D^+}(B^0 \rightarrow D^*(2010)^-D^+)} = -0.83 \pm 0.09$
$C_{D^{*+}D^-}(B^0 \rightarrow D^*(2010)^+D^-) = -0.03 \pm 0.09$ (S = 1.1)
$\boldsymbol{S_{D^{*+}D^-}(B^0 \rightarrow D^*(2010)^+D^-)} = -0.80 \pm 0.09$
$C_{D^{*+}D^{*-}}(B^0 \rightarrow D^{*+}D^{*-}) = 0.01 \pm 0.09$ (S = 1.6)
$\boldsymbol{S_{D^{*+}D^{*-}}(B^0 \rightarrow D^{*+}D^{*-})} = -0.59 \pm 0.14$ (S = 1.8)
$C_+(B^0 \rightarrow D^{*+}D^{*-}) = 0.00 \pm 0.10$ (S = 1.6)
$\boldsymbol{S_+(B^0 \rightarrow D^{*+}D^{*-})} = -0.73 \pm 0.09$
$C_-(B^0 \rightarrow D^{*+}D^{*-}) = 0.19 \pm 0.31$
$S_-(B^0 \rightarrow D^{*+}D^{*-}) = 0.1 \pm 1.6$ (S = 3.5)
$C(B^0 \rightarrow D^*(2010)^+D^*(2010)^-K_S^0) = 0.01 \pm 0.29$
$S(B^0 \rightarrow D^*(2010)^+D^*(2010)^-K_S^0) = 0.1 \pm 0.4$
$C_{D^+D^-}(B^0 \rightarrow D^+D^-) = -0.22 \pm 0.24$ (S = 2.5)
$\boldsymbol{S_{D^+D^-}(B^0 \rightarrow D^+D^-)} = -0.76^{+0.15}_{-0.13}$ (S = 1.2)
$C_{J/\psi(1S)\pi^0}(B^0 \rightarrow J/\psi(1S)\pi^0) = 0.03 \pm 0.17$ (S = 1.5)
$\boldsymbol{S_{J/\psi(1S)\pi^0}(B^0 \rightarrow J/\psi(1S)\pi^0)} = -0.88 \pm 0.32$ (S = 2.2)
$C(B^0 \rightarrow J/\psi(1S)\rho^0) = -0.06 \pm 0.06$
$\boldsymbol{S(B^0 \rightarrow J/\psi(1S)\rho^0)} = -0.66^{+0.16}_{-0.12}$
$C_{D^{(*)}_{CP}h^0}(B^0 \rightarrow D^{(*)}_{CP}h^0) = -0.02 \pm 0.08$
$\boldsymbol{S_{D^{(*)}_{CP}h^0}(B^0 \rightarrow D^{(*)}_{CP}h^0)} = -0.66 \pm 0.12$
$C_{K^0\pi^0}(B^0 \rightarrow K^0\pi^0) = 0.00 \pm 0.13$ (S = 1.4)
$\boldsymbol{S_{K^0\pi^0}(B^0 \rightarrow K^0\pi^0)} = 0.58 \pm 0.17$
$C_{\eta'(958)K_S^0}(B^0 \rightarrow \eta'(958)K_S^0) = -0.04 \pm 0.20$ (S = 2.5)
$S_{\eta'(958)K_S^0}(B^0 \rightarrow \eta'(958)K_S^0) = 0.43 \pm 0.17$ (S = 1.5)
$C_{\eta'K^0}(B^0 \rightarrow \eta'K^0) = -0.06 \pm 0.04$
$\boldsymbol{S_{\eta'K^0}(B^0 \rightarrow \eta'K^0)} = 0.63 \pm 0.06$
$C_{\omega K_S^0}(B^0 \rightarrow \omega K_S^0) = 0.0 \pm 0.4$ (S = 3.0)
$S_{\omega K_S^0}(B^0 \rightarrow \omega K_S^0) = 0.70 \pm 0.21$

$C\ (B^0 \to\ K^0_S \pi^0 \pi^0) = -0.21 \pm 0.20$
$S\ (B^0 \to\ K^0_S \pi^0 \pi^0) = 0.89^{+0.27}_{-0.30}$
$C_{\rho^0 K^0_S}\ (B^0 \to\ \rho^0 K^0_S) = -0.04 \pm 0.20$
$S_{\rho^0 K^0_S}\ (B^0 \to\ \rho^0 K^0_S) = 0.50^{+0.17}_{-0.21}$
$C_{f_0 K^0_S}\ (B^0 \to\ f_0(980) K^0_S) = 0.29 \pm 0.20$
$\boldsymbol{S_{f_0 K^0_S}\ (B^0 \to\ f_0(980) K^0_S)} = -0.50 \pm 0.16$
$S_{f_2 K^0_S}\ (B^0 \to\ f_2(1270) K^0_S) = -0.5 \pm 0.5$
$C_{f_2 K^0_S}\ (B^0 \to\ f_2(1270) K^0_S) = 0.3 \pm 0.4$
$S_{f_x K^0_S}\ (B^0 \to\ f_x(1300) K^0_S) = -0.2 \pm 0.5$
$C_{f_x K^0_S}\ (B^0 \to\ f_x(1300) K^0_S) = 0.13 \pm 0.35$
$S_{K^0 \pi^+ \pi^-}\ (B^0 \to\ K^0 \pi^+ \pi^-$ nonresonant$) = -0.01 \pm 0.33$
$C_{K^0 \pi^+ \pi^-}\ (B^0 \to\ K^0 \pi^+ \pi^-$ nonresonant$) = 0.01 \pm 0.26$
$C_{K^0_S K^0_S}\ (B^0 \to\ K^0_S K^0_S) = 0.0 \pm 0.4$ (S = 1.4)
$S_{K^0_S K^0_S}\ (B^0 \to\ K^0_S K^0_S) = -0.8 \pm 0.5$
$C_{K^+ K^- K^0_S}\ (B^0 \to\ K^+ K^- K^0_S$ nonresonant$) = 0.06 \pm 0.08$
$\boldsymbol{S_{K^+ K^- K^0_S}\ (B^0 \to\ K^+ K^- K^0_S}$ **nonresonant)** $= -0.66 \pm 0.11$
$C_{K^+ K^- K^0_S}\ (B^0 \to\ K^+ K^- K^0_S$ inclusive$) = 0.01 \pm 0.09$
$\boldsymbol{S_{K^+ K^- K^0_S}\ (B^0 \to\ K^+ K^- K^0_S}$ **inclusive)** $= -0.65 \pm 0.12$
$C_{\phi K^0_S}\ (B^0 \to\ \phi K^0_S) = 0.01 \pm 0.14$
$\boldsymbol{S_{\phi K^0_S}\ (B^0 \to\ \phi K^0_S)} = 0.59 \pm 0.14$
$C_{K_S K_S K_S}(B^0 \to\ K_S K_S K_S) = -0.14 \pm 0.12$
$S_{K_S K_S K_S}(B^0 \to\ K_S K_S K_S) = -0.82 \pm 0.17$
$C_{K^0_S \pi^0 \gamma}(B^0 \to\ K^0_S \pi^0 \gamma) = 0.36 \pm 0.33$
$S_{K^0_S \pi^0 \gamma}(B^0 \to\ K^0_S \pi^0 \gamma) = -0.8 \pm 0.6$
$C_{K^0_S \pi^+ \pi^- \gamma}(B^0 \to\ K^0_S \pi^+ \pi^- \gamma) = -0.39 \pm 0.20$
$S_{K^0_S \pi^+ \pi^- \gamma}(B^0 \to\ K^0_S \pi^+ \pi^- \gamma) = 0.14 \pm 0.25$
$C_{K^{*0} \gamma}\ (B^0 \to\ K^*(892)^0 \gamma) = -0.04 \pm 0.16$ (S = 1.2)
$S_{K^{*0} \gamma}\ (B^0 \to\ K^*(892)^0 \gamma) = -0.15 \pm 0.22$
$C_{\eta K^0 \gamma}\ (B^0 \to\ \eta K^0 \gamma) = 0.1 \pm 0.4$ (S = 1.4)
$S_{\eta K^0 \gamma}\ (B^0 \to\ \eta K^0 \gamma) = -0.5 \pm 0.5$ (S = 1.2)
$C_{K^0 \phi \gamma}\ (B^0 \to\ K^0 \phi \gamma) = -0.3 \pm 0.6$
$S_{K^0 \phi \gamma}\ (B^0 \to\ K^0 \phi \gamma) = 0.7^{+0.7}_{-1.1}$
$C(B^0 \to\ K^0_S \rho^0 \gamma) = -0.05 \pm 0.19$

$S(B^0 \to K^0_S \rho^0 \gamma) = -0.04 \pm 0.23$
$C\,(B^0 \to \rho^0 \gamma) = 0.4 \pm 0.5$
$S\,(B^0 \to \rho^0 \gamma) = -0.8 \pm 0.7$
$\boldsymbol{C_{\pi\pi}\,(B^0 \to \pi^+\pi^-)} = -0.314 \pm 0.030$
$\boldsymbol{S_{\pi\pi}\,(B^0 \to \pi^+\pi^-)} = -0.670 \pm 0.030$
$C_{\pi^0\pi^0}(B^0 \to \pi^0\pi^0) = -0.33 \pm 0.22$
$C_{\rho\pi}\,(B^0 \to \rho^+\pi^-) = -0.03 \pm 0.07$ (S = 1.2)
$S_{\rho\pi}\,(B^0 \to \rho^+\pi^-) = 0.05 \pm 0.07$
$\boldsymbol{\Delta C_{\rho\pi}\,(B^0 \to \rho^+\pi^-)} = 0.27 \pm 0.06$
$\Delta S_{\rho\pi}\,(B^0 \to \rho^+\pi^-) = 0.01 \pm 0.08$
$C_{\rho^0\pi^0}\,(B^0 \to \rho^0\pi^0) = 0.27 \pm 0.24$
$S_{\rho^0\pi^0}\,(B^0 \to \rho^0\pi^0) = -0.23 \pm 0.34$
$C_{a_1\pi}\,(B^0 \to a_1(1260)^+\pi^-) = -0.05 \pm 0.11$
$S_{a_1\pi}\,(B^0 \to a_1(1260)^+\pi^-) = -0.2 \pm 0.4$ (S = 3.2)
$\boldsymbol{\Delta C_{a_1\pi}\,(B^0 \to a_1(1260)^+\pi^-)} = 0.43 \pm 0.14$ (S = 1.3)
$\Delta S_{a_1\pi}\,(B^0 \to a_1(1260)^+\pi^-) = -0.11 \pm 0.12$
$C\,(B^0 \to b_1^- K^+) = -0.22 \pm 0.24$
$\boldsymbol{\Delta C\,(B^0 \to b_1^- \pi^+)} = -1.04 \pm 0.24$
$C_{\rho^0\rho^0}\,(B^0 \to \rho^0\rho^0) = 0.2 \pm 0.9$
$S_{\rho^0\rho^0}\,(B^0 \to \rho^0\rho^0) = 0.3 \pm 0.7$
$C_{\rho\rho}\,(B^0 \to \rho^+\rho^-) = 0.00 \pm 0.09$
$S_{\rho\rho}\,(B^0 \to \rho^+\rho^-) = -0.14 \pm 0.13$
$|\lambda|\,(B^0 \to J/\psi K^*(892)^0) < 0.25$, CL = 95%
$\cos 2\beta\,(B^0 \to J/\psi K^*(892)^0) = 1.7^{+0.7}_{-0.9}$ (S = 1.6)
$\cos 2\beta\,(B^0 \to [K^0_S \pi^+\pi^-]_{D^{(*)}}\, h^0) = 0.91 \pm 0.25$
$(S_+ + S_-)/2\,(B^0 \to D^{*-}\pi^+) = -0.039 \pm 0.011$
$(S_- - S_+)/2\,(B^0 \to D^{*-}\pi^+) = -0.009 \pm 0.015$
$(S_+ + S_-)/2\,(B^0 \to D^-\pi^+) = -0.046 \pm 0.023$
$(S_- - S_+)/2\,(B^0 \to D^-\pi^+) = -0.022 \pm 0.021$
$S_+\,(B^0 \to D^-\pi^+) = 0.058 \pm 0.023$
$S_-\,(B^0 \to D^+\pi^-) = 0.038 \pm 0.021$
$(S_+ + S_-)/2\,(B^0 \to D^-\rho^+) = -0.024 \pm 0.032$
$(S_- - S_+)/2\,(B^0 \to D^-\rho^+) = -0.10 \pm 0.06$
$C_{\eta_c K^0_S}\,(B^0 \to \eta_c K^0_S) = 0.08 \pm 0.13$
$\boldsymbol{S_{\eta_c K^0_S}\,(B^0 \to \eta_c K^0_S)} = 0.93 \pm 0.17$
$C_{c\overline{c}K^{(*)0}}\,(B^0 \to c\overline{c}K^{(*)0}) = (-0.5 \pm 1.5) \times 10^{-2}$
$\boldsymbol{\sin(2\beta)} = 0.699 \pm 0.017$
$C_{J/\psi(\text{nS})K^0}\,(B^0 \to J/\psi(\text{nS})K^0) = (-0.8 \pm 1.7) \times 10^{-2}$
$\boldsymbol{S_{J/\psi(\text{nS})K^0}\,(B^0 \to J/\psi(\text{nS})K^0)} = 0.701 \pm 0.017$

$C_{J/\psi K^{*0}}$ $(B^0 \to J/\psi K^{*0}) = 0.03 \pm 0.10$
$S_{J/\psi K^{*0}}$ $(B^0 \to J/\psi K^{*0}) = 0.60 \pm 0.25$
$C_{\chi_{c0} K^0_S}$ $(B^0 \to \chi_{c0} K^0_S) = -0.3^{+0.5}_{-0.4}$
$S_{\chi_{c0} K^0_S}$ $(B^0 \to \chi_{c0} K^0_S) = -0.7 \pm 0.5$
$C_{\chi_{c1} K^0_S}$ $(B^0 \to \chi_{c1} K^0_S) = 0.06 \pm 0.07$
$\boldsymbol{S_{\chi_{c1} K^0_S}}$ $\boldsymbol{(B^0 \to \chi_{c1} K^0_S)} = 0.63 \pm 0.10$
$\sin(2\beta_{\text{eff}})(B^0 \to \phi K^0) = 0.22 \pm 0.30$
$\sin(2\beta_{\text{eff}})(B^0 \to \phi K^*_0(1430)^0) = 0.97^{+0.03}_{-0.52}$
$\boldsymbol{\sin(2\beta_{\text{eff}})(B^0 \to K^+ K^- K^0_S)} = 0.77^{+0.13}_{-0.12}$
$\sin(2\beta_{\text{eff}})(B^0 \to [K^0_S \pi^+ \pi^-]_{D^{(*)}} h^0) = 0.80 \pm 0.16$
$\beta_{\text{eff}}(B^0 \to [K^0_S \pi^+ \pi^-]_{D^{(*)}} h^0) = (22 \pm 5)^\circ$
$2\beta_{\text{eff}}(B^0 \to J/\psi \rho^0) = (42^{+10}_{-11})^\circ$
$|\lambda|$ $(B^0 \to [K^0_S \pi^+ \pi^-]_{D^{(*)}} h^0) = 1.01 \pm 0.08$
$|\sin(2\beta + \gamma)| > 0.40$, CL = 90%
$2\ \beta + \gamma = (83 \pm 60)^\circ$
$\boldsymbol{\alpha} = (85.2^{+4.8}_{-4.3})^\circ$
$x_+(B^0 \to D K^{*0}) = 0.04 \pm 0.17$
$x_-(B^0 \to D K^{*0}) = -0.16 \pm 0.14$
$y_+(B^0 \to D K^{*0}) = -0.68 \pm 0.22$
$y_-(B^0 \to D K^{*0}) = 0.20 \pm 0.25$ (S = 1.2)
$\boldsymbol{r_{B^0}(B^0 \to D K^{*0})} = 0.257^{+0.021}_{-0.023}$
$\boldsymbol{\delta_{B^0}(B^0 \to D K^{*0})} = (194.1^{+9.6}_{-8.8})^\circ$

$\overline{B}^0$ modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing. Modes which do not identify the charge state of the B are listed in the $B^\pm/B^0$ ADMIXTURE section.

The branching fractions listed below assume 50% $B^0\overline{B}^0$ and 50% $B^+ B^-$ production at the $\Upsilon(4S)$. We have attempted to bring older measurements up to date by rescaling their assumed $\Upsilon(4S)$ production ratio to 50:50 and their assumed D, D_s, D^*, and ψ branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

For inclusive branching fractions, *e.g.*, $B \to D^\pm X$, the values usually are multiplicities, not branching fractions. They can be greater than one.

B^0 DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\ell^+ \nu_\ell X$	[ggg]	(10.33 ± 0.28) %		–
$e^+ \nu_e X_c$		(10.1 ± 0.4) %		–
$\ell^+ \nu_\ell X_u$		(1.51 ± 0.19) $\times 10^{-3}$		–
$D \ell^+ \nu_\ell X$		(9.3 ± 0.8) %		–
$D^- \ell^+ \nu_\ell$	[ggg]	(2.24 ± 0.09) %		2309
$D^- \tau^+ \nu_\tau$		(1.05 ± 0.23) %		1909
$D^*(2010)^- \ell^+ \nu_\ell$	[ggg]	(4.97 ± 0.12) %		2257
$D^*(2010)^- \tau^+ \nu_\tau$		(1.58 ± 0.09) %	S=1.1	1838
$\overline{D}^0 \pi^- \ell^+ \nu_\ell$		(4.1 ± 0.5) $\times 10^{-3}$		2308
$D_0^*(2300)^- \ell^+ \nu_\ell$, $D_0^{*-} \to \overline{D}^0 \pi^-$		(3.0 ± 1.2) $\times 10^{-3}$	S=1.8	–
$D_2^*(2460)^- \ell^+ \nu_\ell$, $D_2^{*-} \to \overline{D}^0 \pi^-$		(1.21 ± 0.33) $\times 10^{-3}$	S=1.8	2065
$\overline{D}^{(*)} \mathrm{n} \pi \ell^+ \nu_\ell (\mathrm{n} \geq 1)$		(2.3 ± 0.5) %		–
$\overline{D}^{*0} \pi^- \ell^+ \nu_\ell$		(5.8 ± 0.8) $\times 10^{-3}$	S=1.4	2256
$D_1(2420)^- \ell^+ \nu_\ell$, $D_1^- \to \overline{D}^{*0} \pi^-$		(2.80 ± 0.28) $\times 10^{-3}$		–
$D_1'(2430)^- \ell^+ \nu_\ell$, $D_1'^- \to \overline{D}^{*0} \pi^-$		(3.1 ± 0.9) $\times 10^{-3}$		–
$D_2^*(2460)^- \ell^+ \nu_\ell$, $D_2^{*-} \to \overline{D}^{*0} \pi^-$		(6.8 ± 1.2) $\times 10^{-4}$		2065
$D^- \pi^+ \pi^- \ell^+ \nu_\ell$		(1.3 ± 0.5) $\times 10^{-3}$		2299
$D^{*-} \pi^+ \pi^- \ell^+ \nu_\ell$		(1.4 ± 0.5) $\times 10^{-3}$		2247
$\rho^- \ell^+ \nu_\ell$	[ggg]	(2.94 ± 0.21) $\times 10^{-4}$		2583
$\pi^- \ell^+ \nu_\ell$	[ggg]	(1.50 ± 0.06) $\times 10^{-4}$		2638
$\pi^- \tau^+ \nu_\tau$		< 2.5 $\times 10^{-4}$	CL=90%	2339
Inclusive modes				
$K^\pm X$		(78 ± 8) %		–
$D^0 X$		(8.1 ± 1.5) %		–
$\overline{D}^0 X$		(47.4 ± 2.8) %		–
$D^+ X$		< 3.9 %	CL=90%	–
$D^- X$		(36.9 ± 3.3) %		–
$D_s^+ X$		(10.3 $^{+2.1}_{-1.8}$) %		–
$D_s^- X$		< 2.6 %	CL=90%	–
$\Lambda_c^+ X$		< 3.1 %	CL=90%	–
$\overline{\Lambda}_c^- X$		(5.0 $^{+2.1}_{-1.5}$) %		–
$\overline{c} X$		(95 ± 5) %		–
$c X$		(24.6 ± 3.1) %		–
$\overline{c} / c X$		(119 ± 6) %		–

D, D^*, or D_s modes

$D^- \pi^+$	$(2.51 \pm 0.08) \times 10^{-3}$		2306
$D^- \rho^+$	$(7.6 \pm 1.2) \times 10^{-3}$		2235
$D^- K^0 \pi^+$	$(4.9 \pm 0.9) \times 10^{-4}$		2259
$D^- K^*(892)^+$	$(4.5 \pm 0.7) \times 10^{-4}$		2211
$D^- \omega \pi^+$	$(2.8 \pm 0.6) \times 10^{-3}$		2204
$D^- K^+$	$(2.05 \pm 0.08) \times 10^{-4}$		2279
$D^- K^+ \pi^+ \pi^-$	$(3.5 \pm 0.8) \times 10^{-4}$		2236
$D^- K^+ \overline{K}^0$	$< 3.1 \times 10^{-4}$	CL=90%	2188
$D^- K^+ \overline{K}^*(892)^0$	$(8.8 \pm 1.9) \times 10^{-4}$		2070
$\overline{D}^0 \pi^+ \pi^-$	$(8.8 \pm 0.5) \times 10^{-4}$		2301
$D^*(2010)^- \pi^+$	$(2.74 \pm 0.13) \times 10^{-3}$		2255
$\overline{D}^0 K^+ K^-$	$(6.1 \pm 0.5) \times 10^{-5}$		2191
$D^- \pi^+ \pi^+ \pi^-$	$(6.0 \pm 0.6) \times 10^{-3}$		2287
$(D^- \pi^+ \pi^+ \pi^-)$ nonresonant	$(3.9 \pm 1.9) \times 10^{-3}$		2287
$D^- \pi^+ \rho^0$	$(1.1 \pm 1.0) \times 10^{-3}$		2206
$D^- a_1(1260)^+$	$(6.0 \pm 3.3) \times 10^{-3}$		2121
$D^*(2010)^- \pi^+ \pi^0$	$(1.5 \pm 0.5) \%$		2248
$D^*(2010)^- \rho^+$	$(6.8 \pm 0.9) \times 10^{-3}$		2180
$D^*(2010)^- K^+$	$(2.12 \pm 0.15) \times 10^{-4}$		2226
$D^*(2010)^- K^0 \pi^+$	$(3.0 \pm 0.8) \times 10^{-4}$		2205
$D^*(2010)^- K^*(892)^+$	$(3.3 \pm 0.6) \times 10^{-4}$		2155
$D^*(2010)^- K^+ \overline{K}^0$	$< 4.7 \times 10^{-4}$	CL=90%	2131
$D^*(2010)^- K^+ \overline{K}^*(892)^0$	$(1.29 \pm 0.33) \times 10^{-3}$		2007
$D^*(2010)^- \pi^+ \pi^+ \pi^-$	$(7.21 \pm 0.29) \times 10^{-3}$		2235
$(D^*(2010)^- \pi^+ \pi^+ \pi^-)$ non-resonant	$(0.0 \pm 2.5) \times 10^{-3}$		2235
$D^*(2010)^- \pi^+ \rho^0$	$(5.7 \pm 3.2) \times 10^{-3}$		2150
$D^*(2010)^- a_1(1260)^+$	$(1.30 \pm 0.27) \%$		2061
$\overline{D}_1(2420)^0 \pi^- \pi^+$, $\overline{D}_1^0 \to D^{*-} \pi^+$	$(1.47 \pm 0.35) \times 10^{-4}$		–
$D^*(2010)^- K^+ \pi^- \pi^+$	$(4.7 \pm 0.4) \times 10^{-4}$		2181
$D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0$	$(1.76 \pm 0.27) \%$		2218
$D^{*-} 3\pi^+ 2\pi^-$	$(4.7 \pm 0.9) \times 10^{-3}$		2195
$D^*(2010)^- \omega \pi^+$	$(2.46 \pm 0.18) \times 10^{-3}$	S=1.2	2148
$\overline{D}_1(2430)^0 \omega$, $\overline{D}_1^0 \to D^{*-} \pi^+$	$(2.7 \,^{+\,0.8}_{-\,0.4}) \times 10^{-4}$		1992
$D^{*-} \rho(1450)^+$, $\rho^+ \to \omega \pi^+$	$(1.07 \,^{+\,0.40}_{-\,0.34}) \times 10^{-3}$		–
$\overline{D}_1(2420)^0 \omega$, $\overline{D}_1^0 \to D^{*-} \pi^+$	$(7.0 \pm 2.2) \times 10^{-5}$		1995
$\overline{D}_2^*(2460)^0 \omega$, $\overline{D}_2^0 \to D^{*-} \pi^+$	$(4.0 \pm 1.4) \times 10^{-5}$		1975
$D^{*-} b_1(1235)^+$, $b_1^+ \to \omega \pi^+$	$< 7 \times 10^{-5}$	CL=90%	–

$\overline{D}^{**-}\pi^+$	[kkk]	$(1.9 \pm 0.9) \times 10^{-3}$		–
$D_1(2420)^-\pi^+$, $D_1^- \to D^-\pi^+\pi^-$		$(9.9 \ {}^{+2.0}_{-2.5}) \times 10^{-5}$		–
$D_1(2420)^-\pi^+$, $D_1^- \to D^{*-}\pi^+\pi^-$		$< 3.3 \times 10^{-5}$	CL=90%	–
$\overline{D}{}_2^*(2460)^-\pi^+$, $D_2^{*-} \to D^0\pi^-$		$(2.38 \pm 0.16) \times 10^{-4}$		2062
$\overline{D}{}_0^*(2400)^-\pi^+$, $D_0^{*-} \to D^0\pi^-$		$(7.6 \pm 0.8) \times 10^{-5}$		2090
$D_2^*(2460)^-\pi^+$, $D_2^{*-} \to D^{*-}\pi^+\pi^-$		$< 2.4 \times 10^{-5}$	CL=90%	–
$\overline{D}{}_2^*(2460)^-\rho^+$		$< 4.9 \times 10^{-3}$	CL=90%	1974
$D^0\overline{D}{}^0$		$(1.4 \pm 0.7) \times 10^{-5}$		1868
$D^{*0}\overline{D}{}^0$		$< 2.9 \times 10^{-4}$	CL=90%	1794
D^-D^+		$(2.11 \pm 0.18) \times 10^{-4}$		1864
$D^\pm D^{*\mp}$ (CP-averaged)		$(6.1 \pm 0.6) \times 10^{-4}$		–
$D^-D_s^+$		$(7.2 \pm 0.8) \times 10^{-3}$		1812
$D^*(2010)^-D_s^+$		$(8.0 \pm 1.1) \times 10^{-3}$		1735
$D^-D_s^{*+}$		$(7.4 \pm 1.6) \times 10^{-3}$		1732
$D^*(2010)^-D_s^{*+}$		(1.77 ± 0.14) %		1649
$D_{s0}(2317)^-K^+$, $D_{s0}^- \to D_s^-\pi^0$		$(4.2 \pm 1.4) \times 10^{-5}$		2097
$D_{s0}(2317)^-\pi^+$, $D_{s0}^- \to D_s^-\pi^0$		$< 2.5 \times 10^{-5}$	CL=90%	2128
$D_{sJ}(2457)^-K^+$, $D_{sJ}^- \to D_s^-\pi^0$		$< 9.4 \times 10^{-6}$	CL=90%	–
$D_{sJ}(2457)^-\pi^+$, $D_{sJ}^- \to D_s^-\pi^0$		$< 4.0 \times 10^{-6}$	CL=90%	–
$D_s^-D_s^+$		$< 3.6 \times 10^{-5}$	CL=90%	1759
$D_s^{*-}D_s^+$		$< 1.3 \times 10^{-4}$	CL=90%	1674
$D_s^{*-}D_s^{*+}$		$< 2.4 \times 10^{-4}$	CL=90%	1583
$D_{s0}^*(2317)^+D^-$, $D_{s0}^{*+} \to D_s^+\pi^0$		$(1.06 \pm 0.16) \times 10^{-3}$	S=1.1	1602
$D_{s0}(2317)^+D^-$, $D_{s0}^+ \to D_s^{*+}\gamma$		$< 9.5 \times 10^{-4}$	CL=90%	–
$D_{s0}(2317)^+D^*(2010)^-$, $D_{s0}^+ \to D_s^+\pi^0$		$(1.5 \pm 0.6) \times 10^{-3}$		1509
$D_{sJ}(2457)^+D^-$		$(3.5 \pm 1.1) \times 10^{-3}$		–
$D_{sJ}(2457)^+D^-$, $D_{sJ}^+ \to D_s^+\gamma$		$(6.5 \ {}^{+1.7}_{-1.4}) \times 10^{-4}$		–

$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^{*+} \gamma$	< 6.0 $\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^+ \pi^+ \pi^-$	< 2.0 $\times 10^{-4}$	CL=90%	–
$D_{sJ}(2457)^+ D^-$, $D_{sJ}^+ \to D_s^+ \pi^0$	< 3.6 $\times 10^{-4}$	CL=90%	–
$D^*(2010)^- D_{sJ}(2457)^+$	$(9.3 \pm 2.2) \times 10^{-3}$		–
$D_{sJ}(2457)^+ D^*(2010)$, $D_{sJ}^+ \to D_s^+ \gamma$	$(2.3 {}^{+0.9}_{-0.7}) \times 10^{-3}$		–
$D^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0} K^+ + D^{*+} K^0$	$(2.8 \pm 0.7) \times 10^{-4}$		1444
$D^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0} K^+$	$(1.7 \pm 0.6) \times 10^{-4}$		1444
$D^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*+} K^0$	$(2.6 \pm 1.1) \times 10^{-4}$		1444
$D^*(2010)^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0} K^+ + D^{*+} K^0$	$(5.0 \pm 1.4) \times 10^{-4}$		1336
$D^*(2010)^- D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*0} K^+$	$(3.3 \pm 1.1) \times 10^{-4}$		1336
$D^{*-} D_{s1}(2536)^+$, $D_{s1}^+ \to D^{*+} K^0$	$(5.0 \pm 1.7) \times 10^{-4}$		1336
$D^- D_{sJ}(2573)^+$, $D_{sJ}^+ \to D^0 K^+$	$(3.4 \pm 1.8) \times 10^{-5}$		1414
$D^*(2010)^- D_{sJ}(2573)^+$, $D_{sJ}^+ \to D^0 K^+$	< 2 $\times 10^{-4}$	CL=90%	1304
$D^- D_{sJ}(2700)^+$, $D_{sJ}^+ \to D^0 K^+$	$(7.1 \pm 1.2) \times 10^{-4}$		–
$D^+ \pi^-$	$(7.3 \pm 1.2) \times 10^{-7}$		2306
$D_s^+ \pi^-$	$(2.03 \pm 0.18) \times 10^{-5}$		2270
$D_s^{*+} \pi^-$	$(2.1 \pm 0.4) \times 10^{-5}$	S=1.4	2215
$D_s^+ \rho^-$	< 2.4 $\times 10^{-5}$	CL=90%	2197
$D_s^{*+} \rho^-$	$(4.1 \pm 1.3) \times 10^{-5}$		2138
$D_s^+ a_0^-$	< 1.9 $\times 10^{-5}$	CL=90%	–
$D_s^{*+} a_0^-$	< 3.6 $\times 10^{-5}$	CL=90%	–
$D_s^+ a_1(1260)^-$	< 2.1 $\times 10^{-3}$	CL=90%	2080
$D_s^{*+} a_1(1260)^-$	< 1.7 $\times 10^{-3}$	CL=90%	2015
$D_s^+ a_2^-$	< 1.9 $\times 10^{-4}$	CL=90%	–
$D_s^{*+} a_2^-$	< 2.0 $\times 10^{-4}$	CL=90%	–
$D_s^- K^+$	$(2.7 \pm 0.5) \times 10^{-5}$	S=2.7	2242
$D_s^{*-} K^+$	$(2.19 \pm 0.30) \times 10^{-5}$		2185
$D_s^- K^*(892)^+$	$(3.5 \pm 1.0) \times 10^{-5}$		2172

$D_s^{*-} K^*(892)^+$	(3.2 $^{+1.5}_{-1.3}$) $\times 10^{-5}$			2112
$D_s^- \pi^+ K^0$	(9.7 $\pm$ 1.4) $\times 10^{-5}$			2222
$D_s^{*-} \pi^+ K^0$	$<$ 1.10 $\times 10^{-4}$	CL=90%		2164
$D_s^- K^+ \pi^+ \pi^-$	(1.7 $\pm$ 0.5) $\times 10^{-4}$			2198
$D_s^- \pi^+ K^*(892)^0$	$<$ 3.0 $\times 10^{-3}$	CL=90%		2138
$D_s^{*-} \pi^+ K^*(892)^0$	$<$ 1.6 $\times 10^{-3}$	CL=90%		2076
$\overline{D}^0 K^0$	(5.2 $\pm$ 0.7) $\times 10^{-5}$			2280
$\overline{D}^0 K^+ \pi^-$	(8.8 $\pm$ 1.7) $\times 10^{-5}$			2261
$\overline{D}^0 K^*(892)^0$	(4.5 $\pm$ 0.6) $\times 10^{-5}$			2213
$\overline{D}^0 K^*(1410)^0$	$<$ 6.7 $\times 10^{-5}$	CL=90%		2062
$\overline{D}^0 K_0^*(1430)^0$	(7 $\pm$ 7) $\times 10^{-6}$			2058
$\overline{D}^0 K_2^*(1430)^0$	(2.1 $\pm$ 0.9) $\times 10^{-5}$			2057
$D_0^*(2300)^- K^+$, $D_0^{*-} \to \overline{D}^0 \pi^-$	(1.9 $\pm$ 0.9) $\times 10^{-5}$			–
$D_2^*(2460)^- K^+$, $D_2^{*-} \to \overline{D}^0 \pi^-$	(2.03 $\pm$ 0.35) $\times 10^{-5}$			2029
$D_3^*(2760)^- K^+$, $D_3^{*-} \to \overline{D}^0 \pi^-$	$<$ 1.0 $\times 10^{-6}$	CL=90%		–
$\overline{D}^0 K^+ \pi^-$ nonresonant	$<$ 3.7 $\times 10^{-5}$	CL=90%		2261
$[K^+ K^-]_D K^*(892)^0$	(4.2 $\pm$ 0.7) $\times 10^{-5}$			–
$[\pi^+ \pi^-]_D K^*(892)^0$	(6.0 $\pm$ 1.1) $\times 10^{-5}$			–
$[\pi^+ \pi^- \pi^+ \pi^-]_D K^{*0}$	(4.6 $\pm$ 0.9) $\times 10^{-5}$			–
$\overline{D}^0 \pi^0$	(2.67 $\pm$ 0.09) $\times 10^{-4}$			2308
$\overline{D}^0 \rho^0$	(3.21 $\pm$ 0.21) $\times 10^{-4}$			2237
$\overline{D}^0 f_2$	(1.56 $\pm$ 0.21) $\times 10^{-4}$			–
$\overline{D}^0 \eta$	(2.36 $\pm$ 0.32) $\times 10^{-4}$		S=2.5	2274
$\overline{D}^0 \eta'$	(1.38 $\pm$ 0.16) $\times 10^{-4}$		S=1.3	2198
$\overline{D}^0 \omega$	(2.54 $\pm$ 0.16) $\times 10^{-4}$			2235
$D^0 \phi$	$<$ 2.3 $\times 10^{-6}$	CL=95%		2183
$D^0 K^+ \pi^-$	(5.3 $\pm$ 3.2) $\times 10^{-6}$			2261
$D^0 K^*(892)^0$	(3.0 $\pm$ 0.6) $\times 10^{-6}$			2213
$\overline{D}^{*0} \gamma$	$<$ 2.5 $\times 10^{-5}$	CL=90%		2258
$\overline{D}^*(2007)^0 \pi^0$	(2.2 $\pm$ 0.6) $\times 10^{-4}$		S=2.6	2256
$\overline{D}^*(2007)^0 \rho^0$	$<$ 5.1 $\times 10^{-4}$	CL=90%		2182
$\overline{D}^*(2007)^0 \eta$	(2.3 $\pm$ 0.6) $\times 10^{-4}$		S=2.8	2220
$\overline{D}^*(2007)^0 \eta'$	(1.40 $\pm$ 0.22) $\times 10^{-4}$			2141
$\overline{D}^*(2007)^0 \pi^+ \pi^-$	(6.2 $\pm$ 2.2) $\times 10^{-4}$			2249
$\overline{D}^*(2007)^0 K^+ \pi^-$	(5.2 $\pm$ 1.9) $\times 10^{-5}$			2207
$\overline{D}^*(2007)^0 K^0$	(3.6 $\pm$ 1.2) $\times 10^{-5}$			2227
$\overline{D}^*(2007)^0 K^*(892)^0$	$<$ 6.9 $\times 10^{-5}$	CL=90%		2157
$D^*(2007)^0 K^*(892)^0$	$<$ 4.0 $\times 10^{-5}$	CL=90%		2157
$D^*(2007)^0 \pi^+ \pi^+ \pi^- \pi^-$	(2.7 $\pm$ 0.5) $\times 10^{-3}$			2219
$D^*(2010)^+ D^*(2010)^-$	(8.0 $\pm$ 0.6) $\times 10^{-4}$			1711

$\overline{D}^*(2007)^0 \omega$	$(3.6 \pm 1.1) \times 10^{-4}$	S=3.1	2180
$D^*(2010)^+ D^-$	$(6.1 \pm 1.5) \times 10^{-4}$	S=1.6	1790
$D^*(2007)^0 \overline{D}^*(2007)^0$	$< 9 \times 10^{-5}$	CL=90%	1715
$D^- D^0 K^+$	$(1.07 \pm 0.11) \times 10^{-3}$		1574
$D^- D^*(2007)^0 K^+$	$(3.5 \pm 0.4) \times 10^{-3}$		1478
$D^*(2010)^- D^0 K^+$	$(2.47 \pm 0.21) \times 10^{-3}$		1479
$D^*(2010)^- D^*(2007)^0 K^+$	(1.06 ± 0.09) %		1366
$D^- D^+ K^0$	$(7.5 \pm 1.7) \times 10^{-4}$		1568
$D^*(2010)^- D^+ K^0 + D^- D^*(2010)^+ K^0$	$(6.4 \pm 0.5) \times 10^{-3}$		1473
$D^*(2010)^- D^*(2010)^+ K^0$	$(8.1 \pm 0.7) \times 10^{-3}$		1360
$D^{*-} D_{s1}(2536)^+,\ D_{s1}^+ \rightarrow D^{*+} K^0$	$(8.0 \pm 2.4) \times 10^{-4}$		1336
$\overline{D}^0 D^0 K^0$	$(2.7 \pm 1.1) \times 10^{-4}$		1574
$D^0 \overline{D}^0 K^+ \pi^-$	$(3.5 \pm 0.5) \times 10^{-4}$		1476
$\overline{D}^0 D^*(2007)^0 K^0 + \overline{D}^*(2007)^0 D^0 K^0$	$(1.1 \pm 0.5) \times 10^{-3}$		1478
$\overline{D}^*(2007)^0 D^*(2007)^0 K^0$	$(2.4 \pm 0.9) \times 10^{-3}$		1365
$(\overline{D}+\overline{D}^*)(D+D^*)K$	(3.68 ± 0.26) %		–

Charmonium modes

$\eta_c K^0$	$(8.2 \pm 1.1) \times 10^{-4}$		1751
$\eta_c(1S) K^+ \pi^-$	$(6.4 \pm 0.7) \times 10^{-4}$		1722
$\eta_c(1S) K^+ \pi^-$ (NR)	$(6.6 \pm 1.4) \times 10^{-5}$		–
$X(4100)^- K^+,\ X^- \rightarrow \eta_c \pi^-$	$(2.1 \pm 1.1) \times 10^{-5}$		–
$\eta_c(1S) K^*(1410)^0$	$(2.0 \pm 1.6) \times 10^{-4}$		1395
$\eta_c(1S) K_0^*(1430)^0$	$(1.8 \pm 0.4) \times 10^{-4}$		1388
$\eta_c(1S) K_2^*(1430)^0$	$(5.3 {}^{+2.4}_{-2.9}) \times 10^{-5}$		1386
$\eta_c(1S) K^*(1680)^0$	$(4 \pm 4) \times 10^{-5}$		1166
$\eta_c(1S) K_0^*(1950)^0$	$(4.7 {}^{+3.2}_{-4.0}) \times 10^{-5}$		–
$\eta_c K^*(892)^0$	$(5.2 {}^{+0.8}_{-0.9}) \times 10^{-4}$	S=1.6	1646
$\eta_c(2S) K_S^0,\ \eta_c \rightarrow p\overline{p}\pi^+\pi^-$	$(4.2 {}^{+1.4}_{-1.2}) \times 10^{-7}$		–
$\eta_c(2S) K^{*0}$	$< 3.9 \times 10^{-4}$	CL=90%	1159
$h_c(1P) K_S^0$	$< 1.4 \times 10^{-5}$		1401
$h_c(1P) K^{*0}$	$< 4 \times 10^{-4}$	CL=90%	1253
$J/\psi(1S) K^0$	$(8.91 \pm 0.21) \times 10^{-4}$		1683
$J/\psi(1S) K^+ \pi^-$	$(1.15 \pm 0.05) \times 10^{-3}$		1652
$J/\psi(1S) K^*(892)^0$	$(1.27 \pm 0.05) \times 10^{-3}$		1572
$J/\psi(1S) \eta K_S^0$	$(5.4 \pm 0.9) \times 10^{-5}$		1508
$J/\psi(1S) \eta' K_S^0$	$< 2.5 \times 10^{-5}$	CL=90%	1271
$J/\psi(1S) \phi K^0$	$(4.9 \pm 1.0) \times 10^{-5}$	S=1.3	1224

$J/\psi(1S)\omega K^0$	$(2.3 \pm 0.4) \times 10^{-4}$		1386
$\chi_{c0}(3915),\ \chi_{c0} \to J/\psi\omega$	$(2.1 \pm 0.9) \times 10^{-5}$		1102
$J/\psi(1S)K(1270)^0$	$(1.3 \pm 0.5) \times 10^{-3}$		1402
$J/\psi(1S)\pi^0$	$(1.66 \pm 0.10) \times 10^{-5}$		1728
$J/\psi(1S)\eta$	$(1.08 \pm 0.23) \times 10^{-5}$	S=1.5	1673
$J/\psi(1S)\pi^+\pi^-$	$(4.00 \pm 0.15) \times 10^{-5}$		1716
$J/\psi(1S)\pi^+\pi^-$ nonresonant	$< 1.2 \times 10^{-5}$	CL=90%	1716
$J/\psi(1S)f_0(500),\ f_0 \to \pi\pi$	$(8.8\ ^{+1.2}_{-1.6}) \times 10^{-6}$		–
$J/\psi(1S)f_2$	$(3.3\ ^{+0.5}_{-0.6}) \times 10^{-6}$	S=1.5	–
$J/\psi(1S)\rho^0$	$(2.55\ ^{+0.18}_{-0.16}) \times 10^{-5}$		1612
$J/\psi(1S)f_0(980),\ f_0 \to \pi^+\pi^-$	$< 1.1 \times 10^{-6}$	CL=90%	–
$J/\psi(1S)\rho(1450)^0,\ \rho^0 \to \pi\pi$	$(2.9\ ^{+1.6}_{-0.7}) \times 10^{-6}$		–
$J/\psi\,\rho(1700)^0,\ \rho^0 \to \pi^+\pi^-$	$(2.0 \pm 1.3) \times 10^{-6}$		–
$J/\psi(1S)\omega$	$(1.8\ ^{+0.7}_{-0.5}) \times 10^{-5}$		1609
$J/\psi(1S)K^+K^-$	$(2.54 \pm 0.35) \times 10^{-6}$		1534
$J/\psi(1S)a_0(980),\ a_0 \to K^+K^-$	$(4.7 \pm 3.4) \times 10^{-7}$		–
$J/\psi(1S)\phi$	$< 1.1 \times 10^{-7}$	CL=90%	1520
$J/\psi(1S)\eta'(958)$	$(7.6 \pm 2.4) \times 10^{-6}$		1546
$J/\psi(1S)K^0\pi^+\pi^-$	$(4.5 \pm 0.4) \times 10^{-4}$		1611
$J/\psi(1S)K^0K^-\pi^+ +$ c.c.	$< 2.1 \times 10^{-5}$	CL=90%	1467
$J/\psi(1S)K^0K^+K^-$	$(2.5 \pm 0.7) \times 10^{-5}$	S=1.8	1249
$J/\psi(1S)K^0\rho^0$	$(5.4 \pm 3.0) \times 10^{-4}$		1390
$J/\psi(1S)K^*(892)^+\pi^-$	$(8 \pm 4) \times 10^{-4}$		1515
$J/\psi(1S)\pi^+\pi^-\pi^+\pi^-$	$(1.44 \pm 0.12) \times 10^{-5}$		1670
$J/\psi(1S)f_1(1285)$	$(8.4 \pm 2.1) \times 10^{-6}$		1385
$J/\psi(1S)K^*(892)^0\pi^+\pi^-$	$(6.6 \pm 2.2) \times 10^{-4}$		1447
$\eta_{c2}(1D)K^0_S,\ \eta_{c2} \to h_c\gamma$	$< 3.5 \times 10^{-5}$	CL=90%	–
$\eta_{c2}(1D)\pi^-K^+,\ \eta_{c2} \to h_c\gamma$	$< 1.0 \times 10^{-4}$	CL=90%	–
$\chi_{c1}(3872)^-K^+$	$< 5 \times 10^{-4}$	CL=90%	–
$\chi_{c1}(3872)^-K^+,\ \chi_{c1}(3872)^- \to J/\psi(1S)\pi^-\pi^0$	[lll] $< 4.2 \times 10^{-6}$	CL=90%	–
$\chi_{c1}(3872)K^0$	$(1.1 \pm 0.4) \times 10^{-4}$		1140
$\chi_{c1}(3872)K^*(892)^0$	$(1.0 \pm 0.5) \times 10^{-4}$		940
$\chi_{c1}(3872)K^+\pi^-$	$(2.1 \pm 0.8) \times 10^{-4}$		1087
$\chi_{c1}(3872)\gamma$	$< 1.3 \times 10^{-5}$	CL=90%	1220
$Z_c(4430)^\pm K^\mp,\ Z_c^\pm \to \psi(2S)\pi^\pm$	$(6.0\ ^{+3.0}_{-2.4}) \times 10^{-5}$		583

$Z_c(4430)^{\pm} K^{\mp}$, $Z_c^{\pm} \to J/\psi \pi^{\pm}$	$(5.4 \ {}^{+\ 4.0}_{-\ 1.2}) \times 10^{-6}$		583
$Z_c(3900)^{\pm} K^{\mp}$, $Z_c^{\pm} \to J/\psi \pi^{\pm}$	$< 9 \times 10^{-7}$		–
$Z_c(4200)^{\pm} K^{\mp}$, $X^{\pm} \to J/\psi \pi^{\pm}$	$(2.2 \ {}^{+\ 1.3}_{-\ 0.8}) \times 10^{-5}$		–
$J/\psi(1S) p \overline{p}$	$(4.5 \pm 0.6) \times 10^{-7}$		862
$J/\psi(1S) \gamma$	$< 1.5 \times 10^{-6}$	CL=90%	1732
$J/\psi \mu^+ \mu^-$, $J/\psi \to \mu^+ \mu^-$	$< 1.0 \times 10^{-9}$	CL=95%	–
$J/\psi(1S) \overline{D}^0$	$< 1.3 \times 10^{-5}$	CL=90%	877
$\psi(2S) \pi^0$	$(1.17 \pm 0.19) \times 10^{-5}$		1348
$\psi(2S) K^0$	$(5.8 \pm 0.5) \times 10^{-4}$		1283
$\psi(2S) K^0 \pi^+ \pi^-$	$(2.81 \pm 0.30) \times 10^{-4}$		1177
$\psi(3770) K^0$, $\psi \to \overline{D}^0 D^0$	$< 1.23 \times 10^{-4}$	CL=90%	1217
$\psi(3770) K^0$, $\psi \to D^- D^+$	$< 1.88 \times 10^{-4}$	CL=90%	1217
$\psi(2S) \pi^+ \pi^-$	$(2.24 \pm 0.35) \times 10^{-5}$		1332
$\psi(2S) K^+ \pi^-$	$(5.8 \pm 0.4) \times 10^{-4}$		1239
$\psi(2S) K^*(892)^0$	$(5.9 \pm 0.4) \times 10^{-4}$		1116
$\chi_{c0} K^0$	$(1.9 \pm 0.4) \times 10^{-4}$		1477
$\chi_{c0} K^*(892)^0$	$(1.7 \pm 0.4) \times 10^{-4}$		1342
$\chi_{c1} \pi^0$	$(1.12 \pm 0.28) \times 10^{-5}$		1468
$\chi_{c1} K^0$	$(3.95 \pm 0.27) \times 10^{-4}$		1411
$\chi_{c1} \pi^- K^+$	$(4.97 \pm 0.30) \times 10^{-4}$		1371
$\chi_{c1} K^*(892)^0$	$(2.38 \pm 0.19) \times 10^{-4}$	S=1.2	1265
$X(4051)^- K^+$, $X^- \to \chi_{c1} \pi^-$	$(3.0 \ {}^{+\ 4.0}_{-\ 1.8}) \times 10^{-5}$		–
$X(4248)^- K^+$, $X^- \to \chi_{c1} \pi^-$	$(4.0 \ {}^{+20.0}_{-\ 1.0}) \times 10^{-5}$		–
$\chi_{c1} \pi^+ \pi^- K^0$	$(3.2 \pm 0.5) \times 10^{-4}$		1318
$\chi_{c1} \pi^- \pi^0 K^+$	$(3.5 \pm 0.6) \times 10^{-4}$		1321
$\chi_{c2} K^0$	$< 1.5 \times 10^{-5}$	CL=90%	1379
$\chi_{c2} K^*(892)^0$	$(4.9 \pm 1.2) \times 10^{-5}$	S=1.1	1228
$\chi_{c2} \pi^- K^+$	$(7.2 \pm 1.0) \times 10^{-5}$		1338
$\chi_{c2} \pi^+ \pi^- K^0$	$< 1.70 \times 10^{-4}$	CL=90%	1282
$\chi_{c2} \pi^- \pi^0 K^+$	$< 7.4 \times 10^{-5}$	CL=90%	1286
$\psi(4660) K^0$, $\psi \to \Lambda_c^+ \Lambda_c^-$	$< 2.3 \times 10^{-4}$	CL=90%	–
$\psi(4230)^0 K^0$, $\psi^0 \to J/\psi \pi^+ \pi^-$	$< 1.7 \times 10^{-5}$	CL=90%	–

K or *K** modes

$K^+ \pi^-$	$(1.96 \pm 0.05) \times 10^{-5}$		2615
$K^0 \pi^0$	$(9.9 \pm 0.5) \times 10^{-6}$		2615
$\eta' K^0$	$(6.6 \pm 0.4) \times 10^{-5}$	S=1.4	2528

$\eta' K^*(892)^0$		$(2.8 \pm 0.6) \times 10^{-6}$		2472
$\eta' K_0^*(1430)^0$		$(6.3 \pm 1.6) \times 10^{-6}$		2346
$\eta' K_2^*(1430)^0$		$(1.37 \pm 0.32) \times 10^{-5}$		2346
ηK^0		$(1.23^{+0.27}_{-0.24}) \times 10^{-6}$		2587
$\eta K^*(892)^0$		$(1.59 \pm 0.10) \times 10^{-5}$		2534
$\eta K_0^*(1430)^0$		$(1.10 \pm 0.22) \times 10^{-5}$		2415
$\eta K_2^*(1430)^0$		$(9.6 \pm 2.1) \times 10^{-6}$		2414
ωK^0		$(4.8 \pm 0.4) \times 10^{-6}$		2557
$a_0(980)^0 K^0$, $a_0^0 \to \eta \pi^0$		$< 7.8 \times 10^{-6}$	CL=90%	–
$b_1^0 K^0$, $b_1^0 \to \omega \pi^0$		$< 7.8 \times 10^{-6}$	CL=90%	–
$a_0(980)^{\pm} K^{\mp}$, $a_0^{\pm} \to \eta \pi^{\pm}$		$< 1.9 \times 10^{-6}$	CL=90%	–
$b_1^- K^+$, $b_1^- \to \omega \pi^-$		$(7.4 \pm 1.4) \times 10^{-6}$		–
$b_1^0 K^{*0}$, $b_1^0 \to \omega \pi^0$		$< 8.0 \times 10^{-6}$	CL=90%	–
$b_1^- K^{*+}$, $b_1^- \to \omega \pi^-$		$< 5.0 \times 10^{-6}$	CL=90%	–
$a_0(1450)^{\pm} K^{\mp}$, $a_0^{\pm} \to \eta \pi^{\pm}$		$< 3.1 \times 10^{-6}$	CL=90%	–
$K_S^0 X^0$ (Familon)		$< 5.3 \times 10^{-5}$	CL=90%	–
$\omega K^*(892)^0$		$(2.0 \pm 0.5) \times 10^{-6}$		2503
$\omega (K\pi)_0^{*0}$		$(1.84 \pm 0.25) \times 10^{-5}$		–
$\omega K_0^*(1430)^0$		$(1.60 \pm 0.34) \times 10^{-5}$		2380
$\omega K_2^*(1430)^0$		$(1.01 \pm 0.23) \times 10^{-5}$		2380
$\omega K^+ \pi^-$ nonresonant		$(5.1 \pm 1.0) \times 10^{-6}$		2542
$K^+ \pi^- \pi^0$		$(3.78 \pm 0.32) \times 10^{-5}$		2609
$K^+ \rho^-$		$(7.0 \pm 0.9) \times 10^{-6}$		2559
$K^+ \rho(1450)^-$		$(2.4 \pm 1.2) \times 10^{-6}$		–
$K^+ \rho(1700)^-$		$(6 \pm 7) \times 10^{-7}$		–
$(K^+ \pi^- \pi^0)$ nonresonant		$(2.8 \pm 0.6) \times 10^{-6}$		2609
$(K\pi)_0^{*+} \pi^-$, $(K\pi)_0^{*+} \to K^+ \pi^0$		$(3.4 \pm 0.5) \times 10^{-5}$		–
$(K\pi)_0^{*0} \pi^0$, $(K\pi)_0^{*0} \to K^+ \pi^-$		$(8.6 \pm 1.7) \times 10^{-6}$		–
$K_2^*(1430)^0 \pi^0$		$< 4.0 \times 10^{-6}$	CL=90%	2445
$K^*(1680)^0 \pi^0$		$< 7.5 \times 10^{-6}$	CL=90%	2358
$K_x^{*0} \pi^0$	[ppp]	$(6.1 \pm 1.6) \times 10^{-6}$		–
$K^0 \pi^+ \pi^-$		$(4.97 \pm 0.18) \times 10^{-5}$		2609
$K^0 \pi^+ \pi^-$ nonresonant		$(1.39^{+0.26}_{-0.18}) \times 10^{-5}$	S=1.6	2609
$K^0 \rho^0$		$(3.4 \pm 1.1) \times 10^{-6}$	S=2.3	2558
$K^*(892)^+ \pi^-$		$(7.5 \pm 0.4) \times 10^{-6}$		2563
$K_0^*(1430)^+ \pi^-$		$(3.3 \pm 0.7) \times 10^{-5}$	S=2.0	–
$K_x^{*+} \pi^-$	[ppp]	$(5.1 \pm 1.6) \times 10^{-6}$		–
$K^*(1410)^+ \pi^-$, $K^{*+} \to K^0 \pi^+$		$< 3.8 \times 10^{-6}$	CL=90%	–

$(K\pi)^{*+}_0\pi^-$, $(K\pi)^{*+}_0 \rightarrow K^0\pi^+$		$(1.62\pm 0.13)\times 10^{-5}$		–
$f_0(980)K^0$, $f_0 \rightarrow \pi^+\pi^-$		$(8.1 \pm 0.8)\times 10^{-6}$	S=1.3	2522
$K^0 f_0(500)$		$(1.6\ ^{+\ 2.5}_{-\ 1.6})\times 10^{-7}$		–
$K^0 f_0(1500)$		$(1.3 \pm 0.8)\times 10^{-6}$		2393
$f_2(1270)K^0$		$(2.7\ ^{+\ 1.3}_{-\ 1.2})\times 10^{-6}$		2459
$f_x(1300)K0, f_x \rightarrow \pi^+\pi^-$		$(1.8 \pm 0.7)\times 10^{-6}$		–
$K^*(892)^0\pi^0$		$(3.3 \pm 0.6)\times 10^{-6}$		2563
$K^*_2(1430)^+\pi^-$		$(3.65\pm 0.34)\times 10^{-6}$		2445
$K^*(1680)^+\pi^-$		$(1.41\pm 0.10)\times 10^{-5}$		2358
$K^+\pi^-\pi^+\pi^-$	[qqq]	$< 2.3 \times 10^{-4}$	CL=90%	2600
$\rho^0 K^+\pi^-$		$(2.8 \pm 0.7)\times 10^{-6}$		2543
$f_0(980)K^+\pi^-$, $f_0 \rightarrow \pi\pi$		$(1.4\ ^{+\ 0.5}_{-\ 0.6})\times 10^{-6}$		2506
$K^+\pi^-\pi^+\pi^-$ nonresonant		$< 2.1 \times 10^{-6}$	CL=90%	2600
$K^*(892)^0\pi^+\pi^-$		$(5.5 \pm 0.5)\times 10^{-5}$		2557
$K^*(892)^0\rho^0$		$(3.9 \pm 1.3)\times 10^{-6}$	S=1.9	2504
$K^*(892)^0 f_0(980)$, $f_0 \rightarrow \pi\pi$		$(3.9\ ^{+\ 2.1}_{-\ 1.8})\times 10^{-6}$	S=3.9	2466
$K_1(1270)^+\pi^-$		$< 3.0 \times 10^{-5}$	CL=90%	2489
$K_1(1400)^+\pi^-$		$< 2.7 \times 10^{-5}$	CL=90%	2451
$a_1(1260)^- K^+$	[qqq]	$(1.6 \pm 0.4)\times 10^{-5}$		2471
$K^*(892)^+\rho^-$		$(1.03\pm 0.26)\times 10^{-5}$		2504
$K^*_0(1430)^+\rho^-$		$(2.8 \pm 1.2)\times 10^{-5}$		–
$K_1(1400)^0\rho^0$		$< 3.0 \times 10^{-3}$	CL=90%	2388
$K^*_0(1430)^0\rho^0$		$(2.7 \pm 0.6)\times 10^{-5}$		2381
$K^*_0(1430)^0 f_0(980)$, $f_0 \rightarrow \pi\pi$		$(2.7 \pm 0.9)\times 10^{-6}$		–
$K^*_2(1430)^0 f_0(980)$, $f_0 \rightarrow \pi\pi$		$(8.6 \pm 2.0)\times 10^{-6}$		–
K^+K^-		$(7.8 \pm 1.5)\times 10^{-8}$		2593
$K^0\overline{K}^0$		$(1.21\pm 0.16)\times 10^{-6}$		2593
$K^0K^-\pi^+$		$(6.7 \pm 0.5)\times 10^{-6}$		2578
$K^*(892)^{\pm}K^{\mp}$		$< 4 \times 10^{-7}$	CL=90%	2540
$\overline{K}^{*0}K^0 + K^{*0}\overline{K}^0$		$< 9.6 \times 10^{-7}$	CL=90%	–
$K^+K^-\pi^0$		$(2.2 \pm 0.6)\times 10^{-6}$		2579
$K^0_S K^0_S \pi^0$		$< 9 \times 10^{-7}$	CL=90%	2578
$K^0_S K^0_S \eta$		$< 1.0 \times 10^{-6}$	CL=90%	2515
$K^0_S K^0_S \eta'$		$< 2.0 \times 10^{-6}$	CL=90%	2453
$K^0K^+K^-$		$(2.68\pm 0.11)\times 10^{-5}$		2522
$K^0\phi$		$(7.3 \pm 0.7)\times 10^{-6}$		2516
$f_0(980)K^0$, $f_0 \rightarrow K^+K^-$		$(7.0\ ^{+\ 3.5}_{-\ 3.0})\times 10^{-6}$		–
$f_0(1500)K^0$		$(1.3\ ^{+\ 0.7}_{-\ 0.5})\times 10^{-5}$		2393

$f_2'(1525)^0 K^0$	$(3 \ {}^{+5}_{-4}) \times 10^{-7}$		–
$f_0(1710) K^0$, $f_0 \to K^+ K^-$	$(4.4 \pm 0.9) \times 10^{-6}$		–
$K^0 K^+ K^-$ nonresonant	$(3.3 \pm 1.0) \times 10^{-5}$		2522
$K^0_S K^0_S K^0_S$	$(6.0 \pm 0.5) \times 10^{-6}$	S=1.1	2521
$f_0(980) K^0$, $f_0 \to K^0_S K^0_S$	$(2.7 \pm 1.8) \times 10^{-6}$		–
$f_0(1710) K^0$, $f_0 \to K^0_S K^0_S$	$(5.0 \ {}^{+5.0}_{-2.6}) \times 10^{-7}$		–
$f_2(2010) K^0$, $f_2 \to K^0_S K^0_S$	$(5 \pm 6) \times 10^{-7}$		–
$K^0_S K^0_S K^0_S$ nonresonant	$(1.33 \pm 0.31) \times 10^{-5}$		2521
$K^0_S K^0_S K^0_L$	$< 1.6 \times 10^{-5}$	CL=90%	2521
$K^*(892)^0 K^+ K^-$	$(2.75 \pm 0.26) \times 10^{-5}$		2467
$K^*(892)^0 \phi$	$(1.00 \pm 0.05) \times 10^{-5}$		2460
$K^+ K^- \pi^+ \pi^-$ nonresonant	$< 7.17 \times 10^{-5}$	CL=90%	2559
$K^*(892)^0 K^- \pi^+$	$(4.5 \pm 1.3) \times 10^{-6}$		2524
$K^*(892)^0 \overline{K}^*(892)^0$	$(8.3 \pm 2.4) \times 10^{-7}$	S=1.5	2485
$K^+ K^+ \pi^- \pi^-$ nonresonant	$< 6.0 \times 10^{-6}$	CL=90%	2559
$K^*(892)^0 K^+ \pi^-$	$< 2.2 \times 10^{-6}$	CL=90%	2524
$K^*(892)^0 K^*(892)^0$	$< 2 \times 10^{-7}$	CL=90%	2485
$K^*(892)^+ K^*(892)^-$	$< 2.0 \times 10^{-6}$	CL=90%	2485
$K_1(1400)^0 \phi$	$< 5.0 \times 10^{-3}$	CL=90%	2339
$\phi (K\pi)^{*0}_0$	$(4.3 \pm 0.4) \times 10^{-6}$		–
$\phi (K\pi)^{*0}_0$ $(1.60 < m_{K\pi} < 2.15)$ [rrr]	$< 1.7 \times 10^{-6}$	CL=90%	–
$K^*_0(1430)^0 K^- \pi^+$	$< 3.18 \times 10^{-5}$	CL=90%	2403
$K^*_0(1430)^0 \overline{K}^*(892)^0$	$< 3.3 \times 10^{-6}$	CL=90%	2360
$K^*_0(1430)^0 \overline{K}^*_0(1430)^0$	$< 8.4 \times 10^{-6}$	CL=90%	2222
$K^*_0(1430)^0 \phi$	$(3.9 \pm 0.8) \times 10^{-6}$		2333
$K^*_0(1430)^0 K^*(892)^0$	$< 1.7 \times 10^{-6}$	CL=90%	2360
$K^*_0(1430)^0 K^*_0(1430)^0$	$< 4.7 \times 10^{-6}$	CL=90%	2222
$K^*(1680)^0 \phi$	$< 3.5 \times 10^{-6}$	CL=90%	2238
$K^*(1780)^0 \phi$	$< 2.7 \times 10^{-6}$	CL=90%	–
$K^*(2045)^0 \phi$	$< 1.53 \times 10^{-5}$	CL=90%	–
$K^*_2(1430)^0 \rho^0$	$< 1.1 \times 10^{-3}$	CL=90%	2381
$K^*_2(1430)^0 \phi$	$(6.8 \pm 0.9) \times 10^{-6}$	S=1.2	2332
$K^0 \phi \phi$	$(3.7 \pm 0.7) \times 10^{-6}$	S=1.3	2305
$\eta' \eta' K^0$	$< 3.1 \times 10^{-5}$	CL=90%	2337
$\eta K^0 \gamma$	$(7.6 \pm 1.8) \times 10^{-6}$		2587
$\eta' K^0 \gamma$	$< 6.4 \times 10^{-6}$	CL=90%	2528
$K^0 \phi \gamma$	$(2.7 \pm 0.7) \times 10^{-6}$		2516
$K^+ \pi^- \gamma$	$(4.6 \pm 1.4) \times 10^{-6}$		2615
$K^*(892)^0 \gamma$	$(4.18 \pm 0.25) \times 10^{-5}$	S=2.1	2565
$K^*(1410) \gamma$	$< 1.3 \times 10^{-4}$	CL=90%	2451
$K^+ \pi^- \gamma$ nonresonant	$< 2.6 \times 10^{-6}$	CL=90%	2615

$K^*(892)^0 X(214)$, $X \to \mu^+\mu^-$	[sss]	$<$ 2.26	$\times 10^{-8}$	CL=90%	–
$K^0\pi^+\pi^-\gamma$		(1.99± 0.18)	$\times 10^{-5}$		2609
$K^+\pi^-\pi^0\gamma$		(4.1 ± 0.4)	$\times 10^{-5}$		2609
$K_1(1270)^0\gamma$		$<$ 5.8	$\times 10^{-5}$	CL=90%	2491
$K_1(1400)^0\gamma$		$<$ 1.2	$\times 10^{-5}$	CL=90%	2454
$K_2^*(1430)^0\gamma$		(1.24± 0.24)	$\times 10^{-5}$		2447
$K^*(1680)^0\gamma$		$<$ 2.0	$\times 10^{-3}$	CL=90%	2360
$K_3^*(1780)^0\gamma$		$<$ 8.3	$\times 10^{-5}$	CL=90%	2340
$K_4^*(2045)^0\gamma$		$<$ 4.3	$\times 10^{-3}$	CL=90%	2243

Light unflavored meson modes

$\rho^0\gamma$		(8.6 ± 1.5)	$\times 10^{-7}$		2583
$\rho^0 X(214)$, $X \to \mu^+\mu^-$	[sss]	$<$ 1.73	$\times 10^{-8}$	CL=90%	–
$\omega\gamma$		($4.4\ ^{+1.8}_{-1.6}$)	$\times 10^{-7}$		2582
$\phi\gamma$		$<$ 1.0	$\times 10^{-7}$	CL=90%	2541
$f_2(1270)\gamma$, $f_2 \to (KS)^0(KS)^0$		$<$ 3.1	$\times 10^{-7}$		–
$f_2'(1525)\gamma$, $f_2' \to (KS)^0(KS)^0$		$<$ 2.1	$\times 10^{-7}$		–
$\pi^+\pi^-$		(5.12± 0.19)	$\times 10^{-6}$		2636
$\pi^0\pi^0$		(1.59± 0.26)	$\times 10^{-6}$	S=1.4	2636
$\eta\pi^0$		(4.1 ± 1.7)	$\times 10^{-7}$		2610
$\eta\eta$		$<$ 1.0	$\times 10^{-6}$	CL=90%	2582
$\eta'\pi^0$		(1.2 ± 0.6)	$\times 10^{-6}$	S=1.7	2551
$\eta'\eta'$		$<$ 1.7	$\times 10^{-6}$	CL=90%	2460
$\eta'\eta$		$<$ 1.2	$\times 10^{-6}$	CL=90%	2523
$\eta'\rho^0$		$<$ 1.3	$\times 10^{-6}$	CL=90%	2492
$\eta' f_0(980)$, $f_0 \to \pi^+\pi^-$		$<$ 9	$\times 10^{-7}$	CL=90%	2454
$\eta\rho^0$		$<$ 1.5	$\times 10^{-6}$	CL=90%	2553
$\eta f_0(980)$, $f_0 \to \pi^+\pi^-$		$<$ 4	$\times 10^{-7}$	CL=90%	2516
$\omega\eta$		($9.4\ ^{+4.0}_{-3.1}$)	$\times 10^{-7}$		2552
$\omega\eta'$		($1.0\ ^{+0.5}_{-0.4}$)	$\times 10^{-6}$		2491
$\omega\rho^0$		$<$ 1.6	$\times 10^{-6}$	CL=90%	2522
$\omega f_0(980)$, $f_0 \to \pi^+\pi^-$		$<$ 1.5	$\times 10^{-6}$	CL=90%	2485
$\omega\omega$		(1.2 ± 0.4)	$\times 10^{-6}$		2521
$\phi\pi^0$		$<$ 1.5	$\times 10^{-7}$	CL=90%	2540
$\phi\eta$		$<$ 5	$\times 10^{-7}$	CL=90%	2511
$\phi\eta'$		$<$ 5	$\times 10^{-7}$	CL=90%	2448
$\phi\pi^+\pi^-$		(1.8 ± 0.5)	$\times 10^{-7}$		2533
$\phi\rho^0$		$<$ 3.3	$\times 10^{-7}$	CL=90%	2480
$\phi f_0(980)$, $f_0 \to \pi^+\pi^-$		$<$ 3.8	$\times 10^{-7}$	CL=90%	2441
$\phi\omega$		$<$ 7	$\times 10^{-7}$	CL=90%	2479

$\phi\phi$		< 2.7	$\times 10^{-8}$	CL=90%	2435
$a_0(980)^{\pm}\pi^{\mp}$, $a_0^{\pm} \to \eta\pi^{\pm}$		< 3.1	$\times 10^{-6}$	CL=90%	–
$a_0(1450)^{\pm}\pi^{\mp}$, $a_0^{\pm} \to \eta\pi^{\pm}$		< 2.3	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^-\pi^0$		< 7.2	$\times 10^{-4}$	CL=90%	2631
$\rho^0\pi^0$		(2.0 ± 0.5)	$\times 10^{-6}$		2581
$\rho^{\mp}\pi^{\pm}$	[z]	(2.30 ± 0.23)	$\times 10^{-5}$		2581
$\pi^+\pi^-\pi^+\pi^-$		< 1.12	$\times 10^{-5}$	CL=90%	2621
$\rho^0\pi^+\pi^-$		< 8.8	$\times 10^{-6}$	CL=90%	2575
$\rho^0\rho^0$		(9.6 ± 1.5)	$\times 10^{-7}$		2523
$f_0(980)\pi^+\pi^-$, $f_0 \to \pi^+\pi^-$		< 3.0	$\times 10^{-6}$	CL=90%	–
$\rho^0 f_0(980)$, $f_0 \to \pi^+\pi^-$		(7.8 ± 2.5)	$\times 10^{-7}$		2486
$f_0(980) f_0(980)$, $f_0 \to \pi^+\pi^-$, $f_0 \to \pi^+\pi^-$		< 1.9	$\times 10^{-7}$	CL=90%	2447
$f_0(980) f_0(980)$, $f_0 \to \pi^+\pi^-$, $f_0 \to K^+K^-$		< 2.3	$\times 10^{-7}$	CL=90%	2447
$a_1(1260)^{\mp}\pi^{\pm}$	[z]	(2.6 ± 0.5)	$\times 10^{-5}$	S=1.9	2494
$a_2(1320)^{\mp}\pi^{\pm}$	[z]	< 6.3	$\times 10^{-6}$	CL=90%	2473
$\pi^+\pi^-\pi^0\pi^0$		< 3.1	$\times 10^{-3}$	CL=90%	2622
$\rho^+\rho^-$		(2.77 ± 0.19)	$\times 10^{-5}$		2523
$a_1(1260)^0\pi^0$		< 1.1	$\times 10^{-3}$	CL=90%	2495
$\omega\pi^0$		< 5	$\times 10^{-7}$	CL=90%	2580
$\pi^+\pi^+\pi^-\pi^-\pi^0$		< 9.0	$\times 10^{-3}$	CL=90%	2609
$a_1(1260)^+\rho^-$		< 6.1	$\times 10^{-5}$	CL=90%	2433
$a_1(1260)^0\rho^0$		< 2.4	$\times 10^{-3}$	CL=90%	2433
$b_1^{\mp}\pi^{\pm}$, $b_1^{\mp} \to \omega\pi^{\mp}$		(1.09 ± 0.15)	$\times 10^{-5}$		–
$b_1^0\pi^0$, $b_1^0 \to \omega\pi^0$		< 1.9	$\times 10^{-6}$	CL=90%	–
$b_1^-\rho^+$, $b_1^- \to \omega\pi^-$		< 1.4	$\times 10^{-6}$	CL=90%	–
$b_1^0\rho^0$, $b_1^0 \to \omega\pi^0$		< 3.4	$\times 10^{-6}$	CL=90%	–
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$		< 3.0	$\times 10^{-3}$	CL=90%	2592
$a_1(1260)^+ a_1(1260)^-$, $a_1^+ \to 2\pi^+\pi^-$, $a_1^- \to 2\pi^-\pi^+$		(1.18 ± 0.31)	$\times 10^{-5}$		2336
$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^0$		< 1.1	%	CL=90%	2572

Baryon modes

$p\overline{p}$		(1.25 ± 0.32)	$\times 10^{-8}$		2467
$p\overline{p}\pi^+\pi^-$		(2.87 ± 0.19)	$\times 10^{-6}$		2406
$p\overline{p}K^+\pi^-$		(6.3 ± 0.5)	$\times 10^{-6}$		2306
$p\overline{p}K^0$		(2.66 ± 0.32)	$\times 10^{-6}$		2347
$\Theta(1540)^+\overline{p}$, $\Theta^+ \to pK_S^0$	[ttt]	< 5	$\times 10^{-8}$	CL=90%	2318
$f_J(2220)K^0$, $f_J \to p\overline{p}$		< 4.5	$\times 10^{-7}$	CL=90%	2135
$p\overline{p}K^*(892)^0$		$(1.24^{+0.28}_{-0.25})$	$\times 10^{-6}$		2216
$f_J(2220)K_0^*$, $f_J \to p\overline{p}$		< 1.5	$\times 10^{-7}$	CL=90%	–

$p\overline{p}K^+K^-$	$(1.21\pm 0.32)\times 10^{-7}$		2179
$p\overline{p}\pi^0$	$(5.0\pm 1.9)\times 10^{-7}$		2440
$pp\overline{p}\overline{p}$	$<2.0\times 10^{-7}$	CL=90%	1735
$p\overline{\Lambda}\pi^-$	$(3.14\pm 0.29)\times 10^{-6}$		2401
$p\overline{\Lambda}\pi^-\gamma$	$<6.5\times 10^{-7}$	CL=90%	2401
$p\overline{\Sigma}(1385)^-$	$<2.6\times 10^{-7}$	CL=90%	2363
$\Delta(1232)^+\overline{p}+\ \Delta(1232)^-p$	$<1.6\times 10^{-6}$		–
$\Delta^0\overline{\Lambda}$	$<9.3\times 10^{-7}$	CL=90%	2364
$p\overline{\Lambda}K^-$	$<8.2\times 10^{-7}$	CL=90%	2308
$p\overline{\Lambda}D^-$	$(2.5\pm 0.4)\times 10^{-5}$		1765
$p\overline{\Lambda}D^{*-}$	$(3.4\pm 0.8)\times 10^{-5}$		1685
$p\overline{\Sigma}^0\pi^-$	$<3.8\times 10^{-6}$	CL=90%	2383
$\overline{\Lambda}\Lambda$	$<3.2\times 10^{-7}$	CL=90%	2392
$\overline{\Lambda}\Lambda K^0$	$(4.8\ ^{+1.0}_{-0.9})\times 10^{-6}$		2250
$\overline{\Lambda}\Lambda K^{*0}$	$(2.5\ ^{+0.9}_{-0.8})\times 10^{-6}$		2098
$\overline{\Lambda}\Lambda D^0$	$(1.00\ ^{+0.30}_{-0.26})\times 10^{-5}$		1662
$D^0\Sigma^0\overline{\Lambda}+$ c.c.	$<3.1\times 10^{-5}$	CL=90%	1611
$\Delta^0\overline{\Delta}^0$	$<1.5\times 10^{-3}$	CL=90%	2335
$\Delta^{++}\overline{\Delta}^{--}$	$<1.1\times 10^{-4}$	CL=90%	2335
$\overline{D}^0p\overline{p}$	$(1.04\pm 0.07)\times 10^{-4}$		1863
$D_s^-\overline{\Lambda}p$	$(2.8\pm 0.9)\times 10^{-5}$		1710
$\overline{D}^*(2007)^0p\overline{p}$	$(9.9\pm 1.1)\times 10^{-5}$		1788
$D^*(2010)^-p\overline{n}$	$(1.4\pm 0.4)\times 10^{-3}$		1785
$D^-p\overline{p}\pi^+$	$(3.32\pm 0.31)\times 10^{-4}$		1786
$D^*(2010)^-p\overline{p}\pi^+$	$(4.7\pm 0.5)\times 10^{-4}$	S=1.2	1708
$\overline{D}^0p\overline{p}\pi^+\pi^-$	$(3.0\pm 0.5)\times 10^{-4}$		1708
$\overline{D}^{*0}p\overline{p}\pi^+\pi^-$	$(1.9\pm 0.5)\times 10^{-4}$		1623
$\Theta_c\overline{p}\pi^+,\ \Theta_c\to\ D^-p$	$<9\times 10^{-6}$	CL=90%	–
$\Theta_c\overline{p}\pi^+,\ \Theta_c\to\ D^{*-}p$	$<1.4\times 10^{-5}$	CL=90%	–
$\overline{\Sigma}_c^{--}\Delta^{++}$	$<8\times 10^{-4}$	CL=90%	1839
$\overline{\Lambda}_c^-p\pi^+\pi^-$	$(1.02\pm 0.14)\times 10^{-3}$	S=1.3	1934
$\overline{\Lambda}_c^-p$	$(1.54\pm 0.18)\times 10^{-5}$		2021
$\overline{\Lambda}_c^-p\pi^0$	$(1.55\pm 0.18)\times 10^{-4}$		1982
$\Sigma_c(2455)^-p$	$<2.4\times 10^{-5}$		–
$\overline{\Lambda}_c^-p\pi^+\pi^-\pi^0$	$<5.07\times 10^{-3}$	CL=90%	1883
$\overline{\Lambda}_c^-p\pi^+\pi^-\pi^+\pi^-$	$<2.74\times 10^{-3}$	CL=90%	1821
$\quad\overline{\Lambda}_c^-p\pi^+\pi^-$(nonresonant)	$(5.5\pm 1.0)\times 10^{-4}$	S=1.3	1934
$\quad\overline{\Sigma}_c(2520)^{--}p\pi^+$	$(1.02\pm 0.18)\times 10^{-4}$		1860
$\quad\overline{\Sigma}_c(2520)^0p\pi^-$	$<3.1\times 10^{-5}$	CL=90%	1860
$\quad\overline{\Sigma}_c(2455)^0p\pi^-$	$(1.08\pm 0.16)\times 10^{-4}$		1895
$\qquad\overline{\Sigma}_c(2455)^0N^0,\ \ N^0\to p\pi^-$	$(6.4\pm 1.7)\times 10^{-5}$		–

$\overline{\Sigma}_c(2455)^{--} p \pi^+$		(1.84 ± 0.24) $\times 10^{-4}$			1895
$\Lambda_c^- p K^+ \pi^-$		(3.5 ± 0.7) $\times 10^{-5}$			1786
$\overline{\Sigma}_c(2455)^{--} p K^+$, $\overline{\Sigma}_c^{--} \to \overline{\Lambda}_c^- \pi^-$		(8.9 ± 2.5) $\times 10^{-6}$			1754
$\Lambda_c^- p K^*(892)^0$		$< 2.42 \times 10^{-5}$	CL=90%		1647
$\Lambda_c^- p K^+ K^-$		(2.0 ± 0.4) $\times 10^{-5}$			1588
$\Lambda_c^- p \phi$		$< 1.0 \times 10^{-5}$	CL=90%		1567
$\Lambda_c^- p \overline{p} p$		$< 2.8 \times 10^{-6}$			677
$\overline{\Lambda}_c^- \Lambda K^+$		(4.8 ± 1.1) $\times 10^{-5}$			1767
$\overline{\Lambda}_c^- \Lambda_c^+$		$< 1.6 \times 10^{-5}$	CL=95%		1319
$\overline{\Lambda}_c(2593)^-$ / $\overline{\Lambda}_c(2625)^- p$		$< 1.1 \times 10^{-4}$	CL=90%		–
$\overline{\Xi}_c^- \Lambda_c^+$		(1.2 ± 0.8) $\times 10^{-3}$			1147
$\overline{\Xi}_c^- \Lambda_c^+$, $\overline{\Xi}_c^- \to \Xi^+ \pi^- \pi^-$		(2.4 ± 1.1) $\times 10^{-5}$		S=1.8	1147
$\overline{\Xi}_c^- \Lambda_c^+$, $\overline{\Xi}_c^- \to \overline{p} K^+ \pi^-$		(5.3 ± 1.7) $\times 10^{-6}$			–
$\Lambda_c^+ \Lambda_c^- K^0$		(4.0 ± 0.9) $\times 10^{-4}$			732
$\overline{\Xi}_c(2930)^- \Lambda_c^+$, $\overline{\Xi}_c^- \to \Lambda_c^- K^0$		(2.4 ± 0.6) $\times 10^{-4}$			–
$\Lambda \psi_{DS}$	[uuu]	$< 2.1 \times 10^{-5}$	CL=90%		–

Lepton Family number (*LF*) or Lepton number (*L*) or Baryon number (*B*) violating modes, or/and $\Delta B = 1$ weak neutral current (*B1*) modes

$\gamma\gamma$	*B1*		$< 3.2 \times 10^{-7}$	CL=90%		2640
$e^+ e^-$	*B1*		$< 2.5 \times 10^{-9}$	CL=90%		2640
$e^+ e^- \gamma$	*B1*		$< 1.2 \times 10^{-7}$	CL=90%		2640
$\mu^+ \mu^-$	*B1*		($7 \ {}^{+13}_{-11}$) $\times 10^{-11}$		S=1.8	2638
$\mu^+ \mu^- \mu^+ \mu^-$	*B1*		$< 1.8 \times 10^{-10}$	CL=95%		2629
SP, $S \to \mu^+ \mu^-$, $P \to \mu^+ \mu^-$	*B1*	[vvv]	$< 6.0 \times 10^{-10}$	CL=95%		–
aa, $a \to \mu^+ \mu^-$			$< 2.3 \times 10^{-10}$	CL=95%		–
$\tau^+ \tau^-$	*B1*		$< 2.1 \times 10^{-3}$	CL=95%		1952
$\pi^0 \ell^+ \ell^-$	*B1*		$< 5.3 \times 10^{-8}$	CL=90%		2638
$\pi^0 e^+ e^-$	*B1*		$< 8.4 \times 10^{-8}$	CL=90%		2638
$\pi^0 \mu^+ \mu^-$	*B1*		$< 6.9 \times 10^{-8}$	CL=90%		2634
$\eta \ell^+ \ell^-$	*B1*		$< 6.4 \times 10^{-8}$	CL=90%		2611
$\eta e^+ e^-$	*B1*		$< 1.08 \times 10^{-7}$	CL=90%		2611
$\eta \mu^+ \mu^-$	*B1*		$< 1.12 \times 10^{-7}$	CL=90%		2607
$\pi^0 \nu \overline{\nu}$	*B1*		$< 9 \times 10^{-6}$	CL=90%		2638
$K^0 \ell^+ \ell^-$	*B1*	[ggg]	(3.3 ± 0.6) $\times 10^{-7}$			2616
$K^0 e^+ e^-$	*B1*		($2.5 \ {}^{+1.1}_{-0.9}$) $\times 10^{-7}$		S=1.3	2616
$K^0 \mu^+ \mu^-$	*B1*		(3.39 ± 0.35) $\times 10^{-7}$		S=1.1	2612
$K^0 \nu \overline{\nu}$	*B1*		$< 2.6 \times 10^{-5}$	CL=90%		2616
$\rho^0 \nu \overline{\nu}$	*B1*		$< 4.0 \times 10^{-5}$	CL=90%		2583

$K^*(892)^0 \ell^+ \ell^-$	B1	[ggg]		$(9.9 \ ^{+1.2}_{-1.1}) \times 10^{-7}$		2565
$\quad K^*(892)^0 e^+ e^-$	B1			$(1.03 ^{+0.19}_{-0.17}) \times 10^{-6}$		2565
$\quad K^*(892)^0 \mu^+ \mu^-$	B1			$(9.4 \pm 0.5) \times 10^{-7}$		2560
$\pi^+ \pi^- \mu^+ \mu^-$	B1			$(2.1 \pm 0.5) \times 10^{-8}$		2626
$K^*(892)^0 \nu \overline{\nu}$	B1		$<$	1.8×10^{-5}	CL=90%	2565
invisible	B1		$<$	2.4×10^{-5}	CL=90%	–
$\nu \overline{\nu} \gamma$	B1		$<$	1.6×10^{-5}	CL=90%	2640
$\phi \mu^+ \mu^-$			$<$	3.2×10^{-9}	CL=90%	2537
$\phi \nu \overline{\nu}$	B1		$<$	1.27×10^{-4}	CL=90%	2541
$e^\pm \mu^\mp$	LF	[z]	$<$	1.0×10^{-9}	CL=90%	2639
$\pi^0 e^\pm \mu^\mp$	LF		$<$	1.4×10^{-7}	CL=90%	2637
$K^0 e^\pm \mu^\mp$	LF		$<$	3.8×10^{-8}	CL=90%	2615
$K^*(892)^0 e^+ \mu^-$	LF		$<$	1.6×10^{-7}	CL=90%	2563
$K^*(892)^0 e^- \mu^+$	LF		$<$	1.2×10^{-7}	CL=90%	2563
$K^*(892)^0 e^\pm \mu^\mp$	LF		$<$	1.8×10^{-7}	CL=90%	2563
$e^\pm \tau^\mp$	LF	[z]	$<$	1.6×10^{-5}	CL=90%	2341
$\mu^\pm \tau^\mp$	LF	[z]	$<$	1.4×10^{-5}	CL=95%	2340
$\Lambda_c^+ \mu^-$	L,B		$<$	1.4×10^{-6}	CL=90%	2143
$\Lambda_c^+ e^-$	L,B		$<$	4×10^{-6}	CL=90%	2145

$B^\pm/B^0$ ADMIXTURE

CP violation

$A_{CP}(B \to K^*(892)\gamma) = -0.003 \pm 0.011$
$A_{CP}(B \to s\gamma) = 0.015 \pm 0.011$
$A_{CP}(B \to (s+d)\gamma) = 0.010 \pm 0.031$
$A_{CP}(B \to X_s \ell^+ \ell^-) = 0.04 \pm 0.11$
$A_{CP}(B \to X_s \ell^+ \ell^-)$ $(1.0 < q^2 < 6.0\ \text{GeV}^2/c^4) = -0.06 \pm 0.22$
$A_{CP}(B \to X_s \ell^+ \ell^-)$ $(10.1 < q^2 < 12.9$ or $q^2 > 14.2\ \text{GeV}^2/c^4)$ $= 0.19 \pm 0.18$
$A_{CP}(B \to K^* e^+ e^-) = -0.18 \pm 0.15$
$A_{CP}(B \to K^* \mu^+ \mu^-) = -0.03 \pm 0.13$
$A_{CP}(B \to K^* \ell^+ \ell^-) = -0.04 \pm 0.07$
$A_{CP}(B \to \eta\,\text{anything}) = -0.13^{+0.04}_{-0.05}$
$\Delta A_{CP}(X_s \gamma) = A_{CP}(B^\pm \to X_s \gamma) - A_{CP}(B^0 \to X_s \gamma) = 0.041 \pm 0.023$
$\overline{A}_{CP}(B \to X_s \gamma) = (A_{CP}(B^+ \to X_s \gamma) + A_{CP}(B^0 \to X_s \gamma))/2 = 0.009 \pm 0.012$
$\Delta A_{CP}(B \to K^* \gamma) = A_{CP}(B^+ \to K^{*+} \gamma) - A_{CP}(B^0 \to K^{*0} \gamma) = 0.024 \pm 0.028$
$\overline{A}_{CP}(B \to K^* \gamma) = (A_{CP}(B^+ \to K^{*+} \gamma) + A_{CP}(B^0 \to K^{*0} \gamma))/2 = -0.001 \pm 0.014$

The branching fraction measurements are for an admixture of B mesons at the $\Upsilon(4S)$. The values quoted assume that B($\Upsilon(4S) \to B\overline{B}$) = 100%.

For inclusive branching fractions, *e.g.*, $B \to D^{\pm}$ *anything*, the treatment of multiple D's in the final state must be defined. One possibility would be to count the number of events with one-or-more D's and divide by the total number of B's. Another possibility would be to count the total number of D's and divide by the total number of B's, which is the definition of average multiplicity. The two definitions are identical if only one D is allowed in the final state. Even though the "one-or-more" definition seems sensible, for practical reasons inclusive branching fractions are almost always measured using the multiplicity definition. For heavy final state particles, authors call their results inclusive branching fractions while for light particles some authors call their results multiplicities. In the B sections, we list all results as inclusive branching fractions, adopting a multiplicity definition. This means that inclusive branching fractions can exceed 100% and that inclusive partial widths can exceed total widths, just as inclusive cross sections can exceed total cross section.

$\overline{B}$ modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing.

***B* DECAY MODES**		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
		Semileptonic and leptonic modes		
$\ell^+ \nu_\ell$ anything	[ggg,xxx]	(10.84 ± 0.16) %		–
$D^- \ell^+ \nu_\ell$ anything	[ggg]	(2.6 ± 0.5) %		–
$\overline{D}^0 \ell^+ \nu_\ell$ anything	[ggg]	(7.3 ± 1.5) %		–
$\overline{D} \ell^+ \nu_\ell$		(2.42 ± 0.12) %		2310
$D^{*-} \ell^+ \nu_\ell$ anything	[yyy]	(6.7 ± 1.3) $\times 10^{-3}$		–
$\overline{D}^* \ell^+ \nu_\ell$	[zzz]	(4.95 ± 0.11) %		2257
$\overline{D}^{**} \ell^+ \nu_\ell$	[ggg,aaaa]	(2.7 ± 0.7) %		–
$\overline{D}_1(2420) \ell^+ \nu_\ell$ anything		(3.8 ± 1.3) $\times 10^{-3}$	S=2.4	–
$\overline{D} \pi \ell^+ \nu_\ell$ anything + $\overline{D}^* \pi \ell^+ \nu_\ell$ anything		(2.6 ± 0.5) %	S=1.5	–
$\overline{D} \pi \ell^+ \nu_\ell$ anything		(1.5 ± 0.6) %		–
$\overline{D}^* \pi \ell^+ \nu_\ell$ anything		(1.9 ± 0.4) %		–
$\overline{D}_2^*(2460) \ell^+ \nu_\ell$ anything		(4.4 ± 1.6) $\times 10^{-3}$		–
$D^{*-} \pi^+ \ell^+ \nu_\ell$ anything		(1.00 ± 0.34) %		–
$\overline{D} \pi^+ \pi^- \ell^+ \nu_\ell$		(1.62 ± 0.32) $\times 10^{-3}$		2301
$\overline{D}^* \pi^+ \pi^- \ell^+ \nu_\ell$		(9.4 ± 3.2) $\times 10^{-4}$		2247
$D_s^- \ell^+ \nu_\ell$ anything	[ggg]	< 7 $\times 10^{-3}$	CL=90%	–
$D_s^- \ell^+ \nu_\ell K^+$ anything	[ggg]	< 5 $\times 10^{-3}$	CL=90%	–
$D_s^- \ell^+ \nu_\ell K^0$ anything	[ggg]	< 7 $\times 10^{-3}$	CL=90%	–
$X_c \ell^+ \nu_\ell$		(10.65 ± 0.16) %		–
$X_u \ell^+ \nu_\ell$		(1.91 ± 0.27) $\times 10^{-3}$		–
$X_u e^+ \nu_e$		(1.57 ± 0.19) $\times 10^{-3}$		–

$X_u \mu^+ \nu_\mu$		$(1.62 \pm 0.21) \times 10^{-3}$			–
$K^+ \ell^+ \nu_\ell$ anything	[ggg]	(6.3 ± 0.6) %			–
$K^- \ell^+ \nu_\ell$ anything	[ggg]	$(10 \pm 4) \times 10^{-3}$			–
$K^0 / \overline{K}^0 \ell^+ \nu_\ell$ anything	[ggg]	(4.6 ± 0.5) %			–
$\overline{D} \tau^+ \nu_\tau$		$(8.2 \pm 0.8) \times 10^{-3}$			1911
$\overline{D}^* \tau^+ \nu_\tau$		(1.46 ± 0.08) %			1838

D, D^*, or D_s modes

$D^\pm$ anything		(23.1 ± 1.2) %			–
$D^0 / \overline{D}^0$ anything		(61.6 ± 2.9) %		S=1.3	–
$D^*(2010)^\pm$ anything		(22.5 ± 1.5) %			–
$\overline{D}^*(2007)^0$ anything		(26.0 ± 2.7) %			–
$D_s^\pm$ anything	[z]	(8.3 ± 0.8) %			–
$D_s^{*\pm}$ anything		(6.3 ± 1.0) %			–
$D_s^{*\pm} \overline{D}^{(*)}$		(3.4 ± 0.6) %			–
$\overline{D} D_{s0}(2317)$		seen			1605
$\overline{D} D_{sJ}(2457)$		seen			–
$D^{(*)} \overline{D}^{(*)} K^0 + D^{(*)} \overline{D}^{(*)} K^\pm$	[z,bbaa]	$(7.1 {}^{+2.7}_{-1.7})$ %			–
$b \to c \overline{c} s$		(22 ± 4) %			–
$D_s{}^{(*)} \overline{D}^{(*)}$	[z,bbaa]	(3.9 ± 0.4) %			–
$D^* D^*(2010)^\pm$	[z]	$< 5.9 \times 10^{-3}$	CL=90%		1711
$D D^*(2010)^\pm + D^* D^\pm$	[z]	$< 5.5 \times 10^{-3}$	CL=90%		–
$D D^\pm$	[z]	$< 3.1 \times 10^{-3}$	CL=90%		1866
$D_s{}^{(*)\pm} \overline{D}^{(*)} X(n\pi^\pm)$	[z,bbaa]	$(9 {}^{+5}_{-4})$ %			–
$\overline{D}^*(2010)\gamma$		$< 1.1 \times 10^{-3}$	CL=90%		2257
$D_s^+ \pi^-$, $D_s^{*+} \pi^-$, $D_s^+ \rho^-$, $D_s^{*+} \rho^-$, $D_s^+ \pi^0$, $D_s^{*+} \pi^0$, $D_s^+ \eta$, $D_s^{*+} \eta$, $D_s^+ \rho^0$, $D_s^{*+} \rho^0$, $D_s^+ \omega$, $D_s^{*+} \omega$	[z]	$< 4 \times 10^{-4}$	CL=90%		–
$D_{s1}(2536)^+$ anything		$< 9.5 \times 10^{-3}$	CL=90%		–

Charmonium modes

$J/\psi(1S)$ anything		(1.094 ± 0.032) %		S=1.1	–
$J/\psi(1S)$ (direct) anything		$(7.8 \pm 0.4) \times 10^{-3}$		S=1.1	–
$\psi(2S)$ anything		$(3.07 \pm 0.21) \times 10^{-3}$			–
$\chi_{c1}(1P)$ anything		$(3.55 \pm 0.27) \times 10^{-3}$		S=1.3	–
$\chi_{c1}(1P)$ (direct) anything		$(3.08 \pm 0.19) \times 10^{-3}$			–
$\chi_{c2}(1P)$ anything		$(10.0 \pm 1.7) \times 10^{-4}$		S=1.6	–
$\chi_{c2}(1P)$ (direct) anything		$(7.5 \pm 1.1) \times 10^{-4}$			–
$\eta_c(1S)$ anything		$< 9 \times 10^{-3}$	CL=90%		–

$K\chi_{c1}(3872)$		(2.3 ± 0.7) $\times 10^{-4}$		1141
$KX(3940)$, $X \to D^{*0}D^0$		< 6.7 $\times 10^{-5}$	CL=90%	1084
$K\chi_{c0}(3915)$, $\chi_{c0} \to \omega J/\psi$	[ccaa]	(7.1 ± 3.4) $\times 10^{-5}$		1103

K or *K** modes

$K^{\pm}$ anything	[z]	(78.9 ± 2.5) %		–
K^+ anything		(66 ± 5) %		–
K^- anything		(13 ± 4) %		–
$K^0/\overline{K}^0$ anything	[z]	(64 ± 4) %		–
$K^*(892)^{\pm}$ anything		(18 ± 6) %		–
$K^*(892)^0/\overline{K}^*(892)^0$ anything	[z]	(14.6 ± 2.6) %		–
$K^*(892)\gamma$		(4.2 ± 0.6) $\times 10^{-5}$		2565
$\eta K\gamma$		(8.5 $^{+1.8}_{-1.6}$) $\times 10^{-6}$		2588
$K_1(1400)\gamma$		< 1.27 $\times 10^{-4}$	CL=90%	2454
$K_2^*(1430)\gamma$		(1.7 $^{+0.6}_{-0.5}$) $\times 10^{-5}$		2447
$K_2(1770)\gamma$		< 1.2 $\times 10^{-3}$	CL=90%	2342
$K_3^*(1780)\gamma$		< 3.7 $\times 10^{-5}$	CL=90%	2340
$K_4^*(2045)\gamma$		< 1.0 $\times 10^{-3}$	CL=90%	2243
$K\eta'(958)$		(8.3 ± 1.1) $\times 10^{-5}$		2528
$K^*(892)\eta'(958)$		(4.1 ± 1.1) $\times 10^{-6}$		2472
$K\eta$		< 5.2 $\times 10^{-6}$	CL=90%	2588
$K^*(892)\eta$		(1.8 ± 0.5) $\times 10^{-5}$		2534
$K\phi\phi$		(2.3 ± 0.9) $\times 10^{-6}$		2306
$\overline{b} \to \overline{s}\gamma$		(3.49 ± 0.19) $\times 10^{-4}$		–
$\overline{b} \to \overline{d}\gamma$		(9.2 ± 3.0) $\times 10^{-6}$		–
$\overline{b} \to \overline{s}$ gluon		< 6.8 %	CL=90%	–
η anything		(2.6 $^{+0.5}_{-0.8}$) $\times 10^{-4}$		–
η' anything		(4.2 ± 0.9) $\times 10^{-4}$		–
K^+ gluon (charmless)		< 1.87 $\times 10^{-4}$	CL=90%	–
K^0 gluon (charmless)		(1.9 ± 0.7) $\times 10^{-4}$		–

Light unflavored meson modes

$\rho\gamma$		(1.39 ± 0.25) $\times 10^{-6}$	S=1.2	2583
$\rho/\omega\gamma$		(1.30 ± 0.23) $\times 10^{-6}$	S=1.2	–
$\pi^{\pm}$ anything	[z,ddaa]	(358 ± 7) %		–
π^0 anything		(235 ±11) %		–
η anything		(17.6 ± 1.6) %		–
ρ^0 anything		(21 ± 5) %		–
ω anything		< 81 %	CL=90%	–
ϕ anything		(3.43 ± 0.12) %		–
$\phi K^*(892)$		< 2.2 $\times 10^{-5}$	CL=90%	2460
π^+ gluon (charmless)		(3.7 ± 0.8) $\times 10^{-4}$		–

Baryon modes

Λ_c^+ / $\overline{\Lambda}_c^-$ anything		(3.6 ± 0.4) %			–
Λ_c^+ anything		< 1.3	%	CL=90%	–
$\overline{\Lambda}_c^-$ anything		< 7	%	CL=90%	–
$\overline{\Lambda}_c^- \ell^+$ anything		< 9	$\times 10^{-4}$	CL=90%	–
$\overline{\Lambda}_c^- e^+$ anything		< 1.8	$\times 10^{-3}$	CL=90%	–
$\overline{\Lambda}_c^- \mu^+$ anything		< – 1.4	$\times 10^{-3}$	CL=90%	–
$\overline{\Lambda}_c^- p$ anything		(2.05 ± 0.33) %			–
$\overline{\Lambda}_c^- p e^+ \nu_e$		< 8	$\times 10^{-4}$	CL=90%	2021
$\overline{\Sigma}_c^{--}$ anything		(3.4 ± 1.7)	$\times 10^{-3}$		–
$\overline{\Sigma}_c^-$ anything		< 8	$\times 10^{-3}$	CL=90%	–
$\overline{\Sigma}_c^0$ anything		(3.7 ± 1.7)	$\times 10^{-3}$		–
$\overline{\Sigma}_c^0 N (N = p$ or $n)$		< 1.2	$\times 10^{-3}$	CL=90%	1938
Ξ_c^0 anything, $\Xi_c^0 \to \Xi^- \pi^+$		(1.93 ± 0.30)	$\times 10^{-4}$	S=1.1	–
Ξ_c^+, $\Xi_c^+ \to \Xi^- \pi^+ \pi^+$		($4.5 {}^{+1.3}_{-1.2}$)	$\times 10^{-4}$		–
$p / \overline{p}$ anything	[z]	(8.0 ± 0.4) %			–
$p / \overline{p}$ (direct) anything	[z]	(5.5 ± 0.5) %			–
$\overline{p} e^+ \nu_e$ anything		< 5.9	$\times 10^{-4}$	CL=90%	–
$\Lambda / \overline{\Lambda}$ anything	[z]	(4.0 ± 0.5) %			–
Λ anything		seen			–
$\overline{\Lambda}$ anything		seen			–
$\Xi^- / \overline{\Xi}^+$ anything	[z]	(2.7 ± 0.6)	$\times 10^{-3}$		–
baryons anything		(6.8 ± 0.6) %			–
$p \overline{p}$ anything		(2.47 ± 0.23) %			–
$\Lambda \overline{p} / \overline{\Lambda} p$ anything	[z]	(2.5 ± 0.4) %			–
$\Lambda \overline{\Lambda}$ anything		< 5	$\times 10^{-3}$	CL=90%	–

Lepton Family number (*LF*) violating modes or $\Delta B = 1$ weak neutral current (*B1*) modes

$s e^+ e^-$	*B1*		(6.7 ± 1.7)	$\times 10^{-6}$	S=2.0	–
$s \mu^+ \mu^-$	*B1*		(4.3 ± 1.0)	$\times 10^{-6}$		–
$s \ell^+ \ell^-$	*B1*	[ggg]	(5.8 ± 1.3)	$\times 10^{-6}$	S=1.8	–
$\pi \ell^+ \ell^-$	*B1*		< 5.9	$\times 10^{-8}$	CL=90%	2638
$\pi e^+ e^-$	*B1*		< 1.10	$\times 10^{-7}$	CL=90%	2638
$\pi \mu^+ \mu^-$	*B1*		< 5.0	$\times 10^{-8}$	CL=90%	2634
$K e^+ e^-$	*B1*		(4.4 ± 0.6)	$\times 10^{-7}$		2617
$K^*(892) e^+ e^-$	*B1*		(1.19 ± 0.20)	$\times 10^{-6}$	S=1.2	2565
$K \mu^+ \mu^-$	*B1*		(4.4 ± 0.4)	$\times 10^{-7}$		2612
$K^*(892) \mu^+ \mu^-$	*B1*		(1.06 ± 0.09)	$\times 10^{-6}$		2560
$K \ell^+ \ell^-$	*B1*		(4.8 ± 0.4)	$\times 10^{-7}$		2617
$K^*(892) \ell^+ \ell^-$	*B1*		(1.05 ± 0.10)	$\times 10^{-6}$		2565
$K \nu \overline{\nu}$	*B1*		< 1.6	$\times 10^{-5}$	CL=90%	2617

$K^* \nu \overline{\nu}$	B1		<	2.7	$\times 10^{-5}$ CL=90%	–
$\pi \nu \overline{\nu}$	B1		<	8	$\times 10^{-6}$ CL=90%	2638
$\rho \nu \overline{\nu}$	B1		<	2.8	$\times 10^{-5}$ CL=90%	2583
$s e^{\pm} \mu^{\mp}$	LF	[z]	<	2.2	$\times 10^{-5}$ CL=90%	–
$\pi e^{\pm} \mu^{\mp}$	LF		<	9.2	$\times 10^{-8}$ CL=90%	2637
$\rho e^{\pm} \mu^{\mp}$	LF		<	3.2	$\times 10^{-6}$ CL=90%	2582
$K e^{\pm} \mu^{\mp}$	LF		<	3.8	$\times 10^{-8}$ CL=90%	2616
$K^*(892) e^{\pm} \mu^{\mp}$	LF		<	5.1	$\times 10^{-7}$ CL=90%	2563

$B^{\pm}/B^0/B^0_s/b$-baryon ADMIXTURE

These measurements are for an admixture of bottom particles at high energy (LHC, LEP, Tevatron, S$p\overline{p}$S).

Mean life $\tau = (1.5673 \pm 0.0029) \times 10^{-12}$ s

Mean life $\tau = (1.72 \pm 0.10) \times 10^{-12}$ s   Charged b-hadron admixture

Mean life $\tau = (1.58 \pm 0.14) \times 10^{-12}$ s   Neutral b-hadron admixture

$\tau_{\text{charged } b-\text{hadron}} / \tau_{\text{neutral } b-\text{hadron}} = 1.09 \pm 0.13$

$\left|\Delta\tau_b\right| / \tau_{b,\overline{b}} = -0.001 \pm 0.014$

The branching fraction measurements are for an admixture of B mesons and baryons at energies above the $\Upsilon(4S)$. Only the highest energy results (LHC, LEP, Tevatron, S$p\overline{p}$S) are used in the branching fraction averages. In the following, we assume that the production fractions are the same at the LHC, LEP, and at the Tevatron.

For inclusive branching fractions, *e.g.*, $B \rightarrow D^{\pm}$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

The modes below are listed for a $\overline{b}$ initial state. b modes are their charge conjugates. Reactions indicate the weak decay vertex and do not include mixing.

$\overline{b}$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)

PRODUCTION FRACTIONS

The production fractions for weakly decaying b-hadrons at high energy have been calculated from the best values of mean lives, mixing parameters, and branching fractions in this edition by the Heavy Flavor Averaging Group (HFLAV) as described in the note "B^0-$\overline{B}^0$ Mixing" in the B^0 Particle Listings. We no longer provide world averages of the b-hadron production fractions, where results from LEP, Tevatron and LHC are averaged together; indeed the available data (from CDF and LHCb) shows that the fractions depend on the kinematics (in particular the p_T) of the produced b hadron. Hence we would like to list the fractions in Z decays instead, which are well-defined physics observables. The production fractions in $p\overline{p}$ collisions at the Tevatron are also listed at the end of the section. Values assume

$\mathrm{B}(\overline{b} \to B^+) = \mathrm{B}(\overline{b} \to B^0)$
$\mathrm{B}(\overline{b} \to B^+) + \mathrm{B}(\overline{b} \to B^0) + \mathrm{B}(\overline{b} \to B_s^0) + \mathrm{B}(b \to b\text{-baryon}) = 100\%$.

The correlation coefficients between production fractions are also reported:
$cor(B_s^0, b\text{-baryon}) = 0.064$
$cor(B_s^0, B^\pm{=}B^0) = -0.633$
$cor(b\text{-baryon}, B^\pm{=}B^0) = -0.813$.

The notation for production fractions varies in the literature (f_d, d_{B^0}, $f(b \to \overline{B}^0)$, $\mathrm{Br}(b \to \overline{B}^0)$). We use our own branching fraction notation here, $\mathrm{B}(\overline{b} \to B^0)$.

Note these production fractions are b-hadronization fractions, not the conventional branching fractions of b-quark to a B-hadron, which may have considerable dependence on the initial and final state kinematic and production environment.

B^+		$(40.8 \pm 0.7)\ \%$		–
B^0		$(40.8 \pm 0.7)\ \%$		–
B_s^0		$(10.0 \pm 0.8)\ \%$		–
b-baryon		$(8.4 \pm 1.1)\ \%$		–

DECAY MODES

Semileptonic and leptonic modes

ν anything		$(23.1 \pm 1.5)\ \%$		–
$\ell^+ \nu_\ell$ anything	[ggg]	$(10.69 \pm 0.22)\ \%$		–
$e^+ \nu_e$ anything		$(10.86 \pm 0.35)\ \%$		–
$\mu^+ \nu_\mu$ anything		$(10.95^{+0.29}_{-0.25})\ \%$		–
$D^- \ell^+ \nu_\ell$ anything	[ggg]	$(2.2 \pm 0.4)\ \%$	S=1.9	–
$D^- \pi^+ \ell^+ \nu_\ell$ anything		$(4.9 \pm 1.9) \times 10^{-3}$		–
$D^- \pi^- \ell^+ \nu_\ell$ anything		$(2.6 \pm 1.6) \times 10^{-3}$		–
$\overline{D}^0 \ell^+ \nu_\ell$ anything	[ggg]	$(6.79 \pm 0.34)\ \%$		–
$\overline{D}^0 \pi^- \ell^+ \nu_\ell$ anything		$(1.07 \pm 0.27)\ \%$		–
$\overline{D}^0 \pi^+ \ell^+ \nu_\ell$ anything		$(2.3 \pm 1.6) \times 10^{-3}$		–
$D^{*-} \ell^+ \nu_\ell$ anything	[ggg]	$(2.75 \pm 0.19)\ \%$		–
$D^{*-} \pi^- \ell^+ \nu_\ell$ anything		$(6 \pm 7) \times 10^{-4}$		–
$D^{*-} \pi^+ \ell^+ \nu_\ell$ anything		$(4.8 \pm 1.0) \times 10^{-3}$		–
$\overline{D}_j^0 \ell^+ \nu_\ell$ anything $\times$ $\mathrm{B}(\overline{D}_j^0 \to D^{*+} \pi^-)$	[ggg,eeaa]	$(2.6 \pm 0.9) \times 10^{-3}$		–

$D_j^- \ell^+ \nu_\ell$ anything × B($D_j^- \to D^0 \pi^-$)	[ggg,eeaa]	$(7.0 \pm 2.3) \times 10^{-3}$		–
$\overline{D}_2^*(2460)^0 \ell^+ \nu_\ell$ anything × B($\overline{D}_2^*(2460)^0 \to D^{*-} \pi^+$)		$< 1.4 \times 10^{-3}$	CL=90%	–
$D_2^*(2460)^- \ell^+ \nu_\ell$ anything × B($D_2^*(2460)^- \to D^0 \pi^-$)		$(4.2 {}^{+1.5}_{-1.8}) \times 10^{-3}$		–
$\overline{D}_2^*(2460)^0 \ell^+ \nu_\ell$ anything × B($\overline{D}_2^*(2460)^0 \to D^- \pi^+$)		$(1.6 \pm 0.8) \times 10^{-3}$		–
charmless $\ell \overline{\nu}_\ell$	[ggg]	$(1.7 \pm 0.5) \times 10^{-3}$		–
$\tau^+ \nu_\tau$ anything		(2.41 ± 0.23) %		–
$D^{*-} \tau \nu_\tau$ anything		$(9 \pm 4) \times 10^{-3}$		–
$\overline{c} \to \ell^- \overline{\nu}_\ell$ anything	[ggg]	(8.02 ± 0.19) %		–
$c \to \ell^+ \nu$ anything		$(1.6 {}^{+0.4}_{-0.5})$ %		–

Charmed meson and baryon modes

$\overline{D}^0$ anything		(58.7 ± 2.8) %		–
$D^0 D_s^\pm$ anything	[z]	$(9.1 {}^{+4.0}_{-2.8})$ %		–
$D^\mp D_s^\pm$ anything	[z]	$(4.0 {}^{+2.3}_{-1.8})$ %		–
$\overline{D}^0 D^0$ anything	[z]	$(5.1 {}^{+2.0}_{-1.8})$ %		–
$D^0 D^\pm$ anything	[z]	$(2.7 {}^{+1.8}_{-1.6})$ %		–
$D^\pm D^\mp$ anything	[z]	$< 9 \times 10^{-3}$	CL=90%	–
D^- anything		(22.7 ± 1.6) %		–
$D^*(2010)^+$ anything		(17.3 ± 2.0) %		–
$D_1(2420)^0$ anything		(5.0 ± 1.5) %		–
$D^*(2010)^\mp D_s^\pm$ anything	[z]	$(3.3 {}^{+1.6}_{-1.3})$ %		–
$D^0 D^*(2010)^\pm$ anything	[z]	$(3.0 {}^{+1.1}_{-0.9})$ %		–
$D^*(2010)^\pm D^\mp$ anything	[z]	$(2.5 {}^{+1.2}_{-1.0})$ %		–
$D^*(2010)^\pm D^*(2010)^\mp$ anything	[z]	(1.2 ± 0.4) %		–
$\overline{D} D$ anything		$(10 {}^{+11}_{-10})$ %		–
$D_2^*(2460)^0$ anything		(4.7 ± 2.7) %		–
D_s^- anything		(14.7 ± 2.1) %		–
D_s^+ anything		(10.1 ± 3.1) %		–
Λ_c^+ anything		(7.7 ± 1.1) %		–
$\overline{c} / c$ anything	[ddaa]	(116.2 ± 3.2) %		–

Charmonium modes				
$J/\psi(1S)$ anything		(1.16 ± 0.10) %		–
$\psi(2S)$ anything		$(3.06\pm 0.30)\times 10^{-3}$		–
$\chi_{c0}(1P)$ anything		(1.5 ± 0.6) %		–
$\chi_{c1}(1P)$ anything		(1.4 ± 0.4) %		–
$\chi_{c2}(1P)$ anything		$(6.2\pm 2.9)\times 10^{-3}$		–
$\chi_c(2P)$ anything, $\chi_c \to \phi\phi$		$< 2.8\times 10^{-7}$	CL=95%	–
$\eta_c(1S)$ anything		$(5.6\pm 0.9)\times 10^{-3}$		–
$\eta_c(2S)$ anything, $\eta_c \to \phi\phi$		$(3.5\pm 1.3)\times 10^{-7}$		–
$\chi_{c1}(3872)$ anything, $\chi_{c1} \to \phi\phi$		$< 4.5\times 10^{-7}$	CL=95%	–
$\chi_{c0}(3915)$ anything, $\chi_{c0} \to \phi\phi$		$< 3.1\times 10^{-7}$	CL=95%	–
***K* or *K** modes**				
$\overline{s}\gamma$		$(3.1\pm 1.1)\times 10^{-4}$		–
$\overline{s}\overline{\nu}\nu$	*B1*	$< 6.4\times 10^{-4}$	CL=90%	–
$K^\pm$ anything		(74 ± 6) %		–
K^0_S anything		(29.0 ± 2.9) %		–
Pion modes				
$\pi^\pm$ anything		(397 ± 21) %		–
π^0 anything	[*ddaa*]	(278 ± 60) %		–
ϕ anything		(2.82 ± 0.23) %		–
Baryon modes				
$p/\overline{p}$ anything		(13.1 ± 1.1) %		–
$\Lambda/\overline{\Lambda}$ anything		(5.9 ± 0.6) %		–
b-baryon anything		(10.2 ± 2.8) %		–
Other modes				
charged anything	[*ddaa*]	(497 ± 7) %		–
hadron$^+$ hadron$^-$		$(1.7\ ^{+1.0}_{-0.7})\times 10^{-5}$		–
charmless		$(7\pm 21)\times 10^{-3}$		–
$\Delta B = 1$ weak neutral current (*B1*) modes				
$\mu^+\mu^-$ anything	*B1*	$< 3.2\times 10^{-4}$	CL=90%	–

B^*

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

Quantum numbers shown are quark-model predictions.

Mass $m_{B^*} = 5324.71 \pm 0.21$ MeV
$m_{B^*} - m_B = 45.21 \pm 0.21$ MeV
$m_{B^{*+}} - m_{B^+} = 45.37 \pm 0.21$ MeV

B^* DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B\gamma$	seen	45

$B_1(5721)$

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

$B_1(5721)^+$ mass $= 5725.9^{+2.5}_{-2.7}$ MeV
$m_{B_1^+} - m_{B^{*0}} = 401.2^{+2.4}_{-2.7}$ MeV
$B_1(5721)^0$ mass $= 5726.1 \pm 1.3$ MeV (S = 1.2)
$m_{B_1^0} - m_{B^+} = 446.7 \pm 1.3$ MeV (S = 1.2)
$m_{B_1^0} - m_{B^{*+}} = 401.4 \pm 1.2$ MeV (S = 1.2)
Full width $\Gamma(B_1(5721)^+) = 31 \pm 6$ MeV (S = 1.1)
Full width $\Gamma(B_1(5721)^0) = 27.5 \pm 3.4$ MeV (S = 1.1)

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

$B_2^*(5747)$

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

$B_2^*(5747)^+$ mass $= 5737.2 \pm 0.7$ MeV
$m_{B_2^{*+}} - m_{B^0} = 457.5 \pm 0.7$ MeV
$B_2^*(5747)^0$ mass $= 5739.5 \pm 0.7$ MeV (S = 1.4)
$m_{B_2^{*0}} - m_{B_1^0} = 13.4 \pm 1.4$ MeV (S = 1.3)
$m_{B_2^{*0}} - m_{B^+} = 460.2 \pm 0.6$ MeV (S = 1.4)
Full width $\Gamma(B_2^*(5747)^+) = 20 \pm 5$ MeV (S = 2.2)
Full width $\Gamma(B_2^*(5747)^0) = 24.2 \pm 1.7$ MeV

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

$B_J(5970)$

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

$B_J(5970)^+$ mass $m = 5964 \pm 5$ MeV
$m_{B_J(5970)^+} - m_{B^0} = 685 \pm 5$ MeV
$B_J(5970)^0$ mass $m = 5971 \pm 5$ MeV
$m_{B_J(5970)^0} - m_{B^+} = 691 \pm 5$ MeV
$B_J(5970)^+$ full width $\Gamma = 62 \pm 20$ MeV
$B_J(5970)^0$ full width $\Gamma = 81 \pm 12$ MeV

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

BOTTOM, STRANGE MESONS ($B = \pm1$, $S = \mp1$)

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

B_s^0

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m_{B_s^0} = 5366.92 \pm 0.10$ MeV
$m_{B_s^0} - m_B = 87.42 \pm 0.14$ MeV
Mean life $\tau = (1.521 \pm 0.005) \times 10^{-12}$ s
$c\tau = 456.0\ \mu$m
$\Delta\Gamma_{B_s^0} = \Gamma_{B_{sL}^0} - \Gamma_{B_{sH}^0} = (0.083 \pm 0.005) \times 10^{12}\ \text{s}^{-1}$ (S = 1.7)

B_s^0-$\overline{B}_s^0$ mixing parameters

$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0} = (17.765 \pm 0.006) \times 10^{12}\ \hbar\ \text{s}^{-1}$
$= (1.1693 \pm 0.0004) \times 10^{-8}$ MeV
$x_s = \Delta m_{B_s^0}/\Gamma_{B_s^0} = 27.03 \pm 0.09$
χ_s (B_s^0-$\overline{B}_s^0$ mixing parameter) $= 0.499319 \pm 0.000005$

CP violation parameters in B_s^0

$\text{Re}(\epsilon_{B_s^0}) / (1 + |\epsilon_{B_s^0}|^2) = (-0.15 \pm 0.70) \times 10^{-3}$

$C_{KK}(B_s^0 \to K^+ K^-) = 0.162 \pm 0.035$
$S_{KK}(B_s^0 \to K^+ K^-) = 0.14 \pm 0.05$ (S = 1.3)
$r_B(B_s^0 \to D_s^\mp K^\pm) = 0.37^{+0.10}_{-0.09}$
$r_B(B_s^0 \to D_s^\mp K^\pm \pi^\pm \pi^\mp) = 0.47 \pm 0.08$
$\delta_B(B_s^0 \to D_s^\pm K^\mp) = (358 \pm 14)^\circ$
$\delta_B(B_s^0 \to D_s^\pm K^\mp \pi^\pm \pi^\mp) = (-6^{+10}_{-13})^\circ$
CP Violation phase $\beta_s = (2.5 \pm 1.0) \times 10^{-2}$ rad
$|\lambda|$ $(B_s^0 \to J/\psi(1S)\phi) = 1.001 \pm 0.018$ (S = 1.2)
$|\lambda| = 0.999 \pm 0.017$
A, *CP* violation parameter $= -0.79 \pm 0.08$
C, *CP* violation parameter $= 0.19 \pm 0.06$
S, *CP* violation parameter $= 0.17 \pm 0.06$
$A^L_{CP}(B_s \to J/\psi \overline{K}^*(892)^0) = -0.05 \pm 0.06$
$A^\parallel_{CP}(B_s \to J/\psi \overline{K}^*(892)^0) = 0.17 \pm 0.15$
$A^\perp_{CP}(B_s \to J/\psi \overline{K}^*(892)^0) = -0.05 \pm 0.10$
$\boldsymbol{A_{CP}(B_s \to \pi^+ K^-)} = 0.224 \pm 0.012$
$A_{CP}(B_s^0 \to [K^+ K^-]_D \overline{K}^*(892)^0) = -0.04 \pm 0.07$
$A_{CP}(B_s^0 \to [\pi^+ K^-]_D K^*(892)^0) = -0.01 \pm 0.04$
$A_{CP}(B_s^0 \to [\pi^+ \pi^-]_D K^*(892)^0) = 0.06 \pm 0.13$
$S(B_s^0 \to \phi\gamma) = 0.43 \pm 0.32$
$C(B_s^0 \to \phi\gamma) = 0.11 \pm 0.31$
$A^\Delta(B_s^0 \to \phi\gamma) = -0.7 \pm 0.4$
$\Delta a_\perp < 1.2 \times 10^{-12}$ GeV, CL = 95%
$\Delta a_\parallel = (-0.9 \pm 1.5) \times 10^{-14}$ GeV
$\Delta a_X = (1.0 \pm 2.2) \times 10^{-14}$ GeV
$\Delta a_Y = (-3.8 \pm 2.2) \times 10^{-14}$ GeV
$\mathrm{Re}(\xi) = -0.022 \pm 0.033$
$\mathrm{Im}(\xi) = 0.004 \pm 0.011$

These branching fractions all scale with $B(\overline{b} \to B_s^0)$.

The branching fraction $B(B_s^0 \to D_s^- \ell^+ \nu_\ell \text{anything})$ is not a pure measurement since the measured product branching fraction $B(\overline{b} \to B_s^0) \times B(B_s^0 \to D_s^- \ell^+ \nu_\ell \text{anything})$ was used to determine $B(\overline{b} \to B_s^0)$, as described in the note on "B^0-$\overline{B}^0$ Mixing"

For inclusive branching fractions, *e.g.*, $B \to D^\pm \text{anything}$, the values usually are multiplicities, not branching fractions. They can be greater than one.

B_s^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
D_s^- anything	(62 ± 6) %		–

$\ell \nu_\ell X$		(9.6 ± 0.8) %		–
$e^+ \nu X^-$		(9.1 ± 0.8) %		–
$\mu^+ \nu X^-$		(10.2 ± 1.0) %		–
$D_s^- \ell^+ \nu_\ell$ anything	[ffaa]	(8.1 ± 1.3) %		–
$D_s^{*-} \ell^+ \nu_\ell$ anything		(5.4 ± 1.1) %		–
$D_s^- \mu^+ \nu_\mu$		(2.44± 0.23) %		2321
$D_s^{*-} \mu^+ \nu_\mu$		(5.3 ± 0.5) %		2266
$D_{s1}(2536)^- \mu^+ \nu_\mu$, $D_{s1}^- \to D^{*-} K_S^0$		(2.7 ± 0.7) $\times 10^{-3}$		–
$D_{s1}(2536)^- X \mu^+ \nu$, $D_{s1}^- \to \overline{D}^0 K^+$		(4.4 ± 1.3) $\times 10^{-3}$		–
$D_{s2}(2573)^- X \mu^+ \nu$, $D_{s2}^- \to \overline{D}^0 K^+$		(2.7 ± 1.0) $\times 10^{-3}$		–
$K^- \mu^+ \nu_\mu$		(1.06± 0.09) $\times 10^{-4}$		2660
$D_s^- \pi^+$		(2.98± 0.14) $\times 10^{-3}$		2320
$D_s^- \rho^+$		(6.8 ± 1.4) $\times 10^{-3}$		2249
$D_s^- \pi^+ \pi^+ \pi^-$		(6.1 ± 1.0) $\times 10^{-3}$		2301
$D_{s1}(2536)^- \pi^+$, $D_{s1}^- \to D_s^- \pi^+ \pi^-$		(2.4 ± 0.8) $\times 10^{-5}$		–
$D_s^{\mp} K^{\pm}$		(2.25± 0.12) $\times 10^{-4}$		2293
$D_s^- K^+ \pi^+ \pi^-$		(3.2 ± 0.6) $\times 10^{-4}$		2249
$D_s^+ D_s^-$		(4.4 ± 0.5) $\times 10^{-3}$		1824
$D_s^- D^+$		(2.8 ± 0.5) $\times 10^{-4}$		1875
$D^+ D^-$		(2.2 ± 0.6) $\times 10^{-4}$		1925
$D^0 \overline{D}^0$		(1.9 ± 0.5) $\times 10^{-4}$		1930
$D_s^{*-} \pi^+$		($1.9 ^{+0.5}_{-0.4}$) $\times 10^{-3}$		2265
$D_s^{*\mp} K^{\pm}$		($1.32 ^{+0.40}_{-0.32}$) $\times 10^{-4}$		–
$D_s^{*-} \rho^+$		(9.5 ± 2.0) $\times 10^{-3}$		2191
$D_s^{*+} D_s^- + D_s^{*-} D_s^+$		(1.39± 0.17) %		1742
$D_s^{*+} D_s^{*-}$		(1.44± 0.21) %	S=1.1	1655
$D_s^{(*)+} D_s^{(*)-}$		(4.5 ± 1.4) %		–
$D^{*-} D_s^+$		(3.9 ± 0.8) $\times 10^{-4}$		1801
$\overline{D}^{*0} \overline{K}^0$		(2.8 ± 1.1) $\times 10^{-4}$		2278
$\overline{D}^0 \overline{K}^0$		(4.3 ± 0.9) $\times 10^{-4}$		2330
$\overline{D}^0 K^- \pi^+$		(1.04± 0.13) $\times 10^{-3}$		2312
$\overline{D}^*(2007)^0 K^- \pi^+$		(7.3 ± 2.6) $\times 10^{-4}$		2259
$\overline{D}^0 \overline{K}^*(892)^0$		(4.4 ± 0.6) $\times 10^{-4}$		2264
$\overline{D}^0 \overline{K}^*(1410)$		(3.9 ± 3.5) $\times 10^{-4}$		2117
$\overline{D}^0 \overline{K}_0^*(1430)$		(3.0 ± 0.7) $\times 10^{-4}$		2113
$\overline{D}^0 \overline{K}_2^*(1430)$		(1.1 ± 0.4) $\times 10^{-4}$		2112

$\overline{D}^0\,\overline{K}^*(1680)$	$<\ 7.8$	$\times 10^{-5}$	CL=90%	1997
$\overline{D}^0\,\overline{K}^*_0(1950)$	$<\ 1.1$	$\times 10^{-4}$	CL=90%	1890
$\overline{D}^0\,\overline{K}^*_3(1780)$	$<\ 2.6$	$\times 10^{-5}$	CL=90%	1970
$\overline{D}^0\,\overline{K}^*_4(2045)$	$<\ 3.1$	$\times 10^{-5}$	CL=90%	1835
$\overline{D}^0\,K^-\pi^+$(non-resonant)	$(\ 2.1\ \pm\ 0.8\ )$	$\times 10^{-4}$		2312
$D^*_{s2}(2573)^-\pi^+,\ \ D^*_{s2}\to\overline{D}^0\,K^-$	$(\ 2.6\ \pm\ 0.4\ )$	$\times 10^{-4}$		–
$D^*_{s1}(2700)^-\pi^+,\ \ D^*_{s1}\to\overline{D}^0\,K^-$	$(\ 1.6\ \pm\ 0.8\ )$	$\times 10^{-5}$		–
$D^*_{s1}(2860)^-\pi^+,\ \ D^*_{s1}\to\overline{D}^0\,K^-$	$(\ 5\ \pm\ 4\ )$	$\times 10^{-5}$		–
$D^*_{s3}(2860)^-\pi^+,\ \ D^*_{s3}\to\overline{D}^0\,K^-$	$(\ 2.2\ \pm\ 0.6\ )$	$\times 10^{-5}$		–
$\overline{D}^0\,K^+K^-$	$(\ 5.6\ \pm\ 0.9\ )$	$\times 10^{-5}$		2243
$\overline{D}^0\,f_0(980)$	$<\ 3.1$	$\times 10^{-6}$	CL=90%	2242
$\overline{D}^0\,\phi$	$(\ 3.0\ \pm\ 0.5\ )$	$\times 10^{-5}$		2235
$\overline{D}^{*0}\,\phi$	$(\ 3.7\ \pm\ 0.6\ )$	$\times 10^{-5}$		2178
$D^{*\mp}\pi^\pm$	$<\ 6.1$	$\times 10^{-6}$	CL=90%	–
$\eta_c\,\phi$	$(\ 5.0\ \pm\ 0.9\ )$	$\times 10^{-4}$		1663
$\eta_c\,\pi^+\pi^-$	$(\ 1.8\ \pm\ 0.7\ )$	$\times 10^{-4}$		1840
$J/\psi(1S)\,\phi$	$(\ 1.04\pm\ 0.04)$	$\times 10^{-3}$		1588
$J/\psi(1S)\,\phi\phi$	$(\ 1.20^{+\ 0.14}_{-\ 0.16})$	$\times 10^{-5}$		764
$J/\psi(1S)\pi^0$	$<\ 1.2$	$\times 10^{-3}$	CL=90%	1787
$J/\psi(1S)\eta$	$(\ 4.0\ \pm\ 0.7\ )$	$\times 10^{-4}$	S=1.4	1733
$J/\psi(1S)\,K^0_S$	$(\ 1.92\pm\ 0.14)$	$\times 10^{-5}$		1743
$J/\psi(1S)\,\overline{K}^*(892)^0$	$(\ 4.1\ \pm\ 0.4\ )$	$\times 10^{-5}$		1637
$J/\psi(1S)\eta'$	$(\ 3.3\ \pm\ 0.4\ )$	$\times 10^{-4}$		1612
$J/\psi(1S)\pi^+\pi^-$	$(\ 2.02\pm\ 0.17)$	$\times 10^{-4}$	S=1.7	1775
$J/\psi(1S)\,f_0(500),\ \ f_0\to\pi^+\pi^-$	$<\ 4$	$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)\,\rho,\ \ \rho\to\ \pi^+\pi^-$	$<\ 3.4$	$\times 10^{-6}$	CL=90%	–
$J/\psi(1S)\,f_0(980),\ \ f_0\to\pi^+\pi^-$	$(\ 1.24\pm\ 0.15)$	$\times 10^{-4}$	S=2.1	–
$J/\psi(1S)\,f_2(1270),\ \ f_2\to\pi^+\pi^-$	$(\ 1.0\ \pm\ 0.4\ )$	$\times 10^{-6}$		–
$J/\psi(1S)\,f_2(1270)_0,\ \ f_2\to\pi^+\pi^-$	$(\ 7.3\ \pm\ 1.7\ )$	$\times 10^{-7}$		–
$J/\psi(1S)\,f_2(1270)_\parallel,\ \ f_2\to\pi^+\pi^-$	$(\ 1.05\pm\ 0.33)$	$\times 10^{-6}$		–
$J/\psi(1S)\,f_2(1270)_\perp,\ \ f_2\to\pi^+\pi^-$	$(\ 1.3\ \pm\ 0.7\ )$	$\times 10^{-6}$		–
$J/\psi(1S)\,f_0(1370),\ \ f_0\to\pi^+\pi^-$	$(\ 4.4\ ^{+\ 0.6}_{-\ 4.0}\ )$	$\times 10^{-5}$		–

$J/\psi(1S) f_0(1500)$, $f_0 \to \pi^+\pi^-$	$(2.04^{+0.32}_{-0.24}) \times 10^{-5}$		–
$J/\psi(1S) f'_2(1525)_0$, $f'_2 \to \pi^+\pi^-$	$(1.03 \pm 0.22) \times 10^{-6}$		–
$J/\psi(1S) f'_2(1525)_{\parallel}$, $f'_2 \to \pi^+\pi^-$	$(1.2 ^{+2.6}_{-0.8}) \times 10^{-7}$		–
$J/\psi(1S) f'_2(1525)_{\perp}$, $f'_2 \to \pi^+\pi^-$	$(5 \pm 4) \times 10^{-7}$		–
$J/\psi(1S) f_0(1790)$, $f_0 \to \pi^+\pi^-$	$(4.9 ^{+10.0}_{-1.0}) \times 10^{-6}$		–
$J/\psi(1S)\pi^+\pi^-$ (nonresonant)	$(1.74^{+1.10}_{-0.34}) \times 10^{-5}$		1775
$J/\psi(1S)\overline{K}^0\pi^+\pi^-$	$< 4.4 \times 10^{-5}$	CL=90%	1675
$J/\psi(1S)K^+K^-$	$(7.9 \pm 0.7) \times 10^{-4}$		1601
$J/\psi(1S)K^0K^-\pi^+ +$ c.c.	$(9.5 \pm 1.3) \times 10^{-4}$		1538
$J/\psi(1S)\overline{K}^0K^+K^-$	$< 1.2 \times 10^{-5}$	CL=90%	1333
$J/\psi K^*(892)^0\overline{K}^*(892)^0$	$(1.10 \pm 0.09) \times 10^{-4}$		1083
$J/\psi(1S) f'_2(1525)$	$(2.6 \pm 0.6) \times 10^{-4}$		1310
$J/\psi(1S) p\overline{p}$	$(3.6 \pm 0.4) \times 10^{-6}$		982
$J/\psi(1S)\gamma$	$< 7.3 \times 10^{-6}$	CL=90%	1790
$J/\psi\mu^+\mu^-$, $J/\psi \to \mu^+\mu^-$	$< 2.6 \times 10^{-9}$	CL=95%	–
$J/\psi(1S)\pi^+\pi^-\pi^+\pi^-$	$(7.5 \pm 0.8) \times 10^{-5}$		1731
$J/\psi(1S) f_1(1285)$	$(7.2 \pm 1.4) \times 10^{-5}$		1460
$\psi(2S)\eta$	$(3.3 \pm 0.9) \times 10^{-4}$		1338
$\psi(2S)\eta'$	$(1.29 \pm 0.35) \times 10^{-4}$		1158
$\psi(2S)\pi^+\pi^-$	$(6.9 \pm 1.2) \times 10^{-5}$		1397
$\psi(2S)\phi$	$(5.2 \pm 0.4) \times 10^{-4}$		1120
$\psi(2S)K^0$	$(1.9 \pm 0.5) \times 10^{-5}$		1352
$\psi(2S)K^-\pi^+$	$(3.1 \pm 0.4) \times 10^{-5}$		1310
$\psi(2S)\overline{K}^*(892)^0$	$(3.3 \pm 0.5) \times 10^{-5}$		1196
$\chi_{c1}\phi$	$(1.97 \pm 0.25) \times 10^{-4}$		1274
$\chi_{c1}(3872)\phi$	$(1.1 \pm 0.4) \times 10^{-4}$		936
$\chi_{c1}(3872)(K^+K^-)_{non-\phi}$	$(8.6 \pm 3.5) \times 10^{-5}$		961
$\pi^+\pi^-$	$(7.0 \pm 1.0) \times 10^{-7}$		2680
$\pi^0\pi^0$	$< 2.1 \times 10^{-4}$	CL=90%	2680
$\eta\pi^0$	$< 1.0 \times 10^{-3}$	CL=90%	2654
$\eta\eta$	$< 1.43 \times 10^{-4}$	CL=90%	2627
$\rho^0\rho^0$	$< 3.20 \times 10^{-4}$	CL=90%	2569
$\eta' K^0_S$	$< 8.16 \times 10^{-6}$	CL=90%	2573
$\eta'\eta$	$< 6.5 \times 10^{-5}$	CL=90%	2568
$\eta'\eta'$	$(3.3 \pm 0.7) \times 10^{-5}$		2507
$\eta'\phi$	$< 8.2 \times 10^{-7}$	CL=90%	2495
$\phi f_0(980)$, $f_0(980) \to \pi^+\pi^-$	$(1.12 \pm 0.21) \times 10^{-6}$		–

$\phi f_2(1270)$, $f_2(1270) \to \pi^+\pi^-$		$(6.1 \ {}^{+\ 1.8}_{-\ 1.5}) \times 10^{-7}$		–
$\phi\rho^0$		$(2.7 \pm 0.8) \times 10^{-7}$		2526
$\phi\pi^+\pi^-$		$(3.5 \pm 0.5) \times 10^{-6}$		2579
$\phi\phi$		$(1.85 \pm 0.14) \times 10^{-5}$		2482
$\phi\phi\phi$		$(2.2 \pm 0.6) \times 10^{-6}$		2165
$\pi^+ K^-$		$(5.8 \pm 0.7) \times 10^{-6}$		2659
$K^+ K^-$		$(2.66 \pm 0.22) \times 10^{-5}$		2638
$K^0 \overline{K}^0$		$(1.76 \pm 0.31) \times 10^{-5}$		2637
$K^0 \pi^+\pi^-$		$(9.5 \pm 2.1) \times 10^{-6}$		2653
$K^0 K^\pm \pi^\mp$		$(8.4 \pm 0.9) \times 10^{-5}$		2622
$K^*(892)^- \pi^+$		$(2.9 \pm 1.1) \times 10^{-6}$		2607
$K^*(892)^\pm K^\mp$		$(1.9 \pm 0.5) \times 10^{-5}$		2585
$K_0^*(1430)^\pm K^\mp$		$(3.1 \pm 2.5) \times 10^{-5}$		–
$K_2^*(1430)^\pm K^\mp$		$(1.0 \pm 1.7) \times 10^{-5}$		–
$K^*(892)^0 \overline{K}^0 +$ c.c.		$(2.0 \pm 0.6) \times 10^{-5}$		2585
$K_0^*(1430) \overline{K}^0 +$ c.c.		$(3.3 \pm 1.0) \times 10^{-5}$		2468
$K_2^*(1430)^0 \overline{K}^0 +$ c.c.		$(1.7 \pm 2.2) \times 10^{-5}$		2467
$K_S^0 \overline{K}^*(892)^0 +$ c.c.		$(1.6 \pm 0.4) \times 10^{-5}$		2585
$K^0 K^+ K^-$		$(1.3 \pm 0.6) \times 10^{-6}$		2568
$\overline{K}^*(892)^0 \rho^0$		$< 7.67 \times 10^{-4}$	CL=90%	2550
$\overline{K}^*(892)^0 K^*(892)^0$		$(1.11 \pm 0.27) \times 10^{-5}$		2531
$\phi K^*(892)^0$		$(1.14 \pm 0.30) \times 10^{-6}$		2507
$p\overline{p}$		$< 1.5 \times 10^{-8}$	CL=90%	2514
$p\overline{p} K^+ K^-$		$(4.5 \pm 0.5) \times 10^{-6}$		2231
$p\overline{p} K^+ \pi^-$		$(1.39 \pm 0.26) \times 10^{-6}$		2355
$p\overline{p}\pi^+\pi^-$		$(4.3 \pm 2.0) \times 10^{-7}$		2454
$p\overline{\Lambda} K^- +$ c.c.		$(5.5 \pm 1.0) \times 10^{-6}$		2358
$\Lambda_c^- \Lambda\pi^+$		$(3.6 \pm 1.6) \times 10^{-4}$		1979
$\Lambda_c^- \Lambda_c^+$		$< 8.0 \times 10^{-5}$	CL=95%	1405

Lepton Family number (*LF*) violating modes or $\Delta B = 1$ weak neutral current (*B1*) modes

$\gamma\gamma$	*B1*	$< 3.1 \times 10^{-6}$	CL=90%	2683
$\phi\gamma$	*B1*	$(3.4 \pm 0.4) \times 10^{-5}$		2587
$\mu^+\mu^-$	*B1*	$(3.01 \pm 0.35) \times 10^{-9}$		2681
$e^+ e^-$	*B1*	$< 9.4 \times 10^{-9}$	CL=90%	2683
$\tau^+\tau^-$	*B1*	$< 6.8 \times 10^{-3}$	CL=95%	2011
$\mu^+\mu^-\gamma$		$< 2.0 \times 10^{-9}$		2681
$\mu^+\mu^-\mu^+\mu^-$	*B1*	$< 8.6 \times 10^{-10}$	CL=95%	2673
$S P$, $S \to \mu^+\mu^-$, $P \to \mu^+\mu^-$	*B1* [vvv]	$< 2.2 \times 10^{-9}$	CL=95%	–
$a a$, $a \to \mu^+\mu^-$		$< 5.8 \times 10^{-10}$	CL=95%	–

$\phi(1020)\mu^+\mu^-$	B1	$(8.4 \pm 0.4) \times 10^{-7}$		2582
$f_2'(1525)\mu^+\mu^-$		$(1.62\pm 0.22) \times 10^{-7}$		2464
$\overline{K}^*(892)^0\mu^+\mu^-$	B1	$(2.9 \pm 1.1) \times 10^{-8}$		2605
$\pi^+\pi^-\mu^+\mu^-$	B1	$(8.4 \pm 1.7) \times 10^{-8}$		2670
$\phi\nu\overline{\nu}$	B1	$< 5.4 \times 10^{-3}$	CL=90%	2587
$e^\pm\mu^\mp$	LF	[z] $< 5.4 \times 10^{-9}$	CL=90%	2682
$\mu^\pm\tau^\mp$	LF	$< 4.2 \times 10^{-5}$	CL=95%	2388

B_s^*

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

I, J, P need confirmation. Quantum numbers shown are quark-model predictions.

Mass $m = 5415.4^{+1.8}_{-1.5}$ MeV (S = 2.9)

$m_{B_s^*} - m_{B_s} = 48.5^{+1.8}_{-1.5}$ MeV (S = 2.9)

B_s^* DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B_s\gamma$	seen	48

$B_{s1}(5830)^0$

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

I, J, P need confirmation.

Mass $m = 5828.70 \pm 0.20$ MeV

$m_{B_{s1}^0} - m_{B^{*+}} = 503.99 \pm 0.17$ MeV

Full width $\Gamma = 0.5 \pm 0.4$ MeV

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

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

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

I, J, P need confirmation.

Mass $m = 5839.86 \pm 0.12$ MeV

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

Full width $\Gamma = 1.49 \pm 0.27$ MeV

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

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

$B^0 K^0_S$	0.43 $\pm$0.11	245
$B^{*0} K^0_S$	0.04 $\pm$0.04	–

BOTTOM, CHARMED MESONS ($B = C = \pm1$)

$B^+_c = c\overline{b}$, $B^-_c = \overline{c}\,b$, similarly for B^*_c's

B^+_c

$I(J^P) = 0(0^-)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

Mass $m = 6274.47 \pm 0.32$ MeV
$m_{B^+_c} - m_{B^0_s} = 907.8 \pm 0.5$ MeV
Mean life $\tau = (0.510 \pm 0.009) \times 10^{-12}$ s

B^-_c modes are charge conjugates of the modes below.

B^+_c DECAY MODES × B($\overline{b} \to B_c$)	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi(1S)\,\ell^+\nu_\ell$ anything	seen		–
$J/\psi(1S)\,\mu^+\nu_\mu$	seen		2372
$J/\psi(1S)\,\tau^+\nu_\tau$	seen		1932
$J/\psi(1S)\,\pi^+$	seen		2370
$J/\psi(1S)\,K^+$	seen		2341
$J/\psi(1S)\,\pi^+\pi^+\pi^-$	seen		2350
$J/\psi(1S)\,a_1(1260)$	not seen		2169
$J/\psi(1S)\,K^+K^-\pi^+$	seen		2203
$J/\psi(1S)\,\pi^+\pi^+\pi^+\pi^-\pi^-$	seen		2309
$\psi(2S)\,\pi^+$	seen		2051
$J/\psi(1S)\,D^0K^+$	seen		1539
$J/\psi(1S)\,D^*(2007)^0K^+$	seen		1411
$J/\psi(1S)\,D^*(2010)^+K^{*0}$	seen		919
$J/\psi(1S)\,D^+K^{*0}$	seen		1122
$J/\psi(1S)\,D^+_s$	seen		1821
$J/\psi(1S)\,D^{*+}_s$	seen		1727
$J/\psi(1S)\,p\overline{p}\pi^+$	seen		1791
$\chi_{c0}\,\pi^+$	$(2.4^{+0.9}_{-0.8}) \times 10^{-5}$		2205
$p\overline{p}\pi^+$	not seen		2970
D^0K^+	seen		2837

$D^0\pi^+$	not seen			2858
$D^{*0}\pi^+$	not seen			2814
$D^{*0}K^+$	not seen			2792
$D_s^+\overline{D}^0$	< 7.2	$\times 10^{-4}$	90%	2483
$D_s^+ D^0$	< 3.0	$\times 10^{-4}$	90%	2483
$D^+\overline{D}^0$	< 1.9	$\times 10^{-4}$	90%	2521
$D^+ D^0$	< 1.4	$\times 10^{-4}$	90%	2521
$D_s^{*+}\overline{D}^0$	< 5.3	$\times 10^{-4}$	90%	2425
$D_s^+\overline{D}^*(2007)^0$	< 4.6	$\times 10^{-4}$	90%	2427
$D_s^{*+} D^0$	< 9	$\times 10^{-4}$	90%	2425
$D_s^+ D^*(2007)^0$	< 6.6	$\times 10^{-4}$	90%	2427
$D^*(2010)^+\overline{D}^0$	< 3.8	$\times 10^{-4}$	90%	2467
$D^*(2010)^+\overline{D}^0$, $D^{*+} \to D^+\pi^0/\gamma$	not seen			–
$D^+\overline{D}^*(2007)^0$	< 6.5	$\times 10^{-4}$	90%	2466
$D^*(2007)^+ D^0$	< 2.0	$\times 10^{-4}$	90%	–
$D^*(2010)^+ D^0$, $D^{*+} \to D^+\pi^0/\gamma$	not seen			2467
$D^+ D^*(2007)^0$	< 3.7	$\times 10^{-4}$	90%	2466
$D_s^{*+}\overline{D}^*(2007)^0$	< 1.3	$\times 10^{-3}$	90%	2366
$D_s^{*+} D^*(2007)^0$	< 1.3	$\times 10^{-3}$	90%	2366
$D^*(2010)^+\overline{D}^*(2007)^0$	< 1.0	$\times 10^{-3}$	90%	2410
$D^*(2010)^+ D^*(2007)^0$	< 7.7	$\times 10^{-4}$	90%	2410
D^+K^{*0}	not seen			2783
$D^+\overline{K}^{*0}$	not seen			2783
$D_s^+K^{*0}$	not seen			2751
$D_s^+\overline{K}^{*0}$	not seen			2751
$D_s^+\phi$	not seen			2727
K^+K^0	not seen			3098
$B_s^0\pi^+$ / B($\overline{b} \to B_s$)	seen			–

$B_c(2S)^\pm$

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

Mass $m = 6871.2 \pm 1.0$ MeV

$B_c(2S)^\pm$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$B_c^+\pi^+\pi^-$	seen	504

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

$\eta_c(1S)$

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

Mass $m = 2983.9 \pm 0.4$ MeV (S = 1.2)
Full width $\Gamma = 32.0 \pm 0.7$ MeV

$\eta_c(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Decays involving hadronic resonances			
$\eta'(958)\pi\pi$	(1.87 ± 0.26) %		1323
$\eta'(958)K\overline{K}$	(1.61 ± 0.25) %		1131
$\rho\rho$	(1.5 ± 0.4) %		1275
$K^*(892)^0K^-\pi^+ +$ c.c.	(1.5 ± 0.5) %		1278
$K^*(892)\overline{K}^*(892)$	$(6.3\pm1.2)\times10^{-3}$		1196
$K^*(892)^0\overline{K}^*(892)^0\pi^+\pi^-$	(1.1 ± 0.5) %		1073
ϕK^+K^-	$(2.9\pm1.4)\times10^{-3}$		1104
$\phi\phi$	$(1.58\pm0.19)\times10^{-3}$		1089
$\phi 2(\pi^+\pi^-)$	$<4\times10^{-3}$	90%	1251
$a_0(980)\pi$	seen		1327
$K^*(892)\overline{K}+$ c.c.	<1.28 %	90%	1310
$f_2(1270)\eta$	seen		1145
$f_2(1270)\eta'$	seen		984
$\omega\omega$	$(2.1\pm0.5)\times10^{-3}$		1270
$\omega\phi$	$<2.5\times10^{-4}$	90%	1185
$f_2(1270)f_2(1270)$	$(9.7\pm2.5)\times10^{-3}$		774
$f_2(1270)f'_2(1525)$	$(9.1\pm3.0)\times10^{-3}$		524
$f_0(500)\eta$	seen		–
$f_0(500)\eta'$	seen		–
$f_0(980)\eta$	seen		1264
$f_0(980)\eta'$	seen		1130
$f_0(1500)\eta$	seen		1016
$f_0(1710)\eta'$	seen		623
$f_0(2100)\eta'$	seen		†
$f_0(2200)\eta$	seen		498
$a_0(1320)\pi$	seen		–
$a_0(1450)\pi$	seen		1140
$a_0(1700)\pi$	seen		–
$a_0(1950)\pi$	seen		860
$K_0^*(1430)\overline{K}$	seen		–
$K_2^*(1430)\overline{K}$	seen		–

$K_0^*(1950)\overline{K}$	seen		–

Decays into stable hadrons

$K\overline{K}\pi$	(7.0 ±0.4) %		1381
$K\overline{K}\eta$	(1.32±0.15) %		1265
$\eta\pi^+\pi^-$	(1.7 ±0.5) %		1428
$\eta 2(\pi^+\pi^-)$	(4.6 ±1.4) %		1386
$K^+K^-\pi^+\pi^-$	(6.5 ±1.0) × 10^{-3}		1345
$K^+K^-\pi^+\pi^-\pi^0$	(3.4 ±0.5) %		1304
$K^0K^-\pi^+\pi^-\pi^+$+c.c.	(5.7 ±1.6) %		–
$K^+K^-2(\pi^+\pi^-)$	(7.6 ±2.4) × 10^{-3}		1254
$2(K^+K^-)$	(1.38±0.29) × 10^{-3}		1056
$\pi^+\pi^-\pi^0$	< 5 × 10^{-4}	90%	1476
$\pi^+\pi^-\pi^0\pi^0$	(4.8 ±1.1) %		1460
$2(\pi^+\pi^-)$	(8.7 ±1.1) × 10^{-3}		1459
$2(\pi^+\pi^-\pi^0)$	(16.2 ±2.1) %		1409
$3(\pi^+\pi^-)$	(1.8 ±0.4) %		1407
$p\overline{p}$	(1.35±0.13) × 10^{-3}		1160
$p\overline{p}\pi^0$	(3.6 ±1.4) × 10^{-3}		1101
$\Lambda\overline{\Lambda}$	(1.02±0.23) × 10^{-3}		991
$K^+\overline{p}\Lambda$+ c.c.	(2.5 ±0.4) × 10^{-3}		772
$\overline{\Lambda}(1520)\Lambda$+ c.c.	(3.1 ±1.3) × 10^{-3}		694
$\Sigma^+\overline{\Sigma}^-$	(2.1 ±0.6) × 10^{-3}		901
$\Xi^-\overline{\Xi}^+$	(9.0 ±2.6) × 10^{-4}		692
$\pi^+\pi^-p\overline{p}$	(5.5 ±1.9) × 10^{-3}		1027

Radiative decays

$\gamma\gamma$	(1.68±0.12) × 10^{-4}		1492

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

$\pi^+\pi^-$	*P,CP*	< 1.1 × 10^{-4}	90%	1485
$\pi^0\pi^0$	*P,CP*	< 4 × 10^{-5}	90%	1486
K^+K^-	*P,CP*	< 6 × 10^{-4}	90%	1408
$K_S^0K_S^0$	*P,CP*	< 3.1 × 10^{-4}	90%	1407

$J/\psi(1S)$

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

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

$J/\psi(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	(87.7 ± 0.5) %		–
virtual$\gamma \to$ hadrons	(13.50 ± 0.30) %		–

ggg		(64.1 ± 1.0) %		–
γgg		(8.8 ± 1.1) %		–
$e^+ e^-$		(5.971 ± 0.032) %		1548
$e^+ e^- \gamma$	[ggaa]	$(8.8 \pm 1.4) \times 10^{-3}$		1548
$\mu^+ \mu^-$		(5.961 ± 0.033) %		1545

Decays involving hadronic resonances

$\rho\pi$		(1.69 ± 0.15) %	S=2.4	1448
$\rho^0 \pi^0$		$(5.6 \pm 0.7) \times 10^{-3}$		1448
$a_2(1320)^0 \pi^+ \pi^- \to 2(\pi^+ \pi^-)\pi^0$		$(2.8 \pm 0.6) \times 10^{-3}$		–
$a_2(1320)^+ \pi^- \pi^0 + \text{c.c} \to 2(\pi^+ \pi^-)\pi^0$		$(3.7 \pm 0.7) \times 10^{-3}$		–
$a_2(1320)\rho$		(1.09 ± 0.22) %		1123
$\eta\pi^+\pi^-$		$(3.8 \pm 0.7) \times 10^{-4}$		1487
$\eta\pi^+\pi^-\pi^0$		(1.17 ± 0.20) %		1470
$\eta\pi^+\pi^- 3\pi^0$		$(4.9 \pm 1.0) \times 10^{-3}$		1419
$\eta\rho$		$(1.93 \pm 0.23) \times 10^{-4}$		1396
$\eta\phi(2170) \to \eta\phi f_0(980) \to \eta\phi\pi^+\pi^-$		$(1.2 \pm 0.4) \times 10^{-4}$		628
$\eta\phi(2170) \to \eta K^*(892)^0 \overline{K}^*(892)^0$		$< 2.52 \times 10^{-4}$	CL=90%	–
$\eta K^\pm K^0_S \pi^\mp$	[z]	$(2.2 \pm 0.4) \times 10^{-3}$		1278
$\eta K^*(892)^0 \overline{K}^*(892)^0$		$(1.15 \pm 0.26) \times 10^{-3}$		1003
$\rho\eta'(958)$		$(8.1 \pm 0.8) \times 10^{-5}$	S=1.6	1281
$\rho^\pm \pi^\mp \pi^+ \pi^- 2\pi^0$		(2.8 ± 0.8) %		1364
$\rho^+ \rho^- \pi^+ \pi^- \pi^0$		$(6 \pm 4) \times 10^{-3}$		1186
$\rho^+ K^+ K^- \pi^- + \text{c.c} \to K^+ K^- \pi^+ \pi^- \pi^0$		$(3.5 \pm 0.8) \times 10^{-3}$		–
$\rho^\mp K^\pm K^0_S$		$(1.9 \pm 0.4) \times 10^{-3}$		1269
$\rho(1450)\pi \to \pi^+\pi^-\pi^0$		$(2.3 \pm 0.7) \times 10^{-3}$		–
$\rho(1450)^\pm \pi^\mp \to K^0_S K^\pm \pi^\mp$		$(3.5 \pm 0.6) \times 10^{-4}$		–
$\rho(1450)^0 \pi^0 \to K^+ K^- \pi^0$		$(2.7 \pm 0.6) \times 10^{-4}$		–
$\rho(1450)\eta'(958) \to \pi^+\pi^-\eta'(958)$		$(3.3 \pm 0.7) \times 10^{-6}$		–
$\rho(1700)\pi \to \pi^+\pi^-\pi^0$		$(1.7 \pm 1.1) \times 10^{-4}$		–
$\rho(2150)\pi \to \pi^+\pi^-\pi^0$		$(8 \pm 40) \times 10^{-6}$		–
$\omega\pi^0$		$(4.5 \pm 0.5) \times 10^{-4}$	S=1.4	1446
$\omega\pi^0 \to \pi^+\pi^-\pi^0$		$(1.7 \pm 0.8) \times 10^{-5}$		–
$\omega\pi^+\pi^-$		$(8.5 \pm 1.0) \times 10^{-3}$	S=1.3	1435
$\omega\pi^0\pi^0$		$(3.4 \pm 0.8) \times 10^{-3}$		1436
$\omega 3\pi^0$		$(1.9 \pm 0.6) \times 10^{-3}$		1419
$\omega f_2(1270)$		$(4.3 \pm 0.6) \times 10^{-3}$		1142
$\omega\eta$		$(1.74 \pm 0.20) \times 10^{-3}$	S=1.6	1394
$\omega\pi^+\pi^-\pi^0$		$(4.0 \pm 0.7) \times 10^{-3}$		1418

$\omega\pi^0\eta$		$(3.4 \pm 1.7) \times 10^{-4}$		1363
$\omega\pi^+\pi^+\pi^-\pi^-$		$(8.5 \pm 3.4) \times 10^{-3}$		1392
$\omega\pi^+\pi^- 2\pi^0$		(3.3 ± 0.5) %		1394
$\omega\eta'\pi^+\pi^-$		$(1.12 \pm 0.13) \times 10^{-3}$		1173
$\omega\eta'(958)$		$(1.89 \pm 0.18) \times 10^{-4}$		1279
$\omega f_0(980)$		$(1.4 \pm 0.5) \times 10^{-4}$		1267
$\omega f_0(1710) \to \omega K\overline{K}$		$(4.8 \pm 1.1) \times 10^{-4}$		878
$\omega f_1(1420)$		$(6.8 \pm 2.4) \times 10^{-4}$		1062
$\omega f'_2(1525)$		$< 2.2 \times 10^{-4}$	CL=90%	1007
$\omega X(1835) \to \omega p\overline{p}$		$< 3.9 \times 10^{-6}$	CL=95%	–
$\omega X(1835),\ X \to \eta'\pi^+\pi^-$		$< 6.2 \times 10^{-5}$		–
ωK^+K^-		$(1.52 \pm 0.31) \times 10^{-3}$		1268
$\omega K^\pm K^0_S\pi^\mp$	[z]	$(3.4 \pm 0.5) \times 10^{-3}$		1210
$\omega K\overline{K}$		$(1.9 \pm 0.4) \times 10^{-3}$		1268
$\omega K^*(892)\overline{K}$ + c.c.		$(6.1 \pm 0.9) \times 10^{-3}$		1097
$\eta' K^{*\pm}K^\mp$		$(1.48 \pm 0.13) \times 10^{-3}$		–
$\eta' K^{*0}\overline{K}^0$ + c.c.		$(1.66 \pm 0.21) \times 10^{-3}$		1000
$\eta' h_1(1415) \to \eta' K^*\overline{K}$ + c.c.		$(2.16 \pm 0.31) \times 10^{-4}$		–
$\eta' h_1(1415) \to \eta' K^{*\pm}K^\mp$		$(1.51 \pm 0.23) \times 10^{-4}$		–
$\eta' h_1(1415) \to \gamma\eta'\eta'$		$(4.7 {+1.1 \atop -2.0}) \times 10^{-7}$		–
$\overline{K}K^*(892)$+c.c. $\to K^0_S K^\pm\pi^\mp$		$(5.0 \pm 0.5) \times 10^{-3}$		–
$K^+K^*(892)^-$ + c.c.		$(6.0 {+0.8 \atop -1.0}) \times 10^{-3}$	S=2.9	1373
$K^+K^*(892)^-$ + c.c. $\to K^+K^-\pi^0$		$(2.69 {+0.13 \atop -0.20}) \times 10^{-3}$		–
$K^+K^*(892)^-$ + c.c. $\to K^0K^\pm\pi^\mp$ + c.c.		$(3.0 \pm 0.4) \times 10^{-3}$		–
$K^0\overline{K}^*(892)^0$ + c.c.		$(4.2 \pm 0.4) \times 10^{-3}$		1373
$K^0\overline{K}^*(892)^0$ + c.c. $\to K^0K^\pm\pi^\mp$ + c.c.		$(3.2 \pm 0.4) \times 10^{-3}$		–
$\overline{K}^*(892)^0K^+\pi^-$ + c.c.		$(5.7 \pm 0.8) \times 10^{-3}$		1343
$K^*(892)^\pm K^\mp\pi^0$		$(4.1 \pm 1.3) \times 10^{-3}$		1344
$K^*(892)^+K^0_S\pi^-$ + c.c.		$(2.0 \pm 0.5) \times 10^{-3}$		1342
$K^*(892)^+K^0_S\pi^-$ + c.c. $\to K^0_S K^0_S\pi^+\pi^-$		$(6.7 \pm 2.2) \times 10^{-4}$		–
$K^*(892)^0K^-\pi^+$ + c.c. $\to K^+K^-\pi^+\pi^-$		$(3.8 \pm 0.5) \times 10^{-3}$		–
$K^*(892)^0K^0_S \to \gamma K^0_S K^0_S$		$(6.3 {+0.6 \atop -0.5}) \times 10^{-6}$		–
$K^*(892)^0K^0_S\pi^0$		$(7 \pm 4) \times 10^{-4}$		1343
$K^*(892)^\pm K^*(700)^\mp$		$(1.1 {+1.0 \atop -0.6}) \times 10^{-3}$		–
$K^*(892)^0\overline{K}^*(892)^0$		$(2.3 \pm 0.6) \times 10^{-4}$		1266

$K^*(892)^{\pm} K^*(892)^{\mp}$	$(1.00\ {}^{+\ 0.22}_{-\ 0.40}) \times 10^{-3}$		1266
$K_1(1400)^{\pm} K^{\mp}$	$(3.8 \pm 1.4) \times 10^{-3}$		1170
$K^*(1410)\overline{K}$+c.c $\to K^{\pm} K^{\mp} \pi^0$	$(7 \pm 4) \times 10^{-5}$		–
$K^*(1410)\overline{K}$+ c.c. $\to K^0_S K^{\pm} \pi^{\mp}$	$(8 \pm 6) \times 10^{-5}$		–
$K^*_2(1430)\overline{K}$+c.c. $\to K^{\pm} K^{\mp} \pi^0$	$(1.0 \pm 0.5) \times 10^{-4}$		–
$K^*_2(1430)\overline{K}$+ c.c. $\to K^0_S K^{\pm} \pi^{\mp}$	$(4.0 \pm 1.0) \times 10^{-4}$		–
$\overline{K}^*_2(1430) K$+ c.c.	$< 4.0 \times 10^{-3}$	CL=90%	1158
$K^*_2(1430)^+ K^-$+ c.c. $\to K^+ K^- \pi^0$	$(2.69\ {}^{+\ 0.25}_{-\ 0.19}) \times 10^{-4}$		–
$K^*_2(1430)^0 K^- \pi^+$+ c.c. $\to K^+ K^- \pi^+ \pi^-$	$(2.6 \pm 0.9) \times 10^{-3}$		–
$K^*_2(1430)^+ K^0_S \pi^-$+ c.c.	$(3.6 \pm 1.8) \times 10^{-3}$		1116
$\overline{K}^*_2(1430)^0 K^*(892)^0$+ c.c.	$(4.67 \pm 0.29) \times 10^{-3}$		1011
$K^*_2(1430)^- K^*(892)^+$+ c.c.	$(3.4 \pm 2.9) \times 10^{-3}$		1011
$K^*_2(1430)^- K^*(892)^+$+ c.c. $\to K^*(892)^+ K^0_S \pi^-$+ c.c.	$(4 \pm 4) \times 10^{-4}$		–
$K^*_2(1430)^0 \overline{K}^*_2(1430)^0$	$< 2.9 \times 10^{-3}$	CL=90%	601
$\overline{K}_2(1770)^0 K^*(892)^0$+ c.c. $\to K^*(892)^0 K^- \pi^+$+ c.c.	$(6.9 \pm 0.9) \times 10^{-4}$		–
$K^*_2(1980)^+ K^-$+ c.c. $\to K^+ K^- \pi^0$	$(1.10\ {}^{+\ 0.60}_{-\ 0.14}) \times 10^{-5}$		–
$K^*_4(2045)^+ K^-$+ c.c. $\to K^+ K^- \pi^0$	$(6.2\ {}^{+\ 2.9}_{-\ 1.6}) \times 10^{-6}$		–
$K_1(1270)^{\pm} K^{\mp}$	$< 3.0 \times 10^{-3}$	CL=90%	1240
$K_1(1270) K^0_S \to \gamma K^0_S K^0_S$	$(8.5 \pm 2.5) \times 10^{-7}$		–
$a_2(1320)^{\pm} \pi^{\mp}$	[z] $< 4.3 \times 10^{-3}$	CL=90%	1263
$\phi \pi^0$	3×10^{-6} or 1×10^{-7}		1377
$\phi \pi^+ \pi^-$	$(9.4 \pm 1.5) \times 10^{-4}$	S=1.7	1365
$\phi \pi^0 \pi^0$	$(5.0 \pm 1.0) \times 10^{-4}$		1366
$\phi 2(\pi^+ \pi^-)$	$(1.60 \pm 0.32) \times 10^{-3}$		1318
$\phi \eta$	$(7.4 \pm 0.6) \times 10^{-4}$	S=1.2	1320
$\phi \eta'(958)$	$(4.6 \pm 0.5) \times 10^{-4}$	S=2.2	1192
$\phi \eta \eta'$	$(2.32 \pm 0.17) \times 10^{-4}$		885
$\phi f_0(980)$	$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9	1178
$\phi f_0(980) \to \phi \pi^+ \pi^-$	$(2.60 \pm 0.34) \times 10^{-4}$		–
$\phi f_0(980) \to \phi \pi^0 \pi^0$	$(1.8 \pm 0.5) \times 10^{-4}$		–
$\phi \pi^0 f_0(980) \to \phi \pi^0 \pi^+ \pi^-$	$(4.5 \pm 1.0) \times 10^{-6}$		–

$\phi\pi^0 f_0(980) \to \phi\pi^0 p^0 \pi^0$		(1.7 ± 0.6) × 10^{-6}		1045
$\phi f_0(980)\eta \to \eta\phi\pi^+\pi^-$		(3.2 ± 1.0) × 10^{-4}		–
$\phi a_0(980)^0 \to \phi\eta\pi^0$		(4.4 ± 1.4) × 10^{-6}		–
$\phi f_2(1270)$		(3.2 ± 0.6) × 10^{-4}		1036
$\phi f_1(1285)$		(2.6 ± 0.5) × 10^{-4}		1032
$\phi f_1(1285) \to \phi\pi^0 f_0(980) \to \phi\pi^0\pi^+\pi^-$		(9.4 ± 2.8) × 10^{-7}		952
$\phi f_1(1285) \to \phi\pi^0 f_0(980) \to \phi 3\pi^0$		(2.1 ± 2.2) × 10^{-7}		955
$\phi\eta(1405) \to \phi\eta\pi^+\pi^-$		(2.0 ± 1.0) × 10^{-5}		946
$\phi f_2'(1525)$		(8 ± 4) × 10^{-4}	S=2.7	877
$\phi X(1835) \to \phi p\overline{p}$		< 2.1 × 10^{-7}	CL=90%	–
$\phi X(1835) \to \phi\eta\pi^+\pi^-$		< 2.8 × 10^{-4}	CL=90%	578
$\phi X(1870) \to \phi\eta\pi^+\pi^-$		< 6.13 × 10^{-5}	CL=90%	–
$\phi K\overline{K}$		(1.77 ± 0.16) × 10^{-3}	S=1.3	1179
$\phi f_0(1710) \to \phi K\overline{K}$		(3.6 ± 0.6) × 10^{-4}		875
$\phi K^+ K^-$		(8.3 ± 1.1) × 10^{-4}		1179
$\phi K^0_S K^0_S$		(5.9 ± 1.5) × 10^{-4}		1176
$\phi K^\pm K^0_S \pi^\mp$	[z]	(7.2 ± 0.8) × 10^{-4}		1114
$\phi K^*(892)\overline{K}$ + c.c.		(2.18 ± 0.23) × 10^{-3}		969
$b_1(1235)^\pm \pi^\mp$	[z]	(3.0 ± 0.5) × 10^{-3}		1300
$b_1(1235)^0 \pi^0$		(2.3 ± 0.6) × 10^{-3}		1300
$f_2'(1525) K^+ K^-$		(1.06 ± 0.35) × 10^{-3}		897
$\Delta(1232)^+ \overline{p}$		< 1 × 10^{-4}	CL=90%	1100
$\Delta(1232)^{++} \overline{p}\pi^-$		(1.6 ± 0.5) × 10^{-3}		1030
$\Delta(1232)^{++} \overline{\Delta}(1232)^{--}$		(1.10 ± 0.29) × 10^{-3}		938
$\overline{\Sigma}(1385)^0 p K^-$		(5.1 ± 3.2) × 10^{-4}		646
$\Sigma(1385)^0 \overline{\Lambda}$ + c.c.		< 8.2 × 10^{-6}	CL=90%	911
$\Sigma(1385)^- \overline{\Sigma}^+$ (or c.c.)	[z]	(3.1 ± 0.5) × 10^{-4}		855
$\Sigma(1385)^- \overline{\Sigma}(1385)^+$ (or c.c.)	[z]	(1.16 ± 0.05) × 10^{-3}		697
$\Sigma(1385)^0 \overline{\Sigma}(1385)^0$		(1.07 ± 0.08) × 10^{-3}		697
$\Lambda(1520)\overline{\Lambda}$ + c.c. $\to \gamma\Lambda\overline{\Lambda}$		< 4.1 × 10^{-6}	CL=90%	–
$\overline{\Lambda}(1520)\Lambda$ + c.c.		< 1.80 × 10^{-3}	CL=90%	807
$\Xi^0 \overline{\Xi}^0$		(1.17 ± 0.04) × 10^{-3}		818
$\Xi(1530)^- \overline{\Xi}^+$ + c.c.		(3.18 ± 0.08) × 10^{-4}		600
$\Xi(1530)^0 \overline{\Xi}^0$		(3.2 ± 1.4) × 10^{-4}		608
$\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^- \overline{n}$ + c.c.	[hhaa]	< 1.1 × 10^{-5}	CL=90%	–
$\Theta(1540) K^- \overline{n} \to K^0_S p K^- \overline{n}$	[hhaa]	< 2.1 × 10^{-5}	CL=90%	–
$\Theta(1540) K^0_S \overline{p} \to K^0_S \overline{p} K^+ n$	[hhaa]	< 1.6 × 10^{-5}	CL=90%	–
$\overline{\Theta}(1540) K^+ n \to K^0_S \overline{p} K^+ n$	[hhaa]	< 5.6 × 10^{-5}	CL=90%	–
$\overline{\Theta}(1540) K^0_S p \to K^0_S p K^- \overline{n}$	[hhaa]	< 1.1 × 10^{-5}	CL=90%	–

Decays into stable hadrons

$2(\pi^+\pi^-)\pi^0$	$(4.2 \pm 0.4)\%$	S=2.1	1496
$3(\pi^+\pi^-)\pi^0$	$(2.9 \pm 0.6)\%$		1433
$\pi^+\pi^-3\pi^0$	$(1.9 \pm 0.9)\%$		1497
$\pi^+\pi^-4\pi^0$	$(6.5 \pm 1.3) \times 10^{-3}$		1470
$\rho^\pm\pi^\mp\pi^0\pi^0$	$(1.41 \pm 0.22)\%$		1421
$\rho^+\rho^-\pi^0$	$(6.0 \pm 1.1) \times 10^{-3}$		1298
$\pi^+\pi^-\pi^0$	$(2.10 \pm 0.08)\%$	S=1.6	1533
$2(\pi^+\pi^-\pi^0)$	$(1.61 \pm 0.20)\%$		1468
$\pi^+\pi^-\pi^0 K^+K^-$	$(1.52 \pm 0.27)\%$	S=1.4	1368
$\pi^+\pi^-$	$(1.47 \pm 0.14) \times 10^{-4}$		1542
$2(\pi^+\pi^-)$	$(3.20 \pm 0.25) \times 10^{-3}$	S=1.2	1517
$3(\pi^+\pi^-)$	$(4.3 \pm 0.4) \times 10^{-3}$		1466
$2(\pi^+\pi^-)3\pi^0$	$(6.2 \pm 0.9)\%$		1435
$4(\pi^+\pi^-)\pi^0$	$(9.0 \pm 3.0) \times 10^{-3}$		1345
$2(\pi^+\pi^-)\eta$	$(2.29 \pm 0.28) \times 10^{-3}$		1446
$3(\pi^+\pi^-)\eta$	$(7.2 \pm 1.5) \times 10^{-4}$		1379
$2(\pi^+\pi^-\pi^0)\eta$	$(1.6 \pm 0.5) \times 10^{-3}$		1381
$\pi^+\pi^-\pi^0\pi^0\eta$	$(2.4 \pm 0.5) \times 10^{-3}$		1448
$\rho^\pm\pi^\mp\pi^0\eta$	$(1.9 \pm 0.8) \times 10^{-3}$		1326
K^+K^-	$(2.86 \pm 0.21) \times 10^{-4}$		1468
$K^0_S K^0_L$	$(1.95 \pm 0.11) \times 10^{-4}$	S=2.4	1466
$K^0_S K^0_S$	$< 1.4 \times 10^{-8}$	CL=95%	1466
$K\overline{K}\pi$	$(6.1 \pm 1.0) \times 10^{-3}$		1442
$K^+K^-\pi^0$	$(2.88 \pm 0.12) \times 10^{-3}$		1442
$K^0_S K^\pm\pi^\mp$	$(5.6 \pm 0.5) \times 10^{-3}$		1440
$K^0_S K^0_L\pi^0$	$(2.06 \pm 0.26) \times 10^{-3}$		1440
$K^*(892)^0\overline{K}^0 + \text{c.c.} \to K^0_S K^0_L\pi^0$	$(1.21 \pm 0.18) \times 10^{-3}$		–
$K^*_2(1430)^0\overline{K}^0 + \text{c.c.} \to K^0_S K^0_L\pi^0$	$(4.3 \pm 1.3) \times 10^{-4}$		–
$K^+K^-\pi^+\pi^-$	$(7.0 \pm 1.0) \times 10^{-3}$		1407
$K^+K^-\pi^0\pi^0$	$(2.13 \pm 0.22) \times 10^{-3}$		1410
$K^0_S K^0_L\pi^+\pi^-$	$(3.8 \pm 0.6) \times 10^{-3}$		1406
$K^0_S K^0_L\pi^0\pi^0$	$(1.9 \pm 0.4) \times 10^{-3}$		1408
$K^0_S K^0_L\eta$	$(1.45 \pm 0.33) \times 10^{-3}$		1328
$K^0_S K^0_S\pi^+\pi^-$	$(1.68 \pm 0.19) \times 10^{-3}$		1406
$K^\mp K^0_S\pi^\pm\pi^0$	$(5.7 \pm 0.5) \times 10^{-3}$		1408
$K^+K^-2(\pi^+\pi^-)$	$(3.1 \pm 1.3) \times 10^{-3}$		1320
$K^+K^-\pi^+\pi^-\eta$	$(4.7 \pm 0.7) \times 10^{-3}$		1221
$2(K^+K^-)$	$(7.2 \pm 0.8) \times 10^{-4}$		1131
$K^+K^-K^0_S K^0_S$	$(4.2 \pm 0.7) \times 10^{-4}$		1127
$p\overline{p}$	$(2.120 \pm 0.029) \times 10^{-3}$		1232

$p\overline{p}\pi^0$		$(1.19 \pm 0.08) \times 10^{-3}$	S=1.1	1176
$p\overline{p}\pi^+\pi^-$		$(6.0 \pm 0.5) \times 10^{-3}$	S=1.3	1107
$p\overline{p}\pi^+\pi^-\pi^0$	[iiaa]	$(2.3 \pm 0.9) \times 10^{-3}$	S=1.9	1033
$p\overline{p}\eta$		$(2.00 \pm 0.12) \times 10^{-3}$		948
$p\overline{p}\rho$		$< 3.1 \times 10^{-4}$	CL=90%	774
$p\overline{p}\omega$		$(9.8 \pm 1.0) \times 10^{-4}$	S=1.3	768
$p\overline{p}\eta'(958)$		$(1.29 \pm 0.14) \times 10^{-4}$	S=2.0	596
$p\overline{p}a_0(980) \to p\overline{p}\pi^0\eta$		$(6.8 \pm 1.8) \times 10^{-5}$		–
$p\overline{p}\phi$		$(5.19 \pm 0.33) \times 10^{-5}$		527
$p\overline{n}\pi^-$		$(2.12 \pm 0.09) \times 10^{-3}$		1174
$n\overline{n}$		$(2.09 \pm 0.16) \times 10^{-3}$		1231
$n\overline{n}\pi^+\pi^-$		$(4 \pm 4) \times 10^{-3}$		1106
$nN(1440)$		seen		978
$nN(1520)$		seen		928
$nN(1535)$		seen		917
$\Lambda\overline{\Lambda}$		$(1.89 \pm 0.09) \times 10^{-3}$	S=2.8	1074
$\Lambda\overline{\Lambda}\pi^0$		$(3.8 \pm 0.4) \times 10^{-5}$		998
$\Lambda\overline{\Lambda}\pi^+\pi^-$		$(4.3 \pm 1.0) \times 10^{-3}$		903
$\Lambda\overline{\Lambda}\eta$		$(1.62 \pm 0.17) \times 10^{-4}$		672
$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[z]	$(8.3 \pm 0.7) \times 10^{-4}$	S=1.2	950
$pK^-\overline{\Lambda}$+c.c.		$(8.6 \pm 1.1) \times 10^{-4}$		876
$pK^-\overline{\Sigma}^0$		$(2.9 \pm 0.8) \times 10^{-4}$		819
$\overline{\Lambda}nK^0_S$+ c.c.		$(6.5 \pm 1.1) \times 10^{-4}$		872
$\Lambda\overline{\Sigma}$+ c.c.		$(2.83 \pm 0.23) \times 10^{-5}$		1034
$\Sigma^+\overline{\Sigma}^-$		$(1.07 \pm 0.04) \times 10^{-3}$		992
$\Sigma^0\overline{\Sigma}^0$		$(1.172 \pm 0.032) \times 10^{-3}$	S=1.4	988
$\Sigma^+\overline{\Sigma}^-\eta$		$(6.3 \pm 0.4) \times 10^{-5}$		498
$\Xi^-\overline{\Xi}^+$		$(9.7 \pm 0.8) \times 10^{-4}$	S=1.4	807

Radiative decays

$\gamma\eta_c(1S)$	(1.7 ± 0.4) %	S=1.5	111
$\gamma\eta_c(1S) \to 3\gamma$	$(3.8 {}^{+1.3}_{-1.0}) \times 10^{-6}$	S=1.1	–
$\gamma\eta_c(1S) \to \gamma\eta\eta\eta'$	$(4.9 \pm 0.8) \times 10^{-5}$		–
3γ	$(1.16 \pm 0.22) \times 10^{-5}$		1548
4γ	$< 9 \times 10^{-6}$	CL=90%	1548
5γ	$< 1.5 \times 10^{-5}$	CL=90%	1548
$\gamma\pi^0$	$(3.56 \pm 0.17) \times 10^{-5}$		1546
$\gamma\pi^0\pi^0$	$(1.15 \pm 0.05) \times 10^{-3}$		1543
$\gamma 2\pi^+ 2\pi^-$	$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9	1517
$\gamma f_2(1270) f_2(1270)$	$(9.5 \pm 1.7) \times 10^{-4}$		878
$\gamma f_2(1270) f_2(1270)$ (non resonant)	$(8.2 \pm 1.9) \times 10^{-4}$		–
$\gamma\pi^+\pi^- 2\pi^0$	$(8.3 \pm 3.1) \times 10^{-3}$		1518
$\gamma K^0_S K^0_S$	$(8.1 \pm 0.4) \times 10^{-4}$		1466

$\gamma(K\overline{K}\pi)$ $[J^{PC}=0^{-+}]$	$(7 \pm 4) \times 10^{-4}$	S=2.1	1442
$\gamma K^+ K^- \pi^+ \pi^-$	$(2.1 \pm 0.6) \times 10^{-3}$		1407
$\gamma K^*(892)\overline{K}^*(892)$	$(4.0 \pm 1.3) \times 10^{-3}$		1266
$\gamma \eta$	$(1.085 \pm 0.018) \times 10^{-3}$		1500
$\gamma \eta \pi^0$	$(2.14 \pm 0.31) \times 10^{-5}$		1497
$\gamma a_0(980)^0 \to \gamma \eta \pi^0$	$< 2.5 \times 10^{-6}$	CL=95%	–
$\gamma a_2(1320)^0 \to \gamma \eta \pi^0$	$< 6.6 \times 10^{-6}$	CL=95%	–
$\gamma \eta \pi \pi$	$(6.1 \pm 1.0) \times 10^{-3}$		1487
$\gamma \eta_2(1870) \to \gamma \eta \pi^+ \pi^-$	$(6.2 \pm 2.4) \times 10^{-4}$		–
$\gamma \eta'(958)$	$(5.25 \pm 0.07) \times 10^{-3}$	S=1.3	1400
$\gamma \rho \rho$	$(4.5 \pm 0.8) \times 10^{-3}$		1340
$\gamma \rho \omega$	$< 5.4 \times 10^{-4}$	CL=90%	1338
$\gamma \rho \phi$	$< 8.8 \times 10^{-5}$	CL=90%	1258
$\gamma \omega \omega$	$(1.61 \pm 0.33) \times 10^{-3}$		1336
$\gamma \phi \phi$	$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1	1166
$\gamma \eta(1405/1475) \to \gamma K \overline{K} \pi$	$(2.8 \pm 0.6) \times 10^{-3}$	S=1.6	1223
$\gamma \eta(1405/1475) \to \gamma \gamma \rho^0$	$(7.8 \pm 2.0) \times 10^{-5}$	S=1.8	1223
$\gamma \eta(1405/1475) \to \gamma \eta \pi^+ \pi^-$	$(3.0 \pm 0.5) \times 10^{-4}$		–
$\gamma \eta(1405/1475) \to \gamma \rho^0 \rho^0$	$(1.7 \pm 0.4) \times 10^{-3}$	S=1.3	1223
$\gamma \eta(1405/1475) \to \gamma \gamma \phi$	$< 8.2 \times 10^{-5}$	CL=95%	–
$\gamma \eta(1405) \to \gamma \gamma \gamma$	$< 2.63 \times 10^{-6}$	CL=90%	–
$\gamma \eta(1475) \to \gamma \gamma \gamma$	$< 1.86 \times 10^{-6}$	CL=90%	–
$\gamma \eta(1760) \to \gamma \rho^0 \rho^0$	$(1.3 \pm 0.9) \times 10^{-4}$		1048
$\gamma \eta(1760) \to \gamma \omega \omega$	$(1.98 \pm 0.33) \times 10^{-3}$		–
$\gamma \eta(1760) \to \gamma \gamma \gamma$	$< 4.80 \times 10^{-6}$	CL=90%	–
$\gamma \eta(2225)$	$(3.14 {}^{+0.50}_{-0.19}) \times 10^{-4}$		752
$\gamma f_2(1270)$	$(1.63 \pm 0.12) \times 10^{-3}$	S=1.3	1286
$\gamma f_2(1270) \to \gamma K^0_S K^0_S$	$(2.58 {}^{+0.60}_{-0.22}) \times 10^{-5}$		–
$\gamma f_1(1285)$	$(6.1 \pm 0.8) \times 10^{-4}$		1283
$\gamma f_0(1370) \to \gamma K \overline{K}$	$(4.2 \pm 1.5) \times 10^{-4}$		–
$\gamma f_0(1370) \to \gamma K^0_S K^0_S$	$(1.1 \pm 0.4) \times 10^{-5}$		–
$\gamma f_1(1420) \to \gamma K \overline{K} \pi$	$(7.9 \pm 1.3) \times 10^{-4}$		1220
$\gamma f_0(1500) \to \gamma \pi \pi$	$(1.09 \pm 0.24) \times 10^{-4}$		1183
$\gamma f_0(1500) \to \gamma \eta \eta$	$(1.7 {}^{+0.6}_{-1.4}) \times 10^{-5}$		–
$\gamma f_0(1500) \to \gamma K^0_S K^0_S$	$(1.59 {}^{+0.24}_{-0.60}) \times 10^{-5}$		–
$\gamma f_1(1510) \to \gamma \eta \pi^+ \pi^-$	$(4.5 \pm 1.2) \times 10^{-4}$		–
$\gamma f'_2(1525)$	$(5.7 {}^{+0.8}_{-0.5}) \times 10^{-4}$	S=1.5	1177
$\gamma f'_2(1525) \to \gamma K^0_S K^0_S$	$(8.0 {}^{+0.7}_{-0.5}) \times 10^{-5}$		–
$\gamma f'_2(1525) \to \gamma \eta \eta$	$(3.4 \pm 1.4) \times 10^{-5}$		–
$\gamma f_2(1640) \to \gamma \omega \omega$	$(2.8 \pm 1.8) \times 10^{-4}$		–

$\gamma f_0(1710) \to \gamma \pi \pi$	$(3.8 \pm 0.5) \times 10^{-4}$		–
$\gamma f_0(1710) \to \gamma K \overline{K}$	$(9.5 {+1.0 \atop -0.5}) \times 10^{-4}$	S=1.5	1075
$\gamma f_0(1710) \to \gamma \omega \omega$	$(3.1 \pm 1.0) \times 10^{-4}$		–
$\gamma f_0(1710) \to \gamma \eta \eta$	$(2.4 {+1.2 \atop -0.7}) \times 10^{-4}$		–
$\gamma f_0(1710) \to \gamma \omega \phi$	$(2.5 \pm 0.6) \times 10^{-4}$		–
$\gamma f_0(1770) \to \gamma K^0_S K^0_S$	$(1.11 {+0.20 \atop -0.33}) \times 10^{-5}$		–
$\gamma f_2(1810) \to \gamma \eta \eta$	$(5.4 {+3.5 \atop -2.4}) \times 10^{-5}$		–
$\gamma \eta_1(1855) \to \gamma \eta \eta'$	$(2.7 {+0.4 \atop -0.5}) \times 10^{-6}$		–
$\gamma f_2(1910) \to \gamma \omega \omega$	$(2.0 \pm 1.4) \times 10^{-4}$		–
$\gamma f_2(1950) \to \gamma K^*(892) \overline{K}^*(892)$	$(7.0 \pm 2.2) \times 10^{-4}$		–
$\gamma f_0(2020) \to \gamma \eta' \eta'$	$(2.63 {+0.32 \atop -0.50}) \times 10^{-4}$		–
$\gamma f_4(2050)$	$(2.7 \pm 0.7) \times 10^{-3}$		891
$\gamma f_0(2100) \to \gamma \eta \eta$	$(1.13 {+0.60 \atop -0.30}) \times 10^{-4}$		–
$\gamma f_0(2100) \to \gamma \pi \pi$	$(6.2 \pm 1.0) \times 10^{-4}$		–
$\gamma f_0(2200) \to \gamma K \overline{K}$	$(5.9 \pm 1.3) \times 10^{-4}$		–
$\gamma f_0(2200) \to \gamma K^0_S K^0_S$	$(2.72 {+0.19 \atop -0.50}) \times 10^{-4}$		–
$\gamma f_J(2220) \to \gamma \pi \pi$	$< 3.9 \times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \to \gamma K \overline{K}$	$< 4.1 \times 10^{-5}$	CL=90%	–
$\gamma f_J(2220) \to \gamma p \overline{p}$	$(1.5 \pm 0.8) \times 10^{-5}$		–
$\gamma f_0(2330) \to \gamma K^0_S K^0_S$	$(4.9 \pm 0.7) \times 10^{-5}$		–
$\gamma f_0(2330) \to \gamma \eta' \eta'$	$(6.1 {+4.0 \atop -1.8}) \times 10^{-6}$		–
$\gamma f_2(2340) \to \gamma \eta \eta$	$(5.6 {+2.4 \atop -2.2}) \times 10^{-5}$		–
$\gamma f_2(2340) \to \gamma K^0_S K^0_S$	$(5.5 {+4.0 \atop -1.5}) \times 10^{-5}$		–
$\gamma f_2(2340) \to \gamma \eta' \eta'$	$(8.7 {+0.9 \atop -1.8}) \times 10^{-6}$		–
$\gamma f_0(2470) \to \gamma \eta' \eta'$	$(8.2 {+4.0 \atop -2.8}) \times 10^{-7}$		–
$\gamma X(1835) \to \gamma \pi^+ \pi^- \eta'$	$(2.7 {+0.6 \atop -0.8}) \times 10^{-4}$	S=1.6	1006
$\gamma X(1835) \to \gamma p \overline{p}$	$(7.7 {+1.5 \atop -0.9}) \times 10^{-5}$		–
$\gamma X(1835) \to \gamma K^0_S K^0_S \eta$	$(3.3 {+2.0 \atop -1.3}) \times 10^{-5}$		–
$\gamma X(1835) \to \gamma \gamma \gamma$	$< 3.56 \times 10^{-6}$	CL=90%	–
$\gamma X(1835) \to \gamma 3(\pi^+ \pi^-)$	$(2.4 {+0.7 \atop -0.8}) \times 10^{-5}$		–
$\gamma X(2370) \to \gamma K^+ K^- \eta'$	$(1.8 \pm 0.7) \times 10^{-5}$		–
$\gamma X(2370) \to \gamma K^0_S K^0_S \eta'$	$(1.2 \pm 0.5) \times 10^{-5}$		–
$\gamma X(2370) \to \gamma \eta \eta \eta'$	$< 9.2 \times 10^{-6}$	CL=90%	–

$\gamma p \overline{p}$		$(3.8 \pm 1.0) \times 10^{-4}$			1232
$\gamma p \overline{p} \pi^+ \pi^-$		$< 7.9 \times 10^{-4}$		CL=90%	1107
$\gamma \Lambda \overline{\Lambda}$		$< 1.3 \times 10^{-4}$		CL=90%	1074
$\gamma A^0 \to \gamma$ invisible	[jjaa]	$< 1.7 \times 10^{-6}$		CL=90%	–
$\gamma A^0 \to \gamma \mu^+ \mu^-$	[kkaa]	$< 7.8 \times 10^{-7}$		CL=90%	–

Dalitz decays

$\pi^0 e^+ e^-$		$(7.6 \pm 1.4) \times 10^{-7}$			1546
$\eta e^+ e^-$		$(1.42 \pm 0.08) \times 10^{-5}$			1500
$\eta'(958) e^+ e^-$		$(6.59 \pm 0.18) \times 10^{-5}$			1400
$X(1835) e^+ e^-$, $X \to \pi^+ \pi^- \eta'$		$(3.58 \pm 0.25) \times 10^{-6}$			–
$X(2120) e^+ e^-$, $X \to \pi^+ \pi^- \eta'$		$(8.2 \pm 1.3) \times 10^{-7}$			–
$X(2370) e^+ e^-$, $X \to \pi^+ \pi^- \eta'$		$(1.08 \pm 0.17) \times 10^{-6}$			–
$\eta U \to \eta e^+ e^-$	[llaa]	$< 9.11 \times 10^{-7}$		CL=90%	–
$\eta'(958) U \to \eta'(958) e^+ e^-$	[llaa]	$< 2.0 \times 10^{-7}$		CL=90%	–
$\phi e^+ e^-$		$< 1.2 \times 10^{-7}$		CL=90%	1381

Weak decays

$D^- e^+ \nu_e$ + c.c.		$< 7.1 \times 10^{-8}$		CL=90%	984
$\overline{D}^0 e^+ e^-$ + c.c.		$< 8.5 \times 10^{-8}$		CL=90%	987
$D_s^- e^+ \nu_e$ + c.c.		$< 1.3 \times 10^{-6}$		CL=90%	923
$D_s^{*-} e^+ \nu_e$ + c.c.		$< 1.8 \times 10^{-6}$		CL=90%	828
$D^- \pi^+$ + c.c.		$< 7.5 \times 10^{-5}$		CL=90%	977
$\overline{D}^0 \overline{K}^0$ + c.c.		$< 1.7 \times 10^{-4}$		CL=90%	898
$\overline{D}^0 \overline{K}^{*0}$ + c.c.		$< 2.5 \times 10^{-6}$		CL=90%	670
$D_s^- \pi^+$ + c.c.		$< 1.3 \times 10^{-4}$		CL=90%	915
$D_s^- \rho^+$ + c.c.		$< 1.3 \times 10^{-5}$		CL=90%	663

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

$\gamma\gamma$	C	$< 2.7 \times 10^{-7}$		CL=90%	1548
$\gamma\phi$	C	$< 1.4 \times 10^{-6}$		CL=90%	1381
$e^\pm \mu^\mp$	LF	$< 1.6 \times 10^{-7}$		CL=90%	1547
$e^\pm \tau^\mp$	LF	$< 7.5 \times 10^{-8}$		CL=90%	1039
$\mu^\pm \tau^\mp$	LF	$< 2.0 \times 10^{-6}$		CL=90%	1035
$\Lambda_c^+ e^-$ +c.c.		$< 6.9 \times 10^{-8}$		CL=90%	–

Other decays

invisible		$< 7 \times 10^{-4}$		CL=90%	–

$\chi_{c0}(1P)$

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

Mass $m = 3414.71 \pm 0.30$ MeV
Full width $\Gamma = 10.8 \pm 0.6$ MeV

$\chi_{c0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic decays			
$2(\pi^+\pi^-)$	(2.34 ± 0.18) %		1679
$\rho^0\pi^+\pi^-$	$(9.1\ \pm2.9\ )\times10^{-3}$		1607
$f_0(980)f_0(980)$	$(6.6\ \pm2.1\ )\times10^{-4}$		1391
$\pi^+\pi^-\pi^0\pi^0$	$(3.3\ \pm0.4\ )$ %		1680
$\rho^+\pi^-\pi^0+$ c.c.	$(2.9\ \pm0.4\ )$ %		1607
$4\pi^0$	$(3.3\ \pm0.4\ )\times10^{-3}$		1681
$\pi^+\pi^-K^+K^-$	(1.81 ± 0.14) %		1580
$K_0^*(1430)^0\overline{K}_0^*(1430)^0\to\pi^+\pi^-K^+K^-$	$(9.8\ {}^{+4.0}_{-2.8}\ )\times10^{-4}$		–
$K_0^*(1430)^0\overline{K}_2^*(1430)^0+$ c.c. $\to\pi^+\pi^-K^+K^-$	$(8.0\ {}^{+2.0}_{-2.4}\ )\times10^{-4}$		–
$K_1(1270)^+K^-+$ c.c. $\to\pi^+\pi^-K^+K^-$	$(6.3\ \pm1.9\ )\times10^{-3}$		–
$K_1(1400)^+K^-+$ c.c. $\to\pi^+\pi^-K^+K^-$	$<2.7\times10^{-3}$	CL=90%	–
$f_0(980)f_0(980)$	$(1.6\ {}^{+1.0}_{-0.9}\ )\times10^{-4}$		1391
$f_0(980)f_0(2200)$	$(7.9\ {}^{+2.0}_{-2.5}\ )\times10^{-4}$		586
$f_0(1370)f_0(1370)$	$<2.7\times10^{-4}$	CL=90%	1019
$f_0(1370)f_0(1500)$	$<1.7\times10^{-4}$	CL=90%	907
$f_0(1370)f_0(1710)$	$(6.7\ {}^{+3.5}_{-2.3}\ )\times10^{-4}$		709
$f_0(1500)f_0(1370)$	$<1.3\times10^{-4}$	CL=90%	907
$f_0(1500)f_0(1500)$	$<5\times10^{-5}$	CL=90%	774
$f_0(1500)f_0(1710)$	$<7\times10^{-5}$	CL=90%	515
$K^+K^-\pi^+\pi^-\pi^0$	$(8.6\ \pm0.9\ )\times10^{-3}$		1545
$K_S^0K^\pm\pi^\mp\pi^+\pi^-$	$(4.2\ \pm0.4\ )\times10^{-3}$		1543
$K^+K^-\pi^0\pi^0$	$(5.6\ \pm0.9\ )\times10^{-3}$		1582
$K^+\pi^-\overline{K}^0\pi^0+$ c.c.	(2.49 ± 0.33) %		1581
$\rho^+K^-K^0+$ c.c.	(1.21 ± 0.21) %		1458
$K^*(892)^-K^+\pi^0\to K^+\pi^-\overline{K}^0\pi^0+$ c.c.	$(4.6\ \pm1.2\ )\times10^{-3}$		–
$K_S^0K_S^0\pi^+\pi^-$	$(5.7\ \pm1.1\ )\times10^{-3}$		1579
$K^+K^-\eta\pi^0$	$(3.0\ \pm0.7\ )\times10^{-3}$		1468
$3(\pi^+\pi^-)$	(1.20 ± 0.18) %		1633
$K^+\overline{K}^*(892)^0\pi^-+$ c.c.	$(7.5\ \pm1.6\ )\times10^{-3}$		1523

$K^*(892)^0 \overline{K}^*(892)^0$	$(1.7 \pm 0.6) \times 10^{-3}$		1456
$\pi\pi$	$(8.51 \pm 0.33) \times 10^{-3}$		1702
$\pi^0\eta$	$< 1.8 \times 10^{-4}$		1661
$\pi^0\eta'$	$< 1.1 \times 10^{-3}$		1570
$\pi^0\eta_c$	$< 1.6 \times 10^{-3}$	CL=90%	383
$\eta\eta$	$(3.01 \pm 0.19) \times 10^{-3}$		1617
$\eta\eta'$	$(9.1 \pm 1.1) \times 10^{-5}$		1521
$\eta'\eta'$	$(2.17 \pm 0.12) \times 10^{-3}$		1413
$\omega\omega$	$(9.7 \pm 1.1) \times 10^{-4}$		1517
$\omega\phi$	$(1.41 \pm 0.13) \times 10^{-4}$		1447
$\omega K^+ K^-$	$(1.94 \pm 0.21) \times 10^{-3}$		1457
$K^+ K^-$	$(6.05 \pm 0.31) \times 10^{-3}$		1634
$K^0_S K^0_S$	$(3.16 \pm 0.17) \times 10^{-3}$		1633
$\pi^+\pi^-\eta$	$< 2.0 \times 10^{-4}$	CL=90%	1651
$\pi^+\pi^-\eta'$	$< 4 \times 10^{-4}$	CL=90%	1560
$\overline{K}^0 K^+ \pi^- +$ c.c.	$< 9 \times 10^{-5}$	CL=90%	1610
$K^+ K^- \pi^0$	$< 6 \times 10^{-5}$	CL=90%	1611
$K^+ K^- \eta$	$< 2.3 \times 10^{-4}$	CL=90%	1512
$K^+ K^- K^0_S K^0_S$	$(1.4 \pm 0.5) \times 10^{-3}$		1331
$K^0_S K^0_S K^0_S K^0_S$	$(5.8 \pm 0.5) \times 10^{-4}$		1327
$K^+ K^- K^+ K^-$	$(2.82 \pm 0.29) \times 10^{-3}$		1333
$K^+ K^- \phi$	$(9.7 \pm 2.5) \times 10^{-4}$		1381
$\overline{K}^0 K^+ \pi^- \phi +$ c.c.	$(3.7 \pm 0.6) \times 10^{-3}$		1326
$K^+ K^- \pi^0 \phi$	$(1.90 \pm 0.35) \times 10^{-3}$		1329
$\phi\pi^+\pi^-\pi^0$	$(1.18 \pm 0.15) \times 10^{-3}$		1525
$\phi\phi$	$(8.0 \pm 0.7) \times 10^{-4}$		1370
$\phi\phi\eta$	$(8.4 \pm 1.0) \times 10^{-4}$		1100
$p\overline{p}$	$(2.21 \pm 0.08) \times 10^{-4}$		1426
$p\overline{p}\pi^0$	$(7.0 \pm 0.7) \times 10^{-4}$	S=1.3	1379
$p\overline{p}\eta$	$(3.5 \pm 0.4) \times 10^{-4}$		1187
$p\overline{p}\omega$	$(5.2 \pm 0.6) \times 10^{-4}$		1043
$p\overline{p}\phi$	$(6.0 \pm 1.4) \times 10^{-5}$		876
$p\overline{p}\pi^+\pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4	1320
$p\overline{p}\pi^0\pi^0$	$(1.04 \pm 0.28) \times 10^{-3}$		1324
$p\overline{p}K^+K^-$ (non-resonant)	$(1.22 \pm 0.26) \times 10^{-4}$		890
$p\overline{p}K^0_S K^0_S$	$< 8.8 \times 10^{-4}$	CL=90%	884
$p\overline{n}\pi^-$	$(1.27 \pm 0.11) \times 10^{-3}$		1376
$\overline{p}n\pi^+$	$(1.37 \pm 0.12) \times 10^{-3}$		1376
$p\overline{n}\pi^-\pi^0$	$(2.34 \pm 0.21) \times 10^{-3}$		1321
$\overline{p}n\pi^+\pi^0$	$(2.21 \pm 0.18) \times 10^{-3}$		1321
$\Lambda\overline{\Lambda}$	$(3.59 \pm 0.15) \times 10^{-4}$		1292
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(1.18 \pm 0.13) \times 10^{-3}$		1153
$\quad\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$< 5 \times 10^{-4}$	CL=90%	1153
$\Lambda\overline{\Lambda}\eta$	$(2.3 \pm 0.4) \times 10^{-4}$		979

$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	< 5	$\times 10^{-4}$	CL=90%	1083
$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	< 5	$\times 10^{-4}$	CL=90%	1083
$K^+\overline{p}\Lambda$+ c.c.	(1.25±0.12)	$\times 10^{-3}$	S=1.3	1132
$nK^0_S\overline{\Lambda}$ + c.c.	(6.6 ±0.5)	$\times 10^{-4}$		1129
$K^*(892)^+\overline{p}\Lambda$+ c.c.	(4.8 ±0.9)	$\times 10^{-4}$		845
$K^+\overline{p}\Lambda(1520)$+ c.c.	(2.9 ±0.7)	$\times 10^{-4}$		859
$\Lambda(1520)\overline{\Lambda}(1520)$	(3.1 ±1.2)	$\times 10^{-4}$		780
$\Sigma^0\overline{\Sigma}^0$	(4.68±0.32)	$\times 10^{-4}$		1222
$\Sigma^+\overline{p}K^0_S$+ c.c.	(3.52±0.27)	$\times 10^{-4}$		1089
$\Sigma^0\overline{p}K^+$+ c.c.	(3.03±0.20)	$\times 10^{-4}$		1090
$\Sigma^+\overline{\Sigma}^-$	(4.6 ±0.8)	$\times 10^{-4}$	S=2.6	1225
$\Sigma^-\overline{\Sigma}^+$	(5.1 ±0.5)	$\times 10^{-4}$		1217
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	(1.6 ±0.6)	$\times 10^{-4}$		1001
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	(2.3 ±0.7)	$\times 10^{-4}$		1001
$K^-\Lambda\overline{\Xi}^+$+ c.c.	(1.94±0.35)	$\times 10^{-4}$		873
$\Xi^0\overline{\Xi}^0$	(4.5 ±0.5)	$\times 10^{-4}$	S=1.7	1089
$\Xi^-\overline{\Xi}^+$	(4.45±0.19)	$\times 10^{-4}$		1081
$\eta_c\pi^+\pi^-$	< 7	$\times 10^{-4}$	CL=90%	307

Radiative decays

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

$\chi_{c1}(1P)$

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

Mass $m = 3510.67 \pm 0.05$ MeV (S = 1.2)
Full width $\Gamma = 0.84 \pm 0.04$ MeV

$\chi_{c1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
e^+e^-	(1.4 $^{+1.5}_{-1.0}$) $\times 10^{-7}$		1755

Hadronic decays

$3(\pi^+\pi^-)$	(5.8 ±1.4) $\times 10^{-3}$	S=1.2	1683
$2(\pi^+\pi^-)$	(7.6 ±2.6) $\times 10^{-3}$		1728
$\pi^+\pi^-\pi^0\pi^0$	(1.19±0.15) %		1729
$\rho^+\pi^-\pi^0$+ c.c.	(1.45±0.24) %		1658
$\rho^0\pi^+\pi^-$	(3.9 ±3.5) $\times 10^{-3}$		1657
$4\pi^0$	(5.4 ±0.8) $\times 10^{-4}$		1729

$\pi^+\pi^- K^+ K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		1632
$K^+ K^- \pi^0 \pi^0$	$(1.12 \pm 0.27) \times 10^{-3}$		1634
$K^+ K^- \pi^+ \pi^- \pi^0$	(1.15 ± 0.13) %		1598
$K^0_S K^\pm \pi^\mp \pi^+ \pi^-$	$(7.5 \pm 0.8) \times 10^{-3}$		1596
$K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	$(8.6 \pm 1.4) \times 10^{-3}$		1632
$\rho^- K^+ \overline{K}^0 +$ c.c.	$(5.0 \pm 1.2) \times 10^{-3}$		1514
$K^*(892)^0 \overline{K}^0 \pi^0 \to K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	$(2.3 \pm 0.6) \times 10^{-3}$		–
$K^+ K^- \eta \pi^0$	$(1.12 \pm 0.34) \times 10^{-3}$		1523
$\pi^+\pi^- K^0_S K^0_S$	$(6.9 \pm 2.9) \times 10^{-4}$		1630
$K^+ K^- \eta$	$(3.2 \pm 1.0) \times 10^{-4}$		1566
$\overline{K}^0 K^+ \pi^- +$ c.c.	$(7.0 \pm 0.6) \times 10^{-3}$		1661
$K^*(892)^0 \overline{K}^0 +$ c.c.	$(10 \pm 4) \times 10^{-4}$		1602
$K^*(892)^+ K^- +$ c.c.	$(1.4 \pm 0.6) \times 10^{-3}$		1602
$K^*_J(1430)^0 \overline{K}^0 +$ c.c. $\to K^0_S K^+ \pi^- +$ c.c.	$< 8 \times 10^{-4}$	CL=90%	–
$K^*_J(1430)^+ K^- +$ c.c. $\to K^0_S K^+ \pi^- +$ c.c.	$< 2.1 \times 10^{-3}$	CL=90%	–
$K^+ K^- \pi^0$	$(1.81 \pm 0.24) \times 10^{-3}$		1662
$\eta \pi^+ \pi^-$	$(4.62 \pm 0.23) \times 10^{-3}$		1701
$a_0(980)^+ \pi^- +$ c.c. $\to \eta \pi^+ \pi^-$	$(3.2 \pm 0.4) \times 10^{-3}$	S=2.2	–
$a_2(1320)^+ \pi^- +$ c.c. $\to \eta \pi^+ \pi^-$	$(1.76 \pm 0.24) \times 10^{-4}$		–
$a_2(1700)^+ \pi^- +$ c.c. $\to \eta \pi^+ \pi^-$	$(4.6 \pm 0.7) \times 10^{-5}$		–
$f_2(1270) \eta \to \eta \pi^+ \pi^-$	$(3.5 \pm 0.6) \times 10^{-4}$		–
$f_4(2050) \eta \to \eta \pi^+ \pi^-$	$(2.5 \pm 0.9) \times 10^{-5}$		–
$\pi_1(1400)^+ \pi^- +$ c.c. $\to \eta \pi^+ \pi^-$	$< 5 \times 10^{-5}$	CL=90%	–
$\pi_1(1600)^+ \pi^- +$ c.c. $\to \eta \pi^+ \pi^-$	$< 1.5 \times 10^{-5}$	CL=90%	–
$\pi_1(2015)^+ \pi^- +$ c.c. $\to \eta \pi^+ \pi^-$	$< 8 \times 10^{-6}$	CL=90%	–
$f_2(1270) \eta$	$(6.7 \pm 1.1) \times 10^{-4}$		1467
$\pi^+ \pi^- \eta'$	$(2.2 \pm 0.4) \times 10^{-3}$		1612
$K^+ K^- \eta'(958)$	$(8.8 \pm 0.9) \times 10^{-4}$		1461
$K^*_0(1430)^+ K^- +$ c.c.	$(6.4 {}^{+2.2}_{-2.8}) \times 10^{-4}$		–
$f_0(980) \eta'(958)$	$(1.6 {}^{+1.4}_{-0.7}) \times 10^{-4}$		1460
$f_0(1710) \eta'(958)$	$(7 {}^{+7}_{-5}) \times 10^{-5}$		1100
$f'_2(1525) \eta'(958)$	$(9 \pm 6) \times 10^{-5}$		1229
$\pi^0 f_0(980) \to \pi^0 \pi^+ \pi^-$	$(3.5 \pm 0.9) \times 10^{-7}$		–
$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(3.2 \pm 2.1) \times 10^{-3}$		1577
$K^*(892)^0 \overline{K}^*(892)^0$	$(1.4 \pm 0.4) \times 10^{-3}$		1512
$K^+ K^- K^0_S K^0_S$	$< 4 \times 10^{-4}$	CL=90%	1390

$K^0_S K^0_S K^0_S K^0_S$	$(3.5 \pm 1.0) \times 10^{-5}$		1387
$K^+ K^- K^+ K^-$	$(5.4 \pm 1.1) \times 10^{-4}$		1393
$K^+ K^- \phi$	$(4.1 \pm 1.5) \times 10^{-4}$		1440
$\overline{K}^0 K^+ \pi^- \phi +$ c.c.	$(3.3 \pm 0.5) \times 10^{-3}$		1387
$K^+ K^- \pi^0 \phi$	$(1.62 \pm 0.30) \times 10^{-3}$		1390
$\phi \pi^+ \pi^- \pi^0$	$(7.5 \pm 1.0) \times 10^{-4}$		1578
$\omega \omega$	$(5.7 \pm 0.7) \times 10^{-4}$		1571
$\omega K^+ K^-$	$(7.8 \pm 0.9) \times 10^{-4}$		1513
$\omega \phi$	$(2.7 \pm 0.4) \times 10^{-5}$		1503
$\phi \phi$	$(4.2 \pm 0.5) \times 10^{-4}$		1429
$\phi \phi \eta$	$(3.0 \pm 0.5) \times 10^{-4}$		1172
$p \overline{p}$	$(7.60 \pm 0.34) \times 10^{-5}$		1484
$p \overline{p} \pi^0$	$(1.55 \pm 0.18) \times 10^{-4}$		1438
$p \overline{p} \eta$	$(1.45 \pm 0.25) \times 10^{-4}$		1254
$p \overline{p} \omega$	$(2.12 \pm 0.31) \times 10^{-4}$		1117
$p \overline{p} \phi$	$< 1.7 \times 10^{-5}$	CL=90%	962
$p \overline{p} \pi^+ \pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$		1381
$p \overline{p} \pi^0 \pi^0$	$< 5 \times 10^{-4}$	CL=90%	1385
$p \overline{p} K^+ K^-$ (non-resonant)	$(1.27 \pm 0.22) \times 10^{-4}$		974
$p \overline{p} K^0_S K^0_S$	$< 4.5 \times 10^{-4}$	CL=90%	968
$p \overline{n} \pi^-$	$(3.8 \pm 0.5) \times 10^{-4}$		1435
$\overline{p} n \pi^+$	$(3.9 \pm 0.5) \times 10^{-4}$		1435
$p \overline{n} \pi^- \pi^0$	$(1.03 \pm 0.12) \times 10^{-3}$		1383
$\overline{p} n \pi^+ \pi^0$	$(1.01 \pm 0.12) \times 10^{-3}$		1383
$\Lambda \overline{\Lambda}$	$(1.27 \pm 0.08) \times 10^{-4}$		1355
$\Lambda \overline{\Lambda} \pi^+ \pi^-$	$(2.9 \pm 0.5) \times 10^{-4}$		1223
$\quad \Lambda \overline{\Lambda} \pi^+ \pi^-$ (non-resonant)	$(2.5 \pm 0.6) \times 10^{-4}$		1223
$\Lambda \overline{\Lambda} \eta$	$(5.9 \pm 1.5) \times 10^{-5}$		1059
$\quad \Sigma(1385)^+ \overline{\Lambda} \pi^- +$ c.c.	$< 1.3 \times 10^{-4}$	CL=90%	1157
$\quad \Sigma(1385)^- \overline{\Lambda} \pi^+ +$ c.c.	$< 1.3 \times 10^{-4}$	CL=90%	1157
$K^+ \overline{p} \Lambda +$c.c.	$(4.2 \pm 0.4) \times 10^{-4}$	S=1.2	1203
$n K^0_S \overline{\Lambda} +$ c.c.	$(1.66 \pm 0.17) \times 10^{-4}$		1200
$K^*(892)^+ \overline{p} \Lambda +$ c.c.	$(4.9 \pm 0.7) \times 10^{-4}$		935
$K^+ \overline{p} \Lambda(1520) +$ c.c.	$(1.7 \pm 0.4) \times 10^{-4}$		951
$\Lambda(1520) \overline{\Lambda}(1520)$	$< 9 \times 10^{-5}$	CL=90%	880
$\Sigma^0 \overline{\Sigma}^0$	$(4.2 \pm 0.6) \times 10^{-5}$		1288
$\Sigma^+ \overline{p} K^0_S +$ c.c.	$(1.53 \pm 0.12) \times 10^{-4}$		1163
$\Sigma^0 \overline{p} K^+ +$ c.c.	$(1.46 \pm 0.10) \times 10^{-4}$		1163
$\Sigma^+ \overline{\Sigma}^-$	$(3.6 \pm 0.7) \times 10^{-5}$		1291
$\Sigma^- \overline{\Sigma}^+$	$(5.7 \pm 1.5) \times 10^{-5}$		1283
$\Sigma(1385)^+ \overline{\Sigma}(1385)^-$	$< 9 \times 10^{-5}$	CL=90%	1081
$\Sigma(1385)^- \overline{\Sigma}(1385)^+$	$< 5 \times 10^{-5}$	CL=90%	1081
$K^- \Lambda \overline{\Xi}^+ +$ c.c.	$(1.35 \pm 0.24) \times 10^{-4}$		963
$\Xi^0 \overline{\Xi}^0$	$(7.5 \pm 1.3) \times 10^{-5}$		1163

$\Xi^- \overline{\Xi}^+$	$(6.0 \pm 0.6) \times 10^{-5}$		1155
$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$		–
$K^0_S K^0_S$	$< 6 \times 10^{-5}$	CL=90%	1683
$\eta_c \pi^+\pi^-$	$< 3.2 \times 10^{-3}$	CL=90%	413
Radiative decays			
$\gamma J/\psi(1S)$	(34.3 ± 1.0) %		389
$\gamma \rho^0$	$(2.16 \pm 0.17) \times 10^{-4}$		1670
$\gamma \omega$	$(6.8 \pm 0.8) \times 10^{-5}$		1668
$\gamma \phi$	$(2.4 \pm 0.5) \times 10^{-5}$		1607
$\gamma \gamma$	$< 6.3 \times 10^{-6}$	CL=90%	1755
$e^+ e^- J/\psi(1S)$	$(3.46 \pm 0.22) \times 10^{-3}$		389
$\mu^+ \mu^- J/\psi(1S)$	$(2.33 \pm 0.29) \times 10^{-4}$		335

$h_c(1P)$

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

Mass $m = 3525.37 \pm 0.14$ MeV (S = 1.2)
Full width $\Gamma = 0.78 \pm 0.28$ MeV

$h_c(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi(1S)\pi^0$	$< 5 \times 10^{-4}$	90%	382
$J/\psi(1S)\pi\pi$	not seen		312
$J/\psi(1S)\pi^+\pi^-$	$< 2.7 \times 10^{-3}$	90%	305
$p\overline{p}$	$< 1.7 \times 10^{-4}$	90%	1492
$p\overline{p}\pi^0$	$< 8 \times 10^{-4}$	90%	1447
$p\overline{p}\pi^+\pi^-$	$(3.3 \pm 0.6) \times 10^{-3}$		1390
$p\overline{p}\pi^0\pi^0$	$< 6 \times 10^{-4}$	90%	1394
$p\overline{p}\pi^+\pi^-\pi^0$	$(4.4 \pm 1.3) \times 10^{-3}$		1331
$p\overline{p}\eta$	$(7.4 \pm 2.2) \times 10^{-4}$		1264
$\pi^+\pi^-\pi^0$	$(1.9 \pm 0.5) \times 10^{-3}$		1749
$\pi^+\pi^-\pi^0\eta$	$(8.3 \pm 2.4) \times 10^{-3}$		1695
$2\pi^+2\pi^-\pi^0$	$(9.4 \pm 1.7) \times 10^{-3}$		1716
$3\pi^+3\pi^-\pi^0$	< 1.0 %	90%	1661
$K^+K^-\pi^+\pi^-$	$< 7 \times 10^{-4}$	90%	1640
$K^+K^-\pi^+\pi^-\pi^0$	$(3.8 \pm 0.8) \times 10^{-3}$		1606
$K^+K^-\pi^+\pi^-\eta$	$< 2.7 \times 10^{-3}$	90%	1480
$K^+K^-\pi^0$	$< 6 \times 10^{-4}$	90%	1670
$K^+K^-\pi^0\eta$	$< 2.4 \times 10^{-3}$	90%	1532
$K^+K^-\eta$	$< 1.0 \times 10^{-3}$	90%	1574
$2K^+2K^-\pi^0$	$< 2.8 \times 10^{-4}$	90%	1339
$K^0_S K^\pm \pi^\mp$	$< 6 \times 10^{-4}$	90%	1668
$K^0_S K^\pm \pi^\mp \pi^+\pi^-$	$(3.2 \pm 1.0) \times 10^{-3}$		1604

	Radiative decays	
$\gamma\eta$	$(4.7\pm2.1)\times10^{-4}$	1720
$\gamma\eta'(958)$	$(1.5\pm0.4)\times10^{-3}$	1633
$\gamma\eta_c(1S)$	$(57\ \pm5\ )$ %	500

$\chi_{c2}(1P)$

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

Mass $m = 3556.17 \pm 0.07$ MeV
Full width $\Gamma = 1.97 \pm 0.09$ MeV

$\chi_{c2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
	Hadronic decays		
$2(\pi^+\pi^-)$	(1.02 ± 0.09) %		1751
$\pi^+\pi^-\pi^0\pi^0$	(1.83 ± 0.23) %		1752
$\rho^+\pi^-\pi^0$ + c.c.	(2.19 ± 0.34) %		1682
$4\pi^0$	$(1.11\pm0.15)\times10^{-3}$		1752
$K^+K^-\pi^0\pi^0$	$(2.1\ \pm0.4\ )\times10^{-3}$		1658
$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(1.38 ± 0.20) %		1657
$\rho^-K^+\overline{K}^0$ + c.c.	$(4.1\ \pm1.2\ )\times10^{-3}$		1540
$K^*(892)^0K^-\pi^+ \to K^-\pi^+K^0\pi^0$ + c.c.	$(2.9\ \pm0.8\ )\times10^{-3}$		–
$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(3.8\ \pm0.9\ )\times10^{-3}$		–
$K^*(892)^-K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(3.7\ \pm0.8\ )\times10^{-3}$		–
$K^*(892)^+\overline{K}^0\pi^- \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(2.9\ \pm0.8\ )\times10^{-3}$		–
$K^+K^-\eta\pi^0$	$(1.3\ \pm0.4\ )\times10^{-3}$		1549
$K^+K^-\pi^+\pi^-$	$(8.4\ \pm0.9\ )\times10^{-3}$		1656
$K^+K^-\pi^+\pi^-\pi^0$	(1.17 ± 0.13) %		1623
$K^0_SK^\pm\pi^\mp\pi^+\pi^-$	$(7.3\ \pm0.8\ )\times10^{-3}$		1621
$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(2.1\ \pm1.1\ )\times10^{-3}$		1602
$K^*(892)^0\overline{K}^*(892)^0$	$(2.3\ \pm0.4\ )\times10^{-3}$		1538
$3(\pi^+\pi^-)$	$(8.6\ \pm1.8\ )\times10^{-3}$		1707
$\phi\phi$	$(1.06\pm0.09)\times10^{-3}$		1457
$\phi\phi\eta$	$(5.3\ \pm0.6\ )\times10^{-4}$		1206
$\omega\omega$	$(8.4\ \pm1.0\ )\times10^{-4}$		1597
ωK^+K^-	$(7.3\ \pm0.9\ )\times10^{-4}$		1540
$\omega\phi$	$(9.6\ \pm2.7\ )\times10^{-6}$		1529
$\pi\pi$	$(2.23\pm0.09)\times10^{-3}$		1773
$\rho^0\pi^+\pi^-$	$(3.7\ \pm1.6\ )\times10^{-3}$		1682
$\pi^+\pi^-\pi^0$ (non-resonant)	$(2.0\ \pm0.4\ )\times10^{-5}$		1765
$\rho(770)^\pm\pi^\mp$	$(6\ \ \pm4\ \ )\times10^{-6}$		–

$\pi^+\pi^-\eta$	$(4.8 \pm 1.3) \times 10^{-4}$		1724
$\pi^+\pi^-\eta'$	$(5.0 \pm 1.8) \times 10^{-4}$		1636
$\eta\eta$	$(5.4 \pm 0.4) \times 10^{-4}$		1692
K^+K^-	$(1.01\pm 0.06) \times 10^{-3}$		1708
$K^0_S K^0_S$	$(5.2 \pm 0.4) \times 10^{-4}$		1707
$K^*(892)^\pm K^\mp$	$(1.44\pm 0.21) \times 10^{-4}$		1627
$K^*(892)^0 \overline{K}^0 +$ c.c.	$(1.24\pm 0.27) \times 10^{-4}$		1627
$K^*_2(1430)^\pm K^\mp$	$(1.48\pm 0.12) \times 10^{-3}$		–
$K^*_2(1430)^0 \overline{K}^0 +$ c.c.	$(1.24\pm 0.17) \times 10^{-3}$		1443
$K^*_3(1780)^\pm K^\mp$	$(5.2 \pm 0.8) \times 10^{-4}$		–
$K^*_3(1780)^0 \overline{K}^0 +$ c.c.	$(5.6 \pm 2.1) \times 10^{-4}$		1274
$a_2(1320)^0\pi^0$	$(1.29\pm 0.34) \times 10^{-3}$		–
$a_2(1320)^\pm\pi^\mp$	$(1.8 \pm 0.6) \times 10^{-3}$		1530
$\overline{K}^0 K^+\pi^- +$ c.c.	$(1.28\pm 0.18) \times 10^{-3}$		1685
$K^+K^-\pi^0$	$(3.0 \pm 0.8) \times 10^{-4}$		1686
$K^+K^-\eta$	$< 3.2 \times 10^{-4}$	90%	1592
$K^+K^-\eta'(958)$	$(1.94\pm 0.34) \times 10^{-4}$		1488
$\eta\eta'$	$(2.2 \pm 0.5) \times 10^{-5}$		1600
$\eta'\eta'$	$(4.6 \pm 0.6) \times 10^{-5}$		1498
$\pi^+\pi^- K^0_S K^0_S$	$(2.2 \pm 0.5) \times 10^{-3}$		1655
$K^+K^- K^0_S K^0_S$	$< 4 \times 10^{-4}$	90%	1418
$K^0_S K^0_S K^0_S K^0_S$	$(1.13\pm 0.18) \times 10^{-4}$		1415
$K^+K^-K^+K^-$	$(1.65\pm 0.20) \times 10^{-3}$		1421
$K^+K^-\phi$	$(1.42\pm 0.29) \times 10^{-3}$		1468
$\overline{K}^0 K^+\pi^-\phi +$ c.c.	$(4.8 \pm 0.7) \times 10^{-3}$		1416
$K^+K^-\pi^0\phi$	$(2.7 \pm 0.5) \times 10^{-3}$		1419
$\phi\pi^+\pi^-\pi^0$	$(9.3 \pm 1.2) \times 10^{-4}$		1603
$p\overline{p}$	$(7.33\pm 0.33) \times 10^{-5}$		1510
$p\overline{p}\pi^0$	$(4.7 \pm 0.4) \times 10^{-4}$		1465
$p\overline{p}\eta$	$(1.74\pm 0.25) \times 10^{-4}$		1285
$p\overline{p}\omega$	$(3.6 \pm 0.4) \times 10^{-4}$		1152
$p\overline{p}\phi$	$(2.8 \pm 0.9) \times 10^{-5}$		1002
$p\overline{p}\pi^+\pi^-$	$(1.32\pm 0.34) \times 10^{-3}$		1410
$p\overline{p}\pi^0\pi^0$	$(7.8 \pm 2.3) \times 10^{-4}$		1414
$p\overline{p}K^+K^-$ (non-resonant)	$(1.91\pm 0.32) \times 10^{-4}$		1013
$p\overline{p}K^0_S K^0_S$	$< 7.9 \times 10^{-4}$	90%	1007
$p\overline{n}\pi^-$	$(8.5 \pm 0.9) \times 10^{-4}$		1463
$\overline{p}n\pi^+$	$(8.9 \pm 0.8) \times 10^{-4}$		1463
$p\overline{n}\pi^-\pi^0$	$(2.17\pm 0.18) \times 10^{-3}$		1411
$\overline{p}n\pi^+\pi^0$	$(2.11\pm 0.18) \times 10^{-3}$		1411
$\Lambda\overline{\Lambda}$	$(1.83\pm 0.16) \times 10^{-4}$		1384
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(1.25\pm 0.15) \times 10^{-3}$		1255
$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(6.6 \pm 1.5) \times 10^{-4}$		1255

$\Lambda\overline{\Lambda}\eta$	$(1.05\pm0.26)\times10^{-4}$		1096
$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$<4\times10^{-4}$	90%	1192
$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$<6\times10^{-4}$	90%	1192
$K^+\overline{p}\Lambda$ + c.c.	$(7.8\pm0.5)\times10^{-4}$		1236
$nK^0_S\overline{\Lambda}$ + c.c.	$(3.58\pm0.28)\times10^{-4}$		1233
$K^*(892)^+\overline{p}\Lambda$+ c.c.	$(8.2\pm1.1)\times10^{-4}$		976
$K^+\overline{p}\Lambda(1520)$+ c.c.	$(2.8\pm0.7)\times10^{-4}$		992
$\Lambda(1520)\overline{\Lambda}(1520)$	$(4.6\pm1.5)\times10^{-4}$		924
$\Sigma^0\overline{\Sigma}^0$	$(3.7\pm0.6)\times10^{-5}$		1319
$\Sigma^+\overline{p}K^0_S$+ c.c.	$(8.2\pm0.9)\times10^{-5}$		1197
$\Sigma^0\overline{p}K^+$+ c.c.	$(9.1\pm0.8)\times10^{-5}$		1197
$\Sigma^+\overline{\Sigma}^-$	$(3.4\pm0.7)\times10^{-5}$		1322
$\Sigma^-\overline{\Sigma}^+$	$(4.4\pm1.8)\times10^{-5}$		1314
$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$<1.6\times10^{-4}$	90%	1118
$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$<8\times10^{-5}$	90%	1118
$K^-\Lambda\overline{\Xi}^+$+ c.c.	$(1.76\pm0.32)\times10^{-4}$		1004
$\Xi^0\overline{\Xi}^0$	$(1.83\pm0.22)\times10^{-4}$		1197
$\Xi^-\overline{\Xi}^+$	$(1.44\pm0.12)\times10^{-4}$		1189
$J/\psi(1S)\pi^+\pi^-\pi^0$	<1.5 %	90%	185
$\pi^0\eta_c$	$<3.2\times10^{-3}$	90%	511
$\eta_c(1S)\pi^+\pi^-$	$<5.4\times10^{-3}$	90%	459
Radiative decays			
$\gamma J/\psi(1S)$	(19.0 ± 0.5) %		430
$\gamma\rho^0$	$<1.9\times10^{-5}$	90%	1694
$\gamma\omega$	$<6\times10^{-6}$	90%	1692
$\gamma\phi$	$<7\times10^{-6}$	90%	1632
$\gamma\gamma$	$(2.85\pm0.10)\times10^{-4}$		1778
$e^+e^-J/\psi(1S)$	$(2.15\pm0.14)\times10^{-3}$		430
$\mu^+\mu^-J/\psi(1S)$	$(2.02\pm0.33)\times10^{-4}$		381

$\eta_c(2S)$

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

Quantum numbers are quark model predictions.

Mass $m = 3637.7 \pm 1.1$ MeV (S = 1.2)
Full width $\Gamma = 13.9 \pm 2.6$ MeV

$\eta_c(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
hadrons	not seen		–
$K\overline{K}\pi$	(1.9 ± 1.2) %		1729
$K\overline{K}\eta$	$(5\pm4)\times10^{-3}$		1637
$2\pi^+2\pi^-$	<2.1 %	90%	1792
$\rho^0\rho^0$	$<1.9\times10^{-3}$	90%	1645

$3\pi^+3\pi^-$	(1.3 ± 0.9) %		1749
$K^+K^-\pi^+\pi^-$	<1.4 %	90%	1700
$K^{*0}\overline{K}^{*0}$	$<2.9 \times 10^{-3}$	90%	1585
$K^+K^-\pi^+\pi^-\pi^0$	(1.4 ± 1.0) %		1668
$K^+K^-2\pi^+2\pi^-$	<1.4 %	90%	1627
$K^0_S K^- 2\pi^+\pi^- +$ c.c.	(1.0 ± 0.8) %		1666
$2K^+2K^-$	$<1.3 \times 10^{-3}$	90%	1470
$\phi\phi$	$<1.1 \times 10^{-3}$	90%	1506
$p\overline{p}$	$<2.0 \times 10^{-3}$	90%	1558
$p\overline{p}\pi^+\pi^-$	seen		1461
$\gamma\gamma$	$(1.6\pm1.0) \times 10^{-4}$		1819
$\gamma J/\psi(1S)$	<1.4 %	90%	501
$\pi^+\pi^-\eta$	$<6 \times 10^{-3}$	90%	1766
$\pi^+\pi^-\eta'$	$(2.6\pm1.9) \times 10^{-3}$		1680
$\pi^+\pi^-\eta_c(1S)$	<25 %	90%	538

$\psi(2S)$

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

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

$\psi(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
hadrons	(97.85 ± 0.13) %		–
virtual $\gamma \to$ hadrons	(1.73 ± 0.14) %	S=1.5	–
ggg	(10.6 ± 1.6) %		–
γgg	(1.03 ± 0.29) %		–
light hadrons	(15.4 ± 1.5) %		–
K^0_S anything	(16.0 ± 1.1) %		–
e^+e^-	$(7.93 \pm0.17) \times 10^{-3}$		1843
$\mu^+\mu^-$	$(8.0 \pm0.6) \times 10^{-3}$		1840
$\tau^+\tau^-$	$(3.1 \pm0.4) \times 10^{-3}$		489
Decays into $J/\psi(1S)$ and anything			
$J/\psi(1S)$ anything	(61.4 ± 0.6) %		–
$J/\psi(1S)$ neutrals	(25.38 ± 0.32) %		–
$J/\psi(1S)\pi^+\pi^-$	(34.68 ± 0.30) %		477
$J/\psi(1S)\pi^0\pi^0$	(18.24 ± 0.31) %		481
$J/\psi(1S)\eta$	(3.37 ± 0.05) %		199
$J/\psi(1S)\pi^0$	$(1.268\pm0.032) \times 10^{-3}$		528
Hadronic decays			
$\pi^+\pi^-$	$(7.8 \pm2.6) \times 10^{-6}$		1838
$\pi^+\pi^-\pi^0$	$(2.01 \pm0.17) \times 10^{-4}$	S=1.7	1830

$\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$	(3.2 ±1.2) $\times 10^{-5}$		S=1.8	–
$\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0$	(1.9 $^{+1.2}_{-0.4}$) $\times 10^{-4}$			–
$2(\pi^+\pi^-)$	(2.4 ±0.6) $\times 10^{-4}$		S=2.2	1817
$\rho^0\pi^+\pi^-$	(2.2 ±0.6) $\times 10^{-4}$		S=1.4	1750
$2(\pi^+\pi^-)\pi^0$	(2.9 ±1.0) $\times 10^{-3}$		S=4.7	1799
$\rho a_2(1320)$	(2.6 ±0.9) $\times 10^{-4}$			1500
$\pi^+\pi^-\pi^0\pi^0\pi^0$	(5.3 ±0.9) $\times 10^{-3}$			1800
$\pi^+\pi^-4\pi^0$	(1.4 ±1.0) $\times 10^{-3}$			1778
$\rho^\pm\pi^\mp\pi^0\pi^0$	< 2.7 $\times 10^{-3}$	CL=90%		1737
$3(\pi^+\pi^-)$	(3.5 ±2.0) $\times 10^{-4}$		S=2.8	1774
$2(\pi^+\pi^-\pi^0)$	(4.8 ±1.5) $\times 10^{-3}$			1776
$3(\pi^+\pi^-)\pi^0$	(3.5 ±1.6) $\times 10^{-3}$			1746
$2(\pi^+\pi^-)3\pi^0$	(1.42 ±0.31) %			1748
$\eta\pi^+\pi^-$	< 1.6 $\times 10^{-4}$	CL=90%		1791
$\eta\pi^+\pi^-\pi^0$	(9.5 ±1.7) $\times 10^{-4}$			1778
$\eta 2(\pi^+\pi^-)$	(1.2 ±0.6) $\times 10^{-3}$			1758
$\eta\pi^+\pi^-\pi^0\pi^0$	< 4 $\times 10^{-4}$	CL=90%		1760
$\eta\pi^+\pi^-3\pi^0$	< 2.1 $\times 10^{-3}$	CL=90%		1736
$\eta 2(\pi^+\pi^-\pi^0)$	< 2.1 $\times 10^{-3}$	CL=90%		1705
$\rho\eta$	(2.2 ±0.6) $\times 10^{-5}$		S=1.1	1717
$\eta'\pi^+\pi^-\pi^0$	(4.5 ±2.1) $\times 10^{-4}$			1692
$\eta'\rho$	(1.9 $^{+1.7}_{-1.2}$) $\times 10^{-5}$			1625
$\omega\pi^0$	(2.1 ±0.6) $\times 10^{-5}$			1757
$\omega\pi^+\pi^-$	(7.3 ±1.2) $\times 10^{-4}$		S=2.1	1748
$\omega\pi^+\pi^-2\pi^0$	(8.7 ±2.4) $\times 10^{-3}$			1715
$b_1^\pm\pi^\mp$	(4.0 ±0.6) $\times 10^{-4}$		S=1.1	1635
$\omega f_2(1270)$	(2.2 ±0.4) $\times 10^{-4}$			1515
$\omega\pi^0\pi^0$	(1.11 ±0.35) $\times 10^{-3}$			1749
$\omega 3\pi^0$	< 8 $\times 10^{-4}$	CL=90%		1736
$b_1^0\pi^0$	(2.4 ±0.6) $\times 10^{-4}$			–
$\omega\eta$	< 1.1 $\times 10^{-5}$	CL=90%		1715
$\omega\eta'$	(3.2 $^{+2.5}_{-2.1}$) $\times 10^{-5}$			1623
$\phi\pi^0$	< 4 $\times 10^{-7}$	CL=90%		1699
$\phi\pi^+\pi^-$	(1.18 ±0.26) $\times 10^{-4}$		S=1.5	1690
$\phi f_0(980) \rightarrow \pi^+\pi^-$	(7.5 ±3.3) $\times 10^{-5}$		S=1.6	–
$\phi\eta$	(3.10 ±0.31) $\times 10^{-5}$			1654
$\eta\phi(2170)$, $\phi(2170) \rightarrow \phi f_0(980)$, $f_0 \rightarrow \pi^+\pi^-$	< 2.2 $\times 10^{-6}$	CL=90%		–
$\phi\eta'$	(1.54 ±0.20) $\times 10^{-5}$			1555
$\phi f_1(1285)$	(3.0 ±1.3) $\times 10^{-5}$			1436
$\phi\eta(1405) \rightarrow \phi\pi^+\pi^-\eta$	(8.5 ±1.7) $\times 10^{-6}$			–
$\phi f'_2(1525)$	(4.4 ±1.6) $\times 10^{-5}$			1325

K^+K^-	$(7.5 \pm 0.5) \times 10^{-5}$		1776
$K^+K^-\pi^+$	$(7.3 \pm 0.5) \times 10^{-4}$		1754
$K^+K^-\pi^0$	$(4.07 \pm 0.31) \times 10^{-5}$		1754
$K^0_S K^0_S$	$< 4.6 \times 10^{-6}$		1775
$K^0_S K^0_L$	$(5.34 \pm 0.33) \times 10^{-5}$		1775
$K^0_S K^0_L \pi^0$	$< 3.0 \times 10^{-4}$	CL=90%	1753
$K^+K^-\pi^0\pi^0$	$(2.6 \pm 1.3) \times 10^{-4}$		1728
$K^+K^-\pi^+\pi^-\pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$		1694
$\omega f_0(1710) \to \omega K^+K^-$	$(5.9 \pm 2.2) \times 10^{-5}$		–
$K^*(892)^0 K^-\pi^+\pi^0 +$ c.c.	$(8.6 \pm 2.2) \times 10^{-4}$		–
$K^*(892)^+ K^-\pi^+\pi^- +$ c.c.	$(9.6 \pm 2.8) \times 10^{-4}$		–
$K^*(892)^+ K^-\rho^0 +$ c.c.	$(7.3 \pm 2.6) \times 10^{-4}$		–
$K^*(892)^0 K^-\rho^+ +$ c.c.	$(6.1 \pm 1.8) \times 10^{-4}$		–
$K^0_S K^0_S \pi^+\pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$		1724
$K^0_S K^0_L \pi^0\pi^0$	$(1.3 \pm 0.6) \times 10^{-3}$		1726
$K^0_S K^0_L \eta$	$(1.3 \pm 0.5) \times 10^{-3}$		1661
$K^+K^-\rho^0$	$(2.2 \pm 0.4) \times 10^{-4}$		1616
$K^*(892)^0 \overline{K}^*_2(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		1417
$K^+K^-\pi^+\pi^-\eta$	$(1.3 \pm 0.7) \times 10^{-3}$		1574
$K^+K^-2(\pi^+\pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$		1654
$K^+K^-2(\pi^+\pi^-)\pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$		1611
$K^+K^*(892)^- +$ c.c.	$(2.9 \pm 0.4) \times 10^{-5}$	S=1.2	1698
$2(K^+K^-)$	$(6.3 \pm 1.3) \times 10^{-5}$		1499
$2(K^+K^-)\pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$		1440
$K^+K^-\phi$	$(7.0 \pm 1.6) \times 10^{-5}$		1546
$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$		1588
$K^+\overline{K}^*(892)^0\pi^- +$ c.c.	$(6.7 \pm 2.5) \times 10^{-4}$		1674
ηK^+K^-, no $\eta\phi$	$(3.49 \pm 0.17) \times 10^{-5}$		1664
$X(1750)\eta \to K^+K^-\eta$	$(4.8 \pm 2.8) \times 10^{-6}$		–
$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%	1532
$K^*_2(1430)^\pm K^\mp$	$(7.1 {}^{+1.3}_{-0.9}) \times 10^{-5}$		–
$K^*(892)^0\overline{K}^0 +$ c.c.	$(1.09 \pm 0.20) \times 10^{-4}$		1697
ωK^+K^-	$(1.62 \pm 0.11) \times 10^{-4}$	S=1.1	1614
$\omega K^0_S K^0_S$	$(7.0 \pm 0.5) \times 10^{-5}$		1612
$\omega K^*(892)^+ K^- +$ c.c.	$(2.07 \pm 0.26) \times 10^{-4}$		1482
$\omega K^*_2(1430)^+ K^- +$ c.c.	$(6.1 \pm 1.2) \times 10^{-5}$		1252
$\omega \overline{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$		1481
$\omega \overline{K}^*_2(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$		1250
$\omega X(1440) \to \omega K^0_S K^-\pi^+ +$ c.c.	$(1.6 \pm 0.4) \times 10^{-5}$		–
$\omega X(1440) \to \omega K^+K^-\pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$		–
$\omega f_1(1285) \to \omega K^0_S K^-\pi^+ +$ c.c.	$(3.0 \pm 1.0) \times 10^{-6}$		–

$\omega f_1(1285) \to \omega K^+ K^- \pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$		–
$p\overline{p}$	$(2.94 \pm 0.08) \times 10^{-4}$		1586
$n\overline{n}$	$(3.06 \pm 0.15) \times 10^{-4}$		1586
$p\overline{p}\pi^0$	$(1.53 \pm 0.07) \times 10^{-4}$		1543
$N(940)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(6.4 {}^{+1.8}_{-1.3}) \times 10^{-5}$		–
$N(1440)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(7.3 {}^{+1.7}_{-1.5}) \times 10^{-5}$	S=2.5	–
$N(1520)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(6.4 {}^{+2.3}_{-1.8}) \times 10^{-6}$		–
$N(1535)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(2.5 \pm 1.0) \times 10^{-5}$		–
$N(1650)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(3.8 {}^{+1.4}_{-1.7}) \times 10^{-5}$		–
$N(1720)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(1.79 {}^{+0.26}_{-0.70}) \times 10^{-5}$		–
$N(2300)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(2.6 {}^{+1.2}_{-0.7}) \times 10^{-5}$		–
$N(2570)\overline{p}+$ c.c. $\to p\overline{p}\pi^0$	$(2.13 {}^{+0.40}_{-0.31}) \times 10^{-5}$		–
$p\overline{p}\pi^+\pi^-$	$(6.0 \pm 0.4) \times 10^{-4}$		1491
$p\overline{p}K^+K^-$	$(2.7 \pm 0.7) \times 10^{-5}$		1118
$p\overline{p}\eta$	$(6.0 \pm 0.4) \times 10^{-5}$		1373
$N(1535)\overline{p}+$ c.c. $\to p\overline{p}\eta$	$(4.5 {}^{+0.7}_{-0.6}) \times 10^{-5}$		–
$p\overline{p}\pi^+\pi^-\pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$		1435
$p\overline{p}\rho^0$	$(5.0 \pm 2.2) \times 10^{-5}$		1252
$p\overline{p}\omega$	$(6.9 \pm 2.1) \times 10^{-5}$		1247
$p\overline{p}\eta'$	$(1.10 \pm 0.13) \times 10^{-5}$		1141
$p\overline{p}\phi$	$(6.1 \pm 0.6) \times 10^{-6}$		1109
$\phi X(1835) \to p\overline{p}\phi$	$< 1.82 \times 10^{-7}$	CL=90%	–
$p\overline{n}\pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$		–
$p\overline{n}\pi^-\pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$		1492
$\Lambda\overline{\Lambda}$	$(3.81 \pm 0.13) \times 10^{-4}$	S=1.4	1467
$\Lambda\overline{\Lambda}\pi^0$	$(1.4 \pm 0.7) \times 10^{-6}$		1412
$\Lambda\overline{\Lambda}\eta$	$(2.43 \pm 0.32) \times 10^{-5}$		1197
$\Lambda(1670)\overline{\Lambda} \to \Lambda\overline{\Lambda}\eta$	$(1.3 \pm 0.7) \times 10^{-5}$		–
$\Lambda\overline{\Lambda}\omega(782)$	$(3.3 \pm 0.4) \times 10^{-5}$		1037
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$		1346
$\Lambda\overline{p}K^+$	$(1.00 \pm 0.14) \times 10^{-4}$		1327
$\Lambda\overline{p}K^*(892)^+ +$ c.c.	$(6.3 \pm 0.7) \times 10^{-5}$		1087
$\Lambda\overline{p}K^+\pi^+\pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$		1167
$\overline{\Lambda}nK^0_S +$ c.c.	$(8.1 \pm 1.8) \times 10^{-5}$		1324
$\Delta^{++}\overline{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$		1371
$\Lambda\overline{\Sigma}^+\pi^- +$ c.c.	$(1.40 \pm 0.13) \times 10^{-4}$		1376
$\Lambda\overline{\Sigma}^-\pi^+ +$ c.c.	$(1.54 \pm 0.14) \times 10^{-4}$		1379
$\Lambda\overline{\Sigma}^0 +$ c.c.	$(1.6 \pm 0.7) \times 10^{-6}$		1437
$\Sigma^0\overline{p}K^+ +$ c.c.	$(1.67 \pm 0.18) \times 10^{-5}$		1291

$\Sigma^+ \overline{\Sigma}^-$		(2.43 ±0.10) × 10^{-4}		S=1.4	1408
$\Sigma^0 \overline{\Sigma}^0$		(2.35 ±0.09) × 10^{-4}		S=1.1	1405
$\Sigma^- \overline{\Sigma}^+$		(2.82 ±0.09) × 10^{-4}			1401
$\Sigma^+ \overline{\Sigma}^- \eta$		(9.6 ±2.4) × 10^{-6}			1108
$\Sigma(1385)^+ \overline{\Sigma}(1385)^-$		(8.5 ±0.7) × 10^{-5}			1218
$\Sigma(1385)^- \overline{\Sigma}(1385)^+$		(8.5 ±0.8) × 10^{-5}			1218
$\Sigma(1385)^0 \overline{\Sigma}(1385)^0$		(6.9 ±0.7) × 10^{-5}			1218
$\Xi^- \overline{\Xi}^+$		(2.87 ±0.11) × 10^{-4}		S=1.1	1284
$\Xi^0 \overline{\Xi}^0$		(2.3 ±0.4) × 10^{-4}		S=4.2	1291
$\Xi(1530)^0 \overline{\Xi}(1530)^0$		(6.8 ±0.4) × 10^{-5}			1025
$\Lambda \overline{\Xi}^+ K^- +$ c.c.		(3.9 ±0.4) × 10^{-5}			1114
$\Xi(1530)^- \overline{\Xi}(1530)^+$		(1.15 ±0.07) × 10^{-4}			1025
$\Xi(1530)^- \overline{\Xi}^+$		(7.0 ±1.2) × 10^{-6}			1165
$\Xi(1530)^0 \overline{\Xi}^0$		(5.3 ±0.5) × 10^{-6}			1169
$\Xi(1690)^- \overline{\Xi}^+ \to K^- \Lambda \overline{\Xi}^+ +$ c.c.		(5.2 ±1.6) × 10^{-6}			–
$\Xi(1820)^- \overline{\Xi}^+ \to K^- \Lambda \overline{\Xi}^+ +$ c.c.		(1.20 ±0.32) × 10^{-5}			–
$\Sigma^0 \overline{\Xi}^+ K^- +$ c.c.		(3.7 ±0.4) × 10^{-5}			1060
$\Omega^- \overline{\Omega}^+$		(5.66 ±0.30) × 10^{-5}		S=1.3	774
$\eta_c \pi^+ \pi^- \pi^0$		< 1.0 × 10^{-3}		CL=90%	512
$h_c(1P) \pi^0$		(7.4 ±0.5) × 10^{-4}			85
$\Lambda_c^+ \overline{p} e^+ e^- +$ c.c.		< 1.7 × 10^{-6}		CL=90%	830
$\Theta(1540) \overline{\Theta}(1540) \to K_S^0 p K^- \overline{n} +$ c.c.	[hhaa]	< 8.8 × 10^{-6}		CL=90%	–
$\Theta(1540) K^- \overline{n} \to K_S^0 p K^- \overline{n}$	[hhaa]	< 1.0 × 10^{-5}		CL=90%	–
$\Theta(1540) K_S^0 \overline{p} \to K_S^0 \overline{p} K^+ n$	[hhaa]	< 7.0 × 10^{-6}		CL=90%	–
$\overline{\Theta}(1540) K^+ n \to K_S^0 \overline{p} K^+ n$	[hhaa]	< 2.6 × 10^{-5}		CL=90%	–
$\overline{\Theta}(1540) K_S^0 p \to K_S^0 p K^- \overline{n}$	[hhaa]	< 6.0 × 10^{-6}		CL=90%	–

Radiative decays

$\gamma \chi_{c0}(1P)$	(9.79 ±0.20) %			261
$\gamma \chi_{c1}(1P)$	(9.75 ±0.24) %			171
$\gamma \chi_{c2}(1P)$	(9.52 ±0.20) %			128
$\gamma \eta_c(1S)$	(3.4 ±0.5) × 10^{-3}		S=1.3	635
$\gamma \eta_c(2S)$	(7 ±5) × 10^{-4}			48
$\gamma \pi^0$	(1.04 ±0.22) × 10^{-6}		S=1.4	1841
$\gamma 2(\pi^+ \pi^-)$	(4.0 ±0.6) × 10^{-4}			1817
$\gamma 3(\pi^+ \pi^-)$	< 1.7 × 10^{-4}		CL=90%	1774
$\gamma \eta'(958)$	(1.24 ±0.04) × 10^{-4}			1719
$\gamma f_2(1270)$	(2.73 $^{+0.29}_{-0.25}$) × 10^{-4}		S=1.8	1622
$\gamma f_0(1370) \to \gamma K \overline{K}$	(3.1 ±1.7) × 10^{-5}			1588
$\gamma f_0(1500)$	(9.3 ±1.9) × 10^{-5}			1529
$\gamma f_2'(1525)$	(3.3 ±0.8) × 10^{-5}			1531

$\gamma f_0(1710) \to \gamma \pi \pi$	(3.5 ±0.6) × 10^{-5}			–
$\gamma f_0(1710) \to \gamma K \overline{K}$	(6.6 ±0.7) × 10^{-5}			–
$\gamma f_0(2100) \to \gamma \pi \pi$	(4.8 ±1.0) × 10^{-6}			1244
$\gamma f_0(2200) \to \gamma K \overline{K}$	(3.2 ±1.0) × 10^{-6}			1193
$\gamma f_J(2220) \to \gamma \pi \pi$	< 5.8 × 10^{-6}	CL=90%		1168
$\gamma f_J(2220) \to \gamma K \overline{K}$	< 9.5 × 10^{-6}	CL=90%		1168
$\gamma \eta$	(9.2 ±1.8) × 10^{-7}			1802
$\gamma \eta \pi^+ \pi^-$	(8.7 ±2.1) × 10^{-4}			1791
$\gamma \eta(1405) \to \gamma K \overline{K} \pi$	< 9 × 10^{-5}	CL=90%		1569
$\gamma \eta(1405) \to \gamma \eta \pi^+ \pi^-$	(3.6 ±2.5) × 10^{-5}			–
$\gamma \eta(1405) \to \gamma f_0(980) \pi^0 \to \gamma \pi^+ \pi^- \pi^0$	< 5.0 × 10^{-7}	CL=90%		–
$\gamma \eta(1475) \to \gamma K \overline{K} \pi$	< 1.4 × 10^{-4}	CL=90%		–
$\gamma \eta(1475) \to \gamma \eta \pi^+ \pi^-$	< 8.8 × 10^{-5}	CL=90%		–
$\gamma K^{*0} K^+ \pi^- +$ c.c.	(3.7 ±0.9) × 10^{-4}			1674
$\gamma K^{*0} \overline{K}^{*0}$	(2.4 ±0.7) × 10^{-4}			1613
$\gamma K^0_S K^+ \pi^- +$ c.c.	(2.6 ±0.5) × 10^{-4}			1753
$\gamma K^+ K^- \pi^+ \pi^-$	(1.9 ±0.5) × 10^{-4}			1726
$\gamma K^+ K^- 2(\pi^+ \pi^-)$	< 2.2 × 10^{-4}	CL=90%		1654
$\gamma 2(K^+ K^-)$	< 4 × 10^{-5}	CL=90%		1499
$\gamma p \overline{p}$	(3.9 ±0.5) × 10^{-5}	S=2.0		1586
$\gamma f_2(1950) \to \gamma p \overline{p}$	(1.20 ±0.22) × 10^{-5}			–
$\gamma f_2(2150) \to \gamma p \overline{p}$	(7.2 ±1.8) × 10^{-6}			–
$\gamma X(1835) \to \gamma p \overline{p}$	(4.6 $^{+1.8}_{-4.0}$) × 10^{-6}			–
$\gamma X \to \gamma p \overline{p}$	[nnaa] < 2 × 10^{-6}	CL=90%		–
$\gamma p \overline{p} \pi^+ \pi^-$	(2.8 ±1.4) × 10^{-5}			1491
$\gamma \gamma$	< 1.5 × 10^{-4}	CL=90%		1843
$\gamma \gamma J/\psi$	(3.1 $^{+1.0}_{-1.2}$) × 10^{-4}			542
$e^+ e^- \eta'$	(1.90 ±0.26) × 10^{-6}			1719
$e^+ e^- \eta_c(1S)$	(3.8 ±0.4) × 10^{-5}			635
$e^+ e^- \chi_{c0}(1P)$	(1.06 ±0.24) × 10^{-3}			261
$e^+ e^- \chi_{c1}(1P)$	(8.5 ±0.6) × 10^{-4}			171
$e^+ e^- \chi_{c2}(1P)$	(7.0 ±0.8) × 10^{-4}			128
Weak decays				
$D^0 e^+ e^- +$ c.c.	< 1.4 × 10^{-7}	CL=90%		1371
$\Lambda_c^+ \overline{\Sigma}^- +$ c.c.	< 1.4 × 10^{-5}	CL=90%		586
Other decays				
invisible	< 1.6 %	CL=90%		–

$\psi(3770)$

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

Mass $m = 3773.7 \pm 0.4$ MeV (S = 1.4)
Full width $\Gamma = 27.2 \pm 1.0$ MeV

$\psi(3770)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$D\overline{D}$	$(93\ ^{+8}_{-9})$ %	S=2.0	287
$D^0\overline{D}^0$	$(52\ ^{+4}_{-5})$ %	S=2.0	287
D^+D^-	(41 ± 4) %	S=2.0	254
$J/\psi X$	$(5.0 \pm 2.2) \times 10^{-3}$		–
$J/\psi\pi^+\pi^-$	$(1.93 \pm 0.28) \times 10^{-3}$		561
$J/\psi\pi^0\pi^0$	$(8.0 \pm 3.0) \times 10^{-4}$		565
$J/\psi\eta$	$(9 \pm 4) \times 10^{-4}$		361
$J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	CL=90%	604
e^+e^-	$(9.6 \pm 0.7) \times 10^{-6}$	S=1.3	1887
Decays to light hadrons			
$b_1(1235)\pi$	$< 1.4 \times 10^{-5}$	CL=90%	1684
$\phi\eta'$	$< 7 \times 10^{-4}$	CL=90%	1607
$\omega\eta'$	$< 4 \times 10^{-4}$	CL=90%	1672
$\rho^0\eta'$	$< 6 \times 10^{-4}$	CL=90%	1674
$\phi\eta$	$(3.1 \pm 0.7) \times 10^{-4}$		1703
$\omega\eta$	$< 1.4 \times 10^{-5}$	CL=90%	1762
$\rho^0\eta$	$< 5 \times 10^{-4}$	CL=90%	1764
$\phi\pi^0$	$< 3 \times 10^{-5}$	CL=90%	1746
$\omega\pi^0$	$< 6 \times 10^{-4}$	CL=90%	1803
$\pi^+\pi^-\pi^0$	$< 5 \times 10^{-6}$	CL=90%	1874
$\rho\pi$	$< 5 \times 10^{-6}$	CL=90%	1805
$K^*(892)^+K^-$ + c.c.	$< 1.4 \times 10^{-5}$	CL=90%	1745
$K^*(892)^0\overline{K}^0$ + c.c.	$< 1.2 \times 10^{-3}$	CL=90%	1745
$K^0_S K^0_L$	$< 1.2 \times 10^{-5}$	CL=90%	1820
$2(\pi^+\pi^-)$	$< 1.12 \times 10^{-3}$	CL=90%	1861
$2(\pi^+\pi^-)\pi^0$	$< 1.06 \times 10^{-3}$	CL=90%	1844
$2(\pi^+\pi^-\pi^0)$	< 5.85 %	CL=90%	1821
$\omega\pi^+\pi^-$	$< 6.0 \times 10^{-4}$	CL=90%	1794
$3(\pi^+\pi^-)$	$< 9.1 \times 10^{-3}$	CL=90%	1820
$3(\pi^+\pi^-)\pi^0$	< 1.37 %	CL=90%	1792
$3(\pi^+\pi^-)2\pi^0$	< 11.74 %	CL=90%	1760
$\eta\pi^+\pi^-$	$< 1.24 \times 10^{-3}$	CL=90%	1836
$\pi^+\pi^-2\pi^0$	$< 8.9 \times 10^{-3}$	CL=90%	1862
$\rho^0\pi^+\pi^-$	$< 6.9 \times 10^{-3}$	CL=90%	1796
$\eta 3\pi$	$< 1.34 \times 10^{-3}$	CL=90%	1824
$\eta 2(\pi^+\pi^-)$	< 2.43 %	CL=90%	1804

$\eta\rho^0\pi^+\pi^-$	$<$	1.45	%	CL=90%	1708
$\eta' 3\pi$	$<$	2.44	$\times 10^{-3}$	CL=90%	1741
$K^+K^-\pi^+\pi^-$	$<$	9.0	$\times 10^{-4}$	CL=90%	1773
$\phi\pi^+\pi^-$	$<$	4.1	$\times 10^{-4}$	CL=90%	1737
$K^+K^-2\pi^0$	$<$	4.2	$\times 10^{-3}$	CL=90%	1774
$4(\pi^+\pi^-)$	$<$	1.67	%	CL=90%	1757
$4(\pi^+\pi^-)\pi^0$	$<$	3.06	%	CL=90%	1720
$\phi f_0(980)$	$<$	4.5	$\times 10^{-4}$	CL=90%	1597
$K^+K^-\pi^+\pi^-\pi^0$	$<$	2.36	$\times 10^{-3}$	CL=90%	1741
$K^+K^-\rho^0\pi^0$	$<$	8	$\times 10^{-4}$	CL=90%	1624
$K^+K^-\rho^+\pi^-$	$<$	1.46	%	CL=90%	1623
ωK^+K^-	$<$	3.4	$\times 10^{-4}$	CL=90%	1664
$\phi\pi^+\pi^-\pi^0$	$<$	3.8	$\times 10^{-3}$	CL=90%	1723
$K^{*0}K^-\pi^+\pi^0 +$ c.c.	$<$	1.62	%	CL=90%	1694
$K^{*+}K^-\pi^+\pi^- +$ c.c.	$<$	3.23	%	CL=90%	1693
$K^+K^-\pi^+\pi^-2\pi^0$	$<$	2.67	%	CL=90%	1705
$K^+K^-2(\pi^+\pi^-)$	$<$	1.03	%	CL=90%	1702
$K^+K^-2(\pi^+\pi^-)\pi^0$	$<$	3.60	%	CL=90%	1661
ηK^+K^-	$<$	4.1	$\times 10^{-4}$	CL=90%	1712
$\eta K^+K^-\pi^+\pi^-$	$<$	1.24	%	CL=90%	1624
$\rho^0 K^+K^-$	$<$	5.0	$\times 10^{-3}$	CL=90%	1666
$2(K^+K^-)$	$<$	6.0	$\times 10^{-4}$	CL=90%	1552
ϕK^+K^-	$<$	7.5	$\times 10^{-4}$	CL=90%	1598
$2(K^+K^-)\pi^0$	$<$	2.9	$\times 10^{-4}$	CL=90%	1494
$2(K^+K^-)\pi^+\pi^-$	$<$	3.2	$\times 10^{-3}$	CL=90%	1426
$K^0_S K^-\pi^+$	$<$	3.2	$\times 10^{-3}$	CL=90%	1799
$K^0_S K^-\pi^+\pi^0$	$<$	1.33	%	CL=90%	1773
$K^0_S K^-\rho^+$	$<$	6.6	$\times 10^{-3}$	CL=90%	1665
$K^0_S K^-2\pi^+\pi^-$	$<$	8.7	$\times 10^{-3}$	CL=90%	1740
$K^0_S K^-\pi^+\rho^0$	$<$	1.6	%	CL=90%	1621
$K^0_S K^-\pi^+\eta$	$<$	1.3	%	CL=90%	1670
$K^0_S K^-2\pi^+\pi^-\pi^0$	$<$	4.18	%	CL=90%	1703
$K^0_S K^-2\pi^+\pi^-\eta$	$<$	4.8	%	CL=90%	1570
$K^0_S K^-\pi^+2(\pi^+\pi^-)$	$<$	1.22	%	CL=90%	1658
$K^0_S K^-\pi^+2\pi^0$	$<$	2.65	%	CL=90%	1742
$K^0_S K^-K^+K^-\pi^+$	$<$	4.9	$\times 10^{-3}$	CL=90%	1491
$K^0_S K^-K^+K^-\pi^+\pi^0$	$<$	3.0	%	CL=90%	1427
$K^0_S K^-K^+K^-\pi^+\eta$	$<$	2.2	%	CL=90%	1214
$K^{*0}K^-\pi^+ +$ c.c.	$<$	9.7	$\times 10^{-3}$	CL=90%	1722
$p\overline{p}\pi^0$	$<$	4	$\times 10^{-5}$	CL=90%	1595
$p\overline{p}\pi^+\pi^-$	$<$	5.8	$\times 10^{-4}$	CL=90%	1544
$\Lambda\overline{\Lambda}$	$<$	1.2	$\times 10^{-4}$	CL=90%	1522
$p\overline{p}\pi^+\pi^-\pi^0$	$<$	1.85	$\times 10^{-3}$	CL=90%	1490

$\omega p\overline{p}$	< 2.9	$\times 10^{-4}$	CL=90%	1310
$\Lambda\overline{\Lambda}\pi^0$	< 7	$\times 10^{-5}$	CL=90%	1469
$p\overline{p}2(\pi^+\pi^-)$	< 2.6	$\times 10^{-3}$	CL=90%	1426
$\eta p\overline{p}$	< 5.4	$\times 10^{-4}$	CL=90%	1431
$\eta p\overline{p}\pi^+\pi^-$	< 3.3	$\times 10^{-3}$	CL=90%	1284
$\rho^0 p\overline{p}$	< 1.7	$\times 10^{-3}$	CL=90%	1314
$p\overline{p}K^+K^-$	< 3.2	$\times 10^{-4}$	CL=90%	1186
$\eta p\overline{p}K^+K^-$	< 6.9	$\times 10^{-3}$	CL=90%	737
$\pi^0 p\overline{p}K^+K^-$	< 1.2	$\times 10^{-3}$	CL=90%	1094
$\phi p\overline{p}$	< 1.3	$\times 10^{-4}$	CL=90%	1178
$\Lambda\overline{\Lambda}\pi^+\pi^-$	< 2.5	$\times 10^{-4}$	CL=90%	1405
$\Lambda\overline{p}K^+$	< 2.8	$\times 10^{-4}$	CL=90%	1387
$\Lambda\overline{p}K^+\pi^+\pi^-$	< 6.3	$\times 10^{-4}$	CL=90%	1234
$\Lambda\overline{\Lambda}\eta$	< 1.9	$\times 10^{-4}$	CL=90%	1263
$\Sigma^+\overline{\Sigma}^-$	< 1.0	$\times 10^{-4}$	CL=90%	1465
$\Sigma^0\overline{\Sigma}^0$	< 4	$\times 10^{-5}$	CL=90%	1462
$\Xi^+\overline{\Xi}^-$	< 1.5	$\times 10^{-4}$	CL=90%	1347
$\Xi^0\overline{\Xi}^0$	< 1.4	$\times 10^{-4}$	CL=90%	1353
Radiative decays				
$\gamma\chi_{c2}$	< 6.4	$\times 10^{-4}$	CL=90%	211
$\gamma\chi_{c1}$	(2.49±0.23)	$\times 10^{-3}$		254
$\gamma\chi_{c0}$	(6.9 ±0.6)	$\times 10^{-3}$		342
$\gamma\eta_c$	< 7	$\times 10^{-4}$	CL=90%	707
$\gamma\eta_c(2S)$	< 9	$\times 10^{-4}$	CL=90%	134
$\gamma\eta'$	< 1.8	$\times 10^{-4}$	CL=90%	1765
$\gamma\eta$	< 1.5	$\times 10^{-4}$	CL=90%	1847
$\gamma\pi^0$	< 2	$\times 10^{-4}$	CL=90%	1884

$\psi_2(3823)$

$I^G(J^{PC}) = 0^-(2^{--})$
I, J, P need confirmation.

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

Mass $m = 3823.5 \pm 0.5$ MeV (S = 1.4)
Full width $\Gamma < 2.9$ MeV, CL = 90%

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

ψ_2(3823) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi(1S)\pi^+\pi^-$	<0.06	90%	607
$J/\psi(1S)\pi^0\pi^0$	<0.11	90%	610
$J/\psi(1S)\pi^0$	<0.030	90%	646
$J/\psi(1S)\eta$	<0.14	90%	431
$\chi_{c0}\gamma$	<0.24	90%	387
$\chi_{c1}\gamma$	**DEFINED AS 1**		300

$\chi_{c2}\gamma$	$0.28\ ^{+0.14}_{-0.11}$	258

$\psi_3(3842)$

$I^G(J^{PC}) = 0^-(3^{--})$
J, P need confirmation.

Seen by a single experiment only.

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

ψ_3(3842) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^+ D^-$	seen	443
$D^0 \overline{D}^0$	seen	463

$\chi_{c1}(3872)$

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

also known as $X(3872)$

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

χ_{c1}(3872) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$e^+ e^-$	$< 2.8 \times 10^{-6}$	90%	1936
$\pi^+\pi^-\pi^0$	$< 9 \times 10^{-3}$	90%	1924
$\pi^+\pi^- J/\psi(1S)$	(3.8 ± 1.2) %		650
$\pi^+\pi^-\pi^0 J/\psi(1S)$	not seen		588
$\omega\eta_c(1S)$	< 33 %	90%	368
$\omega J/\psi(1S)$	(4.3 ± 2.1) %		†
$\phi\phi$	not seen		1646
$D^0 \overline{D}^0 \pi^0$	$(49\ ^{+18}_{-20})$ %		116
$\overline{D}^{*0} D^0$	(37 ± 9) %		†
$\gamma\gamma$	< 11 %	90%	1936
$D^0 \overline{D}^0$	< 29 %	90%	519
$D^+ D^-$	< 19 %	90%	502
$\pi^0\chi_{c2}$	< 4 %	90%	273
$\pi^0\chi_{c1}$	(3.4 ± 1.6) %		319
$\pi^0\chi_{c0}$	< 14 %	90%	–
$\pi^+\pi^-\eta_c(1S)$	< 14 %	90%	745
$\pi^0\pi^0\chi_{c0}$	< 7 %	90%	347
$\pi^+\pi^-\chi_{c0}$	< 2.1 %	90%	340
$\pi^+\pi^-\chi_{c1}$	$< 7 \times 10^{-3}$	90%	218
$p\overline{p}$	$< 2.4 \times 10^{-5}$	95%	1693

Radiative decays

$\gamma D^+ D^-$	$<$ 4 %	90%	502
$\gamma \overline{D}^0 D^0$	$<$ 6 %	90%	519
$\gamma J/\psi$	(8 $\pm$ 4) $\times 10^{-3}$		697
$\gamma \chi_{c1}$	$<$ 9 $\times 10^{-3}$	90%	344
$\gamma \chi_{c2}$	$<$ 3.2 %	90%	303
$\gamma \psi(2S)$	(4.5$\pm$ 2.0) %		181

C-violating decays

$\eta J/\psi$	$<$ 1.8 %	90%	491

$\chi_{c0}(3915)$

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

was $X(3915)$

Mass $m = 3921.7 \pm 1.8$ MeV (S = 1.5)
Full width $\Gamma = 18.8 \pm 3.5$ MeV

χ_{c0}(3915) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega J/\psi$	seen	231
$\overline{D}^{*0} D^0$	not seen	312
$D^+ D^-$	seen	591
$\pi^+ \pi^- \eta_c(1S)$	not seen	788
$\eta_c \eta$	not seen	668
$\eta_c \pi^0$	not seen	817
$K \overline{K}$	not seen	1898
$\gamma \gamma$	seen	1961
$\pi^0 \chi_{c1}$	not seen	368

$\chi_{c2}(3930)$

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

Mass $m = 3922.5 \pm 1.0$ MeV (S = 1.7)
Full width $\Gamma = 35.2 \pm 2.2$ MeV (S = 1.2)

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

$\psi(4040)$ [ooaa]

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

Mass $m = 4039 \pm 1$ MeV
Full width $\Gamma = 80 \pm 10$ MeV

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

$\psi(4040)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
e^+e^-	$(1.07\pm0.16)\times10^{-5}$		2019
$D\overline{D}$	seen		775
$D^0\overline{D}^0$	seen		775
D^+D^-	seen		763
$D^*\overline{D}$ + c.c.	seen		569
$D^*(2007)^0\overline{D}^0$ + c.c.	seen		575
$D^*(2010)^+D^-$ + c.c.	seen		561
$D^*\overline{D}^*$	seen		193
$D^*(2007)^0\overline{D}^*(2007)^0$	seen		226
$D^*(2010)^+D^*(2010)^-$	seen		193
$D^0D^-\pi^+$+c.c. (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen		–
$D\overline{D}^*\pi$ (excl. $D^*\overline{D}^*$)	not seen		–
$D^0\overline{D}^{*-}\pi^+$+c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	seen		–
$D_s^+D_s^-$	seen		452
$J/\psi\pi^+\pi^-$	$<4\times10^{-3}$	90%	794
$J/\psi\pi^0\pi^0$	$<2\times10^{-3}$	90%	797
$J/\psi\eta$	$(5.2\pm0.7)\times10^{-3}$		675
$J/\psi\pi^0$	$<2.8\times10^{-4}$	90%	823
$J/\psi\pi^+\pi^-\pi^0$	$<2\times10^{-3}$	90%	746
$\chi_{c1}\gamma$	$<3.4\times10^{-3}$	90%	494
$\chi_{c2}\gamma$	$<5\times10^{-3}$	90%	454
$\chi_{c1}\pi^+\pi^-\pi^0$	<1.1 %	90%	306
$\chi_{c2}\pi^+\pi^-\pi^0$	<3.2 %	90%	233
$h_c(1P)\pi^+\pi^-$	$<3\times10^{-3}$	90%	403
$\phi\pi^+\pi^-$	$<3\times10^{-3}$	90%	1880
$\Lambda\overline{\Lambda}\pi^+\pi^-$	$<2.9\times10^{-4}$	90%	1578
$\Lambda\overline{\Lambda}\pi^0$	$<9\times10^{-5}$	90%	1636
$\Lambda\overline{\Lambda}\eta$	$<3.0\times10^{-4}$	90%	1452
$\Lambda\overline{\Lambda}$	$<6\times10^{-6}$	90%	1683

$\Sigma^+ \overline{\Sigma}^-$	< 1.3	$\times 10^{-4}$	90%	1632
$\Sigma^0 \overline{\Sigma}^0$	< 7	$\times 10^{-5}$	90%	1630
$\Xi^+ \overline{\Xi}^-$	< 1.6	$\times 10^{-4}$	90%	1527
$\Xi^0 \overline{\Xi}^0$	< 1.8	$\times 10^{-4}$	90%	1533
$\mu^+ \mu^-$	$(9 \pm 6$	$) \times 10^{-6}$		2017

$\chi_{c1}(4140)$

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

was $X(4140)$

Mass $m = 4146.5 \pm 3.0$ MeV (S = 1.3)
Full width $\Gamma = 19^{+7}_{-5}$ MeV

$\chi_{c1}(4140)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\phi$	seen	216
$\gamma\gamma$	not seen	2073

$\psi(4160)$ [ooaa]

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

Mass $m = 4191 \pm 5$ MeV
Full width $\Gamma = 70 \pm 10$ MeV

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

$\psi(4160)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$e^+ e^-$	$(6.9 \pm 3.3) \times 10^{-6}$		2096
$\mu^+ \mu^-$	seen		2093
$D\overline{D}$	seen		956
$D^0 \overline{D}^0$	seen		956
$D^+ D^-$	seen		947
$D^* \overline{D}$ + c.c.	seen		798
$D^*(2007)^0 \overline{D}^0$ + c.c.	seen		802
$D^*(2010)^+ D^-$ + c.c.	seen		792
$D^* \overline{D}^*$	seen		592
$D^*(2007)^0 \overline{D}^*(2007)^0$	seen		604
$D^*(2010)^+ D^*(2010)^-$	seen		592
$D^0 D^- \pi^+$ +c.c. (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen		–

$D\overline{D}^{*}\pi$+c.c. (excl. $D^{*}\overline{D}^{*}$)	seen			–
$D^0 D^{*-}\pi^+$+c.c. (excl. $D^{*}(2010)^+ D^{*}(2010)^-$)	not seen			–
$D_s^+ D_s^-$	not seen			719
$D_s^{*+} D_s^-$ +c.c.	seen			385
$J/\psi\pi^+\pi^-$	< 3	$\times 10^{-3}$	90%	919
$J/\psi\pi^0\pi^0$	< 3	$\times 10^{-3}$	90%	922
$J/\psi K^+ K^-$	< 2	$\times 10^{-3}$	90%	407
$J/\psi\eta$	< 8	$\times 10^{-3}$	90%	822
$J/\psi\pi^0$	< 1	$\times 10^{-3}$	90%	944
$J/\psi\eta'$	< 5	$\times 10^{-3}$	90%	457
$J/\psi\pi^+\pi^-\pi^0$	< 1	$\times 10^{-3}$	90%	879
$\psi(2S)\pi^+\pi^-$	< 4	$\times 10^{-3}$	90%	396
$\chi_{c1}\gamma$	< 5	$\times 10^{-3}$	90%	625
$\chi_{c2}\gamma$	< 1.3	%	90%	587
$\chi_{c1}\pi^+\pi^-\pi^0$	< 2	$\times 10^{-3}$	90%	496
$\chi_{c2}\pi^+\pi^-\pi^0$	< 8	$\times 10^{-3}$	90%	445
$h_c(1P)\pi^+\pi^-$	< 5	$\times 10^{-3}$	90%	556
$h_c(1P)\pi^0\pi^0$	< 2	$\times 10^{-3}$	90%	560
$h_c(1P)\eta$	< 2	$\times 10^{-3}$	90%	348
$h_c(1P)\pi^0$	< 4	$\times 10^{-4}$	90%	600
$\phi\pi^+\pi^-$	< 2	$\times 10^{-3}$	90%	1961
$\gamma\chi_{c1}(3872)$	< 1.8	$\times 10^{-3}$	90%	308
$\gamma\chi_{c0}(3915) \to \gamma J/\psi\pi^+\pi^-$	< 1.36	$\times 10^{-4}$	90%	–
$\gamma X(3930) \to \gamma J/\psi\pi^+\pi^-$	< 1.18	$\times 10^{-4}$	90%	–
$\gamma X(3940) \to \gamma J/\psi\pi^+\pi^-$	< 1.47	$\times 10^{-4}$	90%	–
$\gamma\chi_{c0}(3915) \to \gamma\gamma J/\psi$	< 1.26	$\times 10^{-4}$	90%	–
$\gamma X(3930) \to \gamma\gamma J/\psi$	< 8.8	$\times 10^{-5}$	90%	–
$\gamma X(3940) \to \gamma\gamma J/\psi$	< 1.79	$\times 10^{-4}$	90%	–
$\omega\pi^0$	not seen			2020
$\omega\eta$	not seen			1984
$p\overline{p}p\overline{p}$	not seen			834
$\Lambda\overline{\Lambda}$	< 1.5	$\times 10^{-6}$	90%	1774

$\psi(4230)$

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

also known as $Y(4230)$; was $\psi(4260)$

Mass $m = 4222.5 \pm 2.4$ MeV (S = 1.7)
Full width $\Gamma = 48 \pm 8$ MeV (S = 3.6)

ψ(4230) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\mu^+\mu^-$	$(3.2\pm2.9) \times 10^{-5}$	2107
$\eta_c(1S)\pi^+\pi^-$	not seen	1027

$\eta_c(1S)\pi^+\pi^-\pi^0$	seen	992
$J/\psi\pi^+\pi^-$	seen	942
$J/\psi f_0(980),\ f_0(980)\to\ \pi^+\pi^-$	seen	–
$Z_c(3900)^{\pm}\pi^{\mp},\ Z_c^{\pm}\to\ J/\psi\pi^{\pm}$	seen	–
$J/\psi\pi^0\pi^0$	seen	944
$J/\psi K^+K^-$	seen	460
$J/\psi K^0_S K^0_S$	not seen	447
$J/\psi\eta$	seen	848
$J/\psi\pi^0$	not seen	966
$J/\psi\eta'$	seen	504
$J/\psi\pi^+\pi^-\pi^0$	not seen	904
$J/\psi\eta\pi^0$	not seen	770
$J/\psi\eta\eta$	not seen	211
$\psi(2S)\pi^+\pi^-$	seen	426
$\psi(2S)\eta$	not seen	†
$\chi_{c0}\omega$	seen	171
$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	527
$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	477
$h_c(1P)\pi^+\pi^-$	seen	583
$\phi\pi^+\pi^-$	not seen	1976
$\phi f_0(980)\to\ \phi\pi^+\pi^-$	not seen	–
$D\overline{D}$	not seen	987
$D^0\overline{D}^0$	not seen	987
D^+D^-	not seen	978
$D^*\overline{D}$+c.c.	not seen	887
$D^*(2007)^0\overline{D}^0$+c.c.	not seen	–
$D^*(2010)^+D^-$+c.c.	not seen	–
$D^*(2007)^0\overline{D}^*(2007)^0$	not seen	652
$D^*(2010)^+D^*(2010)^-$	not seen	641
$D^0D^-\pi^+$+c.c. (excl. $D^*(2007)^0\overline{D}^{*0}$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen	–
$D\overline{D}^*\pi$+c.c. (excl. $D^*\overline{D}^*$)	not seen	723
$D^0D^{*-}\pi^+$+c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	not seen	–
$D^0D^*(2010)^-\pi^+$+c.c.	seen	716
$D_1(2420)\overline{D}$+ c.c.	not seen	†
$D^*\overline{D}^*\pi$	not seen	367
$D_s^+D_s^-$	not seen	760
$D_s^{*+}D_s^-$+c.c.	not seen	615
$D_s^{*+}D_s^{*-}$	not seen	†
$p\overline{p}$	not seen	1890
$p\overline{p}\pi^0$	not seen	1854
$p\overline{p}\eta$	not seen	1712

$p\overline{p}\omega$	not seen	1610
$\Xi^-\overline{\Xi}^+$	not seen	1645
$\pi^+\pi^+\pi^-\pi^-$	not seen	2087
$\pi^+\pi^+\pi^-\pi^-\pi^0$	not seen	2071
$\omega\pi^0$	not seen	2035
$\omega\eta$	not seen	1999
$K^0_S K^\pm\pi^\mp$	not seen	2032
$K^0_S K^\pm\pi^\mp\pi^0$	not seen	2009
$K^0_S K^\pm\pi^\mp\eta$	not seen	1917
$K^+K^-\pi^0$	not seen	2033
$K^+K^-\pi^+\pi^-$	not seen	2008
$K^+K^-\pi^+\pi^-\pi^0$	not seen	1981
$K^+K^+K^-K^-$	not seen	1813
$K^+K^+K^-K^-\pi^0$	not seen	1762
$p\overline{p}\pi^+\pi^-$	not seen	1810
$p\overline{p}\pi^+\pi^-\pi^0$	not seen	1764
$p\overline{p}p\overline{p}$	not seen	864
$\Lambda\overline{\Lambda}$	not seen	1791
Radiative decays		
$\eta_c(1S)\gamma$	possibly seen	1055
$\eta_c(1S)\pi^0\gamma$	not seen	1049
$\chi_{c1}\gamma$	not seen	650
$\chi_{c2}\gamma$	not seen	612
$\chi_{c1}(3872)\gamma$	seen	334

$\chi_{c1}(4274)$

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

was $X(4274)$

Mass $m = 4286^{+8}_{-9}$ MeV (S = 1.7)
Full width $\Gamma = 51 \pm 7$ MeV

χ_{c1}(4274) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\phi$	seen	522

$\psi(4360)$

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

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

ψ(4360) MASS = 4374 ± 7 MeV (S = 2.4)
ψ(4360) WIDTH = 118 ± 12 MeV (S = 2.1)

ψ(4360) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$h_c \pi^+ \pi^-$	seen	723
$\psi(2S)\pi^+\pi^-$	seen	579
$\psi(3770)\pi^+\pi^-$	possibly seen	495
$\psi_2(3823)\pi^+\pi^-$	seen	444
$J/\psi \eta$	seen	983
$D^+ D^- \pi^+ \pi^-$	seen	862
$D_1(2420)\overline{D}$+ c.c.	possibly seen	431
$\omega \pi^0$	not seen	2115
$\omega \eta$	not seen	2080
$p\overline{p}\eta$	not seen	1806
$p\overline{p}\omega$	not seen	1708

ψ(4415) [ooaa]

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

Mass $m = 4421 \pm 4$ MeV
Full width $\Gamma = 62 \pm 20$ MeV

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

ψ(4415) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$D\overline{D}$	seen		1187
$D^0\overline{D}^0$	seen		1187
$D^+ D^-$	seen		1179
$D^*\overline{D}$+ c.c.	seen		1063
$D^*(2007)^0\overline{D}^0$+ c.c.	seen		1067
$D^*(2010)^+ D^-$+ c.c.	seen		1059
$D^*\overline{D}^*$	seen		919
$D^*(2007)^0\overline{D}^*(2007)^0$+ c.c.	seen		927
$D^*(2010)^+ D^*(2010)^-$+ c.c.	seen		919
$D^0 D^- \pi^+$ (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.	$<$ 2.3 %	90%	–
$D\overline{D}_2^*(2460) \rightarrow D^0 D^- \pi^+$+c.c.	(10 ±4) %		–
$D^0 D^{*-} \pi^+$+c.c.	$<$ 11 %	90%	926
$D_1(2420)\overline{D}$+ c.c.	possibly seen		537
$D_s^+ D_s^-$	not seen		1006
$\omega \chi_{c2}$	possibly seen		330
$D_s^{*+} D_s^-$+c.c.	seen		–

$D_s^{*+} D_s^{*-}$	not seen			652
$\psi_2(3823)\pi^+\pi^-$	possibly seen			492
$\psi(3770)\pi^+\pi^-$	possibly seen			541
$J/\psi\eta$	< 6	$\times 10^{-3}$	90%	1022
$\chi_{c1}\gamma$	< 8	$\times 10^{-4}$	90%	817
$\chi_{c2}\gamma$	< 4	$\times 10^{-3}$	90%	780
$\Lambda\overline{\Lambda}$	< 3.1	$\times 10^{-6}$	90%	1908
$\omega\pi^0$	not seen			2139
$\omega\eta$	not seen			2105
e^+e^-	(9.4 ± 3.2)	$\times 10^{-6}$		2210
$\mu^+\mu^-$	(2.0 ± 1.0)	$\times 10^{-5}$		2208

$\psi(4660)$

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

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

$\psi(4660)$ MASS $= 4630 \pm 6$ MeV (S = 1.4)
$\psi(4660)$ WIDTH $= 72^{+14}_{-12}$ MeV (S = 1.7)

$\psi(4660)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
e^+e^-	not seen	2315
$\psi(2S)\pi^+\pi^-$	seen	809
$J/\psi\eta$	not seen	1192
$D^0 D^{*-}\pi^+$	not seen	1153
$\psi_2(3823)\pi^+\pi^-$	seen	691
$\chi_{c1}\gamma$	not seen	984
$\chi_{c2}\gamma$	not seen	949
$\Lambda_c^+\Lambda_c^-$	seen	363
$D_s^+ D_{s1}(2536)^-$	seen	534
$\omega\pi^0$	not seen	2247
$\omega\eta$	not seen	2215

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

$\eta_b(1S)$

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

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

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

$\Upsilon(1S)$

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

Mass $m = 9460.40 \pm 0.10$ MeV
Full width $\Gamma = 54.02 \pm 1.25$ keV

$\Upsilon(1S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\tau^+\tau^-$	(2.60 $\pm$0.10) %		4384
e^+e^-	(2.39 $\pm$0.08) %		4730
$\mu^+\mu^-$	(2.48 $\pm$0.04) %		4729
Hadronic decays			
ggg	(81.7 $\pm$0.7) %		–
γgg	(2.2 $\pm$0.6) %		–
$\eta'(958)$ anything	(2.94 $\pm$0.24) %		–
$J/\psi(1S)$ anything	(5.4 $\pm$0.4) $\times 10^{-4}$	S=1.4	4223
$J/\psi(1S)\eta_c$	$<$ 2.2 $\times 10^{-6}$	CL=90%	3623
$J/\psi(1S)\chi_{c0}$	$<$ 3.4 $\times 10^{-6}$	CL=90%	3429
$J/\psi(1S)\chi_{c1}$	(3.9 $\pm$1.2) $\times 10^{-6}$		3382
$J/\psi(1S)\chi_{c2}$	$<$ 1.4 $\times 10^{-6}$	CL=90%	3359
$J/\psi(1S)\eta_c(2S)$	$<$ 2.2 $\times 10^{-6}$	CL=90%	3317
$J/\psi(1S)X(3940)$	$<$ 5.4 $\times 10^{-6}$	CL=90%	3148
$J/\psi(1S)X(4160)$	$<$ 5.4 $\times 10^{-6}$	CL=90%	3020

$X(4350)$ anything, $X \to J/\psi(1S)\phi$	$<$ 8.1	$\times 10^{-6}$	CL=90%	–
$Z_c(3900)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	$<$ 1.3	$\times 10^{-5}$	CL=90%	–
$Z_c(4200)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	$<$ 6.0	$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	$<$ 4.9	$\times 10^{-5}$	CL=90%	–
$X^{\pm}_{cs}$ anything, $X \to J/\psi K^{\pm}$	$<$ 5.7	$\times 10^{-6}$	CL=90%	–
$\psi(4230)$ anything, $\psi \to J/\psi(1S)\pi^+\pi^-$	$<$ 3.8	$\times 10^{-5}$	CL=90%	–
$\psi(4230)$ anything, $\psi \to J/\psi(1S)K^+K^-$	$<$ 7.5	$\times 10^{-6}$	CL=90%	–
$\chi_{c1}(4140)$ anything, $\chi_{c1} \to J/\psi(1S)\phi$	$<$ 5.2	$\times 10^{-6}$	CL=90%	–
χ_{c0} anything	$<$ 4	$\times 10^{-3}$	CL=90%	–
χ_{c1} anything	(1.90 $\pm$0.35)	$\times 10^{-4}$		–
$\chi_{c1}(1P)X_{tetra}$	$<$ 3.78	$\times 10^{-5}$	CL=90%	–
χ_{c2} anything	(2.8 $\pm$0.8)	$\times 10^{-4}$		–
$\psi(2S)$ anything	(1.23 $\pm$0.20)	$\times 10^{-4}$		–
$\psi(2S)\eta_c$	$<$ 3.6	$\times 10^{-6}$	CL=90%	3345
$\psi(2S)\chi_{c0}$	$<$ 6.5	$\times 10^{-6}$	CL=90%	3124
$\psi(2S)\chi_{c1}$	$<$ 4.5	$\times 10^{-6}$	CL=90%	3070
$\psi(2S)\chi_{c2}$	$<$ 2.1	$\times 10^{-6}$	CL=90%	3043
$\psi(2S)\eta_c(2S)$	$<$ 3.2	$\times 10^{-6}$	CL=90%	2994
$\psi(2S)X(3940)$	$<$ 2.9	$\times 10^{-6}$	CL=90%	2797
$\psi(2S)X(4160)$	$<$ 2.9	$\times 10^{-6}$	CL=90%	2645
$\psi(4230)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	$<$ 7.9	$\times 10^{-5}$	CL=90%	–
$\psi(4360)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	$<$ 5.2	$\times 10^{-5}$	CL=90%	–
$\psi(4660)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	$<$ 2.2	$\times 10^{-5}$	CL=90%	–
$X(4050)^{\pm}$ anything, $X \to \psi(2S)\pi^{\pm}$	$<$ 8.8	$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^{\pm}$ anything, $Z_c \to \psi(2S)\pi^{\pm}$	$<$ 6.7	$\times 10^{-5}$	CL=90%	–
$\chi_{c1}(3872)$anything	$<$ 2.5	$\times 10^{-4}$	CL=90%	–
$Z_c(4200)^+Z_c(4200)^-$	$<$ 2.23	$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^{\pm}Z_c(4200)^{\mp}$	$<$ 8.1	$\times 10^{-6}$	CL=90%	–
$Z_c(3900)^+Z_c(3900)^-$	$<$ 1.8	$\times 10^{-6}$	CL=90%	–
$X(4050)^+X(4050)^-$	$<$ 1.58	$\times 10^{-5}$	CL=90%	–
$X(4250)^+X(4250)^-$	$<$ 2.66	$\times 10^{-5}$	CL=90%	–

$X(4050)^{\pm} X(4250)^{\mp}$		< 4.42	$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^{+} Z_c(4430)^{-}$		< 2.03	$\times 10^{-5}$	CL=90%	–
$X(4055)^{\pm} X(4055)^{\mp}$		< 2.33	$\times 10^{-5}$	CL=90%	–
$X(4055)^{\pm} Z_c(4430)^{\mp}$		< 4.55	$\times 10^{-5}$	CL=90%	–
$\rho\pi$		< 3.68	$\times 10^{-6}$	CL=90%	4697
$\omega\pi^0$		< 3.90	$\times 10^{-6}$	CL=90%	4697
$\pi^+\pi^-$		< 5	$\times 10^{-4}$	CL=90%	4728
K^+K^-		< 5	$\times 10^{-4}$	CL=90%	4704
$p\overline{p}$		< 5	$\times 10^{-4}$	CL=90%	4636
$\pi^+\pi^-\pi^0$		(2.1 ±0.8)	$\times 10^{-6}$		4725
ϕK^+K^-		(2.4 ±0.5)	$\times 10^{-6}$		4623
$\omega\pi^+\pi^-$		(4.5 ±1.0)	$\times 10^{-6}$		4694
$K^*(892)^0 K^-\pi^+$ + c.c.		(4.4 ±0.8)	$\times 10^{-6}$		4667
$\phi f_2'(1525)$		< 1.63	$\times 10^{-6}$	CL=90%	4551
$\omega f_2(1270)$		< 1.79	$\times 10^{-6}$	CL=90%	4611
$\rho(770) a_2(1320)$		< 2.24	$\times 10^{-6}$	CL=90%	4605
$K^*(892)^0 \overline{K}_2^*(1430)^0$ + c.c.		(3.0 ±0.8)	$\times 10^{-6}$		4579
$K_1(1270)^{\pm} K^{\mp}$		< 2.41	$\times 10^{-6}$	CL=90%	4634
$K_1(1400)^{\pm} K^{\mp}$		(1.0 ±0.4)	$\times 10^{-6}$		4613
$b_1(1235)^{\pm}\pi^{\mp}$		< 1.25	$\times 10^{-6}$	CL=90%	4649
$\pi^+\pi^-\pi^0\pi^0$		(1.28 ±0.30)	$\times 10^{-5}$		4720
$K_S^0 K^+\pi^-$ + c.c.		(1.6 ±0.4)	$\times 10^{-6}$		4696
$K^*(892)^0 \overline{K}^0$ + c.c.		(2.9 ±0.9)	$\times 10^{-6}$		4675
$K^*(892)^- K^+$ + c.c.		< 1.11	$\times 10^{-6}$	CL=90%	4675
$f_1(1285)$ anything		(4.6 ±3.1)	$\times 10^{-3}$		–
$D^*(2010)^{\pm}$ anything		(2.52 ±0.20) %			–
$f_1(1285) X_{tetra}$		< 6.24	$\times 10^{-5}$	CL=90%	–
^2H anything		(2.85 ±0.25)	$\times 10^{-5}$		–
Sum of 100 exclusive modes		(1.200±0.017) %			–

Radiative decays

$\gamma\pi^+\pi^-$		(6.3 ±1.8)	$\times 10^{-5}$		4728
$\gamma\pi^0\pi^0$		(1.7 ±0.7)	$\times 10^{-5}$		4728
$\gamma\pi\pi$ (S-wave)		(4.6 ±0.7)	$\times 10^{-5}$		4728
$\gamma\pi^0\eta$		< 2.4	$\times 10^{-6}$	CL=90%	4713
γK^+K^-	[ppaa]	(1.14 ±0.13)	$\times 10^{-5}$		4704
$\gamma p\overline{p}$	[qqaa]	< 6	$\times 10^{-6}$	CL=90%	4636
$\gamma 2h^+ 2h^-$		(7.0 ±1.5)	$\times 10^{-4}$		4720
$\gamma 3h^+ 3h^-$		(5.4 ±2.0)	$\times 10^{-4}$		4703
$\gamma 4h^+ 4h^-$		(7.4 ±3.5)	$\times 10^{-4}$		4679
$\gamma\pi^+\pi^- K^+K^-$		(2.9 ±0.9)	$\times 10^{-4}$		4686
$\gamma 2\pi^+ 2\pi^-$		(2.5 ±0.9)	$\times 10^{-4}$		4720
$\gamma 3\pi^+ 3\pi^-$		(2.5 ±1.2)	$\times 10^{-4}$		4703
$\gamma 2\pi^+ 2\pi^- K^+K^-$		(2.4 ±1.2)	$\times 10^{-4}$		4659

$\gamma \pi^+ \pi^- p \overline{p}$			$(1.5 \pm 0.6) \times 10^{-4}$		4604
$\gamma 2\pi^+ 2\pi^- p \overline{p}$			$(4 \pm 6) \times 10^{-5}$		4563
$\gamma 2K^+ 2K^-$			$(2.0 \pm 2.0) \times 10^{-5}$		4601
$\gamma \eta'(958)$			$< 1.9 \times 10^{-6}$	CL=90%	4682
$\gamma \eta$			$< 1.0 \times 10^{-6}$	CL=90%	4714
$\gamma f_0(980)$			$< 3 \times 10^{-5}$	CL=90%	4678
$\gamma f'_2(1525)$			$(2.9 \pm 0.6) \times 10^{-5}$		4609
$\gamma f_2(1270)$			$(1.01 \pm 0.06) \times 10^{-4}$		4644
$\gamma \eta(1405)$			$< 8.2 \times 10^{-5}$	CL=90%	4625
$\gamma f_0(1500)$			$< 1.5 \times 10^{-5}$	CL=90%	4608
$\quad \gamma f_0(1500) \to \gamma K^+ K^-$			$(1.0 \pm 0.4) \times 10^{-5}$		–
$\gamma f_0(1710)$			$< 2.6 \times 10^{-4}$	CL=90%	4571
$\quad \gamma f_0(1710) \to \gamma K^+ K^-$			$(1.01 \pm 0.32) \times 10^{-5}$		–
$\gamma f_0(1710) \to \gamma \pi^+ \pi^-$			$(5.3 \pm 2.0) \times 10^{-6}$		–
$\quad \gamma f_0(1710) \to \gamma \pi^0 \pi^0$			$< 1.4 \times 10^{-6}$	CL=90%	–
$\quad \gamma f_0(1710) \to \gamma \eta \eta$			$< 1.8 \times 10^{-6}$	CL=90%	–
$\gamma f_4(2050)$			$< 5.3 \times 10^{-5}$	CL=90%	4515
$\gamma f_0(2200) \to \gamma K^+ K^-$			$< 2 \times 10^{-4}$	CL=90%	4475
$\gamma f_J(2220) \to \gamma K^+ K^-$			$< 8 \times 10^{-7}$	CL=90%	4469
$\gamma f_J(2220) \to \gamma \pi^+ \pi^-$			$< 6 \times 10^{-7}$	CL=90%	–
$\gamma f_J(2220) \to \gamma p \overline{p}$			$< 1.1 \times 10^{-6}$	CL=90%	–
$\gamma \eta(2225) \to \gamma \phi \phi$			$< 3 \times 10^{-3}$	CL=90%	4469
$\gamma \eta_c(1S)$			$< 2.9 \times 10^{-5}$	CL=90%	4260
$\gamma \eta_c(2S)$			$< 4 \times 10^{-4}$	CL=90%	4031
$\gamma \chi_{c0}$			$< 6.6 \times 10^{-5}$	CL=90%	4114
$\gamma \chi_{c1}$			$(4.7 {}^{+2.4}_{-1.9}) \times 10^{-5}$		4079
$\gamma \chi_{c2}$			$< 7.6 \times 10^{-6}$	CL=90%	4062
$\gamma \chi_{c1}(3872)$			$< 4 \times 10^{-5}$	CL=90%	3938
$\quad \gamma \chi_{c1}(3872),\ \chi_{c1} \to \pi^+ \pi^- \pi^0 J/\psi$			$< 2.8 \times 10^{-6}$	CL=90%	–
$\gamma \chi_{c0}(3915) \to \omega J/\psi$			$< 3.0 \times 10^{-6}$	CL=90%	–
$\gamma \chi_{c1}(4140) \to \phi J/\psi$			$< 2.2 \times 10^{-6}$	CL=90%	–
$\gamma X \overline{X} (m_X < 3.1$ GeV$)$		[rraa]	$< 1 \times 10^{-3}$	CL=90%	–
$\gamma X \overline{X} (m_X < 4.5$ GeV$)$		[ssaa]	$< 2.4 \times 10^{-4}$	CL=90%	–
$\gamma X \to \gamma + \geq 4$ prongs		[ttaa]	$< 1.78 \times 10^{-4}$	CL=95%	–
$\gamma A^0 \to \gamma \mu^+ \mu^-$		[uuaa]	$< 9 \times 10^{-6}$	CL=90%	–
$\gamma A^0 \to \gamma \tau^+ \tau^-$		[ppaa]	$< 1.30 \times 10^{-4}$	CL=90%	–
$\gamma A^0 \to \gamma g g$		[vvaa]	< 1 %	CL=90%	–
$\gamma A^0 \to \gamma s \overline{s}$		[vvaa]	$< 1 \times 10^{-3}$	CL=90%	–

Lepton Family number (*LF*) violating modes

$e^\pm \mu^\mp$	LF		$< 3.9 \times 10^{-7}$	CL=90%	4730
$\mu^\pm \tau^\mp$	LF		$< 2.7 \times 10^{-6}$	CL=90%	4563
$e^\pm \tau^\mp$	LF		$< 2.7 \times 10^{-6}$	CL=90%	4563

$\gamma e^{\pm}\mu^{\mp}$	*LF*	<4.2 $\times 10^{-7}$	CL=90%	4730
$\gamma \mu^{\pm}\tau^{\mp}$	*LF*	<6.1 $\times 10^{-6}$	CL=90%	4563
$\gamma e^{\pm}\tau^{\mp}$	*LF*	<6.5 $\times 10^{-6}$	CL=90%	4563
Other decays				
invisible		<3.0 $\times 10^{-4}$	CL=90%	–
hadrons		$(96\ \pm 4)$ %		–

$\chi_{b0}(1P)$ [xxaa]

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

Mass $m = 9859.44 \pm 0.42 \pm 0.31$ MeV

$\chi_{b0}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\Upsilon(1S)$	(1.94 ± 0.27) %		391
$D^0 X$	<10.4 %	90%	–
$\pi^+\pi^-K^+K^-\pi^0$	$<1.6 \times 10^{-4}$	90%	4875
$2\pi^+\pi^-K^-K^0_S$	$<5 \times 10^{-5}$	90%	4875
$2\pi^+\pi^-K^-K^0_S2\pi^0$	$<5 \times 10^{-4}$	90%	4846
$2\pi^+2\pi^-2\pi^0$	$<2.1 \times 10^{-4}$	90%	4905
$2\pi^+2\pi^-K^+K^-$	$(1.1\ \pm0.6\ ) \times 10^{-4}$		4861
$2\pi^+2\pi^-K^+K^-\pi^0$	$<2.7 \times 10^{-4}$	90%	4846
$2\pi^+2\pi^-K^+K^-2\pi^0$	$<5 \times 10^{-4}$	90%	4828
$3\pi^+2\pi^-K^-K^0_S\pi^0$	$<1.6 \times 10^{-4}$	90%	4827
$3\pi^+3\pi^-$	$<8 \times 10^{-5}$	90%	4904
$3\pi^+3\pi^-2\pi^0$	$<6 \times 10^{-4}$	90%	4881
$3\pi^+3\pi^-K^+K^-$	$(2.4\ \pm1.2\ ) \times 10^{-4}$		4827
$3\pi^+3\pi^-K^+K^-\pi^0$	$<1.0 \times 10^{-3}$	90%	4808
$4\pi^+4\pi^-$	$<8 \times 10^{-5}$	90%	4880
$4\pi^+4\pi^-2\pi^0$	$<2.1 \times 10^{-3}$	90%	4850
$J/\psi J/\psi$	$<7 \times 10^{-5}$	90%	3836
$J/\psi\psi(2S)$	$<1.2 \times 10^{-4}$	90%	3571
$\psi(2S)\psi(2S)$	$<3.1 \times 10^{-5}$	90%	3273
$J/\psi(1S)$ anything	$<2.3 \times 10^{-3}$	90%	–

$\chi_{b1}(1P)$ [xxaa]

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

Mass $m = 9892.78 \pm 0.26 \pm 0.31$ MeV

$\chi_{b1}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\Upsilon(1S)$	$(35.2\ \pm2.0)$ %		423
$D^0 X$	$(12.6\ \pm2.2)$ %		–

$\pi^+\pi^- K^+ K^- \pi^0$	$(2.0 \pm 0.6) \times 10^{-4}$		4892
$2\pi^+\pi^- K^- K^0_S$	$(1.3 \pm 0.5) \times 10^{-4}$		4892
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$< 6 \times 10^{-4}$	90%	4863
$2\pi^+ 2\pi^- 2\pi^0$	$(8.0 \pm 2.5) \times 10^{-4}$		4921
$2\pi^+ 2\pi^- K^+ K^-$	$(1.5 \pm 0.5) \times 10^{-4}$		4878
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(3.5 \pm 1.2) \times 10^{-4}$		4863
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(8.6 \pm 3.2) \times 10^{-4}$		4845
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$(9.3 \pm 3.3) \times 10^{-4}$		4844
$3\pi^+ 3\pi^-$	$(1.9 \pm 0.6) \times 10^{-4}$		4921
$3\pi^+ 3\pi^- 2\pi^0$	$(1.7 \pm 0.5) \times 10^{-3}$		4898
$3\pi^+ 3\pi^- K^+ K^-$	$(2.6 \pm 0.8) \times 10^{-4}$		4844
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(7.5 \pm 2.6) \times 10^{-4}$		4825
$4\pi^+ 4\pi^-$	$(2.6 \pm 0.9) \times 10^{-4}$		4897
$4\pi^+ 4\pi^- 2\pi^0$	$(1.4 \pm 0.6) \times 10^{-3}$		4867
ω anything	(4.9 ± 1.4) %		–
ωX_{tetra}	$< 4.44 \times 10^{-4}$	90%	–
$J/\psi J/\psi$	$< 2.7 \times 10^{-5}$	90%	3857
$J/\psi \psi(2S)$	$< 1.7 \times 10^{-5}$	90%	3594
$\psi(2S)\psi(2S)$	$< 6 \times 10^{-5}$	90%	3298
$J/\psi(1S)$ anything	$< 1.1 \times 10^{-3}$	90%	–
$J/\psi(1S) X_{tetra}$	$< 2.27 \times 10^{-4}$	90%	–

$h_b(1P)$

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

Mass $m = 9899.3 \pm 0.8$ MeV

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

$\chi_{b2}(1P)$ [xxaa]

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

J needs confirmation.

Mass $m = 9912.21 \pm 0.26 \pm 0.31$ MeV

$\chi_{b2}(1P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma \Upsilon(1S)$	(18.0 ± 1.0) %		442
$D^0 X$	< 7.9 %	90%	–
$\pi^+\pi^- K^+ K^- \pi^0$	$(8 \pm 5) \times 10^{-5}$		4902
$2\pi^+\pi^- K^- K^0_S$	$< 1.0 \times 10^{-4}$	90%	4901
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$(5.3 \pm 2.4) \times 10^{-4}$		4873
$2\pi^+ 2\pi^- 2\pi^0$	$(3.5 \pm 1.4) \times 10^{-4}$		4931

$2\pi^+ 2\pi^- K^+ K^-$	$(1.1\pm0.4) \times 10^{-4}$		4888
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(2.1\pm0.9) \times 10^{-4}$		4872
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(3.9\pm1.8) \times 10^{-4}$		4855
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$< 5 \times 10^{-4}$	90%	4854
$3\pi^+ 3\pi^-$	$(7.0\pm3.1) \times 10^{-5}$		4931
$3\pi^+ 3\pi^- 2\pi^0$	$(1.0\pm0.4) \times 10^{-3}$		4908
$3\pi^+ 3\pi^- K^+ K^-$	$< 8 \times 10^{-5}$	90%	4854
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(3.6\pm1.5) \times 10^{-4}$		4835
$4\pi^+ 4\pi^-$	$(8 \pm4) \times 10^{-5}$		4907
$4\pi^+ 4\pi^- 2\pi^0$	$(1.8\pm0.7) \times 10^{-3}$		4877
$J/\psi J/\psi$	$< 4 \times 10^{-5}$	90%	3869
$J/\psi \psi(2S)$	$< 5 \times 10^{-5}$	90%	3608
$\psi(2S) \psi(2S)$	$< 1.6 \times 10^{-5}$	90%	3313
$J/\psi(1S)$ anything	$(1.5\pm0.4) \times 10^{-3}$		–

$\Upsilon(2S)$

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

Mass $m = 10023.4 \pm 0.5$ MeV
$m_{\Upsilon(3S)} - m_{\Upsilon(2S)} = 331.50 \pm 0.13$ MeV
Full width $\Gamma = 31.98 \pm 2.63$ keV

$\Upsilon(2S)$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\Upsilon(1S)\pi^+\pi^-$	(17.85 ± 0.26) %		475
$\Upsilon(1S)\pi^0\pi^0$	(8.6 ± 0.4) %		480
$\tau^+\tau^-$	(2.00 ± 0.21) %		4686
$\mu^+\mu^-$	(1.93 ± 0.17) %	S=2.2	5011
e^+e^-	(1.91 ± 0.16) %		5012
$\Upsilon(1S)\pi^0$	$< 4 \times 10^{-5}$	CL=90%	531
$\Upsilon(1S)\eta$	$(2.9 \pm 0.4) \times 10^{-4}$	S=2.0	126
$J/\psi(1S)$ anything	$< 6 \times 10^{-3}$	CL=90%	4533
$J/\psi(1S)\eta_c$	$< 5.4 \times 10^{-6}$	CL=90%	3984
$J/\psi(1S)\chi_{c0}$	$< 3.4 \times 10^{-6}$	CL=90%	3808
$J/\psi(1S)\chi_{c1}$	$< 1.2 \times 10^{-6}$	CL=90%	3765
$J/\psi(1S)\chi_{c2}$	$< 2.0 \times 10^{-6}$	CL=90%	3745
$J/\psi(1S)\eta_c(2S)$	$< 2.5 \times 10^{-6}$	CL=90%	3707
$J/\psi(1S)X(3940)$	$< 2.0 \times 10^{-6}$	CL=90%	3555
$J/\psi(1S)X(4160)$	$< 2.0 \times 10^{-6}$	CL=90%	3442
χ_{c1} anything	$(2.2 \pm 0.5) \times 10^{-4}$		–
$\chi_{c1}(1P)^0 X_{tetra}$	$< 3.67 \times 10^{-5}$	CL=90%	–
χ_{c2} anything	$(2.3 \pm 0.8) \times 10^{-4}$		–
$\psi(2S)\eta_c$	$< 5.1 \times 10^{-6}$	CL=90%	3732
$\psi(2S)\chi_{c0}$	$< 4.7 \times 10^{-6}$	CL=90%	3536
$\psi(2S)\chi_{c1}$	$< 2.5 \times 10^{-6}$	CL=90%	3488

$\psi(2S)\chi_{c2}$	< 1.9	$\times 10^{-6}$	CL=90%	3464
$\psi(2S)\eta_c(2S)$	< 3.3	$\times 10^{-6}$	CL=90%	3422
$\psi(2S)X(3940)$	< 3.9	$\times 10^{-6}$	CL=90%	3250
$\psi(2S)X(4160)$	< 3.9	$\times 10^{-6}$	CL=90%	3120
$Z_c(3900)^+ Z_c(3900)^-$	< 1.0	$\times 10^{-6}$	CL=90%	–
$Z_c(4200)^+ Z_c(4200)^-$	< 1.67	$\times 10^{-5}$	CL=90%	–
$Z_c(3900)^\pm Z_c(4200)^\mp$	< 7.3	$\times 10^{-6}$	CL=90%	–
$X(4050)^+ X(4050)^-$	< 1.35	$\times 10^{-5}$	CL=90%	–
$X(4250)^+ X(4250)^-$	< 2.67	$\times 10^{-5}$	CL=90%	–
$X(4050)^\pm X(4250)^\mp$	< 2.72	$\times 10^{-5}$	CL=90%	–
$Z_c(4430)^+ Z_c(4430)^-$	< 2.03	$\times 10^{-5}$	CL=90%	–
$X(4055)^\pm X(4055)^\mp$	< 1.11	$\times 10^{-5}$	CL=90%	–
$X(4055)^\pm Z_c(4430)^\mp$	< 2.11	$\times 10^{-5}$	CL=90%	–
$\overline{^2H}$ anything	$(2.78^{+0.30}_{-0.26})$	$\times 10^{-5}$	S=1.2	–
hadrons	(94 ± 11) %			–
$g g g$	(58.8 ± 1.2) %			–
$\gamma g g$	(1.87 ± 0.28) %			–
$\phi K^+ K^-$	(1.6 ± 0.4)	$\times 10^{-6}$		4910
$\omega \pi^+ \pi^-$	< 2.58	$\times 10^{-6}$	CL=90%	4977
$K^*(892)^0 K^- \pi^+$ + c.c.	(2.3 ± 0.7)	$\times 10^{-6}$		4952
$\phi f_2'(1525)$	< 1.33	$\times 10^{-6}$	CL=90%	4843
$\omega f_2(1270)$	< 5.7	$\times 10^{-7}$	CL=90%	4899
$\rho(770) a_2(1320)$	< 8.8	$\times 10^{-7}$	CL=90%	4894
$K^*(892)^0 \overline{K}_2^*(1430)^0$ + c.c.	(1.5 ± 0.6)	$\times 10^{-6}$		4869
$K_1(1270)^\pm K^\mp$	< 3.22	$\times 10^{-6}$	CL=90%	4921
$K_1(1400)^\pm K^\mp$	< 8.3	$\times 10^{-7}$	CL=90%	4901
$b_1(1235)^\pm \pi^\mp$	< 4.0	$\times 10^{-7}$	CL=90%	4935
$\rho \pi$	< 1.16	$\times 10^{-6}$	CL=90%	4981
$\pi^+ \pi^- \pi^0$	< 8.0	$\times 10^{-7}$	CL=90%	5007
$\omega \pi^0$	< 1.63	$\times 10^{-6}$	CL=90%	4980
$\pi^+ \pi^- \pi^0 \pi^0$	(1.30 ± 0.28)	$\times 10^{-5}$		5002
$K_S^0 K^+ \pi^-$ + c.c.	(1.14 ± 0.33)	$\times 10^{-6}$		4979
$K^*(892)^0 \overline{K}^0$ + c.c.	< 4.22	$\times 10^{-6}$	CL=90%	4959
$K^*(892)^- K^+$ + c.c.	< 1.45	$\times 10^{-6}$	CL=90%	4960
$f_1(1285)$ anything	(2.2 ± 1.6)	$\times 10^{-3}$		–
$f_1(1285) X_{tetra}$	< 6.47	$\times 10^{-5}$	CL=90%	–
Sum of 100 exclusive modes	(2.90 ± 0.30)	$\times 10^{-3}$		–

Radiative decays

$\gamma \chi_{b1}(1P)$	(6.9 ± 0.4) %			130
$\gamma \chi_{b2}(1P)$	(7.15 ± 0.35) %			111
$\gamma \chi_{b0}(1P)$	(3.8 ± 0.4) %			163
$\gamma f_0(1710)$	< 5.9	$\times 10^{-4}$	CL=90%	4862
$\gamma f_2'(1525)$	< 5.3	$\times 10^{-4}$	CL=90%	4897

$\gamma f_2(1270)$		$<$ 2.41	$\times 10^{-4}$	CL=90%	4931
$\gamma \eta_c(1S)$		$<$ 2.7	$\times 10^{-5}$	CL=90%	4568
$\gamma \chi_{c0}$		$<$ 1.0	$\times 10^{-4}$	CL=90%	4430
$\gamma \chi_{c1}$		$<$ 3.6	$\times 10^{-6}$	CL=90%	4397
$\gamma \chi_{c2}$		$<$ 1.5	$\times 10^{-5}$	CL=90%	4381
$\gamma \chi_{c1}(3872)$		$<$ 2.1	$\times 10^{-5}$	CL=90%	4264
$\gamma \chi_{c1}(3872)$, $\chi_{c1} \to \pi^+\pi^-\pi^0 J/\psi$		$<$ 2.4	$\times 10^{-6}$	CL=90%	–
$\gamma \chi_{c0}(3915) \to \omega J/\psi$		$<$ 2.8	$\times 10^{-6}$	CL=90%	–
$\gamma \chi_{c1}(4140) \to \phi J/\psi$		$<$ 1.2	$\times 10^{-6}$	CL=90%	–
$\gamma X(4350) \to \phi J/\psi$		$<$ 1.3	$\times 10^{-6}$	CL=90%	–
$\gamma \eta_b(1S)$		$(5.5 {+1.1 \atop -0.9})$	$\times 10^{-4}$	S=1.2	605
$\gamma \eta_b(1S) \to \gamma$Sum of 26 exclusive modes		$<$ 3.7	$\times 10^{-6}$	CL=90%	–
$\gamma X_{b\overline{b}} \to \gamma$Sum of 26 exclusive modes		$<$ 4.9	$\times 10^{-6}$	CL=90%	–
$\gamma X \to \gamma + \geq 4$ prongs	[yyaa]	$<$ 1.95	$\times 10^{-4}$	CL=95%	–
$\gamma A^0 \to \gamma$hadrons		$<$ 8	$\times 10^{-5}$	CL=90%	–
$\gamma A^0 \to \gamma \mu^+\mu^-$		$<$ 8.3	$\times 10^{-6}$	CL=90%	–

Lepton Family number (*LF*) violating modes

$e^\pm \tau^\mp$	LF	$<$ 3.2	$\times 10^{-6}$	CL=90%	4854
$\mu^\pm \tau^\mp$	LF	$<$ 3.3	$\times 10^{-6}$	CL=90%	4854

$\Upsilon_2(1D)$

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

was $\Upsilon(1D)$

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

$\Upsilon_2(1D)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\gamma\gamma\,\Upsilon(1S)$	seen	679
$\gamma \chi_{bJ}(1P)$	seen	300
$\eta\,\Upsilon(1S)$	not seen	426
$\pi^+\pi^-\,\Upsilon(1S)$	$(6.6\pm1.6) \times 10^{-3}$	623

$\chi_{b0}(2P)$ [xxaa]

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

Mass $m = 10232.5 \pm 0.4 \pm 0.5$ MeV

$\chi_{b0}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\gamma\,\Upsilon(2S)$	(1.38 ± 0.30) %		207
$\gamma\,\Upsilon(1S)$	$(3.8 \pm1.7) \times 10^{-3}$		743

$D^0 X$	< 8.2	%	90%	–
$\pi^+\pi^- K^+ K^- \pi^0$	< 3.4	$\times 10^{-5}$	90%	5064
$2\pi^+\pi^- K^- K^0_S$	< 5	$\times 10^{-5}$	90%	5063
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	< 2.2	$\times 10^{-4}$	90%	5036
$2\pi^+ 2\pi^- 2\pi^0$	< 2.4	$\times 10^{-4}$	90%	5092
$2\pi^+ 2\pi^- K^+ K^-$	< 1.5	$\times 10^{-4}$	90%	5050
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.2	$\times 10^{-4}$	90%	5035
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 1.1	$\times 10^{-3}$	90%	5019
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	< 7	$\times 10^{-4}$	90%	5018
$3\pi^+ 3\pi^-$	< 7	$\times 10^{-5}$	90%	5091
$3\pi^+ 3\pi^- 2\pi^0$	< 1.2	$\times 10^{-3}$	90%	5070
$3\pi^+ 3\pi^- K^+ K^-$	< 1.5	$\times 10^{-4}$	90%	5017
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 7	$\times 10^{-4}$	90%	4999
$4\pi^+ 4\pi^-$	< 1.7	$\times 10^{-4}$	90%	5069
$4\pi^+ 4\pi^- 2\pi^0$	< 6	$\times 10^{-4}$	90%	5039

$\chi_{b1}(2P)$ [xxaa]

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

Mass $m = 10255.46 \pm 0.22 \pm 0.50$ MeV
$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)} = 23.5 \pm 1.0$ MeV

$\chi_{b1}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\omega\Upsilon(1S)$	$(1.63^{+0.40}_{-0.34})$ %	134
$\gamma\Upsilon(2S)$	(18.1 ± 1.9) %	229
$\gamma\Upsilon(1S)$	(9.9 ± 1.0) %	764
$\pi\pi\chi_{b1}(1P)$	$(9.1 \pm 1.3) \times 10^{-3}$	238
$D^0 X$	(8.8 ± 1.7) %	–
$\pi^+\pi^- K^+ K^- \pi^0$	$(3.1 \pm 1.0) \times 10^{-4}$	5075
$2\pi^+\pi^- K^- K^0_S$	$(1.1 \pm 0.5) \times 10^{-4}$	5075
$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$(7.7 \pm 3.2) \times 10^{-4}$	5047
$2\pi^+ 2\pi^- 2\pi^0$	$(5.9 \pm 2.0) \times 10^{-4}$	5104
$2\pi^+ 2\pi^- K^+ K^-$	$(10 \pm 4) \times 10^{-5}$	5062
$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(5.5 \pm 1.8) \times 10^{-4}$	5047
$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(10 \pm 4) \times 10^{-4}$	5030
$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$(6.7 \pm 2.6) \times 10^{-4}$	5029
$3\pi^+ 3\pi^-$	$(1.2 \pm 0.4) \times 10^{-4}$	5103
$3\pi^+ 3\pi^- 2\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$	5081
$3\pi^+ 3\pi^- K^+ K^-$	$(2.0 \pm 0.8) \times 10^{-4}$	5029
$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(6.1 \pm 2.2) \times 10^{-4}$	5011
$4\pi^+ 4\pi^-$	$(1.7 \pm 0.6) \times 10^{-4}$	5080
$4\pi^+ 4\pi^- 2\pi^0$	$(1.9 \pm 0.7) \times 10^{-3}$	5051

$h_b(2P)$

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

Mass $m = 10259.8 \pm 1.2$ MeV

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

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

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

Mass $m = 10268.65 \pm 0.22 \pm 0.50$ MeV
$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)} = 13.10 \pm 0.24$ MeV

$\chi_{b2}(2P)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\omega\Upsilon(1S)$	$(1.10^{+0.34}_{-0.30})$ %		194
$\gamma\Upsilon(2S)$	$(8.9\ \pm1.2\ )$ %		242
$\gamma\Upsilon(1S)$	$(6.6\ \pm0.8\ )$ %		776
$\pi\pi\chi_{b2}(1P)$	$(5.1\ \pm0.9\ )\times10^{-3}$		229
D^0X	<2.4 %	90%	–
$\pi^+\pi^-K^+K^-\pi^0$	$<1.1\times10^{-4}$	90%	5082
$2\pi^+\pi^-K^-K^0_S$	$<9\times10^{-5}$	90%	5082
$2\pi^+\pi^-K^-K^0_S2\pi^0$	$<7\times10^{-4}$	90%	5054
$2\pi^+2\pi^-2\pi^0$	$(3.9\ \pm1.6\ )\times10^{-4}$		5110
$2\pi^+2\pi^-K^+K^-$	$(9\ \pm4\ )\times10^{-5}$		5068
$2\pi^+2\pi^-K^+K^-\pi^0$	$(2.4\ \pm1.1\ )\times10^{-4}$		5054
$2\pi^+2\pi^-K^+K^-2\pi^0$	$(4.7\ \pm2.3\ )\times10^{-4}$		5037
$3\pi^+2\pi^-K^-K^0_S\pi^0$	$<4\times10^{-4}$	90%	5036
$3\pi^+3\pi^-$	$(9\ \pm4\ )\times10^{-5}$		5110
$3\pi^+3\pi^-2\pi^0$	$(1.2\ \pm0.4\ )\times10^{-3}$		5088
$3\pi^+3\pi^-K^+K^-$	$(1.4\ \pm0.7\ )\times10^{-4}$		5036
$3\pi^+3\pi^-K^+K^-\pi^0$	$(4.2\ \pm1.7\ )\times10^{-4}$		5017
$4\pi^+4\pi^-$	$(9\ \pm5\ )\times10^{-5}$		5087
$4\pi^+4\pi^-2\pi^0$	$(1.3\ \pm0.5\ )\times10^{-3}$		5058

$\Upsilon(3S)$

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

Mass $m = 10355.1 \pm 0.5$ MeV
$m_{\Upsilon(3S)} - m_{\Upsilon(2S)} = 331.50 \pm 0.13$ MeV
Full width $\Gamma = 20.32 \pm 1.85$ keV

$\Upsilon(3S)$ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\Upsilon(2S)$ anything		(10.6 ± 0.8) %		296
$\Upsilon(2S)\pi^+\pi^-$		(2.82 ± 0.18) %	S=1.6	176
$\Upsilon(2S)\pi^0\pi^0$		(1.85 ± 0.14) %		190
$\Upsilon(2S)\gamma\gamma$		(5.0 ± 0.7) %		326
$\Upsilon(2S)\pi^0$		$< 5.1 \times 10^{-4}$	CL=90%	298
$\Upsilon(1S)\pi^+\pi^-$		(4.37 ± 0.08) %		813
$\Upsilon(1S)\pi^0\pi^0$		(2.20 ± 0.13) %		816
$\Upsilon(1S)\eta$		$< 1 \times 10^{-4}$	CL=90%	677
$\Upsilon(1S)\pi^0$		$< 7 \times 10^{-5}$	CL=90%	846
$h_b(1P)\pi^0$		$< 1.2 \times 10^{-3}$	CL=90%	426
$h_b(1P)\pi^0 \to \gamma\eta_b(1S)\pi^0$		$(4.3 \pm 1.4) \times 10^{-4}$		–
$h_b(1P)\pi^+\pi^-$		$< 1.2 \times 10^{-4}$	CL=90%	352
$\tau^+\tau^-$		(2.29 ± 0.30) %		4863
$\mu^+\mu^-$		(2.18 ± 0.21) %	S=2.1	5176
e^+e^-		(2.18 ± 0.20) %		5178
hadrons		(93 ± 12) %		–
ggg		(35.7 ± 2.6) %		–
γgg		$(9.7 \pm 1.8) \times 10^{-3}$		–
$\overline{^2H}$ anything		$(2.33 \pm 0.33) \times 10^{-5}$		–
Radiative decays				
$\gamma\chi_{b2}(2P)$		(13.1 ± 1.6) %	S=3.4	86
$\gamma\chi_{b1}(2P)$		(12.6 ± 1.2) %	S=2.4	99
$\gamma\chi_{b0}(2P)$		(5.9 ± 0.6) %	S=1.4	122
$\gamma\chi_{b2}(1P)$		$(10.0 \pm 1.0) \times 10^{-3}$	S=1.7	433
$\gamma\chi_{b1}(1P)$		$(9 \pm 5) \times 10^{-4}$	S=1.8	452
$\gamma\chi_{b0}(1P)$		$(2.7 \pm 0.4) \times 10^{-3}$		484
$\gamma\eta_b(2S)$		$< 6.2 \times 10^{-4}$	CL=90%	350
$\gamma\eta_b(1S)$		$(5.1 \pm 0.7) \times 10^{-4}$		912
$\gamma A^0 \to \gamma$ hadrons		$< 8 \times 10^{-5}$	CL=90%	–
$\gamma X \to \gamma + \geq 4$ prongs	[zzaa]	$< 2.2 \times 10^{-4}$	CL=95%	–
$\gamma A^0 \to \gamma\mu^+\mu^-$		$< 5.5 \times 10^{-6}$	CL=90%	–
$\gamma A^0 \to \gamma\tau^+\tau^-$	[aabb]	$< 1.6 \times 10^{-4}$	CL=90%	–
Lepton Family number (*LF*) violating modes				
$e^\pm\tau^\mp$	*LF*	$< 4.2 \times 10^{-6}$	CL=90%	5025
$e^\pm\mu^\mp$	*LF*	$< 3.6 \times 10^{-7}$	CL=90%	5177
$\mu^\pm\tau^\mp$	*LF*	$< 3.1 \times 10^{-6}$	CL=90%	5025

$\chi_{b1}(3P)$ [xxaa]

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

J needs confirmation.

Mass $m = 10513.4 \pm 0.7$ MeV

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

$\chi_{b2}(3P)$ [xxaa]

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

J needs confirmation.

Mass $m = 10524.0 \pm 0.8$ MeV

$\chi_{b2}(3P)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(3S)\gamma$	seen	168

$\Upsilon(4S)$

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

also known as $\Upsilon(10580)$

Mass $m = 10579.4 \pm 1.2$ MeV

Full width $\Gamma = 20.5 \pm 2.5$ MeV

$\Upsilon(4S)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\overline{B}$	> 96 %	95%	326
B^+B^-	(51.4 ± 0.6) %		331
D_s^+ anything + c.c.	(17.8 ± 2.6) %		–
$B^0\overline{B}^0$	(48.6 ± 0.6) %		326
$J/\psi K_S^0 + (J/\psi, \eta_c) K_S^0$	$< 4 \times 10^{-7}$	90%	–
non-$B\overline{B}$	< 4 %	95%	–
e^+e^-	$(1.57 \pm 0.08) \times 10^{-5}$		5290
$\rho^+\rho^-$	$< 5.7 \times 10^{-6}$	90%	5233
$K^*(892)^0\overline{K}^0$	$< 2.0 \times 10^{-6}$	90%	5240
$J/\psi(1S)$ anything	$< 1.9 \times 10^{-4}$	95%	–
D^{*+} anything + c.c.	< 7.4 %	90%	5099
ϕ anything	(7.1 ± 0.6) %		5240
$\phi\eta$	$< 1.8 \times 10^{-6}$	90%	5226
$\phi\eta'$	$< 4.3 \times 10^{-6}$	90%	5196
$\rho\eta$	$< 1.3 \times 10^{-6}$	90%	5247

$\rho\eta'$	$< 2.5 \times 10^{-6}$	90%	5217
$\Upsilon(1S)$ anything	$< 4 \times 10^{-3}$	90%	1053
$\Upsilon(1S)\pi^+\pi^-$	$(8.2 \pm 0.4) \times 10^{-5}$		1026
$\Upsilon(1S)\eta$	$(1.81 \pm 0.18) \times 10^{-4}$		924
$\Upsilon(1S)\eta'$	$(3.4 \pm 0.9) \times 10^{-5}$		–
$\Upsilon(2S)\pi^+\pi^-$	$(8.2 \pm 0.8) \times 10^{-5}$		468
$h_b(1P)\pi^+\pi^-$	not seen		600
$h_b(1P)\eta$	$(2.18 \pm 0.21) \times 10^{-3}$		390
$\eta_b(1S)\omega$	$< 1.8 \times 10^{-4}$	90%	–
${}^2H$ anything	$< 1.3 \times 10^{-5}$	90%	–
Double Radiative Decays			
$\gamma\gamma\,\Upsilon(\mathrm{D}) \to \gamma\gamma\eta\,\Upsilon(1S)$	$< 2.3 \times 10^{-5}$	90%	–

$\Upsilon(10860)$

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

Mass $m = 10885.2^{+2.6}_{-1.6}$ MeV
Full width $\Gamma = 37 \pm 4$ MeV

Υ(10860) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$B\overline{B}X$	$(76.2^{+2.7}_{-4.0})$ %		–
$B\overline{B}$	(5.5 ± 1.0) %		1322
$B\overline{B}^* +$ c.c.	(13.7 ± 1.6) %		–
$B^*\overline{B}^*$	(38.1 ± 3.4) %		1127
$B\overline{B}^{(*)}\pi$	< 19.7 %	90%	1015
$B\overline{B}\pi$	(0.0 ± 1.2) %		1015
$B^*\overline{B}\pi + B\overline{B}^*\pi$	(7.3 ± 2.3) %		–
$B^*\overline{B}^*\pi$	(1.0 ± 1.4) %		739
$B\overline{B}\pi\pi$	< 8.9 %	90%	551
$B_s^{(*)}\overline{B}_s^{(*)}$	(20.1 ± 3.1) %		905
$B_s\overline{B}_s$	$(5 \pm 5) \times 10^{-3}$		905
$B_s\overline{B}_s^* +$ c.c.	(1.35 ± 0.32) %		–
$B_s^*\overline{B}_s^*$	(17.6 ± 2.7) %		543
no open-bottom	$(3.8^{+5.0}_{-0.5})$ %		–
e^+e^-	$(8.3 \pm 2.1) \times 10^{-6}$		5443
$K^*(892)^0\overline{K}^0$	$< 1.0 \times 10^{-5}$	90%	5395
$\Upsilon(1S)\pi^+\pi^-$	$(5.3 \pm 0.6) \times 10^{-3}$		1306
$\Upsilon(1S)\eta$	$(8.5 \pm 1.7) \times 10^{-4}$		1229
$\Upsilon(1S)\eta'$	$< 6.9 \times 10^{-5}$	90%	985
$\Upsilon(2S)\pi^+\pi^-$	$(7.8 \pm 1.3) \times 10^{-3}$		783
$\Upsilon(2S)\eta$	$(4.1 \pm 0.6) \times 10^{-3}$		639
$\Upsilon(3S)\pi^+\pi^-$	$(4.8^{+1.9}_{-1.7}) \times 10^{-3}$		440

$\Upsilon(1S) K^+ K^-$	$(6.1 \pm 1.8) \times 10^{-4}$		959
$\eta \Upsilon_J(1D)$	$(4.8 \pm 1.1) \times 10^{-3}$		–
$h_b(1P)\pi^+\pi^-$	$(3.5 {+1.0 \atop -1.3}) \times 10^{-3}$		903
$h_b(2P)\pi^+\pi^-$	$(5.7 {+1.7 \atop -2.1}) \times 10^{-3}$		544
$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	$(2.5 \pm 2.3) \times 10^{-3}$		894
$\chi_{b0}(1P)\pi^+\pi^-\pi^0$	$< 6.3 \times 10^{-3}$	90%	894
$\chi_{b0}(1P)\omega$	$< 3.9 \times 10^{-3}$	90%	631
$\chi_{b0}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$< 4.8 \times 10^{-3}$	90%	–
$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	$(1.85 \pm 0.33) \times 10^{-3}$		861
$\chi_{b1}(1P)\omega$	$(1.57 \pm 0.30) \times 10^{-3}$		582
$\chi_{b1}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$(5.2 \pm 1.9) \times 10^{-4}$		–
$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	$(1.17 \pm 0.30) \times 10^{-3}$		841
$\chi_{b2}(1P)\omega$	$(6.0 \pm 2.7) \times 10^{-4}$		552
$\chi_{b2}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$(6 \pm 4) \times 10^{-4}$		–
$\gamma X_b \to \gamma \Upsilon(1S)\omega$	$< 3.8 \times 10^{-5}$	90%	–
$\eta_b(1S)\omega$	$< 1.3 \times 10^{-3}$	90%	1177
$\eta_b(2S)\omega$	$< 5.6 \times 10^{-3}$	90%	399

Inclusive Decays.

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

ϕ anything	$(13.8 {+2.4 \atop -1.7})$ %	–
D^0 anything + c.c.	(108 ± 8) %	–
D_s anything + c.c.	(46 ± 6) %	–
J/ψ anything	(2.06 ± 0.21) %	–
B^0 anything + c.c.	(77 ± 8) %	–
B^+ anything + c.c.	(72 ± 6) %	–

$\Upsilon(11020)$

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

Mass $m = 11000 \pm 4$ MeV
Full width $\Gamma = 24^{+8}_{-6}$ MeV

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

OTHER MESONS

$Z_c(3900)$

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

was $X(3900)$

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

$Z_c(3900)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\pi$	seen	699
$h_c\pi^\pm$	not seen	318
$\eta_c\pi^+\pi^-$	not seen	759
$(D\overline{D}^*)^\pm$	seen	–
$D^0 D^{*-}$ + c.c.	seen	152
$D^- D^{*0}$ + c.c.	seen	143
$\omega\pi^\pm$	not seen	1862
$J/\psi\eta$	not seen	510
$D^+ D^{*-}$ + c.c	seen	–
$D^0\overline{D}^{*0}$ + c.c	seen	–

$X(4020)^\pm$

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

Mass $m = 4024.1 \pm 1.9$ MeV
Full width $\Gamma = 13 \pm 5$ MeV (S = 1.7)

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

$Z_c(4430)$

$I^G(J^{PC}) = 1^+(1^{+-})$
G, C need confirmation.

was $X(4430)^\pm$

Quantum numbers not established.

Mass $m = 4478^{+15}_{-18}$ MeV
Full width $\Gamma = 181 \pm 31$ MeV

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

$Z_b(10610)$

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

was $X(10610)$

Mass $m = 10607.2 \pm 2.0$ MeV
Full width $\Gamma = 18.4 \pm 2.4$ MeV

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

$Z_b(10650)$

$I^G(J^{PC}) = 1^+(1^{+-})$
I, *G*, *C* need confirmation.

was $X(10650)^\pm$

Mass $m = 10652.2 \pm 1.5$ MeV
Full width $\Gamma = 11.5 \pm 2.2$ MeV

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

$Z_b(10650)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Upsilon(1S)\pi^+$	$(1.7^{+0.8}_{-0.6}) \times 10^{-3}$	1117
$\Upsilon(2S)\pi^+$	$(1.4^{+0.6}_{-0.4})$ %	595
$\Upsilon(3S)\pi^+$	$(1.6^{+0.7}_{-0.5})$ %	259

$h_b(1P)\pi^+$	$(8.4^{+2.9}_{-2.4})$ %	714
$h_b(2P)\pi^+$	$(15\ \pm 4\ )$ %	360
$B^+\overline{B}^0$	not seen	703
$B^+\overline{B}^{*0} + B^{*+}\overline{B}^0$	not seen	–
$B^{*+}\overline{B}^{*0}$	$(74\ ^{+4}_{-6}\ )$ %	122

NOTES

[a] See the review on "Form Factors for Radiative Pion and Kaon Decays" 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] Forbidden by angular momentum conservation.

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

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

[h] Our estimate. See the Particle Listings for details.

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

[j] See also the $\omega(1650)$.

[k] See also the $\omega(1420)$.

[l] See the note in the $K^\pm$ Particle Listings.

[n] Neglecting photon channels. See, *e.g.*, A. Pais and S.B. Treiman, Phys. Rev. **D12**, 2744 (1975).

[o] The definition of the slope parameters of the $K \to 3\pi$ Dalitz plot is as follows (see also "Note on Dalitz Plot Parameters for $K \to 3\pi$ Decays" in the $K^\pm$ Particle Listings):

$$|M|^2 = 1 + g(s_3 - s_0)/m^2_{\pi^+} + \cdots .$$

[p] For more details and definitions of parameters see the Particle Listings.

[q] See the $K^\pm$ Particle Listings for the energy limits used in this measurement.

[*r*] Most of this radiative mode, the low-momentum γ part, is also included in the parent mode listed without γ's.

[*s*] Structure-dependent part.

[*t*] Direct-emission branching fraction.

[*u*] Violates angular-momentum conservation.

[*v*] Derived from measured values of ϕ_{+-}, ϕ_{00}, $|\eta|$, $|m_{K^0_L} - m_{K^0_S}|$, and $\tau_{K^0_S}$, as described in the introduction to "Tests of Conservation Laws."

[*x*] The *CP*-violation parameters are defined as follows (see also "Note on *CP* Violation in $K_S \to 3\pi$" and "Note on *CP* Violation in K^0_L Decay" in the Particle Listings):

$$\eta_{+-} = |\eta_{+-}|e^{i\phi_{+-}} = \frac{A(K^0_L \to \pi^+\pi^-)}{A(K^0_S \to \pi^+\pi^-)} = \epsilon + \epsilon'$$

$$\eta_{00} = |\eta_{00}|e^{i\phi_{00}} = \frac{A(K^0_L \to \pi^0\pi^0)}{A(K^0_S \to \pi^0\pi^0)} = \epsilon - 2\epsilon'$$

$$\delta = \frac{\Gamma(K^0_L \to \pi^-\ell^+\nu) - \Gamma(K^0_L \to \pi^+\ell^-\nu)}{\Gamma(K^0_L \to \pi^-\ell^+\nu) + \Gamma(K^0_L \to \pi^+\ell^-\nu)} ,$$

$$\mathrm{Im}(\eta_{+-0})^2 = \frac{\Gamma(K^0_S \to \pi^+\pi^-\pi^0)^{CP\ \text{viol.}}}{\Gamma(K^0_L \to \pi^+\pi^-\pi^0)} ,$$

$$\mathrm{Im}(\eta_{000})^2 = \frac{\Gamma(K^0_S \to \pi^0\pi^0\pi^0)}{\Gamma(K^0_L \to \pi^0\pi^0\pi^0)} .$$

where for the last two relations *CPT* is assumed valid, *i.e.*, $\mathrm{Re}(\eta_{+-0}) \simeq 0$ and $\mathrm{Re}(\eta_{000}) \simeq 0$.

[*y*] See the K^0_S Particle Listings for the energy limits used in this measurement.

[*z*] The value is for the sum of the charge states or particle/antiparticle states indicated.

[*aa*] $\mathrm{Re}(\epsilon'/\epsilon) = \epsilon'/\epsilon$ to a very good approximation provided the phases satisfy *CPT* invariance.

[*bb*] This mode includes gammas from inner bremsstrahlung but not the direct emission mode $K^0_L \to \pi^+\pi^-\gamma(\mathrm{DE})$.

[*cc*] See the K^0_L Particle Listings for the energy limits used in this measurement.

[*dd*] Allowed by higher-order electroweak interactions.

[*ee*] Violates *CP* in leading order. Test of direct *CP* violation since the indirect *CP*-violating and *CP*-conserving contributions are expected to be suppressed.

[*ff*] See our minireview under the $K_2(1770)$ in the 2004 edition of this *Review*.

[*gg*] This result applies to $Z^0 \rightarrow\ c\overline{c}$ decays only. Here ℓ^+ is an average (not a sum) of e^+ and μ^+ decays.

[*hh*] See the Particle Listings for the (complicated) definition of this quantity.

[*ii*] The branching fraction for this mode may differ from the sum of the submodes that contribute to it, due to interference effects. See the relevant papers in the Particle Listings.

[*jj*] These subfractions of the $K^- 2\pi^+$ mode are uncertain: see the Particle Listings.

[*kk*] See the listings under "$D \rightarrow\ K\pi\pi\pi$ partial wave analyses" and our 2008 Review (Physics Letters **B667** 1 (2008)) for measurements of submodes of this mode.

[*ll*] The unseen decay modes of the resonances are included.

[*nn*] This is *not* a test for the ΔC=1 weak neutral current, but leads to the $\pi^+\ell^+\ell^-$ final state.

[*oo*] This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

[*pp*] In the 2010 *Review*, the values for these quantities were given using a measure of the asymmetry that was inconsistent with the usual definition.

[*qq*] This value is obtained by subtracting the branching fractions for 2-, 4- and 6-prongs from unity.

[*rr*] This is the sum of our $K^- 2\pi^+\pi^-$, $K^- 2\pi^+\pi^-\pi^0$, $\overline{K}^0 2\pi^+ 2\pi^-$, $K^+ 2K^-\pi^+$, $2\pi^+ 2\pi^-$, $2\pi^+ 2\pi^-\pi^0$, $K^+ K^-\pi^+\pi^-$, and $K^+ K^-\pi^+\pi^-\pi^0$, branching fractions.

[*ss*] This is the sum of our $K^- 3\pi^+ 2\pi^-$ and $3\pi^+ 3\pi^-$ branching fractions.

[*tt*] The branching fractions for the $K^- e^+\nu_e$, $K^*(892)^- e^+\nu_e$, $\pi^- e^+\nu_e$, and $\rho^- e^+\nu_e$ modes add up to 6.17 $\pm$ 0.17 %.

[*uu*] This is a doubly Cabibbo-suppressed mode.

[*vv*] Submodes of the $D^0 \rightarrow\ K^0_S\pi^+\pi^-\pi^0$ mode with a K^* and/or ρ were studied by COFFMAN 92B, but with only 140 events. With nothing new for 18 years, we refer to our 2008 edition, Physics Letters **B667** 1 (2008), for those results.

[*xx*] This branching fraction includes all the decay modes of the resonance in the final state.

[*yy*] This limit assumes the average of B($D^0 \rightarrow\ K^- e^+\nu_e$) and B($D^0 \rightarrow K^-\mu^+\nu_\mu$) for the B($D^0 \rightarrow\ K^-\ell^+\nu_\ell$) value.

[*zz*] This is the purely e^+ semileptonic branching fraction: the e^+ fraction from τ^+ decays has been subtracted off. The sum of our (non-τ) e^+ exclusive fractions — an $e^+\nu_e$ with an η, η', ϕ, K^0, or K^{*0} — is 5.99 ± 0.31 %.

[*aaa*] This fraction includes η from η' decays.

[*bbb*] The sum of our exclusive η' fractions — $\eta' e^+ \nu_e$, $\eta' \mu^+ \nu_\mu$, $\eta' \pi^+$, $\eta' \rho^+$, and $\eta' K^+$ — is 11.8 ± 1.6%.

[*ccc*] This branching fraction includes all the decay modes of the final-state resonance.

[*ddd*] A test for $u\overline{u}$ or $d\overline{d}$ content in the D_s^+. Neither Cabibbo-favored nor Cabibbo-suppressed decays can contribute, and $\omega - \phi$ mixing is an unlikely explanation for any fraction above about 2×10^{-4}.

[*eee*] We decouple the $D_s^+ \to \phi\pi^+$ branching fraction obtained from mass projections (and used to get some of the other branching fractions) from the $D_s^+ \to \phi\pi^+$, $\phi \to K^+K^-$ branching fraction obtained from the Dalitz-plot analysis of $D_s^+ \to K^+K^-\pi^+$. That is, the ratio of these two branching fractions is not exactly the $\phi \to K^+K^-$ branching fraction 0.491.

[*fff*] This is the average of a model-independent and a *K*-matrix parametrization of the $\pi^+\pi^-$ *S*-wave and is a sum over several f_0 mesons.

[*ggg*] An ℓ indicates an *e* or a μ mode, not a sum over these modes.

[*hhh*] An $CP(\pm1)$ indicates the CP=+1 and CP=−1 eigenstates of the D^0-$\overline{D}^0$ system.

[*iii*] *D* denotes D^0 or $\overline{D}^0$.

[*jjj*] D^{*0}_{CP+} decays into $D^0\pi^0$ with the D^0 reconstructed in *CP*-even eigenstates K^+K^- and $\pi^+\pi^-$.

[*kkk*] $\overline{D}^{**}$ represents an excited state with mass $2.2 < \mathrm{M} < 2.8$ GeV/c^2.

[*lll*] $\chi_{c1}(3872)^+$ is a hypothetical charged partner of the $\chi_{c1}(3872)$.

[*nnn*] $\Theta(1710)^{++}$ is a possible narrow pentaquark state and $G(2220)$ is a possible glueball resonance.

[*ooo*] $(\overline{\Lambda}_c^- p)_s$ denotes a low-mass enhancement near 3.35 GeV/c^2.

[*ppp*] Stands for the possible candidates of $K^*(1410)$, $K_0^*(1430)$ and $K_2^*(1430)$.

[*qqq*] B^0 and B_s^0 contributions not separated. Limit is on weighted average of the two decay rates.

[*rrr*] This decay refers to the coherent sum of resonant and nonresonant $J^P = 0^+$ $K\pi$ components with $1.60 < m_{K\pi} < 2.15$ GeV/c^2.

[*sss*] $X(214)$ is a hypothetical particle of mass 214 MeV/c^2 reported by the HyperCP experiment, Physical Review Letters **94** 021801 (2005)

[*ttt*] $\Theta(1540)^+$ denotes a possible narrow pentaquark state.

[*uuu*] ψ_{DS} is a GeV-scale dark sector antibaryon (mass range 1–3.9 GeV/c^2).

[*vvv*] Here S and P are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/c^2 and 214.3 MeV/c^2, respectively.

[*xxx*] These values are model dependent.

[*yyy*] Here "anything" means at least one particle observed.

[*zzz*] This is a B($B^0 \to D^{*-} \ell^+ \nu_\ell$) value.

[*aaaa*] D^{**} stands for the sum of the $D(1\,^1P_1)$, $D(1\,^3P_0)$, $D(1\,^3P_1)$, $D(1\,^3P_2)$, $D(2\,^1S_0)$, and $D(2\,^1S_1)$ resonances.

[*bbaa*] $D^{(*)}\overline{D}^{(*)}$ stands for the sum of $D^*\overline{D}^*$, $D^*\overline{D}$, $D\overline{D}^*$, and $D\overline{D}$.

[*ccaa*] $X(3915)$ denotes a near-threshold enhancement in the $\omega J/\psi$ mass spectrum.

[*ddaa*] Inclusive branching fractions have a multiplicity definition and can be greater than 100%.

[*eeaa*] D_j represents an unresolved mixture of pseudoscalar and tensor D^{**} (P-wave) states.

[*ffaa*] Not a pure measurement. See note at head of B_s^0 Decay Modes.

[*ggaa*] For $E_\gamma > 100$ MeV.

[*hhaa*] $\Theta(1540)$ is a hypothetical pentaquark state of 1.54 GeV/c^2 mass and a width of less than 25 MeV/c^2.

[*iiaa*] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$.

[*jjaa*] For a narrow state A with mass less than 960 MeV.

[*kkaa*] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV.

[*llaa*] For a dark photon U with mass between 100 and 2100 MeV.

[*nnaa*] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.

[*ooaa*] J^{PC} known by production in e^+e^- via single photon annihilation. I^G is not known; interpretation of this state as a single resonance is unclear because of the expectation of substantial threshold effects in this energy region.

[*ppaa*] $2m_\tau <$ M$(\tau^+\tau^-) < 9.2$ GeV

[*qqaa*] 2 GeV $< m_{K^+K^-} <$ 3 GeV

[*rraa*] $X\overline{X}$ = vectors with $m < 3.1$ GeV

[*ssaa*] X and $\overline{X}$ = zero spin with $m < 4.5$ GeV

[*ttaa*] 1.5 GeV $< m_X <$ 5.0 GeV

[*uuaa*] 201 MeV $<$ M$(\mu^+\mu^-) <$ 3565 MeV

[*vvaa*] 0.5 GeV $< m_X <$ 9.0 GeV, where m_X is the invariant mass of the hadronic final state.

[*xxaa*] Spectroscopic labeling for these states is theoretical, pending experimental information.

[*yyaa*] 1.5 GeV $< m_X <$ 5.0 GeV

[*zzaa*] 1.5 GeV $< m_X <$ 5.0 GeV

[*aabb*] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV.

N BARYONS
$(S = 0,\ I = 1/2)$

$p,\ N^+ = uud;\quad n,\ N^0 = udd$

p

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

Mass $m = 1.007276466621 \pm 0.000000000053$ u
Mass $m = 938.27208816 \pm 0.00000029$ MeV [a]
$\left|m_p - m_{\overline{p}}\right|/m_p < 7 \times 10^{-10}$, CL = 90% [b]
$\left|\frac{q_{\overline{p}}}{m_{\overline{p}}}\right|/(\frac{q_p}{m_p}) = 1.000000000003 \pm 0.000000000016$
$\left|q_p + q_{\overline{p}}\right|/e < 7 \times 10^{-10}$, CL = 90% [b]
$\left|q_p + q_e\right|/e < 1 \times 10^{-21}$ [c]
Magnetic moment $\mu = 2.7928473446 \pm 0.0000000008\ \mu_N$
$(\mu_p + \mu_{\overline{p}})\ /\ \mu_p = (0.002 \pm 0.004) \times 10^{-6}$
Electric dipole moment $d < 0.021 \times 10^{-23}\ e\,$cm
Electric polarizability $\alpha = (11.2 \pm 0.4) \times 10^{-4}$ fm^3
Magnetic polarizability $\beta = (2.5 \pm 0.4) \times 10^{-4}$ fm^3 (S = 1.2)
Charge radius, μp Lamb shift $= 0.84087 \pm 0.00039$ fm [d]
Charge radius $= 0.8409 \pm 0.0004$ fm [d]
Magnetic radius $= 0.851 \pm 0.026$ fm [e]
Mean life $\tau > 9 \times 10^{29}$ years, CL = 90% [f] ($p \to$ invisible mode)
Mean life $\tau > 10^{31}$ to 10^{33} years [f] (mode dependent)

See the "Note on Nucleon Decay" in our 1994 edition (Phys. Rev. **D50**, 1173) for a short review.

The "partial mean life" limits tabulated here are the limits on τ/B_i, where τ is the total mean life and B_i is the branching fraction for the mode in question. For N decays, p and n indicate proton and neutron partial lifetimes.

p DECAY MODES	Partial mean life (10^{30} years)	Confidence level	p (MeV/c)
Antilepton + meson			
$N \to e^+ \pi$	> 5300 (n), > 16000 (p)	90%	459
$N \to \mu^+ \pi$	> 3500 (n), > 7700 (p)	90%	453
$N \to \nu \pi$	> 1100 (n), > 390 (p)	90%	459
$p \to e^+ \eta$	> 10000	90%	309
$p \to \mu^+ \eta$	> 4700	90%	297
$n \to \nu \eta$	> 158	90%	310
$N \to e^+ \rho$	> 217 (n), > 720 (p)	90%	149
$N \to \mu^+ \rho$	> 228 (n), > 570 (p)	90%	113

$N \to \nu \rho$	> 19 (n), > 162 (p)	90%	149
$p \to e^+ \omega$	> 1600	90%	143
$p \to \mu^+ \omega$	> 2800	90%	105
$n \to \nu \omega$	> 108	90%	144
$N \to e^+ K$	> 17 (n), > 1000 (p)	90%	339
$N \to \mu^+ K$	> 26 (n), > 1600 (p)	90%	329
$N \to \nu K$	> 86 (n), > 5900 (p)	90%	339
$n \to \nu K^0_S$	> 260	90%	338
$p \to e^+ K^*(892)^0$	> 84	90%	45
$N \to \nu K^*(892)$	> 78 (n), > 51 (p)	90%	45

Antilepton + mesons

$p \to e^+ \pi^+ \pi^-$	> 82	90%	448
$p \to e^+ \pi^0 \pi^0$	> 147	90%	449
$n \to e^+ \pi^- \pi^0$	> 52	90%	449
$p \to \mu^+ \pi^+ \pi^-$	> 133	90%	425
$p \to \mu^+ \pi^0 \pi^0$	> 101	90%	427
$n \to \mu^+ \pi^- \pi^0$	> 74	90%	427
$n \to e^+ K^0 \pi^-$	> 18	90%	319

Lepton + meson

$n \to e^- \pi^+$	> 65	90%	459
$n \to \mu^- \pi^+$	> 49	90%	453
$n \to e^- \rho^+$	> 62	90%	150
$n \to \mu^- \rho^+$	> 7	90%	115
$n \to e^- K^+$	> 32	90%	340
$n \to \mu^- K^+$	> 57	90%	330

Lepton + mesons

$p \to e^- \pi^+ \pi^+$	> 30	90%	448
$n \to e^- \pi^+ \pi^0$	> 29	90%	449
$p \to \mu^- \pi^+ \pi^+$	> 17	90%	425
$n \to \mu^- \pi^+ \pi^0$	> 34	90%	427
$p \to e^- \pi^+ K^+$	> 75	90%	320
$p \to \mu^- \pi^+ K^+$	> 245	90%	279

Antilepton + photon(s)

$p \to e^+ \gamma$	> 670	90%	469
$p \to \mu^+ \gamma$	> 478	90%	463
$n \to \nu \gamma$	> 550	90%	470
$p \to e^+ \gamma \gamma$	> 100	90%	469
$n \to \nu \gamma \gamma$	> 219	90%	470

Antilepton + single massless

$p \to e^+ X$	> 790	90%	–
$p \to \mu^+ X$	> 410	90%	–

Three (or more) leptons

$p \to e^+ e^+ e^-$	> 793	90%	469
$p \to e^+ \mu^+ \mu^-$	> 359	90%	457
$p \to e^+ \nu \nu$	> 170	90%	469
$n \to e^+ e^- \nu$	> 257	90%	470
$n \to \mu^+ e^- \nu$	> 83	90%	464
$n \to \mu^+ \mu^- \nu$	> 79	90%	458
$p \to \mu^+ e^+ e^-$	> 529	90%	463
$p \to \mu^- e^+ e^+$	$>1.90 \times 10^4$	90%	463
$p \to \mu^+ \mu^+ \mu^-$	> 675	90%	439
$p \to \mu^+ \nu \nu$	> 220	90%	463
$p \to e^- \mu^+ \mu^+$	> 6	90%	457
$n \to 3\nu$	$> 5 \times 10^{-4}$	90%	470

Inclusive modes

$N \to e^+$ anything	> 0.6 (n, p)	90%	–
$N \to \mu^+$ anything	> 12 (n, p)	90%	–
$N \to e^+ \pi^0$ anything	> 0.6 (n, p)	90%	–

$\Delta B = 2$ dinucleon modes

The following are lifetime limits per iron nucleus.

$p p \to \pi^+ \pi^+$	> 72.2	90%	–
$p n \to \pi^+ \pi^0$	> 170	90%	–
$n n \to \pi^+ \pi^-$	> 0.7	90%	–
$n n \to \pi^0 \pi^0$	> 404	90%	–
$p p \to K^+ K^+$	> 170	90%	–
$p p \to e^+ e^+$	> 5.8	90%	–
$p p \to e^+ \mu^+$	> 3.6	90%	–
$p p \to \mu^+ \mu^+$	> 1.7	90%	–
$p n \to e^+ \overline{\nu}$	> 260	90%	–
$p n \to \mu^+ \overline{\nu}$	> 200	90%	–
$p n \to \tau^+ \overline{\nu}_\tau$	> 29	90%	–
$n n \to$ invisible	> 1.4	90%	–
$n n \to \nu_e \overline{\nu}_e$	> 1.4	90%	–
$n n \to \nu_\mu \overline{\nu}_\mu$	> 1.4	90%	–
$p n \to$ invisible	> 0.06	90%	–
$p p \to$ invisible	> 0.11	90%	–

$\overline{p}$ DECAY MODES

$\overline{p}$ DECAY MODES	Partial mean life (years)	Confidence level	p (MeV/c)
$\overline{p} \to e^- \gamma$	$> 7 \times 10^5$	90%	469
$\overline{p} \to \mu^- \gamma$	$> 5 \times 10^4$	90%	463
$\overline{p} \to e^- \pi^0$	$> 4 \times 10^5$	90%	459

$\overline{p} \to \mu^- \pi^0$	$> 5 \times 10^4$	90%	453
$\overline{p} \to e^- \eta$	$> 2 \times 10^4$	90%	309
$\overline{p} \to \mu^- \eta$	$> 8 \times 10^3$	90%	297
$\overline{p} \to e^- K^0_S$	> 900	90%	337
$\overline{p} \to \mu^- K^0_S$	$> 4 \times 10^3$	90%	326
$\overline{p} \to e^- K^0_L$	$> 9 \times 10^3$	90%	337
$\overline{p} \to \mu^- K^0_L$	$> 7 \times 10^3$	90%	326
$\overline{p} \to e^- \gamma\gamma$	$> 2 \times 10^4$	90%	469
$\overline{p} \to \mu^- \gamma\gamma$	$> 2 \times 10^4$	90%	463
$\overline{p} \to e^- \omega$	> 200	90%	143

n

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

Mass $m = 1.0086649160 \pm 0.0000000005$ u
Mass $m = 939.5654205 \pm 0.0000005$ MeV [a]
$(m_n - m_{\overline{n}})/ m_n = (9 \pm 6) \times 10^{-5}$
$m_n - m_p = 1.2933324 \pm 0.0000005$ MeV
$= 0.00138844919(45)$ u
Mean life $\tau = 878.4 \pm 0.5$ s (S = 1.8)
$c\tau = 2.6335 \times 10^8$ km
Magnetic moment $\mu = -1.9130427 \pm 0.0000005\ \mu_N$
Electric dipole moment $d < 0.18 \times 10^{-25}\ e\,$cm, CL = 90%
Mean-square charge radius $\langle r^2_n \rangle = -0.1155 \pm 0.0017$ fm^2
Magnetic radius $\sqrt{\langle r^2_M \rangle} = 0.864^{+0.009}_{-0.008}$ fm
Electric polarizability $\alpha = (11.8 \pm 1.1) \times 10^{-4}$ fm^3
Magnetic polarizability $\beta = (3.7 \pm 1.2) \times 10^{-4}$ fm^3
Charge $q = (-0.2 \pm 0.8) \times 10^{-21}\ e$
Mean $n\overline{n}$-oscillation time $> 8.6 \times 10^7$ s, CL = 90% (free n)
Mean $n\overline{n}$-oscillation time $> 4.7 \times 10^8$ s, CL = 90% [g] (bound n)
Mean nn'-oscillation time > 448 s, CL = 90% [h]

$pe^- \nu_e$ decay parameters [i]

$\lambda \equiv g_A / g_V = -1.2754 \pm 0.0013$ (S = 2.7)
$A = -0.11958 \pm 0.00021$ (S = 1.2)
$B = 0.9807 \pm 0.0030$
$C = -0.2377 \pm 0.0026$
$a = -0.1049 \pm 0.0013$ (S = 1.8)
$\phi_{AV} = (180.017 \pm 0.026)^\circ$ [j]
$D = (-1.2 \pm 2.0) \times 10^{-4}$ [k]
$R = 0.004 \pm 0.013$ [k]
FIERZ INTERFERENCE TERM $b = 0.017 \pm 0.020$

n DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$p e^- \overline{\nu}_e$		100 %		1
$p e^- \overline{\nu}_e \gamma$	[l]	$(9.2\pm0.7)\times10^{-3}$		1
hydrogen-atom $\overline{\nu}_e$		$< 2.7 \times10^{-3}$	95%	1.19
Charge conservation (Q) violating mode				
$p \nu_e \overline{\nu}_e$	Q	$< 8 \times10^{-27}$	68%	1

N(1440) 1/2+

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

Re(pole position) = 1360 to 1380 (≈ 1370) MeV
−2Im(pole position) = 180 to 205 (≈ 190) MeV
Breit-Wigner mass = 1410 to 1470 (≈ 1440) MeV
Breit-Wigner full width = 250 to 450 (≈ 350) MeV

N(1440) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	55–75 %	398
$N\eta$	<1 %	†
$N\pi\pi$	17–50 %	347
$\Delta(1232)\pi$, P-wave	6–27 %	147
$N\sigma$	11–23 %	–
$p\gamma$, helicity=1/2	0.035–0.048 %	414
$n\gamma$, helicity=1/2	0.02–0.04 %	413

N(1520) 3/2−

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

Re(pole position) = 1505 to 1515 (≈ 1510) MeV
−2Im(pole position) = 105 to 120 (≈ 110) MeV
Breit-Wigner mass = 1510 to 1520 (≈ 1515) MeV
Breit-Wigner full width = 100 to 120 (≈ 110) MeV

N(1520) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	55–65 %	453
$N\eta$	0.07–0.09 %	142
$N\pi\pi$	25–35 %	410
$\Delta(1232)\pi$	22–34 %	225
$\Delta(1232)\pi$, S-wave	15–23 %	225
$\Delta(1232)\pi$, D-wave	7–11 %	225
$N\rho$	10–16 %	†
$N\rho$, S=3/2, S-wave	10–16 %	†

$N\rho$, S=1/2 , D-wave	0.2–0.4 %	†
$N\sigma$	<10 %	–
$p\gamma$	0.31–0.52 %	467
$p\gamma$, helicity=1/2	0.01–0.02 %	467
$p\gamma$, helicity=3/2	0.30–0.50 %	467
$n\gamma$	0.30–0.53 %	466
$n\gamma$, helicity=1/2	0.04–0.10 %	466
$n\gamma$, helicity=3/2	0.25–0.45 %	466

N(1535) 1/2⁻

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

Re(pole position) = 1500 to 1520 (≈ 1510) MeV
−2Im(pole position) = 80 to 130 (≈ 110) MeV
Breit-Wigner mass = 1515 to 1545 (≈ 1530) MeV
Breit-Wigner full width = 125 to 175 (≈ 150) MeV

N(1535) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	32–52 %	464
$N\eta$	30–55 %	176
$N\pi\pi$	4–31 %	422
$\Delta(1232)\pi$, D-wave	1–4 %	240
$N\rho$	2–17 %	†
$N\rho$, S=1/2 , S-wave	2–16 %	†
$N\rho$, S=3/2 , D-wave	<1 %	†
$N\sigma$	2–10 %	–
$N(1440)\pi$	5–12 %	†
$p\gamma$, helicity=1/2	0.15–0.30 %	477
$n\gamma$, helicity=1/2	0.01–0.25 %	477

N(1650) 1/2⁻

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

Re(pole position) = 1650 to 1680 (≈ 1665) MeV
−2Im(pole position) = 100 to 170 (≈ 135) MeV
Breit-Wigner mass = 1635 to 1665 (≈ 1650) MeV
Breit-Wigner full width = 100 to 150 (≈ 125) MeV

N(1650) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	50–70 %	547
$N\eta$	15–35 %	348
ΛK	5–15 %	169
$N\pi\pi$	20–58 %	514
$\Delta(1232)\pi$, D-wave	6–18 %	345

$N\rho$	12–22 %	†
$N\rho$, S=1/2, S-wave	<4 %	†
$N\rho$, S=3/2, D-wave	12–18 %	†
$N\sigma$	2–18 %	–
$N(1440)\pi$	6–26 %	150
$p\gamma$, helicity=1/2	0.04–0.20 %	558
$n\gamma$, helicity=1/2	0.003–0.17 %	557

N(1675) 5/2$^-$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$

Re(pole position) = 1650 to 1660 (≈ 1655) MeV
-2Im(pole position) = 120 to 150 (≈ 135) MeV
Breit-Wigner mass = 1665 to 1680 (≈ 1675) MeV
Breit-Wigner full width = 130 to 160 (≈ 145) MeV

***N*(1675) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	38–42 %	564
$N\eta$	< 1 %	376
ΛK	<0.04 %	216
$N\pi\pi$	25–45 %	532
$\Delta(1232)\pi$, D-wave	23–37 %	366
$N\rho$	0.1–0.9 %	†
$N\rho$, S=1/2	<0.2 %	†
$N\rho$, S=3/2 , D-wave	0.1–0.7 %	†
$N\sigma$	3–7 %	–
$p\gamma$	0–0.02 %	575
$p\gamma$, helicity=1/2	0–0.01 %	575
$p\gamma$, helicity=3/2	0–0.01 %	575
$n\gamma$	0–0.15 %	574
$n\gamma$, helicity=1/2	0–0.05 %	574
$n\gamma$, helicity=3/2	0–0.10 %	574

N(1680) 5/2$^+$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^+)$

Re(pole position) = 1660 to 1680 (≈ 1670) MeV
-2Im(pole position) = 110 to 135 (≈ 120) MeV
Breit-Wigner mass = 1680 to 1690 (≈ 1685) MeV
Breit-Wigner full width = 115 to 130 (≈ 120) MeV

***N*(1680) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	60–70 %	571

$N\eta$	<1 %	386
$N\pi\pi$	28–53 %	539
$\Delta(1232)\pi$	11–23 %	374
$\Delta(1232)\pi$, P-wave	4–10 %	374
$\Delta(1232)\pi$, F-wave	1–13 %	374
$N\rho$	8–11 %	†
$N\rho$, S=3/2 , P-wave	6–8 %	†
$N\rho$, S=3/2 , F-wave	2–3 %	†
$N\sigma$	9–19 %	–
$p\gamma$	0.21–0.32 %	581
$p\gamma$, helicity=1/2	0.001–0.011 %	581
$p\gamma$, helicity=3/2	0.20–0.32 %	581
$n\gamma$	0.021–0.046 %	581
$n\gamma$, helicity=1/2	0.004–0.029 %	581
$n\gamma$, helicity=3/2	0.01–0.024 %	581

N(1700) 3/2$^-$

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

Re(pole position) = 1650 to 1750 (≈ 1700) MeV
−2Im(pole position) = 100 to 300 (≈ 200) MeV
Breit-Wigner mass = 1650 to 1800 (≈ 1720) MeV
Breit-Wigner full width = 100 to 300 (≈ 200) MeV

N(1700) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	7–17 %	594
$N\eta$	1–2 %	422
$N\omega$	10–34 %	†
ΛK	1–2 %	283
$N\pi\pi$	>89 %	564
$\Delta(1232)\pi$	55–85 %	402
$\Delta(1232)\pi$, S-wave	50–80 %	402
$\Delta(1232)\pi$, D-wave	4–14 %	402
$N\rho$, S=3/2, S-wave	32–44 %	74
$N\sigma$	2–14 %	–
$N(1440)\pi$	3–11 %	225
$N(1520)\pi$	<4 %	145
$p\gamma$	0.01–0.05 %	604
$p\gamma$, helicity=1/2	0.0–0.024 %	604
$p\gamma$, helicity=3/2	0.002–0.026 %	604
$n\gamma$	0.01–0.13 %	603
$n\gamma$, helicity=1/2	0.0–0.09 %	603
$n\gamma$, helicity=3/2	0.01–0.05 %	603

$N(1710)$ $1/2^+$

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

Re(pole position) = 1650 to 1750 ($\approx$ 1700) MeV
-2Im(pole position) = 80 to 160 ($\approx$ 120) MeV
Breit-Wigner mass = 1680 to 1740 ($\approx$ 1710) MeV
Breit-Wigner full width = 80 to 200 ($\approx$ 140) MeV

***N*(1710) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	5–20 %	588
$N\eta$	10–50 %	412
$N\omega$	1–5 %	†
ΛK	5–25 %	269
ΣK	seen	138
$N\pi\pi$	14–48 %	557
$\Delta(1232)\pi$, P-wave	3–9 %	394
$N\rho$, S=1/2, P-wave	11–23 %	†
$N\sigma$	<16 %	–
$N(1535)\pi$	9–21 %	113
$p\gamma$, helicity=1/2	0.002–0.08 %	598
$n\gamma$, helicity=1/2	0.0–0.02%	597

$N(1720)$ $3/2^+$

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

Re(pole position) = 1660 to 1710 ($\approx$ 1680) MeV
-2Im(pole position) = 150 to 300 ($\approx$ 200) MeV
Breit-Wigner mass = 1680 to 1750 ($\approx$ 1720) MeV
Breit-Wigner full width = 150 to 400 ($\approx$ 250) MeV

***N*(1720) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	8–14 %	594
$N\eta$	1–5 %	422
$N\omega$	12–40 %	†
ΛK	4–19 %	283
$N\pi\pi$	>50 %	564
$\Delta(1232)\pi$	47–89 %	402
$\Delta(1232)\pi$, P-wave	47–77 %	402
$\Delta(1232)\pi$, F-wave	<12 %	402
$N\rho$, S=1/2, P-wave	1–2 %	74
$N\sigma$	2–14 %	–
$N(1440)\pi$	<2 %	225
$N(1520)\pi$, S-wave	1–5 %	145

$p\gamma$	0.05–0.25 %	604
$p\gamma$, helicity=1/2	0.05–0.15 %	604
$p\gamma$, helicity=3/2	0.002–0.16 %	604
$n\gamma$	0.0–0.016 %	603
$n\gamma$, helicity=1/2	0.0–0.01 %	603
$n\gamma$, helicity=3/2	0.0–0.015 %	603

N(1875) 3/2$^-$

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

Re(pole position) = 1850 to 1950 (≈ 1900) MeV
−2Im(pole position) = 100 to 220 (≈ 160) MeV
Breit-Wigner mass = 1850 to 1920 (≈ 1875) MeV
Breit-Wigner full width = 120 to 250 (≈ 200) MeV

N(1875) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	3–11 %	695
$N\eta$	3–16 %	559
$N\omega$	15–25 %	371
ΛK	1–2 %	454
ΣK	0.3–1.1 %	384
$N\pi\pi$	>56 %	670
$\Delta(1232)\pi$	4–44 %	520
$\Delta(1232)\pi$, S-wave	2–21 %	520
$\Delta(1232)\pi$, D-wave	2–23 %	520
$N\rho$, S=3/2, S-wave	36–56 %	379
$N\sigma$	16–60 %	–
$N(1440)\pi$	2–8 %	365
$N(1520)\pi$	<2 %	301
$\Lambda K^*(892)$	<0.2 %	†
$p\gamma$	0.001–0.025 %	703
$p\gamma$, helicity=1/2	0.001–0.021 %	703
$p\gamma$, helicity=3/2	<0.003 %	703
$n\gamma$	<0.040 %	702
$n\gamma$, helicity=1/2	<0.007 %	702
$n\gamma$, helicity=3/2	<0.033 %	702

N(1880) 1/2$^+$

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

Re(pole position) = 1820 to 1900 (≈ 1860) MeV
−2Im(pole position) = 180 to 280 (≈ 230) MeV
Breit-Wigner mass = 1830 to 1930 (≈ 1880) MeV
Breit-Wigner full width = 200 to 400 (≈ 300) MeV

***N*(1880) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	3–31 %	698
$N\eta$	1–55 %	563
$N\omega$	12–28 %	377
ΛK	1–3 %	459
ΣK	10–24 %	389
$N\pi\pi$	$>$32 %	673
$\Delta(1232)\pi$	5–42 %	524
$N\rho$, S=1/2, P-wave	19–45 %	385
$N\sigma$	8–40 %	539
$N(1535)\pi$	4–12 %	293
$N a_0(980)$	1–5 %	†
$\Lambda K^*(892)$	0.5–1.1 %	†
$p\gamma$, helicity=1/2	seen	706
$n\gamma$, helicity=1/2	0.002–0.63 %	705

$N(1895)\ 1/2^-$

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

Re(pole position) = 1890 to 1930 (≈ 1910) MeV
−2Im(pole position) = 80 to 140 (≈ 110) MeV
Breit-Wigner mass = 1870 to 1920 (≈ 1895) MeV
Breit-Wigner full width = 80 to 200 (≈ 120) MeV

***N*(1895) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	2–18 %	707
$N\eta$	15–45 %	575
$N\eta'$	10–40 %	†
$N\omega$	16–40 %	395
ΛK	3–23 %	473
ΣK	6–20 %	405
$N\pi\pi$	17–74 %	683
$\Delta(1232)\pi$, D-wave	3–11 %	535
$N\rho$	14–50 %	403
$N\rho$, S=1/2, S-wave	$<$18 %	403
$N\rho$, S=3/2, D-wave	14–32 %	403
$N\sigma$	$<$13 %	–
$N(1440)\pi$	2–12 %	382
$\Lambda K^*(892)$	4–9 %	†
$p\gamma$, helicity=1/2	0.01–0.06 %	715
$n\gamma$, helicity=1/2	0.003–0.05 %	715

$N(1900)$ $3/2^+$

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

Re(pole position) = 1900 to 1940 (≈ 1920) MeV
−2Im(pole position) = 90 to 160 (≈ 130) MeV
Breit-Wigner mass = 1890 to 1950 (≈ 1920) MeV
Breit-Wigner full width = 100 to 320 (≈ 200) MeV

$N(1900)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	1–20 %	723
$N\eta$	2–14 %	595
$N\eta'$	4–8 %	151
$N\omega$	7–13 %	424
ΛK	2–20 %	495
ΣK	3–7 %	431
$N\pi\pi$	>56 %	699
$\Delta(1232)\pi$	30–70 %	553
$\Delta(1232)\pi$, P-wave	9–25 %	553
$\Delta(1232)\pi$, F-wave	21–45 %	553
$N\rho$, S=1/2	25–40 %	432
$N\sigma$	1–7 %	–
$N(1520)\pi$	7–23 %	341
$N(1535)\pi$	4–10 %	328
$\Lambda K^*(892)$	< 0.2 %	†
$p\gamma$	0.001–0.025 %	731
$p\gamma$, helicity=1/2	0.001–0.021 %	731
$p\gamma$, helicity=3/2	<0.003 %	731
$n\gamma$	<0.040 %	730
$n\gamma$, helicity=1/2	<0.007 %	730
$n\gamma$, helicity=3/2	<0.033 %	730

$N(2060)$ $5/2^-$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$

Re(pole position) = 2020 to 2130 (≈ 2070) MeV
−2Im(pole position) = 350 to 430 (≈ 400) MeV
Breit-Wigner mass = 2030 to 2200 (≈ 2100) MeV
Breit-Wigner full width = 300 to 450 (≈ 400) MeV

$N(2060)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	7–12 %	834
$N\eta$	2–38 %	729
$N\omega$	1–7 %	600

ΛK	10–20 %	644
ΣK	1–5 %	593
$N\pi\pi$	12–52 %	814
$\Delta(1232)\pi$, D-wave	4–10 %	680
$N\rho$	5–33 %	605
$N\rho$, S=1/2, P-wave	<10 %	605
$N\rho$, S=3/2 , D-wave	5–23 %	605
$N\sigma$	3–9 %	–
$N(1440)\pi$	4–14 %	544
$N(1520)\pi$, P-wave	9–21 %	490
$N(1680)\pi$, S-wave	8–22 %	353
$\Lambda K^*(892)$	0.3–1.3 %	307
$p\gamma$	0.03–0.19 %	840
$p\gamma$, helicity=1/2	0.02–0.08 %	840
$p\gamma$, helicity=3/2	0.01–0.10 %	840
$n\gamma$	0.003–0.07 %	840
$n\gamma$, helicity=1/2	0.001–0.02 %	840
$n\gamma$, helicity=3/2	0.002–0.05 %	840

N(2100) 1/2$^+$

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

Re(pole position) = 2050 to 2150 (≈ 2100) MeV
−2Im(pole position) = 240 to 340 (≈ 300) MeV
Breit-Wigner mass = 2050 to 2150 (≈ 2100) MeV
Breit-Wigner full width = 200 to 320 (≈ 260) MeV

***N*(2100) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	8–32 %	834
$N\eta$	5–45 %	729
$N\eta'$	5–11 %	451
$N\omega$	10–25 %	600
ΛK	<1.0 %	644
$N\pi\pi$	>55 %	814
$\Delta(1232)\pi$, P-wave	6–14 %	680
$N\rho$, S=1/2, P-wave	35–70	605
$N\sigma$	14–35 %	–
$N(1535)\pi$	26–34 %	478
$\Lambda K^*(892)$	3–11 %	307
$p\gamma$, helicity=1/2	0.001–0.13 %	840
$n\gamma$, helicity=1/2	0.004–0.09 %	840

$N(2120)\ 3/2^-$

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

Re(pole position) = 2050 to 2150 (≈ 2100) MeV
−2Im(pole position) = 200 to 360 (≈ 280) MeV
Breit-Wigner mass = 2060 to 2160 (≈ 2120) MeV
Breit-Wigner full width = 260 to 360 (≈ 300) MeV

$N(2120)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	5–15 %	846
$N\eta$	1–5 %	743
$N\eta'$	2–6 %	474
$N\omega$	4–20 %	617
ΛK	6–11 %	660
$N\pi\pi$	>27 %	827
$\Delta(1232)\pi$	>23 %	693
$\Delta(1232)\pi$, S-wave	15–70 %	693
$\Delta(1232)\pi$, D-wave	8–45 %	693
$N\rho$, S=3/2 , S-wave	< 3 %	622
$N\sigma$	4–15 %	–
$N(1535)\pi$	7–23 %	494
$\Lambda K^*(892)$	< 0.2 %	339
$p\gamma$	0.16–2.1 %	852
$p\gamma$, helicity=1/2	0.07–0.80 %	852
$p\gamma$, helicity=3/2	0.09–1.3 %	852
$n\gamma$	0.04–0.72 %	852
$n\gamma$, helicity=1/2	0.04–0.60 %	852
$n\gamma$, helicity=3/2	0.001–0.12 %	852

$N(2190)\ 7/2^-$

$I(J^P) = \frac{1}{2}(\frac{7}{2}^-)$

Re(pole position) = 1950 to 2150 (≈ 2050) MeV
−2Im(pole position) = 300 to 500 (≈ 400) MeV
Breit-Wigner mass = 2140 to 2220 (≈ 2180) MeV
Breit-Wigner full width = 300 to 500 (≈ 400) MeV

$N(2190)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	10–20 %	882
$N\eta$	1–5 %	785
$N\omega$	8–20 %	667
ΛK	0.2–0.8 %	705
$N\pi\pi$	22–51 %	864

$\Delta(1232)\pi$, D-wave	19–31 %	734
$N\rho$, S=3/2, D-wave	<11 %	672
$N\sigma$	3–9 %	–
$\Lambda K^*(892)$	0.2–0.8 %	423
$p\gamma$	<0.08 %	888
$p\gamma$, helicity=1/2	<0.06 %	888
$p\gamma$, helicity=3/2	<0.02 %	888
$n\gamma$	<0.04 %	888
$n\gamma$, helicity=1/2	<0.01 %	888
$n\gamma$, helicity=3/2	<0.03 %	888

N(2220) 9/2$^+$

$I(J^P) = \frac{1}{2}(\frac{9}{2}^+)$

Re(pole position) = 2130 to 2200 (≈ 2150) MeV
-2Im(pole position) = 360 to 480 (≈ 400) MeV
Breit-Wigner mass = 2200 to 2300 (≈ 2250) MeV
Breit-Wigner full width = 350 to 500 (≈ 400) MeV

N(2220) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	15–30 %	924

N(2250) 9/2$^-$

$I(J^P) = \frac{1}{2}(\frac{9}{2}^-)$

Re(pole position) = 2100 to 2200 (≈ 2150) MeV
-2Im(pole position) = 350 to 500 (≈ 420) MeV
Breit-Wigner mass = 2250 to 2320 (≈ 2280) MeV
Breit-Wigner full width = 300 to 600 (≈ 500) MeV

N(2250) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	5–15 %	941
$N\eta$	<5 %	852
ΛK	1–3 %	777

N(2600) 11/2$^-$

$I(J^P) = \frac{1}{2}(\frac{11}{2}^-)$

Breit-Wigner mass = 2550 to 2750 (≈ 2600) MeV
Breit-Wigner full width = 500 to 800 (≈ 650) MeV

N(2600) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	3–8 %	1126

Δ BARYONS
($S=0$, $I=3/2$)

$\Delta^{++} = uuu$, $\Delta^{+} = uud$, $\Delta^{0} = udd$, $\Delta^{-} = ddd$

$\Delta(1232)\ 3/2^+$

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

Re(pole position) = 1209 to 1211 (≈ 1210) MeV
−2Im(pole position) = 98 to 102 (≈ 100) MeV
Breit-Wigner mass (mixed charges) = 1230 to 1234 (≈ 1232) MeV
Breit-Wigner full width (mixed charges) = 114 to 120 (≈ 117) MeV

Δ(1232) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	99.4 %	229
$N\gamma$	0.55–0.65 %	259
$N\gamma$, helicity=1/2	0.11–0.13 %	259
$N\gamma$, helicity=3/2	0.44–0.52 %	259
pe^+e^-	$(4.2\pm0.7)\times10^{-5}$	259

$\Delta(1600)\ 3/2^+$

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

Re(pole position) = 1470 to 1590 (≈ 1520) MeV
−2Im(pole position) = 150 to 320 (≈ 280) MeV
Breit-Wigner mass = 1500 to 1640 (≈ 1570) MeV
Breit-Wigner full width = 200 to 300 (≈ 250) MeV

Δ(1600) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	8–24%	492
$N\pi\pi$	58–84 %	454
$\Delta(1232)\pi$	58–82 %	276
$\Delta(1232)\pi$, P-wave	72–82%	276
$\Delta(1232)\pi$, F-wave	<2%	276
$N(1440)\pi$	17–27%	†
$N\gamma$	0.001–0.035 %	505
$N\gamma$, helicity=1/2	0.0–0.02 %	505
$N\gamma$, helicity=3/2	0.001–0.015 %	505

$\Delta(1620)\ 1/2^-$

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

Re(pole position) = 1590 to 1610 ($\approx$ 1600) MeV
-2Im(pole position) = 80 to 140 ($\approx$ 110) MeV
Breit-Wigner mass = 1590 to 1630 ($\approx$ 1610) MeV
Breit-Wigner full width = 110 to 150 ($\approx$ 130) MeV

Δ(1620) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	25–35 %	520
$N\pi\pi$	>67 %	484
$\Delta(1232)\pi$, D-wave	44–72 %	311
$N\rho$	23–32%	†
$N\rho$, S=1/2, S-wave	23–32%	†
$N\rho$, S=3/2, D-wave	<0.04%	†
$N(1440)\pi$	<9 %	98
$N\gamma$, helicity=1/2	0.03–0.10 %	532

$\Delta(1700)\ 3/2^-$

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

Re(pole position) = 1640 to 1690 ($\approx$ 1665) MeV
-2Im(pole position) = 200 to 300 ($\approx$ 250) MeV
Breit-Wigner mass = 1690 to 1730 ($\approx$ 1710) MeV
Breit-Wigner full width = 220 to 380 ($\approx$ 300) MeV

Δ(1700) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	10–20 %	588
$N\pi\pi$	>31 %	557
$\Delta(1232)\pi$	9–70 %	394
$\Delta(1232)\pi$, S-wave	5–54 %	394
$\Delta(1232)\pi$, D-wave	4–16 %	394
$N\rho$, S=3/2, S-wave	22–32%	†
$N(1520)\pi$, P-wave	1–5 %	133
$N(1535)\pi$	0.5–1.5 %	113
$\Delta(1232)\eta$	3–7 %	†
$N\gamma$	0.22–0.60 %	598
$N\gamma$, helicity=1/2	0.12–0.30 %	598
$N\gamma$, helicity=3/2	0.10–0.30 %	598

$\Delta(1900)\ 1/2^-$

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

Re(pole position) = 1830 to 1900 ($\approx$ 1865) MeV
-2Im(pole position) = 180 to 300 ($\approx$ 240) MeV
Breit-Wigner mass = 1840 to 1920 ($\approx$ 1860) MeV
Breit-Wigner full width = 180 to 320 ($\approx$ 250) MeV

Δ(1900) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	4–12%	685
ΣK	seen	367
$N\pi\pi$	$>$ 52%	660
$\Delta(1232)\pi$, D-wave	30–70%	509
$N\rho$	22–60 %	360
$N\rho$, S=1/2, S-wave	11–35%	360
$N\rho$, S=3/2, D-wave	11–25%	360
$N(1440)\pi$	3–32%	353
$N(1520)\pi$	2–10%	288
$\Delta(1232)\eta$	$<$ 2%	251
$N\gamma$, helicity=1/2	0.06–0.43 %	693

$\Delta(1905)\ 5/2^+$

$I(J^P) = \frac{3}{2}(\frac{5}{2}^+)$

Re(pole position) = 1750 to 1800 ($\approx$ 1770) MeV
-2Im(pole position) = 260 to 340 ($\approx$ 300) MeV
Breit-Wigner mass = 1855 to 1910 ($\approx$ 1880) MeV
Breit-Wigner full width = 270 to 400 ($\approx$ 330) MeV

Δ(1905) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	9–15%	698
$N\pi\pi$	>65%	673
$\Delta(1232)\pi$	>48%	524
$\Delta(1232)\pi$, P-wave	8–43%	524
$\Delta(1232)\pi$, F-wave	40–58%	524
$N\rho$, S=3/2, P-wave	17–35%	385
$N(1535)\pi$	$<$ 1 %	293
$N(1680)\pi$, P-wave	5–15%	133
$\Delta(1232)\eta$	2–6%	282
$N\gamma$	0.012–0.036 %	706
$N\gamma$, helicity=1/2	0.002–0.006 %	706
$N\gamma$, helicity=3/2	0.01–0.03 %	706

$\Delta(1910)\ 1/2^+$

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

Re(pole position) = 1800 to 1900 (≈ 1850) MeV
−2Im(pole position) = 200 to 500 (≈ 350) MeV
Breit-Wigner mass = 1850 to 1950 (≈ 1900) MeV
Breit-Wigner full width = 200 to 400 (≈ 300) MeV

Δ(1910) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	10–30%	710
ΣK	4–14%	410
$\Delta(1232)\pi$	34–66%	539
$N(1440)\pi$	3–45%	386
$\Delta(1232)\eta$	5–13%	310
$N\gamma$, helicity=1/2	0.0–0.02 %	718

$\Delta(1920)\ 3/2^+$

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

Re(pole position) = 1850 to 1950 (≈ 1900) MeV
−2Im(pole position) = 200 to 400 (≈ 300) MeV
Breit-Wigner mass = 1870 to 1970 (≈ 1920) MeV
Breit-Wigner full width = 240 to 360 (≈ 300) MeV

Δ(1920) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	5–20 %	723
ΣK	2–6 %	431
$N\pi\pi$	>46 %	699
$\Delta(1232)\pi$	>46 %	553
$\Delta(1232)\pi$, P-wave	2–28 %	553
$\Delta(1232)\pi$, F-wave	44–72 %	553
$N(1440)\pi$, P-wave	4–86 %	403
$N(1520)\pi$, S-wave	<5 %	341
$N(1535)\pi$	<2 %	328
$N a_0(980)$	seen	41
$\Delta(1232)\eta$	5–17 %	336
$N\gamma$	0.01–0.84 %	731
$N\gamma$, helicity=1/2	0.0–0.42 %	731
$N\gamma$, helicity=3/2	0.01–0.42 %	731

Δ(1930) 5/2⁻

$I(J^P) = \frac{3}{2}(\frac{5}{2}^-)$

Re(pole position) = 1820 to 1880 (≈ 1850) MeV
−2Im(pole position) = 300 to 450 (≈ 320) MeV
Breit-Wigner mass = 1900 to 2000 (≈ 1950) MeV
Breit-Wigner full width = 200 to 400 (≈ 300) MeV

Δ(1930) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	5–15 %	742
$N\gamma$	0.0–0.01 %	749
$N\gamma$, helicity=1/2	0.0–0.005 %	749
$N\gamma$, helicity=3/2	0.0–0.004 %	749

Δ(1950) 7/2⁺

$I(J^P) = \frac{3}{2}(\frac{7}{2}^+)$

Re(pole position) = 1870 to 1890 (≈ 1880) MeV
−2Im(pole position) = 220 to 260 (≈ 240) MeV
Breit-Wigner mass = 1915 to 1950 (≈ 1930) MeV
Breit-Wigner full width = 235 to 335 (≈ 285) MeV

Δ(1950) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	35–45 %	729
ΣK	0.3–0.5 %	441
$N\pi\pi$	37–77 %	706
$\Delta(1232)\pi$, F-wave	1–9 %	560
$N(1680)\pi$, P-wave	3–9 %	191
$\Delta(1232)\eta$	< 0.6 %	349
$N\gamma$	0.06–0.14 %	737
$N\gamma$, helicity=1/2	0.03–0.05 %	737
$N\gamma$, helicity=3/2	0.04–0.09 %	737

Δ(2200) 7/2⁻

$I(J^P) = \frac{3}{2}(\frac{7}{2}^-)$

Re(pole position) = 2050 to 2150 (≈ 2100) MeV
−2Im(pole position) = 260 to 420 (≈ 340) MeV
Breit-Wigner mass = 2150 to 2250 (≈ 2200) MeV
Breit-Wigner full width = 200 to 500 (≈ 350) MeV

Δ(2200) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	2–8 %	894
ΣK	1–7 %	672

$N\pi\pi$	>45 %	876
$\Delta\pi$	>45 %	747
$\Delta\pi$, D-wave	>40 %	747
$\Delta\pi$, G-wave	5–25 %	747
$\Delta\eta$, D-wave	seen	614

Δ(2420) 11/2$^+$

$I(J^P) = \frac{3}{2}(\frac{11}{2}^+)$

Re(pole position) = 2300 to 2500 ($\approx$ 2400) MeV
-2Im(pole position) = 350 to 550 ($\approx$ 450) MeV
Breit-Wigner mass = 2300 to 2600 ($\approx$ 2450) MeV
Breit-Wigner full width = 300 to 700 ($\approx$ 500) MeV

Δ(2420) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\pi$	5–10 %	1040

Λ BARYONS ($S = -1$, $I = 0$)

$\Lambda^0 = uds$

Λ

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

Mass $m = 1115.683 \pm 0.006$ MeV
$(m_\Lambda - m_{\overline{\Lambda}}) \,/\, m_\Lambda = (-0.1 \pm 1.1) \times 10^{-5}$ (S = 1.6)
Mean life $\tau = (2.632 \pm 0.020) \times 10^{-10}$ s (S = 1.6)
$(\tau_\Lambda - \tau_{\overline{\Lambda}}) \,/\, \tau_\Lambda = -0.001 \pm 0.009$
$c\tau = 7.89$ cm
Magnetic moment $\mu = -0.613 \pm 0.004\ \mu_N$
Electric dipole moment $d < 1.5 \times 10^{-16}\ e\,$cm, CL = 95%

Decay parameters

$p\pi^-$ $\alpha_- = 0.748 \pm 0.007$ (S = 2.1)
$\overline{p}\pi^+$ $\alpha_+ = -0.757 \pm 0.004$
$\overline{\alpha}_0$ FOR $\overline{\Lambda} \to \overline{n}\pi^0 = -0.692 \pm 0.017$
α_γ FOR $\Lambda \to n\gamma = -0.16 \pm 0.11$
$p\pi^-$ $\phi_- = (-6.5 \pm 3.5)^\circ$
" $\gamma_- = 0.76$ [n]
" $\Delta_- = (8 \pm 4)^\circ$ [n]
$\overline{\alpha}_0 \,/\, \alpha_+$ in $\overline{\Lambda} \to \overline{n}\pi^0$, $\overline{\Lambda} \to \overline{p}\pi^+ = 0.913 \pm 0.030$

R = $|G_E/G_M|$ in $\Lambda \to p\pi^-$, $\overline{\Lambda} \to \overline{p}\pi^+$ = 0.96 ± 0.14
$\Delta\Phi = \Phi_E - \Phi_M$ in $\Lambda \to p\pi^-$, $\overline{\Lambda} \to \overline{p}\pi^+$ = 37 ± 13 degrees
$n\pi^0$ $\alpha_0 = 0.75 \pm 0.05$
$pe^-\overline{\nu}_e$ $g_A/g_V = -0.718 \pm 0.015$ [i]

Λ DECAY MODES			Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$p\pi^-$			(64.1 ± 0.5) %		101
$n\pi^0$			(35.9 ± 0.5) %		104
$n\gamma$			$(8.3 \pm 0.7) \times 10^{-4}$		162
$p\pi^-\gamma$		[o]	$(8.5 \pm 1.4) \times 10^{-4}$		101
$pe^-\overline{\nu}_e$			$(8.34 \pm 0.14) \times 10^{-4}$		163
$p\mu^-\overline{\nu}_\mu$			$(1.51 \pm 0.19) \times 10^{-4}$		131
Lepton (L) and/or Baryon (B) number violating decay modes					
π^+e^-	L,B		$< 6 \times 10^{-7}$	90%	549
$\pi^+\mu^-$	L,B		$< 6 \times 10^{-7}$	90%	544
π^-e^+	L,B		$< 4 \times 10^{-7}$	90%	549
$\pi^-\mu^+$	L,B		$< 6 \times 10^{-7}$	90%	544
K^+e^-	L,B		$< 2 \times 10^{-6}$	90%	449
$K^+\mu^-$	L,B		$< 3 \times 10^{-6}$	90%	441
K^-e^+	L,B		$< 2 \times 10^{-6}$	90%	449
$K^-\mu^+$	L,B		$< 3 \times 10^{-6}$	90%	441
$K^0_S\nu$	L,B		$< 2 \times 10^{-5}$	90%	447
$\overline{p}\pi^+$	B		$< 9 \times 10^{-7}$	90%	101
invisible			$< 7.4 \times 10^{-5}$	90%	–

Λ(1405) 1/2$^-$

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

Mass $m = 1405.1^{+1.3}_{-1.0}$ MeV
Full width $\Gamma = 50.5 \pm 2.0$ MeV
Below $\overline{K}N$ threshold

Λ(1405) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Sigma\pi$	100 %	155

$\Lambda(1520)$ 3/2$^-$

$I(J^P) = 0(\frac{3}{2}^-)$

Mass m = 1518 to 1520 ($\approx$ 1519) MeV [p]
Full width Γ = 15 to 17 ($\approx$ 16) MeV [p]

$\Lambda(1520)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	(45 $\pm$1) %	242
$\Sigma\pi$	(42 $\pm$1) %	268
$\Lambda\pi\pi$	(10 $\pm$1) %	259
$\Sigma\pi\pi$	(0.9 $\pm$0.1) %	168
$\Lambda\gamma$	(0.85$\pm$0.15) %	350

$\Lambda(1600)$ 1/2$^+$

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

Mass m = 1570 to 1630 ($\approx$ 1600) MeV
Full width Γ = 150 to 250 ($\approx$ 200) MeV

$\Lambda(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	15–30 %	343
$\Sigma\pi$	10–60 %	338
$\Lambda\sigma$	(19$\pm$4) %	–
$\Sigma(1385)\pi$	(9$\pm$4) %	158

$\Lambda(1670)$ 1/2$^-$

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

Mass m = 1670 to 1678 ($\approx$ 1674) MeV
Full width Γ = 25 to 35 ($\approx$ 30) MeV

$\Lambda(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	20–30 %	418
$\Sigma\pi$	25–55 %	398
$\Lambda\eta$	10–25 %	88
$\Sigma(1385)\pi$, D-wave	(6.0$\pm$2.0) %	235
$N\overline{K}^*(892)$, S=3/2, D-wave	(5 $\pm$4) %	†
$\Lambda\sigma$	(20 $\pm$8) %	–

$\Lambda(1690)\ 3/2^-$

$I(J^P) = 0(\frac{3}{2}^-)$

Mass m = 1685 to 1695 ($\approx$ 1690) MeV
Full width Γ = 60 to 80 ($\approx$ 70) MeV

Λ(1690) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	20–30 %	433
$\Sigma\pi$	20–40 %	410
$\Lambda\sigma$	(5.0±2.0) %	–
$\Lambda\pi\pi$	∼ 25 %	419
$\Sigma\pi\pi$	∼ 20 %	358
$\Sigma(1385)\pi$, S-wave	(9 ±5) %	251
$\Sigma(1385)\pi$, D-wave	(3.0±2.0) %	251

$\Lambda(1800)\ 1/2^-$

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

Mass m = 1750 to 1850 ($\approx$ 1800) MeV
Full width Γ = 150 to 250 ($\approx$ 200) MeV

Λ(1800) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	25–40 %	528
$\Sigma\pi$	seen	494
$\Lambda\sigma$	(15 ±4) %	–
$\Sigma(1385)\pi$	seen	349
$\Lambda\eta$	0.01 to 0.10	326
$N\overline{K}^*(892)$	seen	†

$\Lambda(1810)\ 1/2^+$

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

Mass m = 1740 to 1840 ($\approx$ 1790) MeV
Full width Γ = 50 to 170 ($\approx$ 110) MeV

Λ(1810) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.05 to 0.35	520
$\Sigma\pi$	(16 ± 5) %	487
$\Sigma(1385)\pi$	(40 ±15) %	340
$N\overline{K}^*(892)$	30–60 %	†

$\Lambda(1820)\ 5/2^{+}$

$I(J^P) = 0(\frac{5}{2}^{+})$

Mass m = 1815 to 1825 ($\approx$ 1820) MeV
Full width Γ = 70 to 90 ($\approx$ 80) MeV

Λ(1820) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	55–65 %	545
$\Sigma\pi$	8–14 %	509
$\Sigma(1385)\pi$	5–10 %	366
$N\overline{K}^{*}(892)$, S=3/2, P-wave	(3.0±1.0) %	†

$\Lambda(1830)\ 5/2^{-}$

$I(J^P) = 0(\frac{5}{2}^{-})$

Mass m = 1820 to 1830 ($\approx$ 1825) MeV
Full width Γ = 60 to 120 ($\approx$ 90) MeV

Λ(1830) DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$N\overline{K}$	0.04 to 0.08		549
$\Sigma\pi$	35–75 %		512
$\Sigma(1385)\pi$	>15 %		370
$\Sigma(1385)\pi$, D-wave	(40 ±15) %	3.2	370

$\Lambda(1890)\ 3/2^{+}$

$I(J^P) = 0(\frac{3}{2}^{+})$

Mass m = 1870 to 1910 ($\approx$ 1890) MeV
Full width Γ = 80 to 160 ($\approx$ 120) MeV

Λ(1890) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.24 to 0.36	599
$\Sigma\pi$	3–10 %	560
$\Sigma(1385)\pi$	seen	423
$\Sigma(1385)\pi$, P-wave	(6.0 ±3.0) %	423
$\Sigma(1385)\pi$, F-wave	(4.0 ±2.0) %	423
$N\overline{K}^{*}(892)$	seen	236

$\Lambda(2100)$ 7/2$^-$

$I(J^P) = 0(\frac{7}{2}^-)$

Mass m = 2090 to 2110 ($\approx$ 2100) MeV
Full width Γ = 100 to 250 ($\approx$ 200) MeV

Λ(2100) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	25–35 %	751
$\Sigma\pi$	$\sim$ 5 %	705
$\Lambda\eta$	<3 %	617
ΞK	<3 %	491
$\Lambda\omega$	<8 %	443
$\Sigma(1385)\pi$, G-wave	(1.0±1.0) %	584
$N\overline{K}^*(892)$	10–20 %	515
$N\overline{K}^*(892)$, S=3/2, D-wave	(4.0±2.0) %	515

$\Lambda(2110)$ 5/2$^+$

$I(J^P) = 0(\frac{5}{2}^+)$

Mass m = 2050 to 2130 ($\approx$ 2090) MeV
Full width Γ = 200 to 300 ($\approx$ 250) MeV

Λ(2110) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	5–25 %	744
$\Sigma\pi$	10–40 %	698
$\Lambda\omega$	seen	432
$\Lambda\omega$, S=3/2, P-wave	(5.0±2.0) %	432
$\Sigma(1385)\pi$	seen	576
$N\overline{K}^*(892)$	10–60 %	505

$\Lambda(2350)$ 9/2$^+$

$I(J^P) = 0(\frac{9}{2}^+)$

Mass m = 2340 to 2370 ($\approx$ 2350) MeV
Full width Γ = 100 to 250 ($\approx$ 150) MeV

Λ(2350) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	$\sim$ 12 %	915
$\Sigma\pi$	$\sim$ 10 %	867

Σ BARYONS
$(S=-1, I=1)$

$\Sigma^+ = uus, \quad \Sigma^0 = uds, \quad \Sigma^- = dds$

Σ^+

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

Mass $m = 1189.37 \pm 0.07$ MeV (S = 2.2)
Mean life $\tau = (0.8018 \pm 0.0026) \times 10^{-10}$ s
$c\tau = 2.404$ cm
$(\tau_{\Sigma^+} - \tau_{\overline{\Sigma}^-}) / \tau_{\Sigma^+} = -0.0006 \pm 0.0012$
Magnetic moment $\mu = 2.458 \pm 0.010\ \mu_N$ (S = 2.1)
$(\mu_{\Sigma^+} + \mu_{\overline{\Sigma}^-}) / \mu_{\Sigma^+} = 0.014 \pm 0.015$
$\Gamma(\Sigma^+ \to n\ell^+\nu)/\Gamma(\Sigma^- \to n\ell^-\overline{\nu}_\ell) < 0.043$

Decay parameters

$p\pi^0$ $\alpha_0 = -0.982 \pm 0.014$
$\overline{\alpha}_0$ FOR $\overline{\Sigma}^- \to \overline{p}\pi^0 = 0.99 \pm 0.04$
$(\alpha_0 + \overline{\alpha}_0) / (\alpha_0 - \overline{\alpha}_0) = 0.00 \pm 0.04$
" $\phi_0 = (36 \pm 34)^\circ$
" $\gamma_0 = 0.16$ [n]
" $\Delta_0 = (187 \pm 6)^\circ$ [n]
$n\pi^+$ $\alpha_+ = 0.068 \pm 0.013$
" $\phi_+ = (167 \pm 20)^\circ$ (S = 1.1)
" $\gamma_+ = -0.97$ [n]
" $\Delta_+ = (-73^{+133}_{-10})^\circ$ [n]
$p\gamma$ $\alpha_\gamma = -0.76 \pm 0.08$

Σ^+ DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$p\pi^0$		(51.57 ± 0.30) %		189
$n\pi^+$		(48.31 ± 0.30) %		185
$p\gamma$		$(1.23 \pm 0.05) \times 10^{-3}$		225
$n\pi^+\gamma$	[o]	$(4.5 \pm 0.5) \times 10^{-4}$		185
$\Lambda e^+\nu_e$		$(2.0 \pm 0.5) \times 10^{-5}$		71
$\Delta S = \Delta Q$ (*SQ*) violating modes or $\Delta S = 1$ weak neutral current (*S1*) modes				
$ne^+\nu_e$	*SQ*	$< 5 \times 10^{-6}$	90%	224
$n\mu^+\nu_\mu$	*SQ*	$< 3.0 \times 10^{-5}$	90%	202
pe^+e^-	*S1*	$< 7 \times 10^{-6}$		225
$p\mu^+\mu^-$	*S1*	$(2.4 {}^{+1.7}_{-1.3}) \times 10^{-8}$		121

Σ^0

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

Mass $m = 1192.642 \pm 0.024$ MeV
$m_{\Sigma^-} - m_{\Sigma^0} = 4.807 \pm 0.035$ MeV (S = 1.1)
$m_{\Sigma^0} - m_{\Lambda} = 76.959 \pm 0.023$ MeV
Mean life $\tau = (7.4 \pm 0.7) \times 10^{-20}$ s
$c\tau = 2.22 \times 10^{-11}$ m
Transition magnetic moment $\left|\mu_{\Sigma\Lambda}\right| = 1.61 \pm 0.08\ \mu_N$

Σ^0 DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda\gamma$		100 %		74
$\Lambda\gamma\gamma$		< 3 %	90%	74
$\Lambda e^+ e^-$	[q]	5×10^{-3}		74

Σ^-

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

Mass $m = 1197.449 \pm 0.030$ MeV (S = 1.2)
$m_{\Sigma^-} - m_{\Sigma^+} = 8.08 \pm 0.08$ MeV (S = 1.9)
$m_{\Sigma^-} - m_{\Lambda} = 81.766 \pm 0.030$ MeV (S = 1.2)
Mean life $\tau = (1.479 \pm 0.011) \times 10^{-10}$ s (S = 1.3)
$c\tau = 4.434$ cm
Magnetic moment $\mu = -1.160 \pm 0.025\ \mu_N$ (S = 1.7)
Σ^- charge radius $= 0.78 \pm 0.10$ fm

Decay parameters

$n\pi^-$	$\alpha_- = -0.068 \pm 0.008$
"	$\phi_- = (10 \pm 15)^\circ$
"	$\gamma_- = 0.98$ [n]
"	$\Delta_- = (249^{+\ 12}_{-120})^\circ$ [n]
$n e^- \overline{\nu}_e$	$g_A/g_V = 0.340 \pm 0.017$ [i]
"	$f_2(0)/f_1(0) = 0.97 \pm 0.14$
"	$D = 0.11 \pm 0.10$
$\Lambda e^- \overline{\nu}_e$	$g_V/g_A = 0.01 \pm 0.10$ [i] (S = 1.5)
"	$g_{WM}/g_A = 2.4 \pm 1.7$ [i]

Σ^- DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$n\pi^-$		(99.848 ± 0.005) %		193
$n\pi^-\gamma$	[o]	$(4.6 \pm 0.6) \times 10^{-4}$		193
$n e^- \overline{\nu}_e$		$(1.017 \pm 0.034) \times 10^{-3}$		230
$n \mu^- \overline{\nu}_\mu$		$(4.5 \pm 0.4) \times 10^{-4}$		210

$\Lambda e^- \overline{\nu}_e$		$(5.73 \pm 0.27) \times 10^{-5}$		79
$\Sigma^+ X$		$< 1.2 \times 10^{-4}$	90%	–
Lepton number (L) violating modes				
$p e^- e^-$	L	$< 6.7 \times 10^{-5}$	90%	231

$\Sigma(1385)\ 3/2^+$

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

$\Sigma(1385)^+$ mass $m = 1382.83 \pm 0.34$ MeV (S = 1.9)
$\Sigma(1385)^0$ mass $m = 1383.7 \pm 1.0$ MeV (S = 1.4)
$\Sigma(1385)^-$ mass $m = 1387.2 \pm 0.5$ MeV (S = 2.2)
$\Sigma(1385)^+$ full width $\Gamma = 36.2 \pm 0.7$ MeV
$\Sigma(1385)^0$ full width $\Gamma = 36 \pm 5$ MeV
$\Sigma(1385)^-$ full width $\Gamma = 39.4 \pm 2.1$ MeV (S = 1.7)
Below $\overline{K} N$ threshold

Σ(1385) DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda\pi$	(87.0 ± 1.5) %		208
$\Sigma\pi$	(11.7 ± 1.5) %		129
$\Lambda\gamma$	$(1.25^{+0.13}_{-0.12})$ %		241
$\Sigma^+\gamma$	$(7.0 \pm 1.7) \times 10^{-3}$		180
$\Sigma^-\gamma$	$< 2.4 \times 10^{-4}$	90%	173

$\Sigma(1660)\ 1/2^+$

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

Re(pole position) $= 1585 \pm 20$ MeV
-2Im(pole position) $= 290^{+140}_{-\ 40}$ MeV
Mass $m = 1640$ to 1680 (≈ 1660) MeV
Full width $\Gamma = 100$ to 300 (≈ 200) MeV

Σ(1660) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.05 to 0.15 ($\approx$ 010)	405
$\Lambda\pi$	(35 ± 12) %	440
$\Sigma\pi$	(37 ± 10) %	387
$\Sigma\sigma$	(20 ± 8) %	–
$\Lambda(1405)\pi$	(4.0 ± 2.0) %	199

$\Sigma(1670)\ 3/2^-$

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

Mass m = 1665 to 1685 ($\approx$ 1675) MeV
Full width Γ = 40 to 100 ($\approx$ 70) MeV

Σ(1670) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.06 to 0.12	419
$\Lambda\pi$	5–15 %	452
$\Sigma\pi$	30–60 %	398
$\Sigma\sigma$	(7.0 ±3.0) %	–

$\Sigma(1750)\ 1/2^-$

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

Mass m = 1700 to 1800 ($\approx$ 1750) MeV
Full width Γ = 100 to 200 ($\approx$ 150) MeV

Σ(1750) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.06 to 0.12	486
$\Lambda\pi$	(14 ±5) %	507
$\Sigma\pi$	(16 ±4) %	456
$\Sigma\eta$	15–55 %	98
$\Sigma(1385)\pi$, D-wave	< 1 %	305
$\Lambda(1520)\pi$	(2.0 ±1.0) %	175
$N\overline{K}^*(892)$, S=1/2	(8 ±4) %	†

$\Sigma(1775)\ 5/2^-$

$I(J^P) = 1(\frac{5}{2}^-)$

Mass m = 1770 to 1780 ($\approx$ 1775) MeV
Full width Γ = 105 to 135 ($\approx$ 120) MeV

Σ(1775) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	37–43%	508
$\Lambda\pi$	14–20%	525
$\Sigma\pi$	2–5%	475
$\Sigma(1385)\pi$	8–12%	327
$\Lambda(1520)\pi$, P-wave	17–23%	202

Σ(1910) 3/2⁻

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

was $\Sigma(1940)$

Mass m = 1870 to 1950 (≈ 1910) MeV
Full width Γ = 150 to 300 (≈ 220) MeV

Σ(1910) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.01 to 0.05 (≈ 0.02)	615
$\Lambda\pi$	(6 ± 4) %	619
$\Sigma\pi$	(86 ±21) %	574
$\Sigma(1385)\pi$	seen	439
$\Lambda(1520)\pi$	seen	329
$\Delta(1232)\overline{K}$	(3.0 ± 1.0) %	377
$N\overline{K}^*(892)$	seen	274
$N\overline{K}^*(892)$, S=1/2 , D-wave	(1.0 ± 1.0) %	274

Σ(1915) 5/2⁺

$I(J^P) = 1(\frac{5}{2}^+)$

Mass m = 1900 to 1935 (≈ 1915) MeV
Full width Γ = 80 to 160 (≈ 120) MeV

Σ(1915) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	0.05 to 0.15	618
$\Lambda\pi$	(6.0 ±2.0) %	623
$\Sigma\pi$	(10.0 ±2.0) %	577
$\Sigma(1385)\pi$, P-wave	(2.0 ±2.0) %	443
$\Sigma(1385)\pi$, F-wave	(4.0 ±2.0) %	443
$\Lambda(1520)\pi$, D-wave	(8.0 ±2.0) %	334
$N\overline{K}^*(892)$, S=1/2, F-wave	(5.0 ±3.0) %	282
$N\overline{K}^*(892)$, S=3/2, F-wave	(5.0 ±2.0) %	282
$\Delta\overline{K}$, P-wave	(16 ±5) %	383
$\Delta\overline{K}$, F-wave	(5.0 ±3.0) %	383

$\Sigma(2030)\ 7/2^+$

$I(J^P) = 1(\frac{7}{2}^+)$

Mass $m = 2025$ to 2040 (≈ 2030) MeV
Full width $\Gamma = 150$ to 200 (≈ 180) MeV

Σ(2030) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\overline{K}$	17–23 %	702
$\Lambda\pi$	17–23 %	700
$\Sigma\pi$	5–10 %	657
ΞK	<2 %	422
$\Sigma(1385)\pi$	5–15 %	532
$\Sigma(1385)\pi$, F-wave	(1.0±1.0) %	532
$\Lambda(1520)\pi$	10–20 %	431
$\Delta(1232)\overline{K}$	10–20 %	498
$\Delta(1232)\overline{K}$, F-wave	(15 ±5) %	498
$\Delta(1232)\overline{K}$, H-wave	(1.0±1.0) %	498
$N\overline{K}^*(892)$, S=3/2, F-wave	(14 ±8) %	439

Ξ BARYONS
$(S=-2, I=1/2)$

$\Xi^0 = uss, \quad \Xi^- = dss$

Ξ^0

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

P is not yet measured; + is the quark model prediction.

Mass $m = 1314.86 \pm 0.20$ MeV
$m_{\Xi^-} - m_{\Xi^0} = 6.85 \pm 0.21$ MeV
Mean life $\tau = (2.90 \pm 0.09) \times 10^{-10}$ s
$c\tau = 8.71$ cm
Magnetic moment $\mu = -1.250 \pm 0.014\ \mu_N$

Decay parameters

$\Lambda\pi^0$	$\alpha = -0.349 \pm 0.009$
"	$\phi = (21 \pm 12)^\circ$
"	$\gamma = 0.85$ [n]
"	$\Delta = (218^{+12}_{-19})^\circ$ [n]
$\Lambda\gamma$	$\alpha = -0.70 \pm 0.07$
$\Lambda e^+ e^-$	$\alpha = -0.8 \pm 0.2$
$\Sigma^0\gamma$	$\alpha = -0.69 \pm 0.06$
$\Sigma^+ e^- \overline{\nu}_e$	$g_1(0)/f_1(0) = 1.22 \pm 0.05$
$\Sigma^+ e^- \overline{\nu}_e$	$f_2(0)/f_1(0) = 2.0 \pm 0.9$

Ξ^0 DECAY MODES			Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda\pi^0$			(99.524 ± 0.012) %		135
$\Lambda\gamma$			$(1.17\ \pm0.07)\times10^{-3}$		184
Λe^+e^-			$(7.6\ \pm0.6)\times10^{-6}$		184
$\Sigma^0\gamma$			$(3.33\ \pm0.10)\times10^{-3}$		117
$\Sigma^+e^-\overline{\nu}_e$			$(2.52\ \pm0.08)\times10^{-4}$		120
$\Sigma^+\mu^-\overline{\nu}_\mu$			$(2.33\ \pm0.35)\times10^{-6}$		64
$\Delta S = \Delta Q$ (SQ) violating modes or $\Delta S = 2$ forbidden ($S2$) modes					
$\Sigma^-e^+\nu_e$	SQ	$<$	$1.6\ \times10^{-4}$	90%	112
$\Sigma^-\mu^+\nu_\mu$	SQ	$<$	$9\ \times10^{-4}$	90%	49
$p\pi^-$	$S2$	$<$	$8\ \times10^{-6}$	90%	299
$pe^-\overline{\nu}_e$	$S2$	$<$	$1.3\ \times10^{-3}$		323
$p\mu^-\overline{\nu}_\mu$	$S2$	$<$	$1.3\ \times10^{-3}$		309

Ξ^-

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

P is not yet measured; + is the quark model prediction.

Mass $m = 1321.71 \pm 0.07$ MeV
$(m_{\Xi^-} - m_{\overline{\Xi}^+})\ /\ m_{\Xi^-} = (-3 \pm 9)\times10^{-5}$
Mean life $\tau = (1.639 \pm 0.015)\times10^{-10}$ s
$c\tau = 4.91$ cm
$(\tau_{\Xi^-} - \tau_{\overline{\Xi}^+})\ /\ \tau_{\Xi^-} = -0.01 \pm 0.07$
Magnetic moment $\mu = -0.6507 \pm 0.0025\ \mu_N$
$(\mu_{\Xi^-} + \mu_{\overline{\Xi}^+})\ /\ \left|\mu_{\Xi^-}\right| = +0.01 \pm 0.05$

Decay parameters

$\Lambda\pi^-$ $\alpha = -0.390 \pm 0.006$ (S = 1.6)
$\alpha(\overline{\Xi}^+)$ for $\overline{\Xi}^+ \to \overline{\Lambda}\pi^+ = 0.371 \pm 0.007$
$(\alpha + \overline{\alpha})\ /\ (\alpha - \overline{\alpha})$ for $\Xi^- \to \Lambda\pi^-$, $\overline{\Xi}^+ \to \overline{\Lambda}\pi^+ = (6\pm14)\times 10^{-3}$
$[\alpha(\Xi^-)\alpha_-(\Lambda) - \alpha(\overline{\Xi}^+)\alpha_+(\overline{\Lambda})]$ / [sum] $= (0 \pm 7)\times10^{-4}$
" $\phi = (-1.2 \pm 1.0)^\circ$ (S = 1.4)
ϕ ANGLE FOR $\overline{\Xi}^+ \to \overline{\Lambda}\pi^+$ $(\tan\phi = \beta/\gamma) = (-1.2 \pm 1.2)^\circ$
$\Delta\Phi_{CP} = (\Phi_- + \Phi_+)/2 = (-0.3 \pm 0.8)^\circ$
" $\gamma = 0.89$ [n]
" $\Delta = (175.9 \pm 1.5)^\circ$ [n]
$\Lambda e^-\overline{\nu}_e$ $g_A/g_V = -0.25 \pm 0.05$ [i]

Ξ^- DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda\pi^-$		(99.887 ± 0.035) %		140
$\Sigma^-\gamma$		$(1.27\ \pm0.23\ )\times10^{-4}$		118
$\Lambda e^-\overline{\nu}_e$		$(5.63\ \pm0.31\ )\times10^{-4}$		190
$\Lambda\mu^-\overline{\nu}_\mu$		$(3.5\ {}^{+3.5}_{-2.2}\ )\times10^{-4}$		163
$\Sigma^0 e^-\overline{\nu}_e$		$(8.7\ \pm1.7\ )\times10^{-5}$		123
$\Sigma^0\mu^-\overline{\nu}_\mu$		$<8\ \times10^{-4}$	90%	70
$\Xi^0 e^-\overline{\nu}_e$		$<2.59\ \times10^{-4}$	90%	7
$\Delta S = 2$ forbidden ($S2$) modes				
$n\pi^-$	$S2$	$<1.9\ \times10^{-5}$	90%	304
$ne^-\overline{\nu}_e$	$S2$	$<3.2\ \times10^{-3}$	90%	327
$n\mu^-\overline{\nu}_\mu$	$S2$	<1.5 %	90%	314
$p\pi^-\pi^-$	$S2$	$<4\ \times10^{-4}$	90%	223
$p\pi^-e^-\overline{\nu}_e$	$S2$	$<4\ \times10^{-4}$	90%	305
$p\pi^-\mu^-\overline{\nu}_\mu$	$S2$	$<4\ \times10^{-4}$	90%	251
$p\mu^-\mu^-$	L	$<4\ \times10^{-8}$	90%	272

$\Xi(1530)\ 3/2^+$

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

$\Xi(1530)^0$ mass $m = 1531.80 \pm 0.32$ MeV (S = 1.3)
$\Xi(1530)^-$ mass $m = 1535.0 \pm 0.6$ MeV
$\Xi(1530)^0$ full width $\Gamma = 9.1 \pm 0.5$ MeV
$\Xi(1530)^-$ full width $\Gamma = 9.9^{+1.7}_{-1.9}$ MeV

$\Xi(1530)$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Xi\pi$	100 %		158
$\Xi\gamma$	<3.7 %	90%	202

$\Xi(1690)$

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

Mass $m = 1690 \pm 10$ MeV [p]
Full width $\Gamma = 20 \pm 15$ MeV

$\Xi(1690)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda\overline{K}$	seen	240
$\Sigma\overline{K}$	seen	70
$\Xi\pi$	seen	311
$\Xi^-\pi^+\pi^-$	possibly seen	213

$\Xi(1820)\ 3/2^-$

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

Mass $m = 1823 \pm 5$ MeV [p]
Full width $\Gamma = 24^{+15}_{-10}$ MeV [p]

Ξ(1820) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda\overline{K}$	large	402
$\Sigma\overline{K}$	small	324
$\Xi\pi$	small	421
$\Xi(1530)\pi$	small	237

$\Xi(1950)$

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

Mass $m = 1950 \pm 15$ MeV [p]
Full width $\Gamma = 60 \pm 20$ MeV [p]

Ξ(1950) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda\overline{K}$	seen	522
$\Sigma\overline{K}$	possibly seen	460
$\Xi\pi$	seen	519

$\Xi(2030)$

$I(J^P) = \frac{1}{2}(\geq \frac{5}{2}^?)$

Mass $m = 2025 \pm 5$ MeV [p]
Full width $\Gamma = 20^{+15}_{-\ 5}$ MeV [p]

Ξ(2030) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda\overline{K}$	~ 20 %	585
$\Sigma\overline{K}$	~ 80 %	529
$\Xi\pi$	small	574
$\Xi(1530)\pi$	small	416
$\Lambda\overline{K}\pi$	small	499
$\Sigma\overline{K}\pi$	small	428

Ω BARYONS
$(S=-3, I=0)$

$\Omega^- = sss$

Ω^-

$I(J^P) = 0(\frac{3}{2}^+)$

$J^P = \frac{3}{2}^+$ is the quark-model prediction; and $J = 3/2$ is fairly well established.

Mass $m = 1672.45 \pm 0.29$ MeV
$(m_{\Omega^-} - m_{\overline{\Omega}^+}) \ / \ m_{\Omega^-} = (-1 \pm 8) \times 10^{-5}$
Mean life $\tau = (0.821 \pm 0.011) \times 10^{-10}$ s
$c\tau = 2.461$ cm
$(\tau_{\Omega^-} - \tau_{\overline{\Omega}^+}) \ / \ \tau_{\Omega^-} = 0.00 \pm 0.05$
Magnetic moment $\mu = -2.02 \pm 0.05 \ \mu_N$

Decay parameters

$\alpha(\Omega^-) \ \alpha_-(\Lambda)$ FOR $\Omega^- \to \Lambda K^- = 0.0115 \pm 0.0015$
ΛK^- $\alpha = 0.0154 \pm 0.0020$
ΛK^-, $\overline{\Lambda} K^+$ $(\alpha + \overline{\alpha})/(\alpha - \overline{\alpha}) = -0.02 \pm 0.13$
$\Xi^0 \pi^-$ $\alpha = 0.09 \pm 0.14$
$\Xi^- \pi^0$ $\alpha = 0.05 \pm 0.21$

Ω^- DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
ΛK^-	(67.8 ± 0.7) %		211
$\Xi^0 \pi^-$	(23.6 ± 0.7) %		294
$\Xi^- \pi^0$	(8.6 ± 0.4) %		289
$\Xi^- \pi^+ \pi^-$	$(3.7^{+0.7}_{-0.6}) \times 10^{-4}$		189
$\Xi(1530)^0 \pi^-$	$< 7 \times 10^{-5}$	90%	17
$\Xi^0 e^- \overline{\nu}_e$	$(5.6 \pm 2.8) \times 10^{-3}$		319
$\Xi^- \gamma$	$< 4.6 \times 10^{-4}$	90%	314
$\Delta S = 2$ forbidden ($S2$) modes			
$\Lambda \pi^-$ *S2*	$< 2.9 \times 10^{-6}$	90%	449

$\Omega(2012)^-$

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

Mass $m = 2012.4 \pm 0.9$ MeV
Full width $\Gamma = 6.4^{+3.0}_{-2.6}$ MeV

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

$\Omega(2012)^-$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Xi^0 K^-$	**DEFINED AS 1**		403
$\Xi^- \overline{K}^0$	0.83 ± 0.21		392
$\Xi^0 \pi^0 K^-$	<0.30	90%	245
$\Xi^0 \pi^- \overline{K}^0$	<0.21	90%	230
$\Xi^- \pi^0 \overline{K}^0$	<0.7	90%	226
$\Xi^- \pi^+ K^-$	<0.08	90%	224

$\Omega(2250)^-$

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

Mass $m = 2252 \pm 9$ MeV
Full width $\Gamma = 55 \pm 18$ MeV

$\Omega(2250)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi^- \pi^+ K^-$	seen	532
$\Xi(1530)^0 K^-$	seen	437

CHARMED BARYONS
($C=+1$)

$\Lambda_c^+ = u\,d\,c$, $\Sigma_c^{++} = u\,u\,c$, $\Sigma_c^+ = u\,d\,c$, $\Sigma_c^0 = d\,d\,c$,
$\Xi_c^+ = u\,s\,c$, $\Xi_c^0 = d\,s\,c$, $\Omega_c^0 = s\,s\,c$

Λ_c^+

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

Mass $m = 2286.46 \pm 0.14$ MeV
Mean life $\tau = (201.5 \pm 2.7) \times 10^{-15}$ s (S = 1.6)
$c\tau = 60.4\ \mu$m

Decay asymmetry parameters

$\Lambda\pi^+$ $\alpha = -0.84 \pm 0.09$
α FOR $\Lambda_c^+ \to \Lambda\rho^+ = -0.76 \pm 0.07$

$\Sigma^+\pi^0$ $\alpha = -0.55 \pm 0.11$
α FOR $\Lambda_c^+ \to \Sigma^0\pi^+ = -0.73 \pm 0.18$
α FOR $\Lambda_c^+ \to \Sigma(1385)^+\pi^0 = -0.92 \pm 0.09$
α FOR $\Lambda_c^+ \to \Sigma(1385)^0\pi^+ = -0.79 \pm 0.11$
$\Lambda\ell^+\nu_\ell$ $\alpha = -0.86 \pm 0.04$
α FOR $\Lambda_c^+ \to pK_S^0 = 0.2 \pm 0.5$
$(\alpha + \overline{\alpha})/(\alpha - \overline{\alpha})$ in $\Lambda_c^+ \to \Lambda\pi^+$, $\overline{\Lambda}_c^- \to \overline{\Lambda}\pi^- = -0.07 \pm 0.31$
$(\alpha + \overline{\alpha})/(\alpha - \overline{\alpha})$ in $\Lambda_c^+ \to \Lambda e^+\nu_e$, $\overline{\Lambda}_c^- \to \overline{\Lambda} e^-\overline{\nu}_e = 0.00 \pm 0.04$
$A_{CP}(\Lambda X)$ in $\Lambda_c \to \Lambda X$, $\overline{\Lambda}_c \to \overline{\Lambda} X = (2 \pm 7)\%$
$\Delta A_{CP} = A_{CP}(\Lambda_c^+ \to pK^+K^-) - A_{CP}(\Lambda_c^+ \to p\pi^+\pi^-) = (0.3 \pm 1.1)\%$

Branching fractions marked with a footnote, e.g. [a], have been corrected for decay modes not observed in the experiments. For example, the submode fraction $\Lambda_c^+ \to p\overline{K}^*(892)^0$ seen in $\Lambda_c^+ \to pK^-\pi^+$ has been multiplied up to include $\overline{K}^*(892)^0 \to \overline{K}^0\pi^0$ decays.

Λ_c^+ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Hadronic modes with a p or n: $S = -1$ final states				
pK_S^0		$(1.59 \pm 0.07)\%$	S=1.1	873
$pK^-\pi^+$		$(6.26 \pm 0.29)\%$	S=1.4	823
$p\overline{K}^*(892)^0$	[r]	$(1.95 \pm 0.27)\%$		685
$\Delta(1232)^{++}K^-$		$(1.08 \pm 0.25)\%$		710
$\Lambda(1520)\pi^+$	[r]	$(2.2 \pm 0.5)\%$		628
$pK^-\pi^+$ nonresonant		$(3.5 \pm 0.4)\%$		823
$pK_S^0\pi^0$		$(1.96 \pm 0.12)\%$		823
$nK_S^0\pi^+$		$(1.82 \pm 0.25)\%$		821
$n\pi^+$		$(6.6 \pm 1.3) \times 10^{-4}$		944
$n\pi^+\pi^0$		$(6.4 \pm 0.9) \times 10^{-3}$		927
$n\pi^+\pi^-\pi^+$		$(4.5 \pm 0.8) \times 10^{-3}$		895
$nK^-\pi^+\pi^+$		$(1.90 \pm 0.12)\%$		756
$p\overline{K}^0\eta$		$(8.3 \pm 1.8) \times 10^{-3}$		568
$pK_S^0\pi^+\pi^-$		$(1.60 \pm 0.11)\%$	S=1.1	754
$pK^-\pi^+\pi^0$		$(4.45 \pm 0.28)\%$	S=1.5	759
$pK^*(892)^-\pi^+$	[r]	$(1.4 \pm 0.5)\%$		580
$p(K^-\pi^+)_{\text{nonresonant}}\pi^0$		$(4.6 \pm 0.8)\%$		759
$\Delta(1232)\overline{K}^*(892)$		seen		419
$pK^-2\pi^+\pi^-$		$(1.4 \pm 0.9) \times 10^{-3}$		671
$pK^-\pi^+2\pi^0$		$(1.0 \pm 0.5)\%$		678
Hadronic modes with a p: $S = 0$ final states				
$p\pi^0$		$< 8 \times 10^{-5}$	CL=90%	945
$p\eta$		$(1.41 \pm 0.11) \times 10^{-3}$		856

$p\eta'$		$(4.9 \pm 0.9) \times 10^{-4}$		639
$p\omega(782)^0$		$(8.3 \pm 1.0) \times 10^{-4}$		751
$p\pi^+\pi^-$		$(4.60 \pm 0.26) \times 10^{-3}$		927
$\quad p f_0(980)$	[r]	$(3.4 \pm 2.3) \times 10^{-3}$		614
$p 2\pi^+ 2\pi^-$		$(2.3 \pm 1.4) \times 10^{-3}$		852
$p K^+ K^-$		$(1.06 \pm 0.06) \times 10^{-3}$		616
$\quad p\phi$	[r]	$(1.06 \pm 0.14) \times 10^{-3}$		590
$\quad p K^+ K^-$ non-ϕ		$(5.3 \pm 1.2) \times 10^{-4}$		616
$p\phi\pi^0$		$(10 \pm 4) \times 10^{-5}$		460
$p K^+ K^- \pi^0$ nonresonant		$< 6.3 \times 10^{-5}$	CL=90%	494

Hadronic modes with a hyperon: $S = -1$ final states

$\Lambda\pi^+$		(1.29 ± 0.05) %	S=1.1	864
$\Lambda(1670)\pi^+$, $\Lambda(1670) \to \eta\Lambda$		$(3.5 \pm 0.5) \times 10^{-3}$		–
$\Lambda\pi^+\pi^0$		(7.02 ± 0.35) %	S=1.1	844
$\quad \Lambda\rho^+$		(4.0 ± 0.5) %		636
$\Lambda\pi^- 2\pi^+$		(3.62 ± 0.26) %	S=1.4	807
$\quad \Sigma(1385)^+\pi^0$, $\Sigma^+ \to \Lambda\pi^+$		$(5.0 \pm 0.7) \times 10^{-3}$		–
$\quad \Sigma(1385)^0\pi^+$, $\Sigma^0 \to \Lambda\pi^0$		$(5.6 \pm 0.8) \times 10^{-3}$		–
$\quad \Sigma(1385)^+\pi^+\pi^-$, $\Sigma^{*+} \to \Lambda\pi^+$		(1.0 ± 0.5) %		688
$\quad \Sigma(1385)^- 2\pi^+$, $\Sigma^{*-} \to \Lambda\pi^-$		$(7.6 \pm 1.4) \times 10^{-3}$		688
$\quad \Lambda\pi^+\rho^0$		(1.4 ± 0.6) %		524
$\quad \Sigma(1385)^+\rho^0$, $\Sigma^{*+} \to \Lambda\pi^+$		$(5 \pm 4) \times 10^{-3}$		363
$\quad \Lambda\pi^- 2\pi^+$ nonresonant		< 1.1 %	CL=90%	807
$\Lambda\pi^-\pi^0 2\pi^+$ total		(2.3 ± 0.8) %		757
$\quad \Lambda\pi^+\eta$	[r]	(1.85 ± 0.11) %	S=1.1	691
$\quad\quad \Sigma(1385)^+\eta$	[r]	$(9.1 \pm 2.0) \times 10^{-3}$		570
$\quad \Lambda\pi^+\omega$	[r]	(1.5 ± 0.5) %		517
$\quad \Lambda\pi^-\pi^0 2\pi^+$, no η or ω		$< 8 \times 10^{-3}$	CL=90%	757
$\Lambda K^+ \overline{K}^0$		$(5.6 \pm 1.1) \times 10^{-3}$	S=1.9	443
$\quad \Xi(1690)^0 K^+$, $\Xi^{*0} \to \Lambda\overline{K}^0$		$(1.6 \pm 0.5) \times 10^{-3}$		286
$\Sigma^0\pi^+$		(1.27 ± 0.06) %	S=1.1	825
$\Sigma^0\pi^+\eta$		$(7.5 \pm 0.8) \times 10^{-3}$		635
$\Sigma^+\pi^0$		(1.25 ± 0.09) %		827
$\Sigma^+\eta$		$(4.4 \pm 2.0) \times 10^{-3}$		713
$\Sigma^+\eta'$		(1.5 ± 0.6) %		391
$\Sigma^+\pi^+\pi^-$		(4.48 ± 0.23) %	S=1.2	804
$\quad \Sigma^+\rho^0$		< 1.7 %	CL=95%	575
$\Sigma^- 2\pi^+$		(1.87 ± 0.18) %		799
$\Sigma^0\pi^+\pi^0$		(3.5 ± 0.4) %		803
$\Sigma^+\pi^0\pi^0$		(1.55 ± 0.14) %		806
$\Sigma^0\pi^- 2\pi^+$		(1.10 ± 0.30) %		763
$\Sigma^+\pi^+\pi^-\pi^0$		—		767

$\Sigma^+ \omega$	[r]	(1.70 ± 0.20) %		569
$\Sigma^- \pi^0 2\pi^+$		(2.1 ± 0.4) %		762
$\Sigma^+ K^+ K^-$		$(3.5 \pm 0.4) \times 10^{-3}$		349
$\Sigma^+ \phi$	[r]	$(3.9 \pm 0.6) \times 10^{-3}$	S=1.1	295
$\Xi(1690)^0 K^+$, $\Xi^{*0} \to \Sigma^+ K^-$		$(1.01 \pm 0.25) \times 10^{-3}$		286
$\Sigma^+ K^+ K^-$ nonresonant		$< 8 \times 10^{-4}$	CL=90%	349
$\Xi^0 K^+$		$(5.5 \pm 0.7) \times 10^{-3}$		653
$\Xi^- K^+ \pi^+$		$(6.2 \pm 0.5) \times 10^{-3}$		565
$\Xi(1530)^0 K^+$		$(4.3 \pm 0.9) \times 10^{-3}$	S=1.1	473

Hadronic modes with a hyperon: $S = 0$ final states

ΛK^+		$(6.0 \pm 0.5) \times 10^{-4}$		781
$\Lambda K^+ \pi^+ \pi^-$		$< 5 \times 10^{-4}$	CL=90%	637
$\Sigma^0 K^+$		$(4.9 \pm 0.6) \times 10^{-4}$		735
$\Sigma^+ K^0_S$		$(4.7 \pm 1.4) \times 10^{-4}$		736
$\Sigma^0 K^+ \pi^+ \pi^-$		$< 2.5 \times 10^{-4}$	CL=90%	574
$\Sigma^+ K^+ \pi^-$		$(2.1 \pm 0.6) \times 10^{-3}$		670
$\Sigma^+ K^*(892)^0$	[r]	$(3.5 \pm 1.0) \times 10^{-3}$		470
$\Sigma^- K^+ \pi^+$		$< 1.2 \times 10^{-3}$	CL=90%	664

Doubly Cabibbo-suppressed modes

$p K^+ \pi^-$		$(1.11 \pm 0.17) \times 10^{-4}$		823

Semileptonic modes

$\Lambda e^+ \nu_e$		(3.56 ± 0.13) %		871
$p K^- e^+ \nu_e$		$(8.8 \pm 1.8) \times 10^{-4}$		874
$\Lambda(1520) e^+ \nu_e$		$(1.0 \pm 0.5) \times 10^{-3}$		639
$\Lambda(1405)^0 e^+ \nu_e$, $\Lambda^0 \to p K^-$		$(4.2 \pm 1.9) \times 10^{-4}$		–
$\Lambda \mu^+ \nu_\mu$		(3.5 ± 0.5) %		867

Inclusive modes

e^+ anything		(3.95 ± 0.35) %		–
p anything		(50 ± 16) %		–
n anything		(50 ± 16) %		–
Λ anything		$(38.2 {}^{+2.9}_{-2.4})$ %		–
K^0_S anything		(9.9 ± 0.7) %		–
3prongs		(24 ± 8) %		–

$\Delta C = 1$ weak neutral current ($C1$) modes, or Lepton Family number (LF), or Lepton number (L), or Baryon number (B) violating modes

$p e^+ e^-$	*C1*	$< 5.5 \times 10^{-6}$	CL=90%	951
$p \mu^+ \mu^-$ non-resonant	*C1*	$< 7.7 \times 10^{-8}$	CL=90%	937
$p e^+ \mu^-$	*LF*	$< 9.9 \times 10^{-6}$	CL=90%	947
$p e^- \mu^+$	*LF*	$< 1.9 \times 10^{-5}$	CL=90%	947

$\overline{p}2e^+$	L,B	< 2.7	$\times 10^{-6}$	CL=90%	951
$\overline{p}2\mu^+$	L,B	< 9.4	$\times 10^{-6}$	CL=90%	937
$\overline{p}e^+\mu^+$	L,B	< 1.6	$\times 10^{-5}$	CL=90%	947
$\Sigma^-\mu^+\mu^+$	L	< 7.0	$\times 10^{-4}$	CL=90%	812
Exotic modes					
$p\gamma_D$		[s] < 8.0	$\times 10^{-5}$	CL=90%	–

$\Lambda_c(2595)^+$

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

The spin-parity follows from the fact that $\Sigma_c(2455)\pi$ decays, with little available phase space, are dominant. This assumes that $J^P = 1/2^+$ for the $\Sigma_c(2455)$.

Mass $m = 2592.25 \pm 0.28$ MeV
$m - m_{\Lambda_c^+} = 305.79 \pm 0.24$ MeV
Full width $\Gamma = 2.6 \pm 0.6$ MeV

$\Lambda_c^+\pi\pi$ and its submode $\Sigma_c(2455)\pi$ — the latter just barely — are the only strong decays allowed to an excited Λ_c^+ having this mass; and the submode seems to dominate.

$\Lambda_c(2595)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+\pi^+\pi^-$	[t] —	117
$\Sigma_c(2455)^{++}\pi^-$	24 ± 7 %	3
$\Sigma_c(2455)^0\pi^+$	24 ± 7 %	3
$\Lambda_c^+\pi^+\pi^-$ 3-body	18 ± 10 %	117
$\Lambda_c^+\pi^0$	[u] not seen	258
$\Lambda_c^+\gamma$	not seen	288

$\Lambda_c(2625)^+$

$I(J^P) = 0(\frac{3}{2}^-)$

J^P has not been measured; $\frac{3}{2}^-$ is the quark-model prediction.

Mass $m = 2628.11 \pm 0.19$ MeV (S = 1.1)
$m - m_{\Lambda_c^+} = 341.65 \pm 0.13$ MeV (S = 1.1)
Full width $\Gamma < 0.97$ MeV, CL = 90%

$\Lambda_c^+\pi\pi$ and its submode $\Sigma(2455)\pi$ are the only strong decays allowed to an excited Λ_c^+ having this mass.

$\Lambda_c(2625)^+$ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda_c^+\pi^+\pi^-$	$\approx 67\%$		184

$\Sigma_c(2455)^{++}\pi^-$		<5	90%	103
$\Sigma_c(2455)^0\pi^+$		<5	90%	103
$\Lambda_c^+\pi^+\pi^-$ 3-body		large		184
$\Lambda_c^+\pi^0$	[u]	not seen		293
$\Lambda_c^+\gamma$		not seen		319

$\Lambda_c(2860)^+$

$I(J^P) = 0(\frac{3}{2}^+)$

Mass $m = 2856.1^{+2.3}_{-6.0}$ MeV
Full width $\Gamma = 68^{+12}_{-22}$ MeV

$\Lambda_c(2860)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$D^0 p$	seen	259

$\Lambda_c(2880)^+$

$I(J^P) = 0(\frac{5}{2}^+)$

Mass $m = 2881.63 \pm 0.24$ MeV
$m - m_{\Lambda_c^+} = 595.17 \pm 0.28$ MeV
Full width $\Gamma = 5.6^{+0.8}_{-0.6}$ MeV

$\Lambda_c(2880)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+\pi^+\pi^-$	seen	471
$\Sigma_c(2455)^{0,++}\pi^\pm$	seen	376
$\Sigma_c(2520)^{0,++}\pi^\pm$	seen	317
$p D^0$	seen	316

$\Lambda_c(2940)^+$

$I(J^P) = 0(\frac{3}{2}^-)$

$J^P = 3/2^-$ is favored, but is not certain

Mass $m = 2939.6^{+1.3}_{-1.5}$ MeV
Full width $\Gamma = 20^{+6}_{-5}$ MeV

$\Lambda_c(2940)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$p D^0$	seen	420
$\Sigma_c(2455)^{0,++}\pi^\pm$	seen	–

$\Sigma_c(2455)$

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

$\Sigma_c(2455)^{++}$ mass $m = 2453.97 \pm 0.14$ MeV
$\Sigma_c(2455)^{+}$ mass $m = 2452.65^{+0.22}_{-0.16}$ MeV
$\Sigma_c(2455)^{0}$ mass $m = 2453.75 \pm 0.14$ MeV
$m_{\Sigma_c(2455)^{++}} - m_{\Lambda_c^+} = 167.510 \pm 0.017$ MeV
$m_{\Sigma_c(2455)^{+}} - m_{\Lambda_c^+} = 166.19^{+0.16}_{-0.08}$ MeV
$m_{\Sigma^0_{c2455}} - m_{\Lambda_c^+} = 167.290 \pm 0.017$ MeV
$m_{\Sigma_c(2455)^{++}} - m_{\Sigma_c(2455)^{0}} = 0.220 \pm 0.013$ MeV
$m_{\Sigma_c(2455)^{+}} - m_{\Sigma_c(2455)^{0}} = -1.10^{+0.16}_{-0.08}$ MeV
$\Sigma_c(2455)^{++}$ full width $\Gamma = 1.89^{+0.09}_{-0.18}$ MeV (S = 1.1)
$\Sigma_c(2455)^{+}$ full width $\Gamma = 2.3 \pm 0.4$ MeV
$\Sigma_c(2455)^{0}$ full width $\Gamma = 1.83^{+0.11}_{-0.19}$ MeV (S = 1.2)

$\Lambda_c^+ \pi$ is the only strong decay allowed to a Σ_c having this mass.

Σ_c(2455) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \pi$	≈ 100 %	94

$\Sigma_c(2520)$

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

J^P has not been measured; $\frac{3}{2}^+$ is the quark-model prediction.

$\Sigma_c(2520)^{++}$ mass $m = 2518.41^{+0.22}_{-0.18}$ MeV (S = 1.1)
$\Sigma_c(2520)^{+}$ mass $m = 2517.4^{+0.7}_{-0.5}$ MeV
$\Sigma_c(2520)^{0}$ mass $m = 2518.48 \pm 0.20$ MeV (S = 1.1)
$m_{\Sigma_c(2520)^{++}} - m_{\Lambda_c^+} = 231.95^{+0.18}_{-0.12}$ MeV (S = 1.3)
$m_{\Sigma_c(2520)^{+}} - m_{\Lambda_c^+} = 230.9^{+0.7}_{-0.5}$ MeV
$m_{\Sigma_c(2520)^{0}} - m_{\Lambda_c^+} = 232.02^{+0.16}_{-0.14}$ MeV (S = 1.3)
$m_{\Sigma_c(2520)^{++}} - m_{\Sigma_c(2520)^{0}} = 0.01 \pm 0.15$ MeV
$\Sigma_c(2520)^{++}$ full width $\Gamma = 14.78^{+0.30}_{-0.40}$ MeV
$\Sigma_c(2520)^{+}$ full width $\Gamma = 17.2^{+4.0}_{-2.2}$ MeV
$\Sigma_c(2520)^{0}$ full width $\Gamma = 15.3^{+0.4}_{-0.5}$ MeV

$\Lambda_c^+ \pi$ is the only strong decay allowed to a Σ_c having this mass.

Σ_c(2520) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \pi$	≈ 100 %	179

$\Sigma_c(2800)$

$I(J^P) = 1(?^?)$

$\Sigma_c(2800)^{++}$ mass $m = 2801^{+4}_{-6}$ MeV
$\Sigma_c(2800)^{+}$ mass $m = 2792^{+14}_{-\ 5}$ MeV
$\Sigma_c(2800)^{0}$ mass $m = 2806^{+5}_{-7}$ MeV (S = 1.3)
$m_{\Sigma_c(2800)^{++}} - m_{\Lambda_c^+} = 514^{+4}_{-6}$ MeV
$m_{\Sigma_c(2800)^{+}} - m_{\Lambda_c^+} = 505^{+14}_{-\ 5}$ MeV
$m_{\Sigma_c(2800)^{0}} - m_{\Lambda_c^+} = 519^{+5}_{-7}$ MeV (S = 1.3)
$\Sigma_c(2800)^{++}$ full width $\Gamma = 75^{+22}_{-17}$ MeV
$\Sigma_c(2800)^{+}$ full width $\Gamma = 62^{+60}_{-40}$ MeV
$\Sigma_c(2800)^{0}$ full width $\Gamma = 72^{+22}_{-15}$ MeV

$\Sigma_c(2800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+\pi$	seen	443

Ξ_c^+

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

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2467.71 \pm 0.23$ MeV (S = 1.3)
Mean life $\tau = (453 \pm 5) \times 10^{-15}$ s
$c\tau = 135.8$ μm

Branching fractions marked with a footnote, e.g. [*a*], have been corrected for decay modes not observed in the experiments. For example, the submode fraction $\Xi_c^+ \to \Sigma^+ \overline{K}^*(892)^0$ seen in $\Xi_c^+ \to \Sigma^+ K^- \pi^+$ has been multiplied up to include $\overline{K}^*(892)^0 \to \overline{K}^0 \pi^0$ decays.

Ξ_c^+ DECAY MODES		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
Cabibbo-favored ($S = -2$) decays				
$p 2K_S^0$		$(2.5\pm1.3) \times 10^{-3}$		766
$\Lambda \overline{K}^0 \pi^+$		—		852
$\Sigma(1385)^+ \overline{K}^0$	[*r*]	(2.9 ± 2.0) %		746
$\Lambda K^- 2\pi^+$		$(9 \pm4) \times 10^{-3}$		787
$\Lambda \overline{K}^*(892)^0 \pi^+$	[*r*]	$< 5 \times 10^{-3}$	CL=90%	608
$\Sigma(1385)^+ K^- \pi^+$	[*r*]	$< 6 \times 10^{-3}$	CL=90%	678
$\Sigma^+ K^- \pi^+$		(2.7 ± 1.2) %		810
$\Sigma^+ \overline{K}^*(892)^0$	[*r*]	(2.3 ± 1.1) %		658

$\Sigma^0 K^- 2\pi^+$	$(8 \pm 5) \times 10^{-3}$		735
$\Xi^0 \pi^+$	(1.6 ± 0.8) %		876
$\Xi^- 2\pi^+$	(2.9 ± 1.3) %		851
$\quad \Xi(1530)^0 \pi^+$	[r] $< 2.9 \times 10^{-3}$	CL=90%	749
$\quad \Xi(1620)^0 \pi^+$	seen		–
$\quad \Xi(1690)^0 \pi^+$	seen		644
$\Xi^0 \pi^+ \pi^0$	(6.7 ± 3.5) %		856
$\Xi^0 \pi^- 2\pi^+$	(5.0 ± 2.6) %		818
$\Xi^0 e^+ \nu_e$	(7 ± 4) %		884
$\Omega^- K^+ \pi^+$	$(2.0\pm1.5) \times 10^{-3}$		399
Cabibbo-suppressed decays			
$p K^- \pi^+$	$(6.2\pm3.0) \times 10^{-3}$	S=1.5	944
$\quad p \overline{K}^*(892)^0$	[r] $(3.3\pm1.7) \times 10^{-3}$		828
$\Sigma^+ \pi^+ \pi^-$	(1.4 ± 0.8) %		922
$\Sigma^- 2\pi^+$	$(5.1\pm3.4) \times 10^{-3}$		918
$\Sigma^+ K^+ K^-$	$(4.3\pm2.5) \times 10^{-3}$		579
$\quad \Sigma^+ \phi$	[r] $< 3.2 \times 10^{-3}$	CL=90%	549
$\quad \Xi(1690)^0 K^+$, $\Xi^0 \to \Sigma^+ K^-$	$< 1.3 \times 10^{-3}$	CL=90%	501
$p \phi(1020)$	$(1.2\pm0.6) \times 10^{-4}$		751

Ξ_c^0

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

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2470.44 \pm 0.28$ MeV (S = 1.2)
$m_{\Xi_c^0} - m_{\Xi_c^+} = 2.72 \pm 0.23$ MeV (S = 1.1)
Mean life $\tau = (151.9 \pm 2.4) \times 10^{-15}$ s
$c\tau = 45.5$ μm

Decay asymmetry parameters

$\Xi^- \pi^+$ $\quad \alpha = -0.64 \pm 0.05$
α FOR $\overline{\Xi}_c^0 \to \overline{\Xi}^+ \pi^- = 0.61 \pm 0.05$
α FOR $\Xi_c^0 \to \Lambda \overline{K}^*(892)^0 = 0.15 \pm 0.22$
α FOR $\Xi_c^0 \to \Sigma^+ K^*(892)^- = -0.52 \pm 0.30$

Ξ_c^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
Cabibbo-favored decays			
$p K^- K^- \pi^+$	$(4.8 \pm 1.2) \times 10^{-3}$	1.1	676
$\quad p K^- \overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^- \pi^+$	$(2.0 \pm 0.6) \times 10^{-3}$		413
$\quad p K^- K^- \pi^+ (\text{no } \overline{K}^{*0})$	$(3.0 \pm 0.9) \times 10^{-3}$		676
ΛK_S^0	$(3.2 \pm 0.7) \times 10^{-3}$		906

$\Lambda K^- \pi^+$	(1.45 ± 0.33) %	1.1	856
$\Lambda \overline{K}^*(892)^0$	$(2.6 \pm0.7) \times 10^{-3}$		717
$\Lambda \overline{K}^0 \pi^+ \pi^-$	seen		786
$\Lambda K^- \pi^+ \pi^+ \pi^-$	seen		703
$\Sigma^0 K^0_S$	$(5.4 \pm1.6) \times 10^{-4}$		864
$\Sigma^+ K^-$	$(1.8 \pm0.4) \times 10^{-3}$		868
$\Sigma^0 \overline{K}^*(892)^0$	$(9.8 \pm2.3) \times 10^{-3}$		658
$\Sigma^+ K^*(892)^-$	$(4.9 \pm1.4) \times 10^{-3}$		661
$\Xi^- \pi^+$	(1.43 ± 0.32) %	1.1	875
$\Xi^- \pi^+ \pi^+ \pi^-$	(4.8 ± 2.3) %		816
$\Xi^0 \phi, \ \phi \to K^+ K^-$	$(5.1 \pm1.3) \times 10^{-4}$		–
$\Xi^0 K^+ K^-$ nonresonant	$(5.6 \pm1.4) \times 10^{-4}$		444
$\Omega^- K^+$	$(4.2 \pm1.0) \times 10^{-3}$		522
$\Xi^- e^+ \nu_e$	(1.04 ± 0.24) %		882
$\Xi^- \mu^+ \nu_\mu$	(1.01 ± 0.25) %		878
Cabibbo-suppressed decays			
$\Lambda_c^+ \pi^-$	$(5.5 \pm1.8) \times 10^{-3}$		115
$\Xi^- K^+$	$(3.9 \pm1.2) \times 10^{-4}$		789
$\Lambda K^+ K^-$ (no ϕ)	$(4.1 \pm1.4) \times 10^{-4}$		648
$\Lambda \phi$	$(4.9 \pm1.5) \times 10^{-4}$		621

$\Xi_c'^+$

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

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2578.2 \pm 0.5$ MeV (S = 1.1)

$m_{\Xi_c'^+} - m_{\Xi_c^+} = 110.5 \pm 0.4$ MeV

$m_{\Xi_c'^+} - m_{\Xi_c'^0} = -0.5 \pm 0.6$ MeV

The $\Xi_c'^+$–Ξ_c^+ mass difference is too small for any strong decay to occur.

$\Xi_c'^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ \gamma$	seen	108

$\Xi_c'^0$

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

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2578.7 \pm 0.5$ MeV

$m_{\Xi_c'^0} - m_{\Xi_c^0} = 108.3 \pm 0.4$ MeV

The $\Xi_c'^0 - \Xi_c^0$ mass difference is too small for any strong decay to occur.

$\Xi_c'^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^0\gamma$	seen	106

$\Xi_c(2645)$

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

J^P has not been measured; $\frac{3}{2}^+$ is the quark-model prediction.

$\Xi_c(2645)^+$ mass $m = 2645.10 \pm 0.30$ MeV (S = 1.2)
$\Xi_c(2645)^0$ mass $m = 2646.16 \pm 0.25$ MeV (S = 1.3)
$m_{\Xi_c(2645)^+} - m_{\Xi_c^0} = 174.67 \pm 0.09$ MeV
$m_{\Xi_c(2645)^0} - m_{\Xi_c^+} = 178.45 \pm 0.10$ MeV
$m_{\Xi_c(2645)^+} - m_{\Xi_c(2645)^0} = -1.06 \pm 0.27$ MeV (S = 1.1)
$\Xi_c(2645)^+$ full width $\Gamma = 2.14 \pm 0.19$ MeV (S = 1.1)
$\Xi_c(2645)^0$ full width $\Gamma = 2.35 \pm 0.22$ MeV

$\Xi_c\pi$ is the only strong decay allowed to a Ξ_c resonance having this mass.

$\Xi_c(2645)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^0\pi^+$	seen	102
$\Xi_c^+\pi^-$	seen	106

$\Xi_c(2790)$

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

J^P has not been measured; $\frac{1}{2}^-$ is the quark-model prediction.

$\Xi_c(2790)^+$ mass $= 2791.9 \pm 0.5$ MeV
$\Xi_c(2790)^0$ mass $= 2793.9 \pm 0.5$ MeV
$m_{\Xi_c(2790)^+} - m_{\Xi_c'^0} = 213.20 \pm 0.22$ MeV
$m_{\Xi_c(2790)^0} - m_{\Xi_c'^+} = 215.70 \pm 0.22$ MeV
$m_{\Xi_c(2790)^+} - m_{\Xi_c(2790)^0} = -2.0 \pm 0.7$ MeV
$\Xi_c(2790)^+$ width $= 8.9 \pm 1.0$ MeV
$\Xi_c(2790)^0$ width $= 10.0 \pm 1.1$ MeV

$\Xi_c(2790)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c'\pi$	seen	159

$\Xi_c(2815)$

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

J^P has not been measured; $\frac{3}{2}^-$ is the quark-model prediction.

$\Xi_c(2815)^+$ mass $m = 2816.51 \pm 0.25$ MeV (S = 1.2)
$\Xi_c(2815)^0$ mass $m = 2819.79 \pm 0.30$ MeV (S = 1.1)
$m_{\Xi_c(2815)^+} - m_{\Xi_c^+} = 348.80 \pm 0.10$ MeV
$m_{\Xi_c(2815)^0} - m_{\Xi_c^0} = 349.35 \pm 0.11$ MeV
$m_{\Xi_c(2815)^+} - m_{\Xi_c(2815)^0} = -3.27 \pm 0.27$ MeV
$\Xi_c(2815)^+$ full width $\Gamma = 2.43 \pm 0.26$ MeV
$\Xi_c(2815)^0$ full width $\Gamma = 2.54 \pm 0.25$ MeV

The $\Xi_c \pi\pi$ modes are consistent with being entirely via $\Xi_c(2645)\pi$.

Ξ_c(2815) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi'_c \pi$	seen	188
$\Xi_c(2645)\pi$	seen	102
$\Xi_c^0 \gamma$	seen	325

$\Xi_c(2970)$

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

was $\Xi_c(2980)$

$\Xi_c(2970)^+$ $m = 2964.3 \pm 1.5$ MeV (S = 3.9)
$\Xi_c(2970)^0$ $m = 2967.1 \pm 1.7$ MeV (S = 6.7)
$m_{\Xi_c(2970)^+} - m_{\Xi_c^+} = 496.6 \pm 1.5$ MeV (S = 3.7)
$m_{\Xi_c(2970)^0} - m_{\Xi_c^0} = 496.7 \pm 1.8$ MeV (S = 5.3)
$m_{\Xi_c(2970)^+} - m_{\Xi_c(2970)^0} = -2.8 \pm 1.9$ MeV (S = 4.8)
$\Xi_c(2970)^+$ width $\Gamma = 20.9^{+2.4}_{-3.5}$ MeV (S = 1.2)

Ξ_c(2970) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \overline{K} \pi$	seen	223
$\Sigma_c(2455)\overline{K}$	seen	122
$\Lambda_c^+ \overline{K}$	not seen	410
$\Lambda_c^+ K^-$	seen	410
$\Xi_c 2\pi$	seen	381
$\Xi'_c \pi$	seen	–
$\Xi_c(2645)\pi$	seen	274

$\Xi_c(3055)$

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

Mass $m = 3055.9 \pm 0.4$ MeV
Full width $\Gamma = 7.8 \pm 1.9$ MeV

$\Xi_c(3055)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Sigma^{++} K^-$	seen	–
ΛD^+	seen	316

$\Xi_c(3080)$

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

$\Xi_c(3080)^+$ $m = 3077.2 \pm 0.4$ MeV
$\Xi_c(3080)^0$ $m = 3079.9 \pm 1.4$ MeV (S = 1.3)
$\Xi_c(3080)^+$ width $\Gamma = 3.6 \pm 1.1$ MeV (S = 1.5)
$\Xi_c(3080)^0$ width $\Gamma = 5.6 \pm 2.2$ MeV

$\Xi_c(3080)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \overline{K} \pi$	seen	415
$\Sigma_c(2455) \overline{K}$	seen	342
$\Sigma_c(2455)^{++} K^-$	seen	342
$\Sigma_c(2520)^{++} K^-$	seen	239
$\Sigma_c(2455) \overline{K} + \Sigma_c(2520) \overline{K}$	seen	–
$\Lambda_c^+ \overline{K}$	not seen	536
$\Lambda_c^+ \overline{K} \pi^+ \pi^-$	not seen	144
ΛD^+	seen	362

Ω_c^0

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

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2695.2 \pm 1.7$ MeV (S = 1.3)
Mean life $\tau = (268 \pm 26) \times 10^{-15}$ s
$c\tau = 80$ μm

No absolute branching fractions have been measured. The following are branching *ratios* relative to $\Omega^- \pi^+$.

Ω_c^0 DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
Cabibbo-favored ($S = -3$) decays — relative to $\Omega^- \pi^+$			
$\Omega^- \pi^+$	**DEFINED AS 1**		821
$\Omega^- \pi^+ \pi^0$	1.80 ± 0.33		797

$\Omega^- \rho^+$	>1.3	90%	532
$\Omega^- \pi^- 2\pi^+$	0.31 ± 0.05		753
$\Omega^- e^+ \nu_e$	1.98 ± 0.15		829
$\Omega^- \mu^+ \nu_\mu$	1.94 ± 0.21		824
$\Xi^0 \overline{K}^0$	1.64 ± 0.29		950
$\Xi^0 K^- \pi^+$	1.20 ± 0.18		901
$\Xi^0 \overline{K}^{*0}$, $\overline{K}^{*0} \to K^- \pi^+$	0.68 ± 0.16		764
$\Omega(2012)^- \pi^+$, $\Omega(2012)^- \to \Xi^0 K^-$	0.12 ± 0.05		–
$\Xi^- \overline{K}^0 \pi^+$	2.12 ± 0.28		895
$\Omega(2012)^- \pi^+$, $\Omega(2012)^- \to \Xi^- \overline{K}^0$	0.12 ± 0.06		–
$\Xi^- K^- 2\pi^+$	0.63 ± 0.09		830
$\Xi(1530)^0 K^- \pi^+$, $\Xi^{*0} \to \Xi^- \pi^+$	0.21 ± 0.06		757
$\Xi^- \overline{K}^{*0} \pi^+$	0.34 ± 0.11		653
$p K^- K^- \pi^+$	seen		864
$\Sigma^+ K^- K^- \pi^+$	<0.32	90%	689
$\Lambda \overline{K}^0 \overline{K}^0$	1.72 ± 0.35		837

$\Omega_c(2770)^0$

$I(J^P) = 0(\frac{3}{2}^+)$

J^P has not been measured; $\frac{3}{2}^+$ is the quark-model prediction.

Mass $m = 2765.9 \pm 2.0$ MeV (S = 1.2)
$m_{\Omega_c(2770)^0} - m_{\Omega_c^0} = 70.7^{+0.8}_{-0.9}$ MeV

The $\Omega_c(2770)^0$–Ω_c^0 mass difference is too small for any strong decay to occur.

$\Omega_c(2770)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Omega_c^0 \gamma$	presumably 100%	70

$\Omega_c(3000)^0$

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

Mass $m = 3000.41 \pm 0.22$ MeV
Full width $\Gamma = 4.5 \pm 0.7$ MeV

$\Omega_c(3000)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ K^-$	seen	182

$\Omega_c(3050)^0$

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

Mass $m = 3050.19 \pm 0.13$ MeV
Full width $\Gamma < 1.2$ MeV, CL = 95%

$\Omega_c(3050)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ K^-$	seen	278

$\Omega_c(3065)^0$

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

Mass $m = 3065.54 \pm 0.26$ MeV
Full width $\Gamma = 3.3 \pm 0.6$ MeV (S = 1.5)

$\Omega_c(3065)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ K^-$	seen	303

$\Omega_c(3090)^0$

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

Mass $m = 3090.1 \pm 0.5$ MeV
Full width $\Gamma = 8.7 \pm 1.3$ MeV

$\Omega_c(3090)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ K^-$	seen	340

$\Omega_c(3120)^0$

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

Mass $m = 3119.1 \pm 1.0$ MeV
Full width $\Gamma < 2.6$ MeV, CL = 95%

$\Omega_c(3120)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ K^-$	seen	379

DOUBLY CHARMED BARYONS ($C=+2$)

$\Xi_{cc}^{++} = u\,c\,c$, $\Xi_{cc}^{+} = d\,c\,c$, $\Omega_{cc}^{+} = s\,c\,c$

Ξ_{cc}^{++}

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

Mass $m = 3621.6 \pm 0.4$ MeV
Mean life $\tau = (256 \pm 27) \times 10^{-15}$ s

Ξ_{cc}^{++} DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda_c^+ K^- \pi^+ \pi^+$	**DEFINED AS 1**		880
$\Xi_c^+ \pi^+$, $\Xi_c^+ \to p K^- \pi^+$	0.0022 ± 0.0006		–
$\Xi_c'^+ \pi^+$, $\Xi_c'^+ \to \Xi_c^+ \gamma$, $\Xi_c^+ \to p K^- \pi^+$	0.0031 ± 0.0010		–
$D^+ p K^- \pi^+$	<0.017	90%	562

BOTTOM BARYONS ($B=-1$)

$\Lambda_b^0 = u\,d\,b$, $\Xi_b^0 = u\,s\,b$, $\Xi_b^- = d\,s\,b$, $\Omega_b^- = s\,s\,b$

Λ_b^0

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

$I(J^P)$ not yet measured; $0(\frac{1}{2}^+)$ is the quark model prediction.

Mass $m = 5619.60 \pm 0.17$ MeV
$m_{\Lambda_b^0} - m_{B^0} = 339.2 \pm 1.4$ MeV
$m_{\Lambda_b^0} - m_{B^+} = 339.72 \pm 0.28$ MeV
Mean life $\tau = (1.471 \pm 0.009) \times 10^{-12}$ s
$c\tau = 441.0$ μm
$A_{CP}(\Lambda_b \to p\pi^-) = -0.025 \pm 0.029$ (S = 1.2)
$A_{CP}(\Lambda_b \to pK^-) = -0.025 \pm 0.022$
$A_{CP}(\Lambda_b \to D\,pK^-) = 0.12 \pm 0.09$
$\Delta A_{CP}(pK^-/\pi^-) = 0.014 \pm 0.024$
$A_{CP}(\Lambda_b \to p\overline{K}^0\pi^-) = 0.22 \pm 0.13$
$\Delta A_{CP}(J/\psi\, p\pi^-/K^-) = (5.7 \pm 2.7) \times 10^{-2}$

$A_{CP}(\Lambda_b \to \Lambda K^+ \pi^-) = -0.53 \pm 0.25$
$A_{CP}(\Lambda_b \to \Lambda K^+ K^-) = -0.28 \pm 0.12$
$\Delta A_{CP}(\Lambda_b^0 \to pK^- \mu^+ \mu^-) = (-4 \pm 5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p\pi^- \pi^+ \pi^-) = (1.1 \pm 2.6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (p\pi^- \pi^+ \pi^-)_{LBM}) = (4 \pm 4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p a_1(1260)^-) = (-1 \pm 4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to N(1520)^0 \rho(770)^0) = (2 \pm 5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Delta(1232)^{++} \pi^- \pi^-) = (0.1 \pm 3.3) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to pK^- \pi^+ \pi^-) = (3.2 \pm 1.3) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (pK^- \pi^+ \pi^-)_{LBM}) = (3.5 \pm 1.6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to N(1520)^0 K^*(892)^0) = (5.5 \pm 2.5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Lambda(1520) \rho(770)^0) = (1 \pm 6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Delta(1232)^{++} K^- \pi^-) = (4.4 \pm 2.7) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p K_1(1410)^-) = (5 \pm 4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to pK^- K^+ \pi^-) = (-7 \pm 5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to pK^- K^+ K^-) = (0.2 \pm 1.9) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Lambda(1520) \phi(1020)) = (4 \pm 6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (pK^-)_{highmass}\ \phi(1020)) = (-0.7 \pm 3.4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (pK^- K^+ K^-)_{LBM}) = (2.7 \pm 2.4) \times 10^{-2}$
$A^{\ell}_{FB}(\mu\mu)$ in $\Lambda_b \to \Lambda \mu^+ \mu^- = -0.39 \pm 0.04$
$\Delta(A^{\ell}_{FB}(\mu\mu))$ in $\Lambda_b \to \Lambda \mu^+ \mu^- = -0.05 \pm 0.09$
$A^{h}_{FB}(p\pi)$ in $\Lambda_b \to \Lambda(p\pi) \mu^+ \mu^- = -0.30 \pm 0.05$
$A^{\ell h}_{FB}$ in $\Lambda_b \to \Lambda \mu^+ \mu^- = 0.25 \pm 0.04$

The branching fractions B(b-baryon $\to \Lambda \ell^- \overline{\nu}_\ell$ anything) and B($\Lambda_b^0 \to \Lambda_c^+ \ell^- \overline{\nu}_\ell$ anything) are not pure measurements because the underlying measured products of these with B($b \to b$-baryon) were used to determine B($b \to b$-baryon), as described in the note "Production and Decay of b-Flavored Hadrons."

For inclusive branching fractions, *e.g.*, $\Lambda_b \to \overline{\Lambda}_c$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

Λ_b^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$J/\psi(1S)\Lambda \times$ B($b \to \Lambda_b^0$)	$(5.8 \pm 0.8) \times 10^{-5}$		1740
$p D^0 \pi^-$	$(6.2 \pm 0.6) \times 10^{-4}$		2370
$p D^+ \pi^- \pi^-$	$(2.7 \pm 0.4) \times 10^{-4}$		2332
$p D^*(2010)^+ \pi^- \pi^-$	$(5.2 \pm 1.0) \times 10^{-4}$		2277
$p D^0 K^-$	$(4.5 \pm 0.8) \times 10^{-5}$		2269
$p J/\psi \pi^-$	$(2.6 {}^{+0.5}_{-0.4}) \times 10^{-5}$		1755
$p \pi^- J/\psi,\ J/\psi \to \mu^+ \mu^-$	$(1.6 \pm 0.8) \times 10^{-6}$		–
$p J/\psi K^-$	$(3.2 {}^{+0.6}_{-0.5}) \times 10^{-4}$		1589

$p\eta_c(1S)K^-$		$(1.06\pm0.26)\times10^{-4}$		1670
$P_c(4312)^+K^-$, $P_c(4312)^+\to p\eta_c(1S)$		$<2.5\times10^{-5}$	CL=95%	–
$P_c(4380)^+K^-$, $P_c\to pJ/\psi$	[v]	$(2.7\pm1.4)\times10^{-5}$		–
$P_c(4450)^+K^-$, $P_c\to pJ/\psi$	[v]	$(1.3\pm0.4)\times10^{-5}$		–
$\chi_{c1}(1P)pK^-$		$(7.6\ {}^{+1.5}_{-1.3})\times10^{-5}$		1242
$\chi_{c1}(1P)p\pi^-$		$(5.0\ {}^{+1.3}_{-1.1})\times10^{-6}$		1462
$\chi_{c2}(1P)pK^-$		$(7.9\ {}^{+1.6}_{-1.4})\times10^{-5}$		1198
$\chi_{c2}(1P)p\pi^-$		$(4.8\pm1.9)\times10^{-6}$		1427
$pJ/\psi(1S)\pi^+\pi^-K^-$		$(6.6\ {}^{+1.3}_{-1.1})\times10^{-5}$		1410
$p\psi(2S)K^-$		$(6.6\ {}^{+1.2}_{-1.0})\times10^{-5}$		1063
$\chi_{c1}(3872)pK^-$		$(3.2\pm1.4)\times10^{-5}$		837
$\chi_{c1}(3872)\Lambda(1520)$		$(1.9\pm0.9)\times10^{-5}$		721
$\psi(2S)p\pi^-$		$(7.5\ {}^{+1.6}_{-1.4})\times10^{-6}$		1320
$p\overline{K}^0\pi^-$		$(1.3\pm0.4)\times10^{-5}$		2693
pK^0K^-		$<3.5\times10^{-6}$	CL=90%	2639
$\Lambda_c^+\pi^-$		$(4.9\pm0.4)\times10^{-3}$	S=1.2	2342
$\Lambda_c^+K^-$		$(3.56\pm0.28)\times10^{-4}$	S=1.2	2314
$\Lambda_c^+a_1(1260)^-$		seen		2153
$\Lambda_c^+D^-$		$(4.6\pm0.6)\times10^{-4}$		1886
$\Lambda_c^+D_s^-$		$(1.10\pm0.10)\ \%$		1833
$\Lambda_c^+\pi^+\pi^-\pi^-$		$(7.6\pm1.1)\times10^{-3}$	S=1.1	2323
$\Lambda_c(2595)^+\pi^-$, $\Lambda_c(2595)^+\to\Lambda_c^+\pi^+\pi^-$		$(3.4\pm1.4)\times10^{-4}$		2210
$\Lambda_c(2625)^+\pi^-$, $\Lambda_c(2625)^+\to\Lambda_c^+\pi^+\pi^-$		$(3.3\pm1.3)\times10^{-4}$		2193
$\Sigma_c(2455)^0\pi^+\pi^-$, $\Sigma_c^0\to\Lambda_c^+\pi^-$		$(5.7\pm2.2)\times10^{-4}$		2265
$\Sigma_c(2455)^{++}\pi^-\pi^-$, $\Sigma_c^{++}\to\Lambda_c^+\pi^+$		$(3.2\pm1.5)\times10^{-4}$		2265
$\Lambda_c^+K^+K^-\pi^-$		$(1.02\pm0.11)\times10^{-3}$		2184
$\Lambda_c^+p\overline{p}\pi^-$		$(2.63\pm0.27)\times10^{-4}$		1805
$\Sigma_c(2455)^0p\overline{p}$, $\Sigma_c^0\to\Lambda_c^+\pi^-$		$(2.3\pm0.5)\times10^{-5}$		–
$\Sigma_c(2520)^0p\overline{p}$, $\Sigma_c(2520)^0\to\Lambda_c^+\pi^-$		$(3.1\pm0.7)\times10^{-5}$		–

$\Lambda_c^+ \ell^- \overline{\nu}_\ell$ anything	[x]	(10.9 ± 2.2) %		–
$\Lambda_c^+ \ell^- \overline{\nu}_\ell$		$(6.2 {}^{+1.4}_{-1.3})$ %		2345
$\Lambda_c^+ \tau^- \overline{\nu}_\tau$		(1.9 ± 0.5) %		1933
$\Lambda_c^+ \pi^+ \pi^- \ell^- \overline{\nu}_\ell$		(5.6 ± 3.1) %		2335
$\Lambda_c(2595)^+ \ell^- \overline{\nu}_\ell$		$(7.9 {}^{+4.0}_{-3.5}) \times 10^{-3}$		2212
$\Lambda_c(2625)^+ \ell^- \overline{\nu}_\ell$		$(1.3 {}^{+0.6}_{-0.5})$ %		2195
$p h^-$	[y]	$< 2.3 \times 10^{-5}$	CL=90%	2730
$p \pi^-$		$(4.5 \pm 0.8) \times 10^{-6}$		2730
$p K^-$		$(5.4 \pm 1.0) \times 10^{-6}$		2709
$p D_s^-$		$< 4.8 \times 10^{-4}$	CL=90%	2364
$p \mu^- \overline{\nu}_\mu$		$(4.1 \pm 1.0) \times 10^{-4}$		2730
$\Lambda \mu^+ \mu^-$		$(1.08 \pm 0.28) \times 10^{-6}$		2695
$p \pi^- \mu^+ \mu^-$		$(6.9 \pm 2.5) \times 10^{-8}$		2720
$p K^- e^+ e^-$		$(3.1 \pm 0.6) \times 10^{-7}$		2708
$p K^- \mu^+ \mu^-$		$(2.6 {}^{+0.5}_{-0.4}) \times 10^{-7}$		2685
$\Lambda \gamma$		$(7.1 \pm 1.7) \times 10^{-6}$		2699
$\Lambda \eta$		$(9 {}^{+7}_{-5}) \times 10^{-6}$		2670
$\Lambda \eta'(958)$		$< 3.1 \times 10^{-6}$	CL=90%	2611
$\Lambda \pi^+ \pi^-$		$(4.6 \pm 1.9) \times 10^{-6}$		2692
$\Lambda K^+ \pi^-$		$(5.6 \pm 1.2) \times 10^{-6}$		2660
$\Lambda K^+ K^-$		$(1.60 \pm 0.22) \times 10^{-5}$		2605
$\Lambda \phi$		$(9.8 \pm 2.6) \times 10^{-6}$		2599
$p \pi^- \pi^+ \pi^-$		$(2.09 \pm 0.21) \times 10^{-5}$		2715
$p K^- K^+ \pi^-$		$(4.0 \pm 0.6) \times 10^{-6}$		2612
$p K^- \pi^+ \pi^-$		$(5.0 \pm 0.5) \times 10^{-5}$		2675
$p K^- K^+ K^-$		$(1.25 \pm 0.13) \times 10^{-5}$		2524

$\Lambda_b(5912)^0$

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

Mass $m = 5912.19 \pm 0.17$ MeV
Full width $\Gamma < 0.25$ MeV, CL = 90%

$\Lambda_b(5912)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi^+ \pi^-$	seen	86

$\Lambda_b(5920)^0$

$J^P = \frac{3}{2}^-$

Mass $m = 5920.09 \pm 0.17$ MeV
Full width $\Gamma < 0.19$ MeV, CL = 90%

$\Lambda_b(5920)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi^+ \pi^-$	seen	108

$\Lambda_b(6070)^0$

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

Quantum numbers based on quark model expectations.

Mass $m = 6072.3 \pm 2.9$ MeV
Full width $\Gamma = 72 \pm 11$ MeV

$\Lambda_b(6070)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi^+ \pi^-$	seen	343

$\Lambda_b(6146)^0$

$J^P = \frac{3}{2}^+$

Mass $m = 6146.2 \pm 0.4$ MeV
$m_{\Lambda_b(6146)^0} - m_{\Lambda_b^0} = 526.55 \pm 0.34$ MeV
Full width $\Gamma = 2.9 \pm 1.3$ MeV

$\Lambda_b(6146)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi^+ \pi^-$	seen	427

$\Lambda_b(6152)^0$

$J^P = \frac{5}{2}^+$

Mass $m = 6152.5 \pm 0.4$ MeV
$m_{\Lambda_b(6152)^0} - m_{\Lambda_b^0} = 532.89 \pm 0.28$ MeV
$m_{\Lambda_b(6152)^0} - m_{\Lambda_b(6146)^0} = 6.34 \pm 0.32$ MeV
Full width $\Gamma = 2.1 \pm 0.9$ MeV

$\Lambda_b(6152)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi^+ \pi^-$	seen	434

Σ_b

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

Mass $m(\Sigma_b^+) = 5810.56 \pm 0.25$ MeV
Mass $m(\Sigma_b^-) = 5815.64 \pm 0.27$ MeV
$m_{\Sigma_b^+} - m_{\Sigma_b^-} = -5.06 \pm 0.18$ MeV
$\Gamma(\Sigma_b^+) = 5.0 \pm 0.5$ MeV
$\Gamma(\Sigma_b^-) = 5.3 \pm 0.5$ MeV

Σ_b DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi$	dominant	133

Σ_b^*

$I(J^P) = 1(\frac{3}{2}^+)$
I, J, P need confirmation.

Mass $m(\Sigma_b^{*+}) = 5830.32 \pm 0.27$ MeV
Mass $m(\Sigma_b^{*-}) = 5834.74 \pm 0.30$ MeV
$m_{\Sigma_b^{*+}} - m_{\Sigma_b^{*-}} = -4.37 \pm 0.33$ MeV (S = 1.6)
$m_{\Sigma_b^{*+}} - m_{\Sigma_b^+} = 19.73 \pm 0.18$
$m_{\Sigma_b^{*-}} - m_{\Sigma_b^-} = 19.09 \pm 0.22$
$\Gamma(\Sigma_b^{*+}) = 9.4 \pm 0.5$ MeV
$\Gamma(\Sigma_b^{*-}) = 10.4 \pm 0.8$ MeV (S = 1.3)
$m_{\Sigma_b^*} - m_{\Sigma_b} = 21.2 \pm 2.0$ MeV

Σ_b^* DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 \pi$	dominant	159

$\Sigma_b(6097)^+$

$J^P = ?^?$

Mass $m = 6095.8 \pm 1.7$ MeV
Full width $\Gamma = 31 \pm 6$ MeV

$\Sigma_b(6097)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b \pi^+ \times$ B($b \to \Sigma_b(6097)^+$)	seen	–

$\Sigma_b(6097)^-$

$J^P = ?^?$

Mass $m = 6098.0 \pm 1.8$ MeV
Full width $\Gamma = 29 \pm 4$ MeV

$\Sigma_b(6097)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b \pi^- \times$ B($b \to \Sigma_b(6097)^-$)	seen	–

Ξ_b^-

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

$m(\Xi_b^-) = 5797.0 \pm 0.6$ MeV (S = 1.7)
$m_{\Xi_b^-} - m_{\Lambda_b^0} = 177.46 \pm 0.31$ MeV (S = 1.3)
$m_{\Xi_b^-} - m_{\Xi_b^0} = 5.9 \pm 0.6$ MeV
Mean life $\tau_{\Xi_b^-} = (1.572 \pm 0.040) \times 10^{-12}$ s

Ξ_b^- DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi \Xi^- \times$ B($b \to \Xi_b^-$)	$(1.02^{+0.26}_{-0.21}) \times 10^{-5}$		1782
$J/\psi \Lambda K^- \times$ B($b \to \Xi_b^-$)	$(2.5 \pm 0.4) \times 10^{-6}$		1631
$p K^- K^- \times$ B($b \to \Xi_b^-$)	$(3.7 \pm 0.8) \times 10^{-8}$		2731
$p K^- K^-$	seen		2731
$p K^- \pi^-$	seen		2783
$\Lambda_b^0 \pi^- \times$ B($b \to \Xi_b^-$)/B($b \to \Lambda_b^0$)	$(5.7 \pm 2.0) \times 10^{-4}$		99
$\Xi_c^0 \pi^-$	seen		2367
$\Sigma(1385) K^-$	$(2.6 \pm 2.3) \times 10^{-7}$		2707
$\Lambda(1405) K^-$	$(1.9 \pm 1.2) \times 10^{-7}$		2702
$\Lambda(1520) K^-$	$(7.6 \pm 3.2) \times 10^{-7}$		2673
$\Lambda(1670) K^-$	$(4.5 \pm 2.3) \times 10^{-7}$		2629
$\Sigma(1775) K^-$	$(2.2 \pm 1.5) \times 10^{-7}$		2599
$\Sigma(1915) K^-$	$(2.6 \pm 2.5) \times 10^{-7}$		2553
$\Xi^- \gamma$	$< 1.3 \times 10^{-4}$	95%	–

Ξ_b^0

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

$m(\Xi_b^0) = 5791.9 \pm 0.5$ MeV
$m_{\Xi_b^0} - m_{\Lambda_b^0} = 172.5 \pm 0.4$ MeV
Mean life $\tau_{\Xi_b^0} = (1.480 \pm 0.030) \times 10^{-12}$ s

Ξ_b^0 DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$p D^0 K^- \times$ B($b \to \Xi_b^0$)	$(1.7 \pm 0.5) \times 10^{-6}$		2374
$p \overline{K}^0 \pi^- \times$ B($b \to \Xi_b^0$)/B($\overline{b} \to B^0$)	$< 1.6 \times 10^{-6}$	90%	2783

$pK^0K^- \times$ B($b \to \Xi_b^0$)/B($\overline{b} \to B^0$)	<1.1	$\times 10^{-6}$	90%	2730
$\Lambda\pi^+\pi^- \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	<1.7	$\times 10^{-6}$	90%	2781
$\Lambda K^-\pi^+ \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	<8	$\times 10^{-7}$	90%	2751
$\Lambda K^+K^- \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	<3	$\times 10^{-7}$	90%	2698
$J/\psi\Lambda$	seen			1868
$J/\psi\Xi^0$	seen			1785
$\Lambda_c^+K^- \times$ B($b \to \Xi_b^0$)	$(6 \pm 4) \times 10^{-7}$			2416
$pK^-\pi^+\pi^- \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	$(1.9 \pm 0.4) \times 10^{-6}$			2766
$pK^-K^-\pi^+ \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	$(1.71 \pm 0.31) \times 10^{-6}$			2704
$pK^-K^+K^- \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	$(1.7 \pm 1.0) \times 10^{-7}$			2620

$\Xi_b'(5935)^-$

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

Mass $m = 5935.02 \pm 0.05$ MeV

$m_{\Xi_b'(5935)^-} - m_{\Xi_b^0} - m_{\pi^-} = 3.653 \pm 0.019$ MeV

Full width $\Gamma < 0.08$ MeV, CL = 95%

$\Xi_b'(5935)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0\pi^- \times$ B($\overline{b} \to \Xi_b'(5935)^-$)/B($\overline{b} \to \Xi_b^0$)	(11.8 ± 1.8) %	31

$\Xi_b(5945)^0$

$J^P = \frac{3}{2}^+$

Mass $m = 5952.3 \pm 0.6$ MeV

Full width $\Gamma = 0.90 \pm 0.18$ MeV

$\Xi_b(5945)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^-\pi^+$	seen	78

$\Xi_b(5955)^-$

$J^P = \frac{3}{2}^+$

Mass $m = 5955.33 \pm 0.13$ MeV
$m_{\Xi_b(5955)^-} - m_{\Xi_b^0} - m_{\pi^-} = 23.96 \pm 0.13$ MeV
Full width $\Gamma = 1.65 \pm 0.33$ MeV

$\Xi_b(5955)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 \pi^- \times$ B($\overline{b} \to \Xi_b^*(5955)^-$)/B($\overline{b} \to \Xi_b^0$)	(20.7±3.5) %	84

$\Xi_b(6100)^-$

$J^P = \frac{3}{2}^-$
J, P need confirmation.

Mass $m = 6100.3 \pm 0.6$ MeV
$m_{\Xi_b(6100)^-} - m_{\Xi_b^-} - 2\, m_{\pi^\pm} = 24.14 \pm 0.24$ MeV
Full width $\Gamma < 1.9$ MeV, CL = 95%

$\Xi_b(6100)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^- \pi^+ \pi^-$	seen	128

$\Xi_b(6227)^-$

$J^P = ?^?$

Mass $m = 6227.9 \pm 0.9$ MeV
Full width $\Gamma = 19.9 \pm 2.6$ MeV

$\Xi_b(6227)^-$ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\Lambda_b^0 K^- \times$ B($b \to \Xi_b(6227)$)/B($b \to \Lambda_b^0$)	(3.20±0.35) × 10^{-3}		336
$\Xi_b^0 \pi^- \times$ B($b \to \Xi_b(6227)$)/B($b \to \Xi_b^0$)	(2.8 ±1.1) %	1.8	398

$\Xi_b(6227)^0$

$J^P = ?^?$

Mass $m = 6226.8 \pm 1.6$ MeV
Full width $\Gamma = 19^{+5}_{-4}$ MeV

$\Xi_b(6227)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^- \pi^+ \times$ B($b \to \Xi_b(6227)^0$)/B($b \to \Xi_b^-$)	(4.5±0.9) %	398

$\Xi_b(6327)^0$

Mass $m = 6327.28 \pm 0.35$ MeV
Full width $\Gamma < 2.56$ MeV, CL = 95%

$\Xi_b(6327)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 K^- \pi^+$	seen	298

$\Xi_b(6333)^0$

Mass $m = 6332.69 \pm 0.28$ MeV
Full width $\Gamma < 1.92$ MeV, CL = 95%

$\Xi_b(6333)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0 K^- \pi^+$	seen	309

Ω_b^-

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

Mass $m = 6045.2 \pm 1.2$ MeV
$m_{\Omega_b^-} - m_{\Lambda_b^0} = 426.4 \pm 2.2$ MeV
$m_{\Omega_b^-} - m_{\Xi_b^-} = 247.3 \pm 3.2$ MeV
Mean life $\tau = (1.64^{+0.18}_{-0.17}) \times 10^{-12}$ s
$\tau(\Omega_b^-)/\tau(\Xi_b^-)$ mean life ratio $= 1.11 \pm 0.16$

Ω_b^- DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi\,\Omega^- \times B(b \to \Omega_b)$	$(2.9^{+1.1}_{-0.8}) \times 10^{-6}$		1805
$p K^- K^- \times B(\overline{b} \to \Omega_b)$	$< 2.3 \times 10^{-9}$	90%	2865
$p \pi^- \pi^- \times B(\overline{b} \to \Omega_b)$	$< 1.5 \times 10^{-8}$	90%	2943
$p K^- \pi^- \times B(\overline{b} \to \Omega_b)$	$< 7 \times 10^{-9}$	90%	2915
$\Omega_c^0 \pi^-$	seen		2419
$\Omega_c^0 \pi^-$, $\Omega_c^0 \to p K^- K^- \pi^+$	seen		–
$\Xi_c^+ K^- \pi^-$	seen		2472

$\Omega_b(6316)^-$

$I(J^P) = ?(?^?)$
I, J, P need confirmation.

Mass $m = 6315.6 \pm 0.6$ MeV
Full width $\Gamma < 4.2$ MeV, CL = 95%

$\Omega_b(6316)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 K^-$	seen	168

$\Omega_b(6330)^-$

$I(J^P) = ?(?^?)$
I, J, P need confirmation.

Mass $m = 6330.3 \pm 0.6$ MeV
Full width $\Gamma < 4.7$ MeV, CL = 95%

$\Omega_b(6330)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 K^-$	seen	206

$\Omega_b(6340)^-$

$I(J^P) = ?(?^?)$
I, J, P need confirmation.

Mass $m = 6339.7 \pm 0.6$ MeV
Full width $\Gamma < 1.8$ MeV, CL = 95%

$\Omega_b(6340)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 K^-$	seen	227

$\Omega_b(6350)^-$

$I(J^P) = ?(?^?)$
I, J, P need confirmation.

Mass $m = 6349.8 \pm 0.6$ MeV
Full width $\Gamma < 3.2$ MeV, CL = 95%

$\Omega_b(6350)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 K^-$	seen	248

b-baryon ADMIXTURE (Λ_b, Ξ_b, Ω_b)

These branching fractions are actually an average over weakly decaying *b*-baryons weighted by their production rates at the LHC, LEP, and Tevatron, branching ratios, and detection efficiencies. They scale with the *b*-baryon production fraction B($b \rightarrow$ *b*-baryon).

The branching fractions B(*b*-baryon $\rightarrow \Lambda \ell^- \overline{\nu}_\ell$ anything) and B($\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell$ anything) are not pure measurements because the underlying measured products of these with B($b \rightarrow$ *b*-baryon) were used to determine B($b \rightarrow$ *b*-baryon), as described in the note "Production and Decay of *b*-Flavored Hadrons."

For inclusive branching fractions, *e.g.*, $B \rightarrow D^\pm$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

***b*-baryon ADMIXTURE DECAY MODES (Λ_b,Ξ_b,Ω_b)**	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$p \mu^- \overline{\nu}$ anything	$(5.8^{+2.3}_{-2.0})$ %		–
$p \ell \overline{\nu}_\ell$ anything	(5.6 ± 1.2) %		–
p anything	(70 ± 22) %		–
$\Lambda \ell^- \overline{\nu}_\ell$ anything	(3.8 ± 0.6) %		–
$\Lambda \ell^+ \nu_\ell$ anything	(3.2 ± 0.8) %		–
Λ anything	(39 ± 7) %		–
$\Xi^- \ell^- \overline{\nu}_\ell$ anything	$(4.6 \pm 1.4) \times 10^{-3}$	1.2	–

EXOTIC BARYONS

$P_c(4312)^+$

Mass $m = 4311.9^{+7.0}_{-0.9}$ MeV
Full width $\Gamma = 10 \pm 5$ MeV

$P_c(4312)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\, p$	seen	658

$P_c(4380)^+$

Mass $m = 4380 \pm 30$ MeV
Full width $\Gamma = 205 \pm 90$ MeV

$P_c(4380)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\, p$	seen	741

$P_c(4440)^+$

Mass $m = 4440^{+4}_{-5}$ MeV
Full width $\Gamma = 21^{+10}_{-11}$ MeV

$P_c(4440)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\, p$	seen	810

$P_c(4457)^+$

was $P_c(4450)$

Mass $m = 4457.3^{+4.0}_{-1.8}$ MeV
Full width $\Gamma = 6.4^{+6.0}_{-2.8}$ MeV

$P_c(4457)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\, p$	seen	828

NOTES

[*a*] The masses of the p and n are most precisely known in u (unified atomic mass units). The conversion factor to MeV, 1 u = 931.494061(21) MeV, is less well known than are the masses in u.

[*b*] The $\left|m_p - m_{\overline{p}}\right|/m_p$ and $\left|q_p + q_{\overline{p}}\right|/e$ are not independent, and both use the more precise measurement of $\left|q_{\overline{p}}/m_{\overline{p}}\right|/(q_p/m_p)$.

[*c*] The limit is from neutrality-of-matter experiments; it assumes $q_n = q_p + q_e$. See also the charge of the neutron.

[*d*] The μp and $e p$ values for the charge radius are much too different to average them. The disagreement is not yet understood.

[*e*] There is a lot of disagreement about the value of the proton magnetic charge radius. See the Listings.

[*f*] The first limit is for $p \rightarrow$ anything or "disappearance" modes of a bound proton. The second entry, a rough range of limits, assumes the dominant decay modes are among those investigated. For antiprotons the best limit, inferred from the observation of cosmic ray $\overline{p}$'s is $\tau_{\overline{p}} > 10^7$ yr, the cosmic-ray storage time, but this limit depends on a number of assumptions. The best direct observation of stored antiprotons gives $\tau_{\overline{p}}/\mathrm{B}(\overline{p} \rightarrow e^- \gamma) > 7 \times 10^5$ yr.

[*g*] There is some controversy about whether nuclear physics and model dependence complicate the analysis for bound neutrons (from which the best limit comes). The first limit here is from reactor experiments with free neutrons.

[*h*] Lee and Yang in 1956 proposed the existence of a mirror world in an attempt to restore global parity symmetry—thus a search for oscillations between the two worlds. Oscillations between the worlds would be maximal when the magnetic fields B and B' were equal. The limit for any B' in the range 0 to 12.5 μT is >12 s (95% CL).

[*i*] The parameters g_A, g_V, and g_{WM} for semileptonic modes are defined by $\overline{B}_f[\gamma_\lambda(g_V + g_A\gamma_5) + i(g_{WM}/m_{B_i})\,\sigma_{\lambda\nu}\,q^\nu]B_i$, and ϕ_{AV} is defined by $g_A/g_V = \left|g_A/g_V\right|e^{i\phi_{AV}}$. See the "Note on Baryon Decay Parameters" in the neutron Particle Listings.

[*j*] Time-reversal invariance requires this to be 0° or 180°.

[*k*] This coefficient is zero if time invariance is not violated.

[*l*] This limit is for γ energies between 0.4 and 782 keV.

[*n*] The decay parameters γ and Δ are calculated from α and ϕ using

$$\gamma = \sqrt{1-\alpha^2}\,\cos\phi\,, \qquad \tan\Delta = -\frac{1}{\alpha}\,\sqrt{1-\alpha^2}\,\sin\phi\,.$$

See the "Note on Baryon Decay Parameters" in the neutron Particle Listings.

[*o*] See the Listings for the pion momentum range used in this measurement.

[*p*] Our estimate. See the Particle Listings for details.

[*q*] A theoretical value using QED.

[*r*] This branching fraction includes all the decay modes of the final-state resonance.

[*s*] Here γ_D stands for a dark photon.

[*t*] See AALTONEN 11H, Fig. 8, for the calculated ratio of $\Lambda_c^+ \pi^0 \pi^0$ and $\Lambda_c^+ \pi^+ \pi^-$ partial widths as a function of the $\Lambda_c(2595)^+ - \Lambda_c^+$ mass difference. At our value of the mass difference, the ratio is about 4.

[*u*] A test that the isospin is indeed 0, so that the particle is indeed a Λ_c^+.

[*v*] P_c^+ is a pentaquark-charmonium state.

[*x*] Not a pure measurement. See note at head of Λ_b^0 Decay Modes.

[*y*] Here h^- means π^- or K^-.

SEARCHES not in other sections

Magnetic Monopole Searches

The most sensitive experiments obtain negative results.

Best cosmic-ray supermassive monopole flux limit:

$< 1.4 \times 10^{-16}$ cm^{-2}sr^{-1}s^{-1} for $1.1 \times 10^{-4} < \beta < 1$

Supersymmetric Particle Searches

All supersymmetric mass bounds here are model dependent.

The limits assume:

1) $\widetilde{\chi}^0_1$ is the lightest supersymmetric particle; 2) R-parity is conserved, unless stated otherwise;

See the Particle Listings for a Note giving details of supersymmetry.

$\widetilde{\chi}^0_i$ — neutralinos (mixtures of $\widetilde{\gamma}$, $\widetilde{Z}^0$, and $\widetilde{H}^0_i$)

Mass $m_{\widetilde{\chi}^0_1} > 0$ GeV, CL = 95%
[general MSSM, non-universal gaugino masses]

Mass $m_{\widetilde{\chi}^0_1} > 46$ GeV, CL = 95%
[all tanβ, all m_0, all $m_{\widetilde{\chi}^0_2} - m_{\widetilde{\chi}^0_1}$]

Mass $m_{\widetilde{\chi}^0_2} > 62.4$ GeV, CL = 95%
[1<tanβ <40, all m_0, all $m_{\widetilde{\chi}^0_2} - m_{\widetilde{\chi}^0_1}$]

Mass $m_{\widetilde{\chi}^0_3} > 99.9$ GeV, CL = 95%
[1<tanβ <40, all m_0, all $m_{\widetilde{\chi}^0_2} - m_{\widetilde{\chi}^0_1}$]

Mass $m_{\widetilde{\chi}^0_4} > 116$ GeV, CL = 95%
[1<tanβ <40, all m_0, all $m_{\widetilde{\chi}^0_2} - m_{\widetilde{\chi}^0_1}$]

$\widetilde{\chi}^\pm_i$ — charginos (mixtures of $\widetilde{W}^\pm$ and $\widetilde{H}^\pm_i$)

Mass $m_{\widetilde{\chi}^\pm_1} > 94$ GeV, CL = 95%
[tan$\beta < 40$, $m_{\widetilde{\chi}^\pm_1} - m_{\widetilde{\chi}^0_1} > 3$ GeV, all m_0]

Mass $m_{\widetilde{\chi}^\pm_1} > 1000$ GeV, CL = 95%
[$2\ell+\not{E}_T$, Tchi1chi1C, $m_{\widetilde{\chi}^0_1}$=0 GeV]

$\widetilde{\chi}^{\pm}$ — long-lived chargino

Mass $m_{\widetilde{\chi}^{\pm}} > 620$ GeV, CL = 95%   [stable $\widetilde{\chi}^{\pm}$]

$\widetilde{\nu}$ — sneutrino

Mass $m >$ 41 GeV, CL = 95%   [model independent]

Mass $m >$ 94 GeV, CL = 95%

[CMSSM, $1 \leq \tan\beta \leq 40$, $m_{\widetilde{e}_R} - m_{\widetilde{\chi}_1^0} > 10$ GeV]

Mass $m >$ 3400 GeV, CL = 95%   [R-Parity Violating]

[$\widetilde{\nu}_\tau \to e\mu$, $\lambda_{312} = \lambda_{321} = 0.07$, $\lambda'_{311} = 0.11$]

$\widetilde{e}$ — scalar electron (selectron)

Mass $m >$ 107 GeV, CL = 95%   [all $m_{\widetilde{e}_L}$–$m_{\widetilde{\chi}_1^0}$]

Mass $m >$ 700 GeV, CL = 95%

[$2\ell + \not{E}_T$, $m_{\widetilde{\ell}_R} = m_{\widetilde{\ell}_L}$ and $\widetilde{\ell} = \widetilde{e}$, $\widetilde{\mu}$, $m_{\widetilde{\chi}_1^0} = 0$ GeV]

Mass $m >$ 250 GeV, CL = 95%

[$\ell^\pm \ell^\mp + \not{E}_T$, $\widetilde{e}_R$, $m_{\widetilde{\chi}_1^0} = 0$ GeV]

Mass $m >$ 410 GeV, CL = 95%   [R-Parity Violating]

[$\geq 4\ell^\pm$, $\widetilde{\ell} \to l\widetilde{\chi}_1^0$, $\widetilde{\chi}_1^0 \to \ell^\pm \ell^\mp \nu$]

$\widetilde{\mu}$ — scalar muon (smuon)

Mass $m >$ 700 GeV, CL = 95%

[$2\ell + \not{E}_T$, $m_{\widetilde{\ell}_R} = m_{\widetilde{\ell}_L}$ and $\widetilde{\ell} = \widetilde{e}$, $\widetilde{\mu}$, $m_{\widetilde{\chi}_1^0} = 0$ GeV]

Mass $m >$ 210, CL = 95%

[$\ell^\pm \ell^\mp + \not{E}_T$, $\widetilde{\mu}_R$, $m_{\widetilde{\chi}_1^0} = 0$ GeV]

Mass $m >$ 94 GeV, CL = 95%

[CMSSM, $1 \leq \tan\beta \leq 40$, $m_{\widetilde{\mu}_R}$–$m_{\widetilde{\chi}_1^0} > 10$ GeV]

Mass $m >$ 410 GeV, CL = 95%   [R-Parity Violating]

[$\geq 4\ell^\pm$, $\widetilde{\ell} \to l\widetilde{\chi}_1^0$, $\widetilde{\chi}_1^0 \to \ell^\pm \ell^\mp \nu$]

$\widetilde{\tau}$ — scalar tau (stau)

Mass $m >$ 81.9 GeV, CL = 95%

[$m_{\widetilde{\tau}_R} - m_{\widetilde{\chi}_1^0} > 15$ GeV, all θ_τ, B($\widetilde{\tau} \to \tau\widetilde{\chi}_1^0$) = 100%]

Mass $m >$ 90 GeV, CL = 95%

[R-Parity Violating, $\widetilde{\tau}_R$, indirect, $\Delta m > 5$ GeV]

Mass $m >$ 286 GeV, CL = 95%   [long-lived $\widetilde{\tau}$]

$\widetilde{q}$ – squarks of the first two quark generations

Mass $m > 1.220 \times 10^3$ GeV, CL = 95%

[jets + $\not{E}_T$, Tsqk1, 1 non-degenerate $\widetilde{q}$, $m_{\widetilde{\chi}_1^0} = 0$ GeV]

Mass $m > 1.600 \times 10^3$ GeV, CL = 95%   [R-Parity Violating]

[$\widetilde{q} \to q\widetilde{\chi}_1^0$, $\widetilde{\chi}_1^0 \to \ell\ell\nu$, λ_{121},$\lambda_{122} \neq 0$, $m_{\widetilde{g}}$=2400GeV]

$\widetilde{q}$ — long-lived squark

Mass $m >$ 1340, CL = 95% [$\widetilde{t}$ R-hadrons]

Mass $m >$ 1250, CL = 95% [$\widetilde{b}$ R-hadrons]

$\widetilde{b}$ — scalar bottom (sbottom)

Mass $m >$ 1.270 × 10^3 GeV, CL = 95%

[b-jets + $\not\!\!E_T$, Tsbot1, $m_{\widetilde{\chi}_1^0}$=0 GeV]

Mass $m >$ 307 GeV, CL = 95% [R-Parity Violating]

[$\widetilde{b} \rightarrow$ $t\,d$ or $t\,s$, λ''_{332} or λ''_{331} coupling]

$\widetilde{t}$ — scalar top (stop)

Mass $m >$ 1.310 × 10^3 GeV, CL = 95%

[jets + $\not\!\!E_T$, Tstop1, $m_{\widetilde{\chi}_1^0}$ < 300 GeV]

Mass $m >$ 1100 GeV, CL = 95% [R-Parity Violating]

[$\widetilde{t} \rightarrow$ $b\,e$, Tstop2RPV, prompt]

Mass $m >$ 460 GeV, CL = 95%

[R-Parity Violating, long-lived $\widetilde{t}$, $\widetilde{t} \rightarrow$ $d\,\overline{\ell}$, 0.01cm < cτ < 1000 cm]

$\widetilde{g}$ — gluino

Mass $m >$ 2.300 × 10^3 GeV, CL = 95%

[jets + $\not\!\!E_T$, Tglu1A, $m_{\widetilde{\chi}_1^0}$ < 200 GeV]

Mass $m >$ 2.260 × 10^3 GeV, CL = 95% [R-Parity Violating]

[$\geq 4\ell$, λ_{12k} $\neq$ 0, $m_{\widetilde{\chi}_1^0}$ > 1000 GeV]

Technicolor

The limits for technicolor (and top-color) particles are quite varied depending on assumptions. See the Technicolor section of the full *Review* (the data listings).

Quark and Lepton Compositeness, Searches for

Scale Limits Λ for Contact Interactions (the lowest dimensional interactions with four fermions)

If the Lagrangian has the form

$$\pm \frac{g^2}{2\Lambda^2}\, \overline{\psi}_L \gamma_\mu \psi_L \overline{\psi}_L \gamma^\mu \psi_L$$

(with $g^2/4\pi$ set equal to 1), then we define $\Lambda \equiv \Lambda^{\pm}_{LL}$. For the full definitions and for other forms, see the Note in the Listings on Searches for Quark and Lepton Compositeness in the full *Review* and the original literature.

$\Lambda^{+}_{LL}(eeee)$	$>$ 8.3 TeV, CL = 95%
$\Lambda^{-}_{LL}(eeee)$	$>$ 10.3 TeV, CL = 95%
$\Lambda^{+}_{LL}(ee\mu\mu)$	$>$ 8.5 TeV, CL = 95%
$\Lambda^{-}_{LL}(ee\mu\mu)$	$>$ 9.5 TeV, CL = 95%
$\Lambda^{+}_{LL}(ee\tau\tau)$	$>$ 7.9 TeV, CL = 95%
$\Lambda^{-}_{LL}(ee\tau\tau)$	$>$ 7.2 TeV, CL = 95%
$\Lambda^{+}_{LL}(\ell\ell\ell\ell)$	$>$ 9.1 TeV, CL = 95%
$\Lambda^{-}_{LL}(\ell\ell\ell\ell)$	$>$ 10.3 TeV, CL = 95%
$\Lambda^{+}_{LL}(eeqq)$	$>$ 24 TeV, CL = 95%
$\Lambda^{-}_{LL}(eeqq)$	$>$ 37 TeV, CL = 95%
$\Lambda^{+}_{LL}(eeuu)$	$>$ 23.3 TeV, CL = 95%
$\Lambda^{-}_{LL}(eeuu)$	$>$ 12.5 TeV, CL = 95%
$\Lambda^{+}_{LL}(eedd)$	$>$ 11.1 TeV, CL = 95%
$\Lambda^{-}_{LL}(eedd)$	$>$ 26.4 TeV, CL = 95%
$\Lambda^{+}_{LL}(eecc)$	$>$ 9.4 TeV, CL = 95%
$\Lambda^{-}_{LL}(eecc)$	$>$ 5.6 TeV, CL = 95%
$\Lambda^{+}_{LL}(eebb)$	$>$ 9.4 TeV, CL = 95%
$\Lambda^{-}_{LL}(eebb)$	$>$ 10.2 TeV, CL = 95%
$\Lambda^{+}_{LL}(\mu\mu qq)$	$>$ 23.3 TeV, CL = 95%
$\Lambda^{-}_{LL}(\mu\mu qq)$	$>$ 40.0 TeV, CL = 95%
$\Lambda(\ell\nu\ell\nu)$	$>$ 3.10 TeV, CL = 90%
$\Lambda(e\nu qq)$	$>$ 2.81 TeV, CL = 95%

$\Lambda^+_{LL}(qqqq)$ > 13.1 none 17.4–29.5 TeV, CL = 95%

$\Lambda^-_{LL}(qqqq)$ $>$ 21.8 TeV, CL = 95%

$\Lambda^+_{LL}(\nu\nu qq)$ $>$ 5.0 TeV, CL = 95%

$\Lambda^-_{LL}(\nu\nu qq)$ $>$ 5.4 TeV, CL = 95%

Excited Leptons

The limits from $\ell^{*+}\ell^{*-}$ do not depend on λ (where λ is the $\ell\ell^*$ transition coupling). The λ-dependent limits assume chiral coupling.

$e^{*\pm}$ — excited electron

Mass $m >$ 103.2 GeV, CL = 95% (from $e^* e^*$)
Mass $m >$ 5.600×10^3 GeV, CL = 95% (from $e e^*$)
Mass $m >$ 356 GeV, CL = 95% (if $\lambda_\gamma = 1$)

$\mu^{*\pm}$ — excited muon

Mass $m >$ 103.2 GeV, CL = 95% (from $\mu^* \mu^*$)
Mass $m >$ 5.700×10^3 GeV, CL = 95% (from $\mu \mu^*$)

$\tau^{*\pm}$ — excited tau

Mass $m >$ 103.2 GeV, CL = 95% (from $\tau^* \tau^*$)
Mass $m >$ 2.500×10^3 GeV, CL = 95% (from $\tau \tau^*$)

ν^* — excited neutrino

Mass $m >$ 1.600×10^3 GeV, CL = 95% (from $\nu^* \nu^*$)
Mass $m >$ 213 GeV, CL = 95% (from $\nu^* X$)

q^* — excited quark

Mass $m >$ 338 GeV, CL = 95% (from $q^* q^*$)
Mass $m >$ 6700 GeV, CL = 95% (from $q^* X$)

Color Sextet and Octet Particles

Color Sextet Quarks (q_6)

Mass $m >$ 84 GeV, CL = 95% (Stable q_6)

Color Octet Charged Leptons (ℓ_8)

Mass $m >$ 86 GeV, CL = 95% (Stable ℓ_8)

Color Octet Neutrinos (ν_8)

Mass $m >$ 110 GeV, CL = 90% ($\nu_8 \to \nu g$)

Extra Dimensions

Please refer to the Extra Dimensions section of the full *Review* for a discussion of the model-dependence of these bounds, and further constraints.

Constraints on the radius of the extra dimensions, for the case of two-flat dimensions of equal radii

(direct tests of Newton's law)

$R <$ 3.8 μm, CL = 95% $(p\,p \to\ j\,G)$

$R <$ 0.16–916 nm (astrophysics; limits depend on technique and assumptions)

Constraints on the fundamental gravity scale

$M_{TT} >$ 9.02 TeV, CL = 95% $(p\,p \to$ dijet, angular distribution)

$M_c >$ 4.16 TeV, CL = 95% $(p\,p \to\ \ell\overline{\ell})$

Constraints on the Kaluza-Klein graviton in warped extra dimensions

$M_G >$ 4.78 TeV, CL = 95% $(p\,p \to\ e^+ e^-,\ \mu^+ \mu^-)$

Constraints on the Kaluza-Klein gluon in warped extra dimensions

$M_{g_{KK}} >$ 3.8 TeV, CL = 95% $(g_{KK} \to\ t\,\overline{t})$

WIMP and Dark Matter Searches

No confirmed evidence found for galactic WIMPs from the GeV to the TeV mass scales and down to 1×10^{-10} pb spin independent cross section at M = 100 GeV.

TESTS OF DISCRETE SPACE-TIME SYMMETRIES

CHARGE CONJUGATION (C) INVARIANCE

$\Gamma(\pi^0 \to 3\gamma)/\Gamma_{total}$		$<3.1 \times 10^{-8}$, CL = 90%
η C-nonconserving decay parameters		
$\quad\pi^+\pi^-\pi^0$ left-right asymmetry		$(0.09^{+0.11}_{-0.12}) \times 10^{-2}$
$\quad\pi^+\pi^-\pi^0$ sextant asymmetry		$(0.12^{+0.10}_{-0.11}) \times 10^{-2}$
$\quad\pi^+\pi^-\pi^0$ quadrant asymmetry		$(-0.09 \pm 0.09) \times 10^{-2}$
$\quad\pi^+\pi^-\gamma$ left-right asymmetry		$(0.9 \pm 0.4) \times 10^{-2}$
$\quad\pi^+\pi^-\gamma$ parameter β (D-wave)		-0.02 ± 0.07 (S = 1.3)
$\Gamma(\eta \to \pi^0\gamma)/\Gamma_{total}$	[*a*]	$<9 \times 10^{-5}$, CL = 90%
$\Gamma(\eta \to 2\pi^0\gamma)/\Gamma_{total}$		$<5 \times 10^{-4}$, CL = 90%
$\Gamma(\eta \to 3\pi^0\gamma)/\Gamma_{total}$		$<6 \times 10^{-5}$, CL = 90%
$\Gamma(\eta \to 3\gamma)/\Gamma_{total}$		$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(\eta \to \pi^0 e^+ e^-)/\Gamma_{total}$	[*b*]	$<8 \times 10^{-6}$, CL = 90%
$\Gamma(\eta \to \pi^0 \mu^+ \mu^-)/\Gamma_{total}$	[*b*]	$<5 \times 10^{-6}$, CL = 90%
$\Gamma(\omega(782) \to \eta\pi^0)/\Gamma_{total}$		$<2.1 \times 10^{-4}$, CL = 90%
$\Gamma(\omega(782) \to 2\pi^0)/\Gamma_{total}$		$<2.2 \times 10^{-4}$, CL = 90%
$\Gamma(\omega(782) \to 3\pi^0)/\Gamma_{total}$		$<2.3 \times 10^{-4}$, CL = 90%
$\eta'(958) \to \pi^+\pi^-\gamma$ decay asymmetry parameter		-0.03 ± 0.04
$\Gamma(\eta'(958) \to \pi^0 e^+ e^-)/\Gamma_{total}$	[*b*]	$<1.4 \times 10^{-3}$, CL = 90%
$\Gamma(\eta'(958) \to \pi^0 \rho^0)/\Gamma_{total}$		$<4 \times 10^{-2}$, CL = 90%
$\Gamma(\eta'(958) \to \eta e^+ e^-)/\Gamma_{total}$	[*b*]	$<2.4 \times 10^{-3}$, CL = 90%
$\Gamma(\eta'(958) \to 3\gamma)/\Gamma_{total}$		$<1.0 \times 10^{-4}$, CL = 90%
$\Gamma(\eta'(958) \to \mu^+\mu^-\pi^0)/\Gamma_{total}$	[*b*]	$<6.0 \times 10^{-5}$, CL = 90%
$\Gamma(\eta'(958) \to \mu^+\mu^-\eta)/\Gamma_{total}$	[*b*]	$<1.5 \times 10^{-5}$, CL = 90%
$\Gamma(J/\psi(1S) \to \gamma\gamma)/\Gamma_{total}$		$<2.7 \times 10^{-7}$, CL = 90%
$\Gamma(J/\psi(1S) \to \gamma\phi)/\Gamma_{total}$		$<1.4 \times 10^{-6}$, CL = 90%

PARITY (P) INVARIANCE

e electric dipole moment	$<0.11 \times 10^{-28}$ e cm, CL = 90%
μ electric dipole moment $\lvert d \rvert$	$<1.8 \times 10^{-19}$ e cm, CL = 95%
Re($d_\tau = \tau$ electric dipole moment)	-0.185 to 0.061×10^{-16} e cm, CL = 95%
$\Gamma(\eta \to \pi^+\pi^-)/\Gamma_{total}$	$<4.4 \times 10^{-6}$, CL = 90%
$\Gamma(\eta \to 2\pi^0)/\Gamma_{total}$	$<3.5 \times 10^{-4}$, CL = 90%
$\Gamma(\eta \to 4\pi^0)/\Gamma_{total}$	$<6.9 \times 10^{-7}$, CL = 90%
$\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{total}$	$<1.8 \times 10^{-5}$, CL = 90%

$\Gamma(\eta'(958) \to \pi^0\pi^0)/\Gamma_{\rm total}$	$<4 \times 10^{-4}$, CL = 90%
$\Gamma(\eta_c(1S) \to \pi^+\pi^-)/\Gamma_{\rm total}$	$<1.1 \times 10^{-4}$, CL = 90%
$\Gamma(\eta_c(1S) \to \pi^0\pi^0)/\Gamma_{\rm total}$	$<4 \times 10^{-5}$, CL = 90%
$\Gamma(\eta_c(1S) \to K^+K^-)/\Gamma_{\rm total}$	$<6 \times 10^{-4}$, CL = 90%
$\Gamma(\eta_c(1S) \to K^0_S K^0_S)/\Gamma_{\rm total}$	$<3.1 \times 10^{-4}$, CL = 90%
p electric dipole moment	$<0.021 \times 10^{-23}$ $e\,$cm
n electric dipole moment	$<0.18 \times 10^{-25}$ $e\,$cm, CL = 90%
Λ electric dipole moment	$<1.5 \times 10^{-16}$ $e\,$cm, CL = 95%
$a_P(\Lambda^0_b \to p\pi^-\pi^+\pi^-)$	(-4.0 ± 0.7)%
$a_P(\Lambda^0_b \to pK^-\pi^+\pi^-)$	(-0.6 ± 0.9)%
$a_P(\Lambda^0_b \to pK^-K^+\pi^-)$	(4 ± 5)%
$a_P(\Lambda^0_b \to pK^-K^+K^-)$	(-1.6 ± 1.5)%
$a_P(\Lambda^0_b \to pK^-\mu^+\mu^-)$	(-5 ± 5)%

TIME REVERSAL (T) INVARIANCE

e electric dipole moment		$<0.11 \times 10^{-28}$ $e\,$cm, CL = 90%
μ electric dipole moment $\lvert d \rvert$		$<1.8 \times 10^{-19}$ $e\,$cm, CL = 95%
μ decay parameters		
transverse e^+ polarization normal to plane of μ spin, e^+ momentum		$(-2 \pm 8) \times 10^{-3}$
α'/A		$(-10 \pm 20) \times 10^{-3}$
β'/A		$(2 \pm 7) \times 10^{-3}$
Re($d_\tau = \tau$ electric dipole moment)		-0.185 to 0.061×10^{-16} $e\,$cm, CL = 95%
P_T in $K^+ \to \pi^0\mu^+\nu_\mu$		$(-1.7 \pm 2.5) \times 10^{-3}$
P_T in $K^+ \to \mu^+\nu_\mu\gamma$		$(-0.6 \pm 1.9) \times 10^{-2}$
Im(ξ) in $K^+ \to \pi^0\mu^+\nu_\mu$ decay (from transverse μ pol.)		-0.006 ± 0.008
asymmetry A_T in K^0-$\overline{K}^0$ mixing		$(6.6 \pm 1.6) \times 10^{-3}$
Im(ξ) in $K^0_{\mu 3}$ decay (from transverse μ pol.)		-0.007 ± 0.026
$A_T(D^\pm \to K^0_S K^\pm\pi^+\pi^-)$	[c]	$(-12 \pm 11) \times 10^{-3}$
$A_T(D^0 \to K^+K^-\pi^+\pi^-)$	[c]	$(2.9 \pm 2.2) \times 10^{-3}$
$A_T(D^\pm_s \to K^0_S K^\pm\pi^+\pi^-)$	[c]	$(-14 \pm 8) \times 10^{-3}$
ΔS^+_T ($S^-_{\ell^-,K^0_S} - S^+_{\ell^+,K^0_S}$)		-1.37 ± 0.15
ΔS^-_T ($S^+_{\ell^-,K^0_S} - S^-_{\ell^+,K^0_S}$)		1.17 ± 0.21
ΔC^+_T ($C^-_{\ell^-,K^0_S} - C^+_{\ell^+,K^0_S}$)		0.10 ± 0.16
ΔC^-_T ($C^+_{\ell^-,K^0_S} - C^-_{\ell^+,K^0_S}$)		0.04 ± 0.16
p electric dipole moment		$<0.021 \times 10^{-23}$ $e\,$cm
n electric dipole moment		$<0.18 \times 10^{-25}$ $e\,$cm, CL = 90%

$n \to p e^- \overline{\nu}_e$ decay parameters		
ϕ_{AV}, phase of g_A relative to g_V	[*d*]	$(180.017 \pm 0.026)^\circ$
triple correlation coefficient D	[*e*]	$(-1.2 \pm 2.0) \times 10^{-4}$
triple correlation coefficient R	[*e*]	0.004 ± 0.013
Λ electric dipole moment		$<1.5 \times 10^{-16}$ e cm, CL = 95%
triple correlation coefficient D for $\Sigma^- \to n e^- \overline{\nu}_e$		0.11 ± 0.10

CP INVARIANCE

$\mathrm{Re}(d^W_\tau)$		$<0.50 \times 10^{-17}$ e cm, CL = 95%
$\mathrm{Im}(d^W_\tau)$		$<1.1 \times 10^{-17}$ e cm, CL = 95%
δ (*CP* violating phase in neutrino mixing)		1.23 ± 0.21 π rad (S = 1.3)
$\eta \to \pi^+ \pi^- e^+ e^-$ decay-plane asymmetry		$(-0.6 \pm 3.1) \times 10^{-2}$
$\Gamma(\eta \to \pi^+ \pi^-)/\Gamma_{\rm total}$		$<4.4 \times 10^{-6}$, CL = 90%
$\Gamma(\eta \to 2\pi^0)/\Gamma_{\rm total}$		$<3.5 \times 10^{-4}$, CL = 90%
$\Gamma(\eta \to 4\pi^0)/\Gamma_{\rm total}$		$<6.9 \times 10^{-7}$, CL = 90%
$\Gamma(\eta'(958) \to \pi^+ \pi^-)/\Gamma_{\rm total}$		$<1.8 \times 10^{-5}$, CL = 90%
$\Gamma(\eta'(958) \to \pi^0 \pi^0)/\Gamma_{\rm total}$		$<4 \times 10^{-4}$, CL = 90%
$K^\pm \to \pi^\pm e^+ e^-$ rate difference/sum		$(-2.2 \pm 1.6) \times 10^{-2}$
$K^\pm \to \pi^\pm \mu^+ \mu^-$ rate difference/sum		0.010 ± 0.023
$K^\pm \to \pi^\pm \pi^0 \gamma$ rate difference/sum		$(0.0 \pm 1.2) \times 10^{-3}$
$K^\pm \to \pi^\pm \pi^+ \pi^-$ rate difference/sum		(0.04 ± 0.06)%
$K^\pm \to \pi^\pm \pi^0 \pi^0$ rate difference/sum		(-0.02 ± 0.28)%
$K^\pm \to \pi^\pm \pi^+ \pi^-$ $(g_+ - g_-)$ / $(g_+ + g_-)$		$(-1.5 \pm 2.2) \times 10^{-4}$
$K^\pm \to \pi^\pm \pi^0 \pi^0$ $(g_+ - g_-)$ / $(g_+ + g_-)$		$(1.8 \pm 1.8) \times 10^{-4}$
A_S = [$\Gamma(K^0_S \to \pi^- e^+ \nu_e)$ - $\Gamma(K^0_S \to \pi^+ e^- \overline{\nu}_e)$] / SUM		$(-4 \pm 6) \times 10^{-3}$
$\mathrm{Im}(\eta_{+-0})$ = Im(A($K^0_S \to \pi^+ \pi^- \pi^0$, *CP*-violating) / A($K^0_L \to \pi^+ \pi^- \pi^0$))		-0.002 ± 0.009
$\mathrm{Im}(\eta_{000}) = \mathrm{Im}(A(K^0_S \to \pi^0 \pi^0 \pi^0)/A(K^0_L \to \pi^0 \pi^0 \pi^0))$		-0.001 ± 0.016
$\lvert\eta_{000}\rvert = \lvert A(K^0_S \to 3\pi^0)/A(K^0_L \to 3\pi^0)\rvert$		<0.0088, CL = 90%
CP asymmetry A in $K^0_S \to \pi^+ \pi^- e^+ e^-$		(-0.4 ± 0.8)%
$\Gamma(K^0_S \to 3\pi^0)/\Gamma_{\rm total}$		$<2.6 \times 10^{-8}$, CL = 90%
linear coefficient j for $K^0_L \to \pi^+ \pi^- \pi^0$		0.0012 ± 0.0008
quadratic coefficient f for $K^0_L \to \pi^+ \pi^- \pi^0$		0.004 ± 0.006
$\lvert\epsilon'_{+-\gamma}\rvert/\epsilon$ for $K^0_L \to \pi^+ \pi^- \gamma$		<0.3, CL = 90%
$\lvert g_{E1}\rvert$ for $K^0_L \to \pi^+ \pi^- \gamma$		<0.21, CL = 90%
$\Gamma(K^0_L \to \pi^0 \mu^+ \mu^-)/\Gamma_{\rm total}$	[*f*]	$<3.8 \times 10^{-10}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 e^+ e^-)/\Gamma_{\rm total}$	[*f*]	$<2.8 \times 10^{-10}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 \nu \overline{\nu})/\Gamma_{\rm total}$	[*g*]	$<3.0 \times 10^{-9}$, CL = 90%

$A_{CP}(D^{\pm} \to \mu^{\pm}\nu)$		$(8 \pm 8)\%$
$A_{CP}(D^{\pm} \to K^0_L e^{\pm}\nu)$		$(-0.6 \pm 1.6)\%$
$A_{CP}(D^{\pm} \to K^0_S \pi^{\pm})$		$(-0.41 \pm 0.09)\%$
$A_{CP}(D^{\pm} \to K^{\mp} 2\pi^{\pm})$		$(-0.18 \pm 0.16)\%$
$A_{CP}(D^{\pm} \to K^{\mp}\pi^{\pm}\pi^{\pm}\pi^0)$		$(-0.3 \pm 0.7)\%$
$A_{CP}(D^{\pm} \to K^0_S \pi^{\pm}\pi^0)$		$(-0.1 \pm 0.7)\%$
$A_{CP}(D^{\pm} \to K^0_S \pi^{\pm}\pi^+\pi^-)$		$(0.0 \pm 1.2)\%$
$A_{CP}(D^{\pm} \to \pi^{\pm}\pi^0)$		$(0.4 \pm 1.3)\%$ (S = 1.7)
$A_{CP}(D^{\pm} \to \pi^{\pm}\eta)$		$(0.3 \pm 0.8)\%$ (S = 1.2)
$A_{CP}(D^{\pm} \to \pi^{\pm}\eta'(958))$		$(-0.6 \pm 0.7)\%$
$A_{CP}(D^{\pm} \to \overline{K}^0 / K^0 K^{\pm})$		$(0.11 \pm 0.17)\%$
$A_{CP}(D^{\pm} \to K^0_S K^{\pm})$		$(-0.01 \pm 0.07)\%$
$A_{CP}(D^{\pm} \to K^+ K^- \pi^{\pm})$		$(0.37 \pm 0.29)\%$
$A_{CP}(D^{\pm} \to K^{\pm} K^{*0})$		$(-0.3 \pm 0.4)\%$
$A_{CP}(D^{\pm} \to \phi\pi^{\pm})$		$(0.01 \pm 0.09)\%$ (S = 1.8)
$A_{CP}(D^{\pm} \to K^{\pm} K^*_0(1430)^0)$		$(8^{+7}_{-6})\%$
$A_{CP}(D^{\pm} \to K^{\pm} K^*_2(1430)^0)$		$(43^{+20}_{-26})\%$
$A_{CP}(D^{\pm} \to K^{\pm} K^*_0(700))$		$(-12^{+18}_{-13})\%$
$A_{CP}(D^{\pm} \to a_0(1450)^0 \pi^{\pm})$		$(-19^{+14}_{-16})\%$
$A_{CP}(D^{\pm} \to \phi(1680)\pi^{\pm})$		$(-9 \pm 26)\%$
$A_{CP}(D^{\pm} \to \pi^+\pi^-\pi^{\pm})$		$(0.5 \pm 2.0)\%$
$A_{CP}(D^{\pm} \to K^0_S K^{\pm}\pi^+\pi^-)$		$(-4 \pm 7)\%$
$A_{CP}(D^{\pm} \to K^{\pm}\pi^0)$		$(-3 \pm 5)\%$
Local *CPV* in $D^{\pm} \to \pi^+\pi^-\pi^{\pm}$		78.1%
Local *CPV* in $D^{\pm} \to K^+ K^- \pi^{\pm}$		31%
$\lvert q/p \rvert$ of D^0–$\overline{D}^0$ mixing		0.995 ± 0.016
A_{Γ} of D^0–$\overline{D}^0$ mixing		$(0.089 \pm 0.113) \times 10^{-3}$
CP-even fraction in $D^0 \to \pi^+\pi^-\pi^0$ decays		$(97.3 \pm 1.7)\%$
CP-even fraction in $D^0 \to \pi^+\pi^-\pi^+\pi^-$ decays		$(74.6 \pm 1.6)\%$ (S = 1.2)
CP-even fraction in $D^0 \to K^+ K^- \pi^0$ decays		$(73 \pm 6)\%$

Where there is ambiguity, the *CP* test is labelled by the D^0 decay mode.

$A_{CP}(D^0 \to K^+ K^-)$		$(-0.07 \pm 0.11)\%$
$A_{CP}(D^0 \to K^0_S K^0_S)$		$(-1.9 \pm 1.1)\%$ (S = 1.1)
$A_{CP}(D^0 \to \pi^+\pi^-)$		$(0.13 \pm 0.14)\%$
$A_{CP}(D^0 \to \pi^0\pi^0)$		$(0.0 \pm 0.6)\%$
$A_{CP}(D^0 \to \rho\gamma)$		$(6 \pm 15) \times 10^{-2}$
$A_{CP}(D^0 \to \phi\gamma)$		$(-9 \pm 7) \times 10^{-2}$
$A_{CP}(D^0 \to \overline{K}^*(892)^0 \gamma)$		$(-0.3 \pm 2.0) \times 10^{-2}$
$A_{CP}(D^0 \to \pi^+\pi^-\pi^0)$		$(0.4 \pm 0.4)\%$
$A_{CP}(D^0 \to \rho(770)^+\pi^- \to \pi^+\pi^-\pi^0)$	[h]	$(1.2 \pm 0.9)\%$
$A_{CP}(D^0 \to \rho(770)^0\pi^0 \to \pi^+\pi^-\pi^0)$	[h]	$(-3.1 \pm 3.0)\%$

$A_{CP}(D^0 \to \rho(770)^- \pi^+ \to \pi^+ \pi^- \pi^0)$	[h]	$(-1.0 \pm 1.7)\%$
$A_{CP}(D^0 \to \rho(1450)^+ \pi^- \to \pi^+ \pi^- \pi^0)$	[h]	$(0 \pm 70)\%$
$A_{CP}(D^0 \to \rho(1450)^0 \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(-20 \pm 40)\%$
$A_{CP}(D^0 \to \rho(1450)^- \pi^+ \to \pi^+ \pi^- \pi^0)$	[h]	$(6 \pm 9)\%$
$A_{CP}(D^0 \to \rho(1700)^+ \pi^- \to \pi^+ \pi^- \pi^0)$	[h]	$(-5 \pm 14)\%$
$A_{CP}(D^0 \to \rho(1700)^0 \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(13 \pm 9)\%$
$A_{CP}(D^0 \to \rho(1700)^- \pi^+ \to \pi^+ \pi^- \pi^0)$	[h]	$(8 \pm 11)\%$
$A_{CP}(D^0 \to f_0(980) \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(0 \pm 35)\%$
$A_{CP}(D^0 \to f_0(1370) \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(25 \pm 18)\%$
$A_{CP}(D^0 \to f_0(1500) \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(0 \pm 18)\%$
$A_{CP}(D^0 \to f_0(1710) \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(0 \pm 24)\%$
$A_{CP}(D^0 \to f_2(1270) \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(-4 \pm 6)\%$
$A_{CP}(D^0 \to \sigma(400) \pi^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(6 \pm 8)\%$
$A_{CP}(\text{nonresonant } D^0 \to \pi^+ \pi^- \pi^0)$	[h]	$(-13 \pm 23)\%$
$A_{CP}(D^0, \overline{D}^0 \to 2\pi^+ 2\pi^-)$		$(0.5 \pm 1.2)\%$
$A_{CP}(D^0 \to a_1(1260)^+ \pi^- \to 2\pi^+ 2\pi^-)$		$(5 \pm 6)\%$
$A_{CP}(D^0 \to a_1(1260)^- \pi^+ \to 2\pi^+ 2\pi^-)$		$(14 \pm 18)\%$
$A_{CP}(D^0 \to \pi(1300)^+ \pi^- \to 2\pi^+ 2\pi^-)$		$(-2 \pm 15)\%$
$A_{CP}(D^0 \to \pi(1300)^- \pi^+ \to 2\pi^+ 2\pi^-)$		$(-6 \pm 30)\%$
$A_{CP}(D^0 \to a_1(1640)^+ \pi^- \to 2\pi^+ 2\pi^-)$		$(9 \pm 26)\%$
$A_{CP}(D^0 \to \pi_2(1670)^+ \pi^- \to 2\pi^+ 2\pi^-)$		$(7 \pm 18)\%$
$A_{CP}(D^0 \to \sigma f_0(1370) \to 2\pi^+ 2\pi^-)$		$(-15 \pm 19)\%$
$A_{CP}(D^0 \to \sigma \rho(770)^0 \to 2\pi^+ 2\pi^-)$		$(3 \pm 27)\%$
$A_{CP}(D^0 \to 2\rho(770)^0 \to 2\pi^+ 2\pi^-)$		$(-6 \pm 6)\%$
$A_{CP}(D^0 \to 2f_2(1270) \to 2\pi^+ 2\pi^-)$		$(-28 \pm 24)\%$
$A_{CP}(D^0 \to K^+ K^- \pi^0)$		$(-1.0 \pm 1.7)\%$
$A_{CP}(D^0 \to K^*(892)^+ K^- \to K^+ K^- \pi^0)$	[h]	$(-0.9 \pm 1.3)\%$
$A_{CP}(D^0 \to K^*(1410)^+ K^- \to K^+ K^- \pi^0)$	[h]	$(-21 \pm 24)\%$
$A_{CP}(D^0 \to (K^+ \pi^0)_S K^- \to K^+ K^- \pi^0)$	[h]	$(7 \pm 15)\%$
$A_{CP}(D^0 \to \phi(1020) \pi^0 \to K^+ K^- \pi^0)$	[h]	$(1.1 \pm 2.2)\%$
$A_{CP}(D^0 \to f_0(980) \pi^0 \to K^+ K^- \pi^0)$	[h]	$(-3 \pm 19)\%$
$A_{CP}(D^0 \to a_0(980)^0 \pi^0 \to K^+ K^- \pi^0)$	[h]	$(-5 \pm 16)\%$
$A_{CP}(D^0 \to f'_2(1525) \pi^0 \to K^+ K^- \pi^0)$	[h]	$(0 \pm 160)\%$
$A_{CP}(D^0 \to K^*(892)^- K^+ \to K^+ K^- \pi^0)$	[h]	$(-5 \pm 4)\%$
$A_{CP}(D^0 \to K^*(1410)^- K^+ \to K^+ K^- \pi^0)$	[h]	$(-17 \pm 29)\%$
$A_{CP}(D^0 \to (K^- \pi^0)_{S-wave} K^+ \to K^+ K^- \pi^0)$	[h]	$(-10 \pm 40)\%$
$A_{CP}(D^0 \to K^0_S \pi^0)$		$(-0.20 \pm 0.17)\%$
$A_{CP}(D^0 \to K^0_S \eta)$		$(0.5 \pm 0.5)\%$
$A_{CP}(D^0 \to K^0_S \eta')$		$(1.0 \pm 0.7)\%$
$A_{CP}(D^0 \to K^0_S \phi)$		$(-3 \pm 9)\%$
$A_{CP}(D^0 \to K^- \pi^+)$		$(0.2 \pm 0.5)\%$

$A_{CP}(D^0 \to K^+\pi^-)$	$(-0.9 \pm 1.4)\%$
$A_{CP}(D_{CP(\pm1)} \to K^\mp\pi^\pm)$	$(13.1 \pm 1.0)\%$
$A_{CP}(D^0 \to K^-\pi^+\pi^0)$	$(0.1 \pm 0.5)\%$
$A_{CP}(D^0 \to K^+\pi^-\pi^0)$	$(0 \pm 5)\%$
$A_{CP}(D^0 \to K^0_S\pi^+\pi^-)$	$(-0.1 \pm 0.8)\%$
$A_{CP}(D^0 \to K^*(892)^-\pi^+ \to K^0_S\pi^+\pi^-)$	$(0.4 \pm 0.5)\%$
$A_{CP}(D^0 \to K^*(892)^+\pi^- \to K^0_S\pi^+\pi^-)$	$(1 \pm 6)\%$
$A_{CP}(D^0 \to K^0_S\rho^0 \to K^0_S\pi^+\pi^-)$	$(-0.1 \pm 0.5)\%$
$A_{CP}(D^0 \to K^0_S\omega \to K^0_S\pi^+\pi^-)$	$(-13 \pm 7)\%$
$A_{CP}(D^0 \to K^0_S f_0(980) \to K^0_S\pi^+\pi^-)$	$(-0.4 \pm 2.7)\%$
$A_{CP}(D^0 \to K^0_S f_2(1270) \to K^0_S\pi^+\pi^-)$	$(-4 \pm 5)\%$
$A_{CP}(D^0 \to K^0_S f_0(1370) \to K^0_S\pi^+\pi^-)$	$(-1 \pm 9)\%$
$A_{CP}(D^0 \to \overline{K}^0\rho^0(1450) \to K^0_S\pi^+\pi^-)$	$(-4 \pm 10)\%$
$A_{CP}(D^0 \to \overline{K}^0 f_0(600) \to K^0_S\pi^+\pi^-)$	$(-3 \pm 5)\%$
$A_{CP}(D^0 \to K^*(1410)^-\pi^+ \to K^0_S\pi^+\pi^-)$	$(-2 \pm 9)\%$
$A_{CP}(D^0 \to K^*_0(1430)^-\pi^+ \to K^0_S\pi^+\pi^-)$	$(4 \pm 4)\%$
$A_{CP}(D^0 \to K^*_0(1430)^-\pi^+ \to K^0_S\pi^+\pi^-)$	$(12 \pm 15)\%$
$A_{CP}(D^0 \to K^*_2(1430)^-\pi^+ \to K^0_S\pi^+\pi^-)$	$(3 \pm 6)\%$
$A_{CP}(D^0 \to K^*_2(1430)^+\pi^- \to K^0_S\pi^+\pi^-)$	$(-10 \pm 32)\%$
$A_{CP}(D^0 \to K^-\pi^+\pi^+\pi^-)$	$(0.2 \pm 0.5)\%$
$A_{CP}(D^0 \to K^+\pi^-\pi^+\pi^-)$	$(-2 \pm 4)\%$
$A_{CP}(D^0 \to K^+K^-\pi^+\pi^-)$	$(1.3 \pm 1.7)\%$
$A_{CP}(D^0 \to K^*_1(1270)^+K^- \to K^+K^-\pi^+\pi^-)$	$(-2.3 \pm 1.7)\%$
$A_{CP}(D^0 \to K^*_1(1270)^+K^- \to K^{*0}\pi^+K^-)$	$(-1 \pm 10)\%$
$A_{CP}(D^0 \to K^*_1(1270)^-K^+ \to \overline{K}^{*0}\pi^-K^+)$	$(-10 \pm 32)\%$
$A_{CP}(D^0 \to K^*_1(1270)^-K^+ \to K^+K^-\pi^+\pi^-)$	$(1.7 \pm 3.5)\%$
$A_{CP}(D^0 \to K^*_1(1270)^+K^- \to \rho^0K^+K^-)$	$(-7 \pm 17)\%$
$A_{CP}(D^0 \to K^*_1(1270)^-K^+ \to \rho^0K^-K^+)$	$(10 \pm 13)\%$
$A_{CP}(D^0 \to K_1(1400)^+K^- \to K^+K^-\pi^+\pi^-)$	$(-4.4 \pm 2.1)\%$
$A_{CP}(D^0 \to K^*(1410)^+K^- \to K^{*0}\pi^+K^-)$	$(-20 \pm 17)\%$
$A_{CP}(D^0 \to K^*(1410)^-K^+ \to \overline{K}^{*0}\pi^-K^+)$	$(-1 \pm 14)\%$
$A_{CP}(D^0 \to K^*(1680)^+K^- \to K^+K^-\pi^+\pi^-)$	$(-17 \pm 29)\%$
$A_{CP}(K^{*0}\overline{K}^{*0})$ in $D^0, \overline{D}^0 \to K^{*0}\overline{K}^{*0}$	$(-5 \pm 14)\%$
$A_{CP}(D^0 \to K^{*0}\overline{K}^{*0}$ S-wave)	$(-3.9 \pm 2.2)\%$
$A_{CP}(\phi\rho^0)$ in $D^0, \overline{D}^0 \to \phi\rho^0$	$(1 \pm 9)\%$
$A_{CP}(D^0 \to \phi\rho^0$ S-wave)	$(-3 \pm 5)\%$
$A_{CP}(D^0 \to \phi\rho^0$ D-wave)	$(-37 \pm 19)\%$
$A_{CP}(D^0 \to \phi(\pi^+\pi^-)_{S-wave})$	$(6 \pm 6)\%$
$A_{CP}(D^0 \to K^*(892)^0(K^-\pi^+)_{S-wave})$	$(-10 \pm 40)\%$

$A_{CP}(D^0 \to K^+ K^- \pi^+ \pi^-$ non-resonant)	$(8 \pm 20)\%$
$A_{CP}((K^- \pi^+)_{P-wave}\,(K^+ \pi^-)_{S-wave})$	$(3 \pm 11)\%$
Local *CPV* p-value in D^0, $\overline{D}^0 \to \pi^+ \pi^- \pi^0$	4.9%
Local *CPV* p-value in D^0, $\overline{D}^0 \to \pi^+ \pi^- \pi^+ \pi^-$	$(0.6 \pm 0.2)\%$
Local *CPV* p-value in D^0, $\overline{D}^0 \to K^0_S \pi^+ \pi^-$	96%
Local *CPV* p-value in D^0, $\overline{D}^0 \to K^+ K^- \pi^0$	16.6%
Local *CPV* p-value in D^0, $\overline{D}^0 \to K^+ K^- \pi^+ \pi^-$	9.1%
$A_{CP}(D_s^\pm \to \mu^\pm \nu)$	$(-0.2 \pm 2.5)\%$
$A_{CP}(D_s^\pm \to K^\pm K^0_S)$	$(0.09 \pm 0.26)\%$
$A_{CP}(D_s^\pm \to K^+ K^- \pi^\pm)$	$(-0.5 \pm 0.9)\%$
$A_{CP}(D_s^\pm \to \phi \pi^\pm)$	$(-0.38 \pm 0.27)\%$
$A_{CP}(D_s^\pm \to K^\pm K^0_S \pi^0)$	$(-2 \pm 6)\%$
$A_{CP}(D_s^\pm \to 2K^0_S \pi^\pm)$	$(3 \pm 5)\%$
$A_{CP}(D_s^\pm \to K^+ K^- \pi^\pm \pi^0)$	$(0.0 \pm 3.0)\%$
$A_{CP}(D_s^\pm \to K^\pm K^0_S \pi^+ \pi^-)$	$(-6 \pm 5)\%$
$A_{CP}(D_s^\pm \to K^0_S K^\mp 2\pi^\pm)$	$(4.1 \pm 2.8)\%$
$A_{CP}(D_s^\pm \to \pi^+ \pi^- \pi^\pm)$	$(-0.7 \pm 3.1)\%$
$A_{CP}(D_s^\pm \to \pi^\pm \eta)$	$(0.3 \pm 0.4)\%$
$A_{CP}(D_s^\pm \to \pi^\pm \eta')$	$(-0.9 \pm 0.5)\%$
$A_{CP}(D_s^\pm \to \eta \pi^\pm \pi^0)$	$(-1 \pm 4)\%$
$A_{CP}(D_s^\pm \to \eta' \pi^\pm \pi^0)$	$(0 \pm 8)\%$
$A_{CP}(D_s^\pm \to K^\pm \pi^0)$	$(2 \pm 4)\%$ (S = 1.2)
$A_{CP}(D_s^\pm \to \overline{K}^0 / K^0 \pi^\pm)$	$(0.4 \pm 0.5)\%$
$A_{CP}(D_s^\pm \to K^0_S \pi^\pm)$	$(0.20 \pm 0.18)\%$
$A_{CP}(D_s^\pm \to K^\pm \pi^+ \pi^-)$	$(3.7 \pm 2.7)\%$
$A_{CP}(D_s^\pm \to K^\pm \eta)$	$(1.8 \pm 1.9)\%$
$A_{CP}(D_s^\pm \to K^\pm \eta'(958))$	$(6 \pm 19)\%$
$A_{CP}(B^+ \to J/\psi(1S) K^+)$	$(1.8 \pm 3.0) \times 10^{-3}$ (S = 1.5)
$A_{CP}(B^+ \to J/\psi(1S) \pi^+)$	$(1.8 \pm 1.2) \times 10^{-2}$ (S = 1.3)
$A_{CP}(B^+ \to J/\psi \rho^+)$	-0.05 ± 0.05
$A_{CP}(B^+ \to J/\psi K^*(892)^+)$	-0.048 ± 0.033
$A_{CP}(B^+ \to \eta_c K^+)$	0.01 ± 0.07 (S = 2.2)
$A_{CP}(B^+ \to \psi(2S) \pi^+)$	0.03 ± 0.06
$A_{CP}(B^+ \to \psi(2S) K^+)$	0.012 ± 0.020 (S = 1.5)
$A_{CP}(B^+ \to \psi(2S) K^*(892)^+)$	0.08 ± 0.21
$A_{CP}(B^+ \to \chi_{c1}(1P) \pi^+)$	0.07 ± 0.18
$A_{CP}(B^+ \to \chi_{c0} K^+)$	-0.20 ± 0.18 (S = 1.5)
$A_{CP}(B^+ \to \chi_{c1} K^+)$	-0.009 ± 0.033
$A_{CP}(B^+ \to \chi_{c1} K^*(892)^+)$	0.5 ± 0.5
$A_{CP}(B^+ \to \overline{D}^0 \pi^+)$	$(-3 \pm 5) \times 10^{-3}$

$A_{CP}(B^+ \to D_{CP(+1)}\pi^+)$	-0.0080 ± 0.0024
$A_{CP}(B^+ \to D_{CP(-1)}\pi^+)$	0.017 ± 0.026
$A_{CP}([K^\mp\pi^\pm\pi^+\pi^-]_D\pi^+)$	0.02 ± 0.05
$A_{CP}(B^+ \to [\pi^+\pi^+\pi^-\pi^-]_D K^+)$	0.10 ± 0.04
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^+\pi^-]_D K^*(892)^+)$	0.02 ± 0.11
$A_{CP}(B^+ \to \overline{D}^0 K^+)$	-0.017 ± 0.005
$A_{CP}([K^\mp\pi^\pm\pi^+\pi^-]_D K^+)$	-0.31 ± 0.11
$A_{CP}(B^+ \to [\pi^+\pi^+\pi^-\pi^-]_D\pi^+)$	$(-4 \pm 8) \times 10^{-3}$
$A_{CP}(B^+ \to [K^-\pi^+]_D K^+)$	-0.58 ± 0.21
$A_{CP}(B^+ \to [K^-\pi^+\pi^0]_D K^+)$	-0.27 ± 0.27 (S = 2.4)
$A_{CP}(B^+ \to [K^+\pi^-\pi^0]_D K^+)$	-0.024 ± 0.013
$A_{CP}(B^+ \to [K^+K^-\pi^0]_D K^+)$	0.07 ± 0.07
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D K^+)$	0.11 ± 0.04
$A_{CP}(B^+ \to \overline{D}^0 K^*(892)^+)$	-0.007 ± 0.019
$A_{CP}(B^+ \to [K^-\pi^+\pi^-\pi^+]_{\overline{D}} K^*(892)^+)$	-0.45 ± 0.25
$A_{CP}(B^+ \to [K^-\pi^+]_D\pi^+)$	0.00 ± 0.09
$A_{CP}(B^+ \to [K^-\pi^+\pi^0]_D\pi^+)$	0.08 ± 0.09
$A_{CP}(B^+ \to [K^+K^-\pi^0]_D\pi^+)$	-0.001 ± 0.019
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D\pi^+)$	0.001 ± 0.010
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\pi)}\pi^+)$	-0.09 ± 0.27
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\gamma)}\pi^+)$	-0.7 ± 0.6
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\pi)} K^+)$	0.8 ± 0.4
$A_{CP}(B^+ \to [K^-\pi^+]_{(D\gamma)} K^+)$	0.4 ± 1.0
$A_{CP}(B^+ \to [\pi^+\pi^-\pi^0]_D K^+)$	-0.02 ± 0.15
$A_{CP}(B^+ \to [K^0_S K^+\pi^-]_D K^+)$	0.10 ± 0.09
$A_{CP}(B^+ \to [K^0_S K^-\pi^+]_D K^+)$	-0.04 ± 0.08
$A_{CP}(B^+ \to [K^0_S K^-\pi^+]_D\pi^+)$	0.003 ± 0.015
$A_{CP}(B^+ \to [K^0_S K^+\pi^-]_D\pi^+)$	-0.034 ± 0.020
$A_{CP}(B^+ \to [K^*(892)^- K^+]_D K^+)$	0.08 ± 0.05
$A_{CP}(B^+ \to [K^*(892)^+ K^-]_D K^+)$	0.02 ± 0.10
$A_{CP}(B^+ \to [K^*(892)^+ K^-]_D\pi^+)$	0.007 ± 0.017
$A_{CP}(B^+ \to [K^*(892)^- K^+]_D\pi^+)$	-0.020 ± 0.011
$A_{ADS}(B^+ \to D K^+)$	-0.451 ± 0.026
$A_{ADS}(B^+ \to D\pi^+)$	0.129 ± 0.014
$A_{ADS}(B^+ \to D^*(D\gamma)K^+)$	-0.6 ± 1.3
$A_{ADS}(B^+ \to D^*(D\pi^0)K^+)$	0.72 ± 0.29
$A_{ADS}(B^+ \to D^*(D\gamma)\pi^+)$	0.08 ± 0.13
$A_{ADS}(B^+ \to D^*(D\pi^0)\pi^+)$	-0.14 ± 0.06
$A_{ADS}(B^+ \to [K^-\pi^+]_D K^+\pi^-\pi^+)$	-0.33 ± 0.35
$A_{ADS}(B^+ \to [K^-\pi^+]_D\pi^+\pi^-\pi^+)$	-0.01 ± 0.09

$A_{CP}(B^+ \to D_{CP(-1)} K^+)$	-0.10 ± 0.07
$A_{CP}(B^+ \to [K^+ K^-]_D K^+ \pi^- \pi^+)$	-0.04 ± 0.06
$A_{CP}(B^+ \to [\pi^+ \pi^-]_D K^+ \pi^- \pi^+)$	-0.05 ± 0.10
$A_{CP}(B^+ \to [K^- \pi^+]_D K^+ \pi^- \pi^+)$	0.013 ± 0.023
$A_{CP}(B^+ \to [K^+ K^-]_D \pi^+ \pi^- \pi^+)$	-0.019 ± 0.015
$A_{CP}(B^+ \to [\pi^+ \pi^-]_D \pi^+ \pi^- \pi^+)$	-0.013 ± 0.019
$A_{CP}(B^+ \to [K^- \pi^+]_D \pi^+ \pi^- \pi^+)$	-0.002 ± 0.011
$A_{CP}(B^+ \to \overline{D}^{*0} \pi^+)$	-0.0004 ± 0.0021 (S = 1.1)
$A_{CP}(B^+ \to D^{*0}_{CP(+1)} \pi^+)$	0.010 ± 0.007
$A_{CP}(B^+ \to D^{*0}_{CP(-1)} \pi^+)$	-0.09 ± 0.05
$A_{CP}(B^+ \to D^{*0} K^+)$	0.012 ± 0.010 (S = 1.5)
$A_{CP}(B^+ \to D^{*0}_{CP(+1)} K^+)$	-0.09 ± 0.05 (S = 2.6)
$A_{CP}(B^+ \to D^{*}_{CP(-1)} K^+)$	0.07 ± 0.10
$A_{CP}(B^+ \to D_{CP(+1)} K^*(892)^+)$	0.08 ± 0.06
$A_{CP}(B^+ \to D_{CP(-1)} K^*(892)^+)$	-0.23 ± 0.22
$A_{CP}(B^+ \to D_s^+ \phi)$	0.0 ± 0.4
$A_{CP}(B^+ \to D_s^+ \overline{D}^0)$	$(-0.4 \pm 0.7)\%$
$A_{CP}(B^+ \to D^{*+} \overline{D}^{*0})$	-0.15 ± 0.11
$A_{CP}(B^+ \to D^{*+} \overline{D}^0)$	-0.06 ± 0.13
$A_{CP}(B^+ \to D^+ \overline{D}^{*0})$	0.13 ± 0.18
$A_{CP}(B^+ \to D^+ \overline{D}^0)$	0.016 ± 0.025
$A_{CP}(B^+ \to K^0_S \pi^+)$	-0.017 ± 0.016
$A_{CP}(B^+ \to K^+ \pi^0)$	0.030 ± 0.013
$A_{CP}(B^+ \to \eta' K^+)$	0.004 ± 0.011
$A_{CP}(B^+ \to \eta' K^*(892)^+)$	-0.26 ± 0.27
$A_{CP}(B^+ \to \eta' K^*_0(1430)^+)$	0.06 ± 0.20
$A_{CP}(B^+ \to \eta' K^*_2(1430)^+)$	0.15 ± 0.13
$A_{CP}(B^+ \to \eta K^*(892)^+)$	0.02 ± 0.06
$A_{CP}(B^+ \to \eta K^*_0(1430)^+)$	0.05 ± 0.13
$A_{CP}(B^+ \to \eta K^*_2(1430)^+)$	-0.45 ± 0.30
$A_{CP}(B^+ \to \omega K^+)$	-0.02 ± 0.04
$A_{CP}(B^+ \to \omega K^{*+})$	0.29 ± 0.35
$A_{CP}(B^+ \to \omega (K\pi)^{*+}_0)$	-0.10 ± 0.09
$A_{CP}(B^+ \to \omega K^*_2(1430)^+)$	0.14 ± 0.15
$A_{CP}(B^+ \to K^{*0} \pi^+)$	-0.04 ± 0.09 (S = 2.1)
$A_{CP}(B^+ \to K^*(892)^+ \pi^0)$	-0.39 ± 0.21 (S = 1.6)
$A_{CP}(B^+ \to K^+ \pi^- \pi^+)$	0.027 ± 0.008
$A_{CP}(B^+ \to K^+ K^- K^+ \text{nonresonant})$	0.06 ± 0.05
$A_{CP}(B^+ \to f(980)^0 K^+)$	-0.08 ± 0.09

$A_{CP}(B^+ \to f_0(1500) K^+)$	0.28 ± 0.30
$A_{CP}(B^+ \to f'_2(1525)^0 K^+)$	$-0.08^{+0.05}_{-0.04}$
$A_{CP}(B^+ \to K^0 \pi^+ \pi^0)$	0.07 ± 0.06
$A_{CP}(B^+ \to K^*_0(1430)^0 \pi^+)$	0.061 ± 0.032
$A_{CP}(B^+ \to K^*_0(1430)^+ \pi^0)$	$0.26^{+0.18}_{-0.14}$
$A_{CP}(B^+ \to K^*_2(1430)^0 \pi^+)$	$0.05^{+0.29}_{-0.24}$
$A_{CP}(B^+ \to K^+ \pi^0 \pi^0)$	-0.06 ± 0.07
$A_{CP}(B^+ \to K^0 \rho^+)$	-0.03 ± 0.15
$A_{CP}(B^+ \to K^{*+} \pi^+ \pi^-)$	0.07 ± 0.08
$A_{CP}(B^+ \to \rho^0 K^*(892)^+)$	0.31 ± 0.13
$A_{CP}(B^+ \to K^*(892)^+ f_0(980))$	-0.15 ± 0.12
$A_{CP}(B^+ \to a_1^+ K^0)$	0.12 ± 0.11
$A_{CP}(B^+ \to b_1^+ K^0)$	-0.03 ± 0.15
$A_{CP}(B^+ \to K^*(892)^0 \rho^+)$	-0.01 ± 0.16
$A_{CP}(B^+ \to b_1^0 K^+)$	-0.46 ± 0.20
$A_{CP}(B^+ \to K^0 K^+)$	0.04 ± 0.14
$A_{CP}(B^+ \to K^0_S K^+)$	-0.21 ± 0.14
$A_{CP}(B^+ \to K^+ K^0_S K^0_S)$	0.025 ± 0.031
$A_{CP}(B^+ \to K^+ K^- \pi^+$ nonresonant)	-0.11 ± 0.06
$A_{CP}(B^+ \to K^+ \overline{K}^*(892)^0)$	0.12 ± 0.10
$A_{CP}(B^+ \to K^+ \overline{K}^*_0(1430)^0)$	0.10 ± 0.17
$A_{CP}(B^+ \to \phi \pi^+)$	0.1 ± 0.5
$A_{CP}(B^+ \to \phi K^+)$	0.024 ± 0.028 (S = 2.3)
$A_{CP}(B^+ \to X_0(1550) K^+)$	-0.04 ± 0.07
$A_{CP}(B^+ \to K^{*+} K^+ K^-)$	0.11 ± 0.09
$A_{CP}(B^+ \to \phi K^*(892)^+)$	-0.01 ± 0.08
$A_{CP}(B^+ \to \phi (K\pi)^{*+}_0)$	0.04 ± 0.16
$A_{CP}(B^+ \to \phi K_1(1270)^+)$	0.15 ± 0.20
$A_{CP}(B^+ \to \phi K^*_2(1430)^+)$	-0.23 ± 0.20
$A_{CP}(B^+ \to K^+ \phi \phi)$	-0.08 ± 0.07
$A_{CP}(B^+ \to K^+ [\phi\phi]_{\eta_c})$	0.10 ± 0.08
$A_{CP}(B^+ \to K^*(892)^+ \gamma)$	0.014 ± 0.018
$A_{CP}(B^+ \to X_s \gamma)$	0.028 ± 0.019
$A_{CP}(B^+ \to \eta K^+ \gamma)$	-0.12 ± 0.07
$A_{CP}(B^+ \to \phi K^+ \gamma)$	-0.13 ± 0.11 (S = 1.1)
$A_{CP}(B^+ \to \rho^+ \gamma)$	-0.11 ± 0.33
$A_{CP}(B^+ \to \pi^+ \pi^0)$	0.03 ± 0.04
$A_{CP}(B^+ \to \rho^0 \pi^+)$	0.009 ± 0.019
$A_{CP}(B^+ \to \rho^0(1450) \pi^+)$	-0.11 ± 0.05
$A_{CP}(B^+ \to \pi^+ \pi^- \pi^+$ nonresonant)	$-0.14^{+0.23}_{-0.16}$

$A_{CP}(B^+ \to \rho^+ \pi^0)$	0.02 ± 0.11
$A_{CP}(B^+ \to \rho^+ \rho^0)$	-0.05 ± 0.05
$A_{CP}(B^+ \to \omega \pi^+)$	-0.04 ± 0.05
$A_{CP}(B^+ \to \omega \rho^+)$	-0.20 ± 0.09
$A_{CP}(B^+ \to \eta \pi^+)$	-0.14 ± 0.07 (S = 1.4)
$A_{CP}(B^+ \to \eta \rho^+)$	0.11 ± 0.11
$A_{CP}(B^+ \to \eta' \pi^+)$	0.06 ± 0.16
$A_{CP}(B^+ \to \eta' \rho^+)$	0.26 ± 0.17
$A_{CP}(B^+ \to b_1^0 \pi^+)$	0.05 ± 0.16
$A_{CP}(B^+ \to p \overline{p} \pi^+)$	0.00 ± 0.04
$A_{CP}(B^+ \to p \overline{p} K^+)$	0.00 ± 0.04 (S = 2.2)
$A_{CP}(B^+ \to p \overline{p} K^*(892)^+)$	0.21 ± 0.16 (S = 1.4)
$A_{CP}(B^+ \to p \overline{\Lambda} \gamma)$	0.17 ± 0.17
$A_{CP}(B^+ \to p \overline{\Lambda} \pi^0)$	0.01 ± 0.17
$A_{CP}(B^+ \to K^+ \ell^+ \ell^-)$	-0.02 ± 0.08
$A_{CP}(B^+ \to K^+ e^+ e^-)$	0.14 ± 0.14
$A_{CP}(B^+ \to K^+ \mu^+ \mu^-)$	0.011 ± 0.017
$A_{CP}(B^+ \to \pi^+ \mu^+ \mu^-)$	-0.11 ± 0.12
$A_{CP}(B^+ \to K^{*+} \ell^+ \ell^-)$	-0.09 ± 0.14
$A_{CP}(B^+ \to K^* e^+ e^-)$	-0.14 ± 0.23
$A_{CP}(B^+ \to K^* \mu^+ \mu^-)$	-0.12 ± 0.24
$\mathrm{Re}(\epsilon_{B^0})/(1+\lvert\epsilon_{B^0}\rvert^2)$	$(-0.5 \pm 0.4) \times 10^{-3}$
$A_{T/CP}(B^0 \leftrightarrow \overline{B}^0)$	0.005 ± 0.018
$A_{CP}(B^0 \to D^*(2010)^+ D^-)$	0.013 ± 0.014
$A_{CP}(B^0 \to \overline{D}^0 \pi^0)$	$(0.4 \pm 2.4) \times 10^{-2}$
$A_{CP}(B^0 \to [K^+ K^-]_D K^*(892)^0)$	-0.05 ± 0.10
$A_{CP}(B^0 \to [K^+ \pi^-]_D K^*(892)^0)$	0.047 ± 0.029
$A_{CP}(B^0 \to [K^+ \pi^- \pi^+ \pi^-]_D K^*(892)^0)$	0.037 ± 0.034
$A_{CP}(B^0 \to [K^- \pi^+]_D K^*(892)^0)$	0.19 ± 0.19
$A_{CP}(B^0 \to [K^- \pi^+ \pi^+ \pi^-]_D K^*(892)^0)$	-0.01 ± 0.24
$R_d^+(B^0 \to [\pi^\pm K^\mp]_D K^{*0})$	0.064 ± 0.021
$R_d^-(\overline{B}^0 \to [\pi^\mp K^\pm]_D K^{*0})$	0.095 ± 0.021
$A_{CP}(B^0 \to [\pi^+ \pi^-]_D K^*(892)^0)$	-0.18 ± 0.14
$A_{CP}(B^0 \to [\pi^+ \pi^- \pi^+ \pi^-]_D K^*(892)^0)$	-0.03 ± 0.15
$R_d^+(B^0 \to [\pi^\pm K^\mp \pi^\pm \pi^\mp]_D K^{*0})$	0.074 ± 0.026
$R_d^-(\overline{B}^0 \to [\pi^\mp K^\pm \pi^\pm \pi^\mp]_D K^{*0})$	0.072 ± 0.025
$A_{CP}(B^0 \to \eta' K^*(892)^0)$	-0.07 ± 0.18
$A_{CP}(B^0 \to \eta' K_0^*(1430)^0)$	-0.19 ± 0.17
$A_{CP}(B^0 \to \eta' K_2^*(1430)^0)$	0.14 ± 0.18
$A_{CP}(B^0 \to \eta K_0^*(1430)^0)$	0.06 ± 0.13

$A_{CP}(B^0 \to \eta K_2^*(1430)^0)$	-0.07 ± 0.19
$A_{CP}(B^0 \to b_1 K^+)$	-0.07 ± 0.12
$A_{CP}(B^0 \to \omega K^{*0})$	0.45 ± 0.25
$A_{CP}(B^0 \to \omega (K\pi)_0^{*0})$	-0.07 ± 0.09
$A_{CP}(B^0 \to \omega K_2^*(1430)^0)$	-0.37 ± 0.17
$A_{CP}(B^0 \to K^+ \pi^- \pi^0)$	$(0 \pm 6) \times 10^{-2}$
$A_{CP}(B^0 \to \rho^- K^+)$	0.20 ± 0.11
$A_{CP}(B^0 \to \rho(1450)^- K^+)$	-0.10 ± 0.33
$A_{CP}(B^0 \to \rho(1700)^- K^+)$	-0.4 ± 0.6
$A_{CP}(B^0 \to K^+ \pi^- \pi^0 \text{nonresonant})$	0.10 ± 0.18
$A_{CP}(B^0 \to K^0 \pi^+ \pi^-)$	-0.01 ± 0.05
$A_{CP}(B^0 \to (K\pi)_0^{*+} \pi^-)$	0.02 ± 0.04
$A_{CP}(B^0 \to K_2^*(1430)^+ \pi^-)$	-0.29 ± 0.24
$A_{CP}(B^0 \to K^*(1680)^+ \pi^-)$	-0.07 ± 0.14
$A_{CP}(B^0 \to f_0(980) K_S^0)$	0.28 ± 0.31
$A_{CP}(B^0 \to (K\pi)_0^{*0} \pi^0)$	-0.15 ± 0.11
$A_{CP}(B^0 \to K^{*0} \pi^0)$	-0.15 ± 0.13
$A_{CP}(B^0 \to K^*(892)^0 \pi^+ \pi^-)$	0.07 ± 0.05
$A_{CP}(B^0 \to K^*(892)^0 \rho^0)$	-0.06 ± 0.09
$A_{CP}(B^0 \to K^{*0} f_0(980))$	0.07 ± 0.10
$A_{CP}(B^0 \to K^{*+} \rho^-)$	0.21 ± 0.15
$A_{CP}(B^0 \to K^*(892)^0 K^+ K^-)$	0.01 ± 0.05
$A_{CP}(B^0 \to a_1^- K^+)$	-0.16 ± 0.12
$A_{CP}(B^0 \to K^0 K^0)$	-0.6 ± 0.7
$A_{CP}(B^0 \to K^*(892)^0 \phi)$	0.00 ± 0.04
$A_{CP}(B^0 \to K^*(892)^0 K^- \pi^+)$	0.2 ± 0.4
$A_{CP}(B^0 \to \phi (K\pi)_0^{*0})$	0.12 ± 0.08
$A_{CP}(B^0 \to \phi K_2^*(1430)^0)$	-0.11 ± 0.10
$A_{CP}(B^0 \to K^*(892)^0 \gamma)$	-0.006 ± 0.011
$A_{CP}(B^0 \to K_2^*(1430)^0 \gamma)$	-0.08 ± 0.15
$A_{CP}(B^0 \to X_s \gamma)$	-0.009 ± 0.018
$A_{CP}(B^0 \to \rho^+ \pi^-)$	0.13 ± 0.06 (S = 1.1)
$A_{CP}(B^0 \to \rho^- \pi^+)$	-0.08 ± 0.08
$A_{CP}(B^0 \to a_1(1260)^\pm \pi^\mp)$	-0.07 ± 0.06
$A_{CP}(B^0 \to b_1^- \pi^+)$	-0.05 ± 0.10
$A_{CP}(B^0 \to p \overline{p} K^*(892)^0)$	0.05 ± 0.12
$A_{CP}(B^0 \to p \overline{\Lambda} \pi^-)$	0.04 ± 0.07
$A_{CP}(B^0 \to K^{*0} \ell^+ \ell^-)$	-0.05 ± 0.10
$A_{CP}(B^0 \to K^{*0} e^+ e^-)$	-0.21 ± 0.19
$A_{CP}(B^0 \to K^{*0} \mu^+ \mu^-)$	-0.034 ± 0.024

$C_{D^*(2010)^- D^+}$ $(B^0 \to D^*(2010)^- D^+)$	-0.02 ± 0.08
$C_{D^*(2010)^+ D^-}$ $(B^0 \to D^*(2010)^+ D^-)$	-0.03 ± 0.09 (S = 1.1)
$C_{D^{*+} D^{*-}}$ $(B^0 \to D^{*+} D^{*-})$	0.01 ± 0.09 (S = 1.6)
C_+ $(B^0 \to D^{*+} D^{*-})$	0.00 ± 0.10 (S = 1.6)
C_- $(B^0 \to D^{*+} D^{*-})$	0.19 ± 0.31
S_- $(B^0 \to D^{*+} D^{*-})$	0.1 ± 1.6 (S = 3.5)
C $(B^0 \to D^*(2010)^+ D^*(2010)^- K^0_S)$	0.01 ± 0.29
S $(B^0 \to D^*(2010)^+ D^*(2010)^- K^0_S)$	0.1 ± 0.4
$C_{D^+ D^-}$ $(B^0 \to D^+ D^-)$	-0.22 ± 0.24 (S = 2.5)
$C_{J/\psi(1S)\pi^0}$ $(B^0 \to J/\psi(1S)\pi^0)$	0.03 ± 0.17 (S = 1.5)
$C(B^0 \to J/\psi(1S)\rho^0)$	-0.06 ± 0.06
$C_{D^{(*)}_{CP} h^0}$ $(B^0 \to D^{(*)}_{CP} h^0)$	-0.02 ± 0.08
$S_{D^{(*)}_{CP} h^0}$ $(B^0 \to D^{(*)}_{CP} h^0)$	-0.66 ± 0.12
$C_{K^0 \pi^0}$ $(B^0 \to K^0 \pi^0)$	0.00 ± 0.13 (S = 1.4)
$C_{\eta'(958) K^0_S}$ $(B^0 \to \eta'(958) K^0_S)$	-0.04 ± 0.20 (S = 2.5)
$S_{\eta'(958) K^0_S}$ $(B^0 \to \eta'(958) K^0_S)$	0.43 ± 0.17 (S = 1.5)
$C_{\eta' K^0}$ $(B^0 \to \eta' K^0)$	-0.06 ± 0.04
$C_{\omega K^0_S}$ $(B^0 \to \omega K^0_S)$	0.0 ± 0.4 (S = 3.0)
$S_{\omega K^0_S}$ $(B^0 \to \omega K^0_S)$	0.70 ± 0.21
C $(B^0 \to K^0_S \pi^0 \pi^0)$	-0.21 ± 0.20
S $(B^0 \to K^0_S \pi^0 \pi^0)$	$0.89^{+0.27}_{-0.30}$
$C_{\rho^0 K^0_S}$ $(B^0 \to \rho^0 K^0_S)$	-0.04 ± 0.20
$S_{\rho^0 K^0_S}$ $(B^0 \to \rho^0 K^0_S)$	$0.50^{+0.17}_{-0.21}$
$C_{f_0(980) K^0_S}$ $(B^0 \to f_0(980) K^0_S)$	0.29 ± 0.20
$S_{f_0(980) K^0_S}$ $(B^0 \to f_0(980) K^0_S)$	-0.50 ± 0.16
$S_{f_2(1270) K^0_S}$ $(B^0 \to f_2(1270) K^0_S)$	-0.5 ± 0.5
$C_{f_2(1270) K^0_S}$ $(B^0 \to f_2(1270) K^0_S)$	0.3 ± 0.4
$S_{f_x(1300) K^0_S}$ $(B^0 \to f_x(1300) K^0_S)$	-0.2 ± 0.5
$C_{f_x(1300) K^0_S}$ $(B^0 \to f_x(1300) K^0_S)$	0.13 ± 0.35
$S_{K^0 \pi^+ \pi^-}$ $(B^0 \to K^0 \pi^+ \pi^-$ nonresonant)	-0.01 ± 0.33
$C_{K^0 \pi^+ \pi^-}$ $(B^0 \to K^0 \pi^+ \pi^-$ nonresonant)	0.01 ± 0.26
$C_{K^0_S K^0_S}$ $(B^0 \to K^0_S K^0_S)$	0.0 ± 0.4 (S = 1.4)

$S_{K^0_S K^0_S}$ $(B^0 \to K^0_S K^0_S)$	-0.8 ± 0.5
$C_{K^+ K^- K^0_S}$ $(B^0 \to K^+ K^- K^0_S$ nonresonant)	0.06 ± 0.08
$C_{K^+ K^- K^0_S}$ $(B^0 \to K^+ K^- K^0_S$ inclusive)	0.01 ± 0.09
$C_{\phi K^0_S}$ $(B^0 \to \phi K^0_S)$	0.01 ± 0.14
$S_{\phi K^0_S}$ $(B^0 \to \phi K^0_S)$	0.59 ± 0.14
$C_{K_S K_S K_S}(B^0 \to K_S K_S K_S)$	-0.14 ± 0.12
$S_{K_S K_S K_S}(B^0 \to K_S K_S K_S)$	-0.82 ± 0.17
$C_{K^0_S \pi^0 \gamma}(B^0 \to K^0_S \pi^0 \gamma)$	0.36 ± 0.33
$S_{K^0_S \pi^0 \gamma}(B^0 \to K^0_S \pi^0 \gamma)$	-0.8 ± 0.6
$C_{K^*(892)^0 \gamma}$ $(B^0 \to K^*(892)^0 \gamma)$	-0.04 ± 0.16 (S = 1.2)
$S_{K^*(892)^0 \gamma}$ $(B^0 \to K^*(892)^0 \gamma)$	-0.15 ± 0.22
$C_{\eta K^0 \gamma}$ $(B^0 \to \eta K^0 \gamma)$	0.1 ± 0.4 (S = 1.4)
$S_{\eta K^0 \gamma}$ $(B^0 \to \eta K^0 \gamma)$	-0.5 ± 0.5 (S = 1.2)
$C_{K^0 \phi \gamma}$ $(B^0 \to K^0 \phi \gamma)$	-0.3 ± 0.6
$S_{K^0 \phi \gamma}$ $(B^0 \to K^0 \phi \gamma)$	$0.7^{+0.7}_{-1.1}$
$C(B^0 \to K^0_S \rho^0 \gamma)$	-0.05 ± 0.19
$S(B^0 \to K^0_S \rho^0 \gamma)$	-0.04 ± 0.23
C $(B^0 \to \rho^0 \gamma)$	0.4 ± 0.5
S $(B^0 \to \rho^0 \gamma)$	-0.8 ± 0.7
$C_{\pi^0 \pi^0}(B^0 \to \pi^0 \pi^0)$	-0.33 ± 0.22
$C_{\rho \pi}$ $(B^0 \to \rho^+ \pi^-)$	-0.03 ± 0.07 (S = 1.2)
$S_{\rho \pi}$ $(B^0 \to \rho^+ \pi^-)$	0.05 ± 0.07
$\Delta S_{\rho \pi}$ $(B^0 \to \rho^+ \pi^-)$	0.01 ± 0.08
$C_{\rho^0 \pi^0}$ $(B^0 \to \rho^0 \pi^0)$	0.27 ± 0.24
$S_{\rho^0 \pi^0}$ $(B^0 \to \rho^0 \pi^0)$	-0.23 ± 0.34
$C_{a_1 \pi}$ $(B^0 \to a_1(1260)^+ \pi^-)$	-0.05 ± 0.11
$S_{a_1 \pi}$ $(B^0 \to a_1(1260)^+ \pi^-)$	-0.2 ± 0.4 (S = 3.2)
$\Delta C_{a_1 \pi}$ $(B^0 \to a_1(1260)^+ \pi^-)$	0.43 ± 0.14 (S = 1.3)
$\Delta S_{a_1 \pi}$ $(B^0 \to a_1(1260)^+ \pi^-)$	-0.11 ± 0.12
C $(B^0 \to b_1^- K^+)$	-0.22 ± 0.24
ΔC $(B^0 \to b_1^- \pi^+)$	-1.04 ± 0.24
$C_{\rho^0 \rho^0}$ $(B^0 \to \rho^0 \rho^0)$	0.2 ± 0.9
$S_{\rho^0 \rho^0}$ $(B^0 \to \rho^0 \rho^0)$	0.3 ± 0.7
$C_{\rho \rho}$ $(B^0 \to \rho^+ \rho^-)$	0.00 ± 0.09

$S_{\rho\rho}$ ($B^0 \rightarrow \rho^+ \rho^-$)	-0.14 ± 0.13
$\lvert\lambda\rvert$ ($B^0 \rightarrow J/\psi K^*(892)^0$)	<0.25, CL = 95%
cos 2β ($B^0 \rightarrow J/\psi K^*(892)^0$)	$1.7^{+0.7}_{-0.9}$ (S = 1.6)
cos 2β ($B^0 \rightarrow [K^0_S \pi^+ \pi^-]_{D^{(*)}} h^0$)	0.91 ± 0.25
$(S_+ + S_-)/2$ ($B^0 \rightarrow D^{*-} \pi^+$)	-0.039 ± 0.011
$(S_- - S_+)/2$ ($B^0 \rightarrow D^{*-} \pi^+$)	-0.009 ± 0.015
$(S_+ + S_-)/2$ ($B^0 \rightarrow D^- \pi^+$)	-0.046 ± 0.023
$(S_- - S_+)/2$ ($B^0 \rightarrow D^- \pi^+$)	-0.022 ± 0.021
S_+ ($B^0 \rightarrow D^- \pi^+$)	0.058 ± 0.023
S_- ($B^0 \rightarrow D^+ \pi^-$)	0.038 ± 0.021
$(S_+ + S_-)/2$ ($B^0 \rightarrow D^- \rho^+$)	-0.024 ± 0.032
$(S_- - S_+)/2$ ($B^0 \rightarrow D^- \rho^+$)	-0.10 ± 0.06
$C_{\eta_c K^0_S}$ ($B^0 \rightarrow \eta_c K^0_S$)	0.08 ± 0.13
$C_{c\overline{c}K^{(*)0}}$ ($B^0 \rightarrow c\overline{c}K^{(*)0}$)	$(-0.5 \pm 1.5) \times 10^{-2}$
$C_{J/\psi(\mathrm{nS})K^0}$ ($B^0 \rightarrow J/\psi(\mathrm{nS}) K^0$)	$(-0.8 \pm 1.7) \times 10^{-2}$
$C_{J/\psi K^{*0}}$ ($B^0 \rightarrow J/\psi K^{*0}$)	0.03 ± 0.10
$S_{J/\psi K^{*0}}$ ($B^0 \rightarrow J/\psi K^{*0}$)	0.60 ± 0.25
$C_{\chi_{c0} K^0_S}$ ($B^0 \rightarrow \chi_{c0} K^0_S$)	$-0.3^{+0.5}_{-0.4}$
$S_{\chi_{c0} K^0_S}$ ($B^0 \rightarrow \chi_{c0} K^0_S$)	-0.7 ± 0.5
$C_{\chi_{c1} K^0_S}$ ($B^0 \rightarrow \chi_{c1} K^0_S$)	0.06 ± 0.07
$\sin(2\beta_{\mathrm{eff}})$($B^0 \rightarrow \phi K^0$)	0.22 ± 0.30
$\sin(2\beta_{\mathrm{eff}})$($B^0 \rightarrow \phi K^*_0(1430)^0$)	$0.97^{+0.03}_{-0.52}$
$\sin(2\beta_{\mathrm{eff}})$($B^0 \rightarrow [K^0_S \pi^+ \pi^-]_{D^{(*)}} h^0$)	0.80 ± 0.16
$\lvert\lambda\rvert$ ($B^0 \rightarrow [K^0_S \pi^+ \pi^-]_{D^{(*)}} h^0$)	1.01 ± 0.08
$\lvert\sin(2\beta + \gamma)\rvert$	>0.40, CL = 90%
$2\beta + \gamma$	$(83 \pm 60)^\circ$
x_+($B^0 \rightarrow D K^{*0}$)	0.04 ± 0.17
x_-($B^0 \rightarrow D K^{*0}$)	-0.16 ± 0.14
y_-($B^0 \rightarrow D K^{*0}$)	0.20 ± 0.25 (S = 1.2)
A_{CP}($B \rightarrow K^*(892)\gamma$)	-0.003 ± 0.011
A_{CP}($B \rightarrow s\gamma$)	0.015 ± 0.011
A_{CP}($B \rightarrow (s+d)\gamma$)	0.010 ± 0.031
A_{CP}($B \rightarrow X_s \ell^+ \ell^-$)	0.04 ± 0.11
A_{CP}($B \rightarrow K^* e^+ e^-$)	-0.18 ± 0.15
A_{CP}($B \rightarrow K^* \mu^+ \mu^-$)	-0.03 ± 0.13
A_{CP}($B \rightarrow K^* \ell^+ \ell^-$)	-0.04 ± 0.07
A_{CP}($B \rightarrow \eta$anything)	$-0.13^{+0.04}_{-0.05}$

$\Delta A_{CP}(X_s\gamma) = A_{CP}(B^{\pm} \to X_s\gamma) - A_{CP}(B^0 \to X_s\gamma)$	0.041 ± 0.023
$\overline{A}_{CP}(B \to X_s\gamma) = (A_{CP}(B^+ \to X_s\gamma) + A_{CP}(B^0 \to X_s\gamma))/2$	0.009 ± 0.012
$\overline{A}_{CP}(B \to K^*\gamma) = (A_{CP}(B^+ \to K^{*+}\gamma) + A_{CP}(B^0 \to K^{*0}\gamma))/2$	-0.001 ± 0.014
$\mathrm{Re}(\epsilon_{B_s^0}) / (1 + \lvert\epsilon_{B_s^0}\rvert^2)$	$(-0.15 \pm 0.70) \times 10^{-3}$
$S_{KK}(B_s^0 \to K^+K^-)$	0.14 ± 0.05 (S = 1.3)
$\delta_B(B_s^0 \to D_s^{\pm}K^{\mp}\pi^{\pm}\pi^{\mp})$	$(-6^{+10}_{-13})^{\circ}$
CP Violation phase β_s	$(2.5 \pm 1.0) \times 10^{-2}$ rad
$A_{CP}^{L}(B_s \to J/\psi\overline{K}^*(892)^0)$	-0.05 ± 0.06
$A_{CP}^{\parallel}(B_s \to J/\psi\overline{K}^*(892)^0)$	0.17 ± 0.15
$A_{CP}^{\perp}(B_s \to J/\psi\overline{K}^*(892)^0)$	-0.05 ± 0.10
$A_{CP}(B_s^0 \to [K^+K^-]_D\overline{K}^*(892)^0)$	-0.04 ± 0.07
$A_{CP}(B_s^0 \to [\pi^+K^-]_D K^*(892)^0)$	-0.01 ± 0.04
$A_{CP}(B_s^0 \to [\pi^+\pi^-]_D K^*(892)^0)$	0.06 ± 0.13
$S(B_s^0 \to \phi\gamma)$	0.43 ± 0.32
$C(B_s^0 \to \phi\gamma)$	0.11 ± 0.31
$\Gamma(\eta_c(1S) \to \pi^+\pi^-)/\Gamma_{\text{total}}$	$<1.1 \times 10^{-4}$, CL = 90%
$\Gamma(\eta_c(1S) \to \pi^0\pi^0)/\Gamma_{\text{total}}$	$<4 \times 10^{-5}$, CL = 90%
$\Gamma(\eta_c(1S) \to K^+K^-)/\Gamma_{\text{total}}$	$<6 \times 10^{-4}$, CL = 90%
$\Gamma(\eta_c(1S) \to K_S^0K_S^0)/\Gamma_{\text{total}}$	$<3.1 \times 10^{-4}$, CL = 90%
n electric dipole moment	$<0.18 \times 10^{-25}$ e cm, CL = 90%
$(\alpha_- + \alpha_+)/(\alpha_- - \alpha_+)$ in $\Lambda \to p\pi^-$, $\overline{\Lambda} \to \overline{p}\pi^+$	-0.002 ± 0.004
$\frac{[\alpha(\Xi^-)\alpha_-(\Lambda)-\alpha(\overline{\Xi}^+)\alpha_+(\overline{\Lambda})]}{[\alpha(\Xi^-)\alpha_-(\Lambda)+\alpha(\overline{\Xi}^+)\alpha_+(\overline{\Lambda})]}$	$(0 \pm 7) \times 10^{-4}$
$(\alpha + \overline{\alpha})/(\alpha - \overline{\alpha})$ in $\Omega^- \to \Lambda K^-$, $\overline{\Omega}^+ \to \overline{\Lambda}K^+$	-0.02 ± 0.13
$(\alpha + \overline{\alpha})/(\alpha - \overline{\alpha})$ in $\Lambda_c^+ \to \Lambda\pi^+$, $\overline{\Lambda}_c^- \to \overline{\Lambda}\pi^-$	-0.07 ± 0.31
$(\alpha + \overline{\alpha})/(\alpha - \overline{\alpha})$ in $\Lambda_c^+ \to \Lambda e^+\nu_e$, $\overline{\Lambda}_c^- \to \overline{\Lambda}e^-\overline{\nu}_e$	0.00 ± 0.04
$A_{CP}(\Lambda_b \to p\pi^-)$	-0.025 ± 0.029 (S = 1.2)
$A_{CP}(\Lambda_b \to pK^-)$	-0.025 ± 0.022
$A_{CP}(\Lambda_b \to DpK^-)$	0.12 ± 0.09
$\Delta A_{CP}(pK^-/\pi^-)$	0.014 ± 0.024
$A_{CP}(\Lambda_b \to p\overline{K}^0\pi^-)$	0.22 ± 0.13
$\Delta A_{CP}(J/\psi p\pi^-/K^-)$	$(5.7 \pm 2.7) \times 10^{-2}$
$A_{CP}(\Lambda_b \to \Lambda K^+\pi^-)$	-0.53 ± 0.25
$A_{CP}(\Lambda_b \to \Lambda K^+K^-)$	-0.28 ± 0.12
$\Delta A_{CP}(\Lambda_b^0 \to pK^-\mu^+\mu^-)$	$(-4 \pm 5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p\pi^-\pi^+\pi^-)$	$(1.1 \pm 2.6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (p\pi^-\pi^+\pi^-)_{LBM})$	$(4 \pm 4) \times 10^{-2}$

$\Delta A_{CP}(\Lambda_b^0 \to p a_1(1260)^-)$	$(-1 \pm 4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to N(1520)^0 \rho(770)^0)$	$(2 \pm 5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Delta(1232)^{++} \pi^- \pi^-)$	$(0.1 \pm 3.3) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p K^- \pi^+ \pi^-)$	$(3.2 \pm 1.3) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (p K^- \pi^+ \pi^-)_{LBM})$	$(3.5 \pm 1.6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to N(1520)^0 K^*(892)^0)$	$(5.5 \pm 2.5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Lambda(1520) \rho(770)^0)$	$(1 \pm 6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Delta(1232)^{++} K^- \pi^-)$	$(4.4 \pm 2.7) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p K_1(1410)^-)$	$(5 \pm 4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p K^- K^+ \pi^-)$	$(-7 \pm 5) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to p K^- K^+ K^-)$	$(0.2 \pm 1.9) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to \Lambda(1520) \phi(1020))$	$(4 \pm 6) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (p K^-)_{highmass}\, \phi(1020))$	$(-0.7 \pm 3.4) \times 10^{-2}$
$\Delta A_{CP}(\Lambda_b^0 \to (p K^- K^+ K^-)_{LBM})$	$(2.7 \pm 2.4) \times 10^{-2}$
$A_c(\Lambda)$	-0.22 ± 0.13
$A_s(\Lambda)$	0.13 ± 0.13
$A_c(\phi)$	-0.01 ± 0.12
$A_s(\phi)$	-0.07 ± 0.12
$a_{CP}(\Lambda_b^0 \to p \pi^- \pi^+ \pi^-)$	$(-0.7 \pm 0.7)\%$
$a_{CP}(\Lambda_b^0 \to p K^- \pi^+ \pi^-)$	$(-0.8 \pm 0.9)\%$
$a_{CP}(\Lambda_b^0 \to p K^- K^+ \pi^-)$	$(-1 \pm 5)\%$
$a_{CP}(\Lambda_b^0 \to p K^- K^+ K^-)$	$(1.1 \pm 1.5)\%$
$a_{CP}(\Lambda_b^0 \to p K^- \mu^+ \mu^-)$	$(1 \pm 5)\%$

CP VIOLATION OBSERVED

$\mathrm{Re}(\epsilon)$		$(1.596 \pm 0.013) \times 10^{-3}$
charge asymmetry in $K^0_{\ell 3}$ decays		
A_L = weighted average of $A_L(\mu)$ and $A_L(e)$		$(0.332 \pm 0.006)\%$
$A_L(\mu) = [\Gamma(\pi^- \mu^+ \nu_\mu) - \Gamma(\pi^+ \mu^- \overline{\nu}_\mu)]/\mathrm{sum}$		$(0.304 \pm 0.025)\%$
$A_L(e) = [\Gamma(\pi^- e^+ \nu_e) - \Gamma(\pi^+ e^- \overline{\nu}_e)]/\mathrm{sum}$		$(0.334 \pm 0.007)\%$
parameters for $K^0_L \to 2\pi$ decay		
$\lvert\eta_{00}\rvert = \lvert A(K^0_L \to 2\pi^0) / A(K^0_S \to 2\pi^0)\rvert$		$(2.220 \pm 0.011) \times 10^{-3}$ (S = 1.8)
$\lvert\eta_{+-}\rvert = \lvert A(K^0_L \to \pi^+\pi^-) / A(K^0_S \to \pi^+\pi^-)\rvert$		$(2.232 \pm 0.011) \times 10^{-3}$ (S = 1.8)
$\lvert\epsilon\rvert = (2\lvert\eta_{+-}\rvert + \lvert\eta_{00}\rvert)/3$		$(2.228 \pm 0.011) \times 10^{-3}$ (S = 1.8)
$\lvert\eta_{00}/\eta_{+-}\rvert$	[*i*]	0.9950 ± 0.0007 (S = 1.6)
$\mathrm{Re}(\epsilon'/\epsilon) = (1 - \lvert\eta_{00}/\eta_{+-}\rvert)/3$	[*i*]	$(1.66 \pm 0.23) \times 10^{-3}$ (S = 1.6)

Assuming *CPT*		
ϕ_{+-}, phase of η_{+-}		$(43.51 \pm 0.05)^\circ$ (S = 1.2)
ϕ_{00}, phase of η_{00}		$(43.52 \pm 0.05)^\circ$ (S = 1.3)
$\phi_\epsilon = (2\phi_{+-} + \phi_{00})/3$		$(43.52 \pm 0.05)^\circ$ (S = 1.2)
Not assuming *CPT*		
ϕ_{+-}, phase of η_{+-}		$(43.4 \pm 0.5)^\circ$ (S = 1.2)
ϕ_{00}, phase of η_{00}		$(43.7 \pm 0.6)^\circ$ (S = 1.2)
$\phi_\epsilon = (2\phi_{+-} + \phi_{00})/3$		$(43.5 \pm 0.5)^\circ$ (S = 1.3)
CP asymmetry *A* in $K^0_L \to \pi^+\pi^- e^+ e^-$		$(13.7 \pm 1.5)\%$
β_{CP} from $K^0_L \to e^+ e^- e^+ e^-$		-0.19 ± 0.07
γ_{CP} from $K^0_L \to e^+ e^- e^+ e^-$		0.01 ± 0.11 (S = 1.6)
parameters for $K^0_L \to \pi^+\pi^-\gamma$ decay		
$\lvert\eta_{+-\gamma}\rvert = \lvert$A($K^0_L \to \pi^+\pi^-\gamma$, *CP* violating)/A($K^0_S \to \pi^+\pi^-\gamma$)$\rvert$		$(2.35 \pm 0.07) \times 10^{-3}$
$\phi_{+-\gamma}$ = phase of $\eta_{+-\gamma}$		$(44 \pm 4)^\circ$
$\Gamma(K^0_L \to \pi^+\pi^-)/\Gamma_{total}$	[*j*]	$(1.967 \pm 0.010) \times 10^{-3}$ (S = 1.5)
$\Gamma(K^0_L \to \pi^0\pi^0)/\Gamma_{total}$		$(8.64 \pm 0.06) \times 10^{-4}$ (S = 1.8)
$\Delta A^{D^0}_{CP} = A_{CP}(K^+K^-) - A_{CP}(\pi^+\pi^-)$		$(-0.154 \pm 0.029)\%$
$A_{CP}(B^+ \to [K^-\pi^+]_{\overline{D}} K^*(892)^+)$		-0.75 ± 0.16
$A_{CP}(B^+ \to D_{CP(+1)} K^+)$		0.132 ± 0.015 (S = 1.8)
$A_{ADS}(B^+ \to D K^+)$		-0.451 ± 0.026
$A_{CP}(B^+ \to \eta K^+)$		-0.37 ± 0.08
$A_{CP}(B^+ \to K^+\pi^-\pi^+)$		0.027 ± 0.008
$A_{CP}(B^+ \to f_2(1270) K^+)$		$-0.68^{+0.19}_{-0.17}$
$A_{CP}(B^+ \to \rho^0 K^+)$		0.37 ± 0.10
$A_{CP}(B^+ \to K^+K^-\pi^+)$		-0.122 ± 0.021
$A_{CP}(B^+ \to \pi^+(K^+K^-)_{S-wave})$		-0.66 ± 0.04
$A_{CP}(B^+ \to K^+K^-K^+)$		-0.033 ± 0.008
$A_{CP}(B^+ \to \pi^+\pi^-\pi^+)$		0.057 ± 0.013
$A_{CP}(B^+ \to f_2(1270)\pi^+)$		0.40 ± 0.06
$A_{CP}(B^+ \to f_0(1370)\pi^+)$		0.72 ± 0.22
γ		$(65.9^{+3.3}_{-3.5})^\circ$
$r_B(B^+ \to D^0 K^+)$		0.0994 ± 0.0026
$\delta_B(B^+ \to D^0 K^+)$		$(127.7^{+3.6}_{-3.9})^\circ$
$r_B(B^+ \to D^0 K^{*+})$		$0.101^{+0.016}_{-0.034}$
$\delta_B(B^+ \to D^0 K^{*+})$		$(48^{+59}_{-16})^\circ$
$r_B(B^+ \to D^{*0} K^+)$		$0.104^{+0.013}_{-0.014}$
$\delta_B(B^+ \to D^{*0} K^+)$		$(314.8^{+7.9}_{-9.9})^\circ$
A_{CP} $(B^0 \to K^+\pi^-)$		-0.0834 ± 0.0032

$A_{CP}(B^0 \to \eta K^*(892)^0)$	0.19 ± 0.05
$A_{CP}(B^0 \to K^*(892)^+ \pi^-)$	-0.27 ± 0.04
$S_{D^*(2010)^- D^+}$ $(B^0 \to D^*(2010)^- D^+)$	-0.83 ± 0.09
$S_{D^*(2010)^+ D^-}$ $(B^0 \to D^*(2010)^+ D^-)$	-0.80 ± 0.09
$S_{D^{*+} D^{*-}}$ $(B^0 \to D^{*+} D^{*-})$	-0.59 ± 0.14 (S = 1.8)
S_+ $(B^0 \to D^{*+} D^{*-})$	-0.73 ± 0.09
$S_{D^+ D^-}$ $(B^0 \to D^+ D^-)$	$-0.76^{+0.15}_{-0.13}$ (S = 1.2)
$S_{J/\psi(1S)\pi^0}$ $(B^0 \to J/\psi(1S)\pi^0)$	-0.88 ± 0.32 (S = 2.2)
$S(B^0 \to J/\psi(1S)\rho^0)$	$-0.66^{+0.16}_{-0.12}$
$S_{K^0 \pi^0}$ $(B^0 \to K^0 \pi^0)$	0.58 ± 0.17
$S_{\eta' K^0}$ $(B^0 \to \eta' K^0)$	0.63 ± 0.06
$S_{K^+ K^- K^0_S}$ $(B^0 \to K^+ K^- K^0_S$ nonresonant)	-0.66 ± 0.11
$S_{K^+ K^- K^0_S}$ $(B^0 \to K^+ K^- K^0_S$ inclusive)	-0.65 ± 0.12
$C_{\pi\pi}$ $(B^0 \to \pi^+ \pi^-)$	-0.314 ± 0.030
$S_{\pi\pi}$ $(B^0 \to \pi^+ \pi^-)$	-0.670 ± 0.030
$\Delta C_{\rho\pi}$ $(B^0 \to \rho^+ \pi^-)$	0.27 ± 0.06
$S_{\eta_c K^0_S}$ $(B^0 \to \eta_c K^0_S)$	0.93 ± 0.17
$\sin(2\beta)$ $(B^0 \to J/\psi K^0_S)$	0.699 ± 0.017
$S_{J/\psi(\mathrm{nS}) K^0}$ $(B^0 \to J/\psi(\mathrm{nS}) K^0)$	0.701 ± 0.017
$S_{\chi_{c1} K^0_S}$ $(B^0 \to \chi_{c1} K^0_S)$	0.63 ± 0.10
$\sin(2\beta_{\mathrm{eff}})(B^0 \to K^+ K^- K^0_S)$	$0.77^{+0.13}_{-0.12}$
α	$(85.2^{+4.8}_{-4.3})^\circ$
$r_{B^0}(B^0 \to D K^{*0})$	$0.257^{+0.021}_{-0.023}$
$\delta_{B^0}(B^0 \to D K^{*0})$	$(194.1^{+9.6}_{-8.8})^\circ$
$C_{KK}(B^0_s \to K^+ K^-)$	0.162 ± 0.035
$r_B(B^0_s \to D^\mp_s K^\pm)$	$0.37^{+0.10}_{-0.09}$
$r_B(B^0_s \to D^\mp_s K^\pm \pi^\pm \pi^\mp)$	0.47 ± 0.08
$\delta_B(B^0_s \to D^\pm_s K^\mp)$	$(358 \pm 14)^\circ$
$A_{CP}(B_s \to \pi^+ K^-)$	0.224 ± 0.012

CPT INVARIANCE

$(m_{W^+} - m_{W^-})$ / m_{average}	$(-3.7 \pm 3.5) \times 10^{-4}$
$(m_{e^+} - m_{e^-})$ / m_{average}	$<8 \times 10^{-9}$, CL = 90%
$\lvert q_{e^+} + q_{e^-} \rvert / e$	$<4 \times 10^{-8}$
$(g_{e^+} - g_{e^-})$ / g_{average}	$(-0.5 \pm 2.1) \times 10^{-12}$

$(\tau_{\mu^+} - \tau_{\mu^-})$ / τ_{average}		$(2 \pm 8) \times 10^{-5}$
$(g_{\mu^+} - g_{\mu^-})$ / g_{average}		$(-0.11 \pm 0.12) \times 10^{-8}$
$(m_{\tau^+} - m_{\tau^-})/m_{\text{average}}$		$<2.8 \times 10^{-4}$, CL = 90%
$\langle \Delta m^2_{21} - \Delta \overline{m}^2_{21} \rangle$ in neutrino mixing		$<1.1 \times 10^{-4}$ eV^2, CL = 99.7%
$\langle \Delta m^2_{32} - \Delta \overline{m}^2_{32} \rangle$ in neutrino mixing		$(-0.12 \pm 0.25) \times 10^{-3}$ eV^2
$m_t - m_{\overline{t}}$		-0.15 ± 0.20 GeV (S = 1.1)
$(m_{\pi^+} - m_{\pi^-})$ / m_{average}		$(2 \pm 5) \times 10^{-4}$
$(\tau_{\pi^+} - \tau_{\pi^-})$ / τ_{average}		$(6 \pm 7) \times 10^{-4}$
$(m_{K^+} - m_{K^-})$ / m_{average}		$(-0.6 \pm 1.8) \times 10^{-4}$
$(\tau_{K^+} - \tau_{K^-})$ / τ_{average}		(0.10 ± 0.09)% (S = 1.2)
$K^{\pm} \rightarrow \mu^{\pm} \nu_{\mu}$ rate difference/sum		(-0.27 ± 0.21)%
$K^{\pm} \rightarrow \pi^{\pm} \pi^0$ rate difference/sum	[k]	(0.4 ± 0.6)%
δ in $K^0 - \overline{K}^0$ mixing		
real part of δ		$(2.5 \pm 2.3) \times 10^{-4}$
imaginary part of δ		$(-1.5 \pm 1.6) \times 10^{-5}$
Re(y), K_{e3} parameter		$(0.4 \pm 2.5) \times 10^{-3}$
Re(x_), K_{e3} parameter		$(-2.9 \pm 2.0) \times 10^{-3}$
$\lvert m_{K^0} - m_{\overline{K}^0} \rvert$ / m_{average}	[l]	$<6 \times 10^{-19}$, CL = 90%
$(\Gamma_{K^0} - \Gamma_{\overline{K}^0})/m_{\text{average}}$		$(8 \pm 8) \times 10^{-18}$
phase difference $\phi_{00} - \phi_{+-}$		$(0.34 \pm 0.32)^{\circ}$
$\text{Re}(\frac{2}{3}\eta_{+-} + \frac{1}{3}\eta_{00}) - \frac{A_L}{2}$		$(-3 \pm 35) \times 10^{-6}$
$A_{CPT}(D^0 \rightarrow K^- \pi^+)$		0.008 ± 0.008
ΔS^{+}_{CPT} $(S^{-}_{\ell^+,K^0_S} - S^{+}_{\ell^+,K^0_S})$		0.16 ± 0.23
ΔS^{-}_{CPT} $(S^{+}_{\ell^+,K^0_S} - S^{-}_{\ell^+,K^0_S})$		-0.03 ± 0.14
ΔC^{+}_{CPT} $(C^{-}_{\ell^+,K^0_S} - C^{+}_{\ell^+,K^0_S})$		0.14 ± 0.17
ΔC^{-}_{CPT} $(C^{+}_{\ell^+,K^0_S} - C^{-}_{\ell^+,K^0_S})$		0.03 ± 0.14
$\lvert m_p - m_{\overline{p}} \rvert / m_p$	[n]	$<7 \times 10^{-10}$, CL = 90%
$(\lvert \frac{q_{\overline{p}}}{m_{\overline{p}}} \rvert - \frac{q_p}{m_p}) / \frac{q_p}{m_p}$		$(0.1 \pm 6.9) \times 10^{-11}$
$\lvert q_p + q_{\overline{p}} \rvert / e$	[n]	$<7 \times 10^{-10}$, CL = 90%
$(\mu_p + \mu_{\overline{p}})$ / μ_p		$(0.002 \pm 0.004) \times 10^{-6}$
$(m_n - m_{\overline{n}})$/ m_n		$(9 \pm 6) \times 10^{-5}$
$(m_{\Lambda} - m_{\overline{\Lambda}})$ / m_{Λ}		$(-0.1 \pm 1.1) \times 10^{-5}$ (S = 1.6)
$(\tau_{\Lambda} - \tau_{\overline{\Lambda}})$ / τ_{Λ}		-0.001 ± 0.009
$(\tau_{\Sigma^+} - \tau_{\overline{\Sigma}^-})$ / τ_{Σ^+}		-0.0006 ± 0.0012
$(\mu_{\Sigma^+} + \mu_{\overline{\Sigma}^-})$ / μ_{Σ^+}		0.014 ± 0.015
$(m_{\Xi^-} - m_{\overline{\Xi}^+})$ / m_{Ξ^-}		$(-3 \pm 9) \times 10^{-5}$

$(\tau_{\Xi^-} - \tau_{\overline{\Xi}^+}) / \tau_{\Xi^-}$	-0.01 ± 0.07
$(\mu_{\Xi^-} + \mu_{\overline{\Xi}^+}) / \lvert\mu_{\Xi^-}\rvert$	$+0.01 \pm 0.05$
$(m_{\Omega^-} - m_{\overline{\Omega}^+}) / m_{\Omega^-}$	$(-1 \pm 8) \times 10^{-5}$
$(\tau_{\Omega^-} - \tau_{\overline{\Omega}^+}) / \tau_{\Omega^-}$	0.00 ± 0.05

TESTS OF NUMBER CONSERVATION LAWS

LEPTON FAMILY NUMBER

Lepton family number conservation means separate conservation of each of L_e, L_μ, L_τ.

$\Gamma(Z \to e^\pm \mu^\mp)/\Gamma_{\text{total}}$	[o]	$<7.5 \times 10^{-7}$, CL = 95%
$\Gamma(Z \to e^\pm \tau^\mp)/\Gamma_{\text{total}}$	[o]	$<5.0 \times 10^{-6}$, CL = 95%
$\Gamma(Z \to \mu^\pm \tau^\mp)/\Gamma_{\text{total}}$	[o]	$<6.5 \times 10^{-6}$, CL = 95%
$\Gamma(H \to e\mu)/\Gamma_{\text{total}}$		$<6.1 \times 10^{-5}$, CL = 95%
$\Gamma(H \to e\tau)/\Gamma_{\text{total}}$		$<2.2 \times 10^{-3}$, CL = 95%
$\Gamma(H \to \mu\tau)/\Gamma_{\text{total}}$		$<1.5 \times 10^{-3}$, CL = 95%
$\sigma(e^+e^- \to e^\pm \tau^\mp) / \sigma(e^+e^- \to \mu^+\mu^-)$		$<8.9 \times 10^{-6}$, CL = 95%
$\sigma(e^+e^- \to \mu^\pm \tau^\mp) / \sigma(e^+e^- \to \mu^+\mu^-)$		$<4.0 \times 10^{-6}$, CL = 95%
limit on $\mu^- \to e^-$ conversion		
$\sigma(\mu^- {}^{32}\text{S} \to e^- {}^{32}\text{S})$ / $\sigma(\mu^- {}^{32}\text{S} \to \nu_\mu {}^{32}\text{P}^*)$		$<7 \times 10^{-11}$, CL = 90%
$\sigma(\mu^- \text{Ti} \to e^- \text{Ti})$ / $\sigma(\mu^- \text{Ti} \to \text{capture})$		$<4.3 \times 10^{-12}$, CL = 90%
$\sigma(\mu^- \text{Pb} \to e^- \text{Pb})$ / $\sigma(\mu^- \text{Pb} \to \text{capture})$		$<4.6 \times 10^{-11}$, CL = 90%
$\sigma(\mu^- \text{Au} \to e^- \text{Au})$ / $\sigma(\mu^- \text{Au} \to \text{capture})$		$<7 \times 10^{-13}$, CL = 90%
limit on muonium $\to$ antimuonium conversion $R_g = G_C / G_F$		<0.0030, CL = 90%
$\Gamma(\mu^- \to e^- \nu_e \overline{\nu}_\mu)/\Gamma_{\text{total}}$	[p]	$<1.2 \times 10^{-2}$, CL = 90%
$\Gamma(\mu^- \to e^- \gamma)/\Gamma_{\text{total}}$		$<4.2 \times 10^{-13}$, CL = 90%
$\Gamma(\mu^- \to e^- e^+ e^-)/\Gamma_{\text{total}}$		$<1.0 \times 10^{-12}$, CL = 90%
$\Gamma(\mu^- \to e^- 2\gamma)/\Gamma_{\text{total}}$		$<7.2 \times 10^{-11}$, CL = 90%
$\Gamma(\tau^- \to e^- \gamma)/\Gamma_{\text{total}}$		$<3.3 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \gamma)/\Gamma_{\text{total}}$		$<4.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to e^- \pi^0)/\Gamma_{\text{total}}$		$<8.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \pi^0)/\Gamma_{\text{total}}$		$<1.1 \times 10^{-7}$, CL = 90%
$\Gamma(\tau^- \to e^- K^0_S)/\Gamma_{\text{total}}$		$<2.6 \times 10^{-8}$, CL = 90%

$\Gamma(\tau^- \rightarrow \mu^- K^0_S)/\Gamma_{\text{total}}$	$<2.3 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \eta)/\Gamma_{\text{total}}$	$<9.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \eta)/\Gamma_{\text{total}}$	$<6.5 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \rho^0)/\Gamma_{\text{total}}$	$<1.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \rho^0)/\Gamma_{\text{total}}$	$<1.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \omega)/\Gamma_{\text{total}}$	$<4.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \omega)/\Gamma_{\text{total}}$	$<4.7 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- K^*(892)^0)/\Gamma_{\text{total}}$	$<3.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- K^*(892)^0)/\Gamma_{\text{total}}$	$<5.9 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \overline{K}^*(892)^0)/\Gamma_{\text{total}}$	$<3.4 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \overline{K}^*(892)^0)/\Gamma_{\text{total}}$	$<7.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \eta'(958))/\Gamma_{\text{total}}$	$<1.6 \times 10^{-7}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \eta'(958))/\Gamma_{\text{total}}$	$<1.3 \times 10^{-7}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- f_0(980) \rightarrow e^- \pi^+ \pi^-)/\Gamma_{\text{total}}$	$<3.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- f_0(980) \rightarrow \mu^- \pi^+ \pi^-)/\Gamma_{\text{total}}$	$<3.4 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \phi)/\Gamma_{\text{total}}$	$<3.1 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \phi)/\Gamma_{\text{total}}$	$<8.4 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- e^+ e^-)/\Gamma_{\text{total}}$	$<2.7 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \mu^+ \mu^-)/\Gamma_{\text{total}}$	$<2.7 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^+ \mu^- \mu^-)/\Gamma_{\text{total}}$	$<1.7 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- e^+ e^-)/\Gamma_{\text{total}}$	$<1.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^+ e^- e^-)/\Gamma_{\text{total}}$	$<1.5 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \mu^+ \mu^-)/\Gamma_{\text{total}}$	$<2.1 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \pi^+ \pi^-)/\Gamma_{\text{total}}$	$<2.3 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \pi^+ \pi^-)/\Gamma_{\text{total}}$	$<2.1 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \pi^+ K^-)/\Gamma_{\text{total}}$	$<3.7 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \pi^- K^+)/\Gamma_{\text{total}}$	$<3.1 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- K^0_S K^0_S)/\Gamma_{\text{total}}$	$<7.1 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- K^+ K^-)/\Gamma_{\text{total}}$	$<3.4 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \pi^+ K^-)/\Gamma_{\text{total}}$	$<8.6 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \pi^- K^+)/\Gamma_{\text{total}}$	$<4.5 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- K^0_S K^0_S)/\Gamma_{\text{total}}$	$<8.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- K^+ K^-)/\Gamma_{\text{total}}$	$<4.4 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \pi^0 \pi^0)/\Gamma_{\text{total}}$	$<6.5 \times 10^{-6}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \pi^0 \pi^0)/\Gamma_{\text{total}}$	$<1.4 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \eta \eta)/\Gamma_{\text{total}}$	$<3.5 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \eta \eta)/\Gamma_{\text{total}}$	$<6.0 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \pi^0 \eta)/\Gamma_{\text{total}}$	$<2.4 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \rightarrow \mu^- \pi^0 \eta)/\Gamma_{\text{total}}$	$<2.2 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \rightarrow e^- \text{light boson})/\Gamma_{\text{total}}$	$<2.7 \times 10^{-3}$, CL = 95%
$\Gamma(\tau^- \rightarrow \mu^- \text{light boson})/\Gamma_{\text{total}}$	$<5 \times 10^{-3}$, CL = 95%

LEPTON FAMILY NUMBER VIOLATION IN NEUTRINOS

$\sin^2(\theta_{12})$		0.307 ± 0.013
Δm^2_{21}		$(7.53 \pm 0.18) \times 10^{-5}$ eV^2
$\sin^2(\theta_{23})$ (Normal order)		$0.547^{+0.018}_{-0.024}$
Δm^2_{32} (Inverted order)		$(-2.519 \pm 0.033) \times 10^{-3}$ eV^2
Δm^2_{32} (Normal order)		$(2.437 \pm 0.033) \times 10^{-3}$ eV^2
$\sin^2(\theta_{13})$		$(2.20 \pm 0.07) \times 10^{-2}$
$\Gamma(t \to e^\pm \mu^\mp c)/\Gamma_{total}$		$<8.9 \times 10^{-7}$
$\Gamma(t \to e^\pm \mu^\mp u)/\Gamma_{total}$		$<7 \times 10^{-8}$
$\Gamma(\pi^+ \to \mu^+ \nu_e)/\Gamma_{total}$	[q]	$<8.0 \times 10^{-3}$, CL = 90%
$\Gamma(\pi^+ \to \mu^- e^+ e^+ \nu)/\Gamma_{total}$		$<1.6 \times 10^{-6}$, CL = 90%
$\Gamma(\pi^0 \to \mu^+ e^-)/\Gamma_{total}$		$<3.8 \times 10^{-10}$, CL = 90%
$\Gamma(\pi^0 \to \mu^- e^+)/\Gamma_{total}$		$<3.2 \times 10^{-10}$, CL = 90%
$\Gamma(\pi^0 \to \mu^+ e^- + \mu^- e^+)/\Gamma_{total}$		$<3.6 \times 10^{-10}$, CL = 90%
$\Gamma(\eta \to \mu^+ e^- + \mu^- e^+)/\Gamma_{total}$		$<6 \times 10^{-6}$, CL = 90%
$\Gamma(\eta'(958) \to e\mu)/\Gamma_{total}$		$<4.7 \times 10^{-4}$, CL = 90%
$\Gamma(\phi(1020) \to e^\pm \mu^\mp)/\Gamma_{total}$		$<2 \times 10^{-6}$, CL = 90%
$\Gamma(K^+ \to \mu^- \nu e^+ e^+)/\Gamma_{total}$		$<2.1 \times 10^{-8}$, CL = 90%
$\Gamma(K^+ \to \mu^+ \nu_e)/\Gamma_{total}$	[q]	$<4 \times 10^{-3}$, CL = 90%
$\Gamma(K^+ \to \pi^+ \mu^+ e^-)/\Gamma_{total}$		$<1.3 \times 10^{-11}$, CL = 90%
$\Gamma(K^+ \to \pi^+ \mu^- e^+)/\Gamma_{total}$		$<6.6 \times 10^{-11}$, CL = 90%
$\Gamma(K^0_L \to e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<4.7 \times 10^{-12}$, CL = 90%
$\Gamma(K^0_L \to e^\pm e^\pm \mu^\mp \mu^\mp)/\Gamma_{total}$	[o]	$<4.12 \times 10^{-11}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 \mu^\pm e^\mp)/\Gamma_{total}$	[o]	$<7.6 \times 10^{-11}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 \pi^0 \mu^\pm e^\mp)/\Gamma_{total}$		$<1.7 \times 10^{-10}$, CL = 90%
$\Gamma(D^+ \to \pi^+ e^+ \mu^-)/\Gamma_{total}$		$<2.1 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to \pi^+ e^- \mu^+)/\Gamma_{total}$		$<2.2 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to K^+ e^+ \mu^-)/\Gamma_{total}$		$<7.5 \times 10^{-8}$, CL = 90%
$\Gamma(D^+ \to K^+ e^- \mu^+)/\Gamma_{total}$		$<1.0 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to \mu^\pm e^\mp)/\Gamma_{total}$	[o]	$<1.3 \times 10^{-8}$, CL = 90%
$\Gamma(D^0 \to \pi^0 e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<8.0 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to \eta e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<2.25 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \pi^+ \pi^- e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<1.71 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \rho^0 e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<5.0 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to \omega e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<1.71 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to K^- K^+ e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<1.00 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \phi e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<5.1 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to \overline{K}^0 e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<1.74 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to K^- \pi^+ e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<1.90 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \overline{K}^*(892)^0 e^\pm \mu^\mp)/\Gamma_{total}$	[o]	$<1.25 \times 10^{-6}$, CL = 90%
$\Gamma(D^+_s \to \pi^+ e^+ \mu^-)/\Gamma_{total}$		$<1.1 \times 10^{-6}$, CL = 90%

$\Gamma(D_s^+ \to \pi^+ e^- \mu^+)/\Gamma_{\text{total}}$		$<9.4 \times 10^{-7}$, CL = 90%
$\Gamma(D_s^+ \to K^+ e^+ \mu^-)/\Gamma_{\text{total}}$		$<7.9 \times 10^{-7}$, CL = 90%
$\Gamma(D_s^+ \to K^+ e^- \mu^+)/\Gamma_{\text{total}}$		$<5.6 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^+ \mu^-)/\Gamma_{\text{total}}$		$<6.4 \times 10^{-3}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^- \mu^+)/\Gamma_{\text{total}}$		$<6.4 \times 10^{-3}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<1.7 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^+ \tau^-)/\Gamma_{\text{total}}$		$<7.4 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^- \tau^+)/\Gamma_{\text{total}}$		$<2.0 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^\pm \tau^\mp)/\Gamma_{\text{total}}$		$<7.5 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to \pi^+ \mu^+ \tau^-)/\Gamma_{\text{total}}$		$<6.2 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to \pi^+ \mu^- \tau^+)/\Gamma_{\text{total}}$		$<4.5 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to \pi^+ \mu^\pm \tau^\mp)/\Gamma_{\text{total}}$		$<7.2 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ e^+ \mu^-)/\Gamma_{\text{total}}$		$<7.0 \times 10^{-9}$, CL = 90%
$\Gamma(B^+ \to K^+ e^- \mu^+)/\Gamma_{\text{total}}$		$<6.4 \times 10^{-9}$, CL = 90%
$\Gamma(B^+ \to K^+ e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<9.1 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to K^+ e^+ \tau^-)/\Gamma_{\text{total}}$		$<4.3 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ e^- \tau^+)/\Gamma_{\text{total}}$		$<1.5 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ e^\pm \tau^\mp)/\Gamma_{\text{total}}$		$<3.0 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ \mu^+ \tau^-)/\Gamma_{\text{total}}$		$<4.5 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ \mu^- \tau^+)/\Gamma_{\text{total}}$		$<2.8 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ \mu^\pm \tau^\mp)/\Gamma_{\text{total}}$		$<4.8 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^+ e^+ \mu^-)/\Gamma_{\text{total}}$		$<1.3 \times 10^{-6}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^+ e^- \mu^+)/\Gamma_{\text{total}}$		$<9.9 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^+ e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<1.4 \times 10^{-6}$, CL = 90%
$\Gamma(B^0 \to e^\pm \mu^\mp)/\Gamma_{\text{total}}$	[o]	$<1.0 \times 10^{-9}$, CL = 90%
$\Gamma(B^0 \to \pi^0 e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<1.4 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to K^0 e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<3.8 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to K^*(892)^0 e^+ \mu^-)/\Gamma_{\text{total}}$		$<1.6 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to K^*(892)^0 e^- \mu^+)/\Gamma_{\text{total}}$		$<1.2 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to K^*(892)^0 e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<1.8 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to e^\pm \tau^\mp)/\Gamma_{\text{total}}$	[o]	$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(B^0 \to \mu^\pm \tau^\mp)/\Gamma_{\text{total}}$	[o]	$<1.4 \times 10^{-5}$, CL = 95%
$\Gamma(B \to s e^\pm \mu^\mp)/\Gamma_{\text{total}}$	[o]	$<2.2 \times 10^{-5}$, CL = 90%
$\Gamma(B \to \pi e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<9.2 \times 10^{-8}$, CL = 90%
$\Gamma(B \to \rho e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<3.2 \times 10^{-6}$, CL = 90%
$\Gamma(B \to K e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<3.8 \times 10^{-8}$, CL = 90%
$\Gamma(B \to K^*(892) e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<5.1 \times 10^{-7}$, CL = 90%
$\Gamma(B_s^0 \to e^\pm \mu^\mp)/\Gamma_{\text{total}}$	[o]	$<5.4 \times 10^{-9}$, CL = 90%
$\Gamma(B_s^0 \to \mu^\pm \tau^\mp)/\Gamma_{\text{total}}$		$<4.2 \times 10^{-5}$, CL = 95%
$\Gamma(J/\psi(1S) \to e^\pm \mu^\mp)/\Gamma_{\text{total}}$		$<1.6 \times 10^{-7}$, CL = 90%
$\Gamma(J/\psi(1S) \to e^\pm \tau^\mp)/\Gamma_{\text{total}}$		$<7.5 \times 10^{-8}$, CL = 90%

$\Gamma(J/\psi(1S) \to \mu^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<2.0 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(1S) \to e^{\pm}\mu^{\mp})/\Gamma_{\rm total}$	$<3.9 \times 10^{-7}$, CL = 90%
$\Gamma(\Upsilon(1S) \to \mu^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<2.7 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(1S) \to e^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<2.7 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(1S) \to \gamma e^{\pm}\mu^{\mp})/\Gamma_{\rm total}$	$<4.2 \times 10^{-7}$, CL = 90%
$\Gamma(\Upsilon(1S) \to \gamma \mu^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<6.1 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(1S) \to \gamma e^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<6.5 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(2S) \to e^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<3.2 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(2S) \to \mu^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<3.3 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(3S) \to e^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<4.2 \times 10^{-6}$, CL = 90%
$\Gamma(\Upsilon(3S) \to e^{\pm}\mu^{\mp})/\Gamma_{\rm total}$	$<3.6 \times 10^{-7}$, CL = 90%
$\Gamma(\Upsilon(3S) \to \mu^{\pm}\tau^{\mp})/\Gamma_{\rm total}$	$<3.1 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda_c^+ \to p e^+ \mu^-)/\Gamma_{\rm total}$	$<9.9 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda_c^+ \to p e^- \mu^+)/\Gamma_{\rm total}$	$<1.9 \times 10^{-5}$, CL = 90%

TOTAL LEPTON NUMBER

Violation of total lepton number conservation also implies violation of lepton family number conservation.

$\Gamma(Z \to p e)/\Gamma_{\rm total}$	$<1.8 \times 10^{-6}$, CL = 95%
$\Gamma(Z \to p \mu)/\Gamma_{\rm total}$	$<1.8 \times 10^{-6}$, CL = 95%
limit on $\mu^- \to e^+$ conversion	
$\sigma(\mu^- {}^{32}\mathrm{S} \to e^+ {}^{32}\mathrm{Si}^*)$ / $\sigma(\mu^- {}^{32}\mathrm{S} \to \nu_\mu {}^{32}\mathrm{P}^*)$	$<9 \times 10^{-10}$, CL = 90%
$\sigma(\mu^- {}^{127}\mathrm{I} \to e^+ {}^{127}\mathrm{Sb}^*)$ / $\sigma(\mu^- {}^{127}\mathrm{I} \to$ anything)	$<3 \times 10^{-10}$, CL = 90%
$\sigma(\mu^-\,\mathrm{Ti} \to e^+\,\mathrm{Ca})$ / $\sigma(\mu^-\,\mathrm{Ti} \to$ capture)	$<3.6 \times 10^{-11}$, CL = 90%
$\Gamma(\tau^- \to e^+\pi^-\pi^-)/\Gamma_{\rm total}$	$<2.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \mu^+\pi^-\pi^-)/\Gamma_{\rm total}$	$<3.9 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to e^+\pi^- K^-)/\Gamma_{\rm total}$	$<3.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to e^+ K^- K^-)/\Gamma_{\rm total}$	$<3.3 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \mu^+\pi^- K^-)/\Gamma_{\rm total}$	$<4.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \mu^+ K^- K^-)/\Gamma_{\rm total}$	$<4.7 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to p e^- e^-)/\Gamma_{\rm total}$	$<3.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p} e^+ e^-)/\Gamma_{\rm total}$	$<3.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p} e^+ \mu^-)/\Gamma_{\rm total}$	$<2.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p} e^- \mu^+)/\Gamma_{\rm total}$	$<1.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to p \mu^- \mu^-)/\Gamma_{\rm total}$	$<4.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p} \mu^+ \mu^-)/\Gamma_{\rm total}$	$<1.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p} \gamma)/\Gamma_{\rm total}$	$<3.5 \times 10^{-6}$, CL = 90%

$\Gamma(\tau^- \to \overline{p}\pi^0)/\Gamma_{\rm total}$		$<1.5 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}2\pi^0)/\Gamma_{\rm total}$		$<3.3 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\eta)/\Gamma_{\rm total}$		$<8.9 \times 10^{-6}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\pi^0\eta)/\Gamma_{\rm total}$		$<2.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \Lambda\pi^-)/\Gamma_{\rm total}$		$<7.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{\Lambda}\pi^-)/\Gamma_{\rm total}$		$<1.4 \times 10^{-7}$, CL = 90%
$t_{1/2}(\,^{76}\text{Ge} \to \,^{76}\text{Se} + 2\,e^-\,)$		$>9.0 \times 10^{25}$ yr, CL = 90%
$t_{1/2}(\,^{136}\text{Xe} \to \,^{136}\text{Ba} + 2\,e^-\,)$		$>10.7 \times 10^{25}$ yr, CL = 90%
$t_{1/2}(\,^{130}\text{Te} \to \,^{130}\text{Xe} + 2\,e^-\,)$		$>1.5 \times 10^{25}$ yr, CL = 90%
$\Gamma(\pi^+ \to \mu^+\overline{\nu}_e)/\Gamma_{\rm total}$	[q]	$<1.5 \times 10^{-3}$, CL = 90%
$\Gamma(K^+ \to \pi^-\mu^+e^+)/\Gamma_{\rm total}$		$<4.2 \times 10^{-11}$, CL = 90%
$\Gamma(K^+ \to \pi^-e^+e^+)/\Gamma_{\rm total}$		$<5.3 \times 10^{-11}$, CL = 90%
$\Gamma(K^+ \to \pi^-\mu^+\mu^+)/\Gamma_{\rm total}$		$<4.2 \times 10^{-11}$, CL = 90%
$\Gamma(K^+ \to \pi^-\pi^0e^+e^+)/\Gamma_{\rm total}$		$<8.5 \times 10^{-10}$, CL = 90%
$\Gamma(K^+ \to \mu^+\overline{\nu}_e)/\Gamma_{\rm total}$	[q]	$<3.3 \times 10^{-3}$, CL = 90%
$\Gamma(K^+ \to \pi^0e^+\overline{\nu}_e)/\Gamma_{\rm total}$		$<3 \times 10^{-3}$, CL = 90%
$\Gamma(D^+ \to \pi^-2e^+)/\Gamma_{\rm total}$		$<5.3 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to \pi^-2\mu^+)/\Gamma_{\rm total}$		$<1.4 \times 10^{-8}$, CL = 90%
$\Gamma(D^+ \to \pi^-e^+\mu^+)/\Gamma_{\rm total}$		$<1.3 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to \rho^-2\mu^+)/\Gamma_{\rm total}$		$<5.6 \times 10^{-4}$, CL = 90%
$\Gamma(D^+ \to K^-2e^+)/\Gamma_{\rm total}$		$<9 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to K^-2\mu^+)/\Gamma_{\rm total}$		$<1.0 \times 10^{-5}$, CL = 90%
$\Gamma(D^+ \to K^-e^+\mu^+)/\Gamma_{\rm total}$		$<1.9 \times 10^{-6}$, CL = 90%
$\Gamma(D^+ \to K^*(892)^-2\mu^+)/\Gamma_{\rm total}$		$<8.5 \times 10^{-4}$, CL = 90%
$\Gamma(D^+ \to \Lambda e^+)/\Gamma_{\rm total}$		$<1.1 \times 10^{-6}$, CL = 90%
$\Gamma(D^+ \to \overline{\Lambda}e^+)/\Gamma_{\rm total}$		$<6.5 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to \Sigma^0e^+)/\Gamma_{\rm total}$		$<1.7 \times 10^{-6}$, CL = 90%
$\Gamma(D^+ \to \overline{\Sigma}^0e^+)/\Gamma_{\rm total}$		$<1.3 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to 2\pi^-2e^+)/\Gamma_{\rm total}$		$<9.1 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to 2\pi^-2\mu^+)/\Gamma_{\rm total}$		$<1.52 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to K^-\pi^-2e^+)/\Gamma_{\rm total}$		$<5.0 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to K^-\pi^-2\mu^+)/\Gamma_{\rm total}$		$<5.3 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to 2K^-2e^+)/\Gamma_{\rm total}$		$<3.4 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to 2K^-2\mu^+)/\Gamma_{\rm total}$		$<1.0 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to \pi^-\pi^-e^+\mu^+)/\Gamma_{\rm total}$		$<3.06 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to K^-\pi^-e^+\mu^+)/\Gamma_{\rm total}$		$<2.10 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to 2K^-e^+\mu^+)/\Gamma_{\rm total}$		$<5.8 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to pe^-)/\Gamma_{\rm total}$		$<2.2 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \overline{p}e^+)/\Gamma_{\rm total}$		$<1.2 \times 10^{-6}$, CL = 90%
$\Gamma(D_s^+ \to \pi^-2e^+)/\Gamma_{\rm total}$		$<1.4 \times 10^{-6}$, CL = 90%
$\Gamma(D_s^+ \to \pi^-2\mu^+)/\Gamma_{\rm total}$		$<8.6 \times 10^{-8}$, CL = 90%

$\Gamma(D_s^+ \to \pi^- e^+ \mu^+)/\Gamma_{total}$	$<6.3 \times 10^{-7}$, CL = 90%
$\Gamma(D_s^+ \to K^- 2e^+)/\Gamma_{total}$	$<7.7 \times 10^{-7}$, CL = 90%
$\Gamma(D_s^+ \to K^- 2\mu^+)/\Gamma_{total}$	$<2.6 \times 10^{-8}$, CL = 90%
$\Gamma(D_s^+ \to K^- e^+ \mu^+)/\Gamma_{total}$	$<2.6 \times 10^{-7}$, CL = 90%
$\Gamma(D_s^+ \to K^*(892)^- 2\mu^+)/\Gamma_{total}$	$<1.4 \times 10^{-3}$, CL = 90%
$\Gamma(B^+ \to \pi^- e^+ e^+)/\Gamma_{total}$	$<2.3 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \pi^- \mu^+ \mu^+)/\Gamma_{total}$	$<4.0 \times 10^{-9}$, CL = 95%
$\Gamma(B^+ \to \pi^- e^+ \mu^+)/\Gamma_{total}$	$<1.5 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to \rho^- e^+ e^+)/\Gamma_{total}$	$<1.7 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to \rho^- \mu^+ \mu^+)/\Gamma_{total}$	$<4.2 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to \rho^- e^+ \mu^+)/\Gamma_{total}$	$<4.7 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to K^- e^+ e^+)/\Gamma_{total}$	$<3.0 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to K^- \mu^+ \mu^+)/\Gamma_{total}$	$<4.1 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to K^- e^+ \mu^+)/\Gamma_{total}$	$<1.6 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^- e^+ e^+)/\Gamma_{total}$	$<4.0 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^- \mu^+ \mu^+)/\Gamma_{total}$	$<5.9 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^- e^+ \mu^+)/\Gamma_{total}$	$<3.0 \times 10^{-7}$, CL = 90%
$\Gamma(B^+ \to D^- e^+ e^+)/\Gamma_{total}$	$<2.6 \times 10^{-6}$, CL = 90%
$\Gamma(B^+ \to D^- e^+ \mu^+)/\Gamma_{total}$	$<1.8 \times 10^{-6}$, CL = 90%
$\Gamma(B^+ \to D^- \mu^+ \mu^+)/\Gamma_{total}$	$<6.9 \times 10^{-7}$, CL = 95%
$\Gamma(B^+ \to D^{*-} \mu^+ \mu^+)/\Gamma_{total}$	$<2.4 \times 10^{-6}$, CL = 95%
$\Gamma(B^+ \to D_s^- \mu^+ \mu^+)/\Gamma_{total}$	$<5.8 \times 10^{-7}$, CL = 95%
$\Gamma(B^+ \to \overline{D}^0 \pi^- \mu^+ \mu^+)/\Gamma_{total}$	$<1.5 \times 10^{-6}$, CL = 95%
$\Gamma(B^+ \to \Lambda^0 \mu^+)/\Gamma_{total}$	$<6 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \Lambda^0 e^+)/\Gamma_{total}$	$<3.2 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \overline{\Lambda}^0 \mu^+)/\Gamma_{total}$	$<6 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \overline{\Lambda}^0 e^+)/\Gamma_{total}$	$<8 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to \Lambda_c^+ \mu^-)/\Gamma_{total}$	$<1.4 \times 10^{-6}$, CL = 90%
$\Gamma(B^0 \to \Lambda_c^+ e^-)/\Gamma_{total}$	$<4 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to \pi^+ e^-)/\Gamma_{total}$	$<6 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to \pi^+ \mu^-)/\Gamma_{total}$	$<6 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to \pi^- e^+)/\Gamma_{total}$	$<4 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to \pi^- \mu^+)/\Gamma_{total}$	$<6 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to K^+ e^-)/\Gamma_{total}$	$<2 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^+ \mu^-)/\Gamma_{total}$	$<3 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^- e^+)/\Gamma_{total}$	$<2 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^- \mu^+)/\Gamma_{total}$	$<3 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K_S^0 \nu)/\Gamma_{total}$	$<2 \times 10^{-5}$, CL = 90%
$\Gamma(\Sigma^- \to p e^- e^-)/\Gamma_{total}$	$<6.7 \times 10^{-5}$, CL = 90%
$\Gamma(\Xi^- \to p \mu^- \mu^-)/\Gamma_{total}$	$<4 \times 10^{-8}$, CL = 90%
$\Gamma(\Lambda_c^+ \to \overline{p} 2e^+)/\Gamma_{total}$	$<2.7 \times 10^{-6}$, CL = 90%

$\Gamma(\Lambda_c^+ \to \overline{p}2\mu^+)/\Gamma_{\rm total}$		$<9.4 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda_c^+ \to \overline{p}e^+\mu^+)/\Gamma_{\rm total}$		$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(\Lambda_c^+ \to \Sigma^-\mu^+\mu^+)/\Gamma_{\rm total}$		$<7.0 \times 10^{-4}$, CL = 90%

BARYON NUMBER

$\Gamma(Z \to pe)/\Gamma_{\rm total}$		$<1.8 \times 10^{-6}$, CL = 95%
$\Gamma(Z \to p\mu)/\Gamma_{\rm total}$		$<1.8 \times 10^{-6}$, CL = 95%
$\Gamma(\tau^- \to pe^-e^-)/\Gamma_{\rm total}$		$<3.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}e^+e^-)/\Gamma_{\rm total}$		$<3.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}e^+\mu^-)/\Gamma_{\rm total}$		$<2.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}e^-\mu^+)/\Gamma_{\rm total}$		$<1.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to p\mu^-\mu^-)/\Gamma_{\rm total}$		$<4.0 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\mu^+\mu^-)/\Gamma_{\rm total}$		$<1.8 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\gamma)/\Gamma_{\rm total}$		$<3.5 \times 10^{-6}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\pi^0)/\Gamma_{\rm total}$		$<1.5 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}2\pi^0)/\Gamma_{\rm total}$		$<3.3 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\eta)/\Gamma_{\rm total}$		$<8.9 \times 10^{-6}$, CL = 90%
$\Gamma(\tau^- \to \overline{p}\pi^0\eta)/\Gamma_{\rm total}$		$<2.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \Lambda\pi^-)/\Gamma_{\rm total}$		$<7.2 \times 10^{-8}$, CL = 90%
$\Gamma(\tau^- \to \overline{\Lambda}\pi^-)/\Gamma_{\rm total}$		$<1.4 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to \Lambda e^+)/\Gamma_{\rm total}$		$<1.1 \times 10^{-6}$, CL = 90%
$\Gamma(D^+ \to \overline{\Lambda}e^+)/\Gamma_{\rm total}$		$<6.5 \times 10^{-7}$, CL = 90%
$\Gamma(D^+ \to \Sigma^0 e^+)/\Gamma_{\rm total}$		$<1.7 \times 10^{-6}$, CL = 90%
$\Gamma(D^+ \to \overline{\Sigma}^0 e^+)/\Gamma_{\rm total}$		$<1.3 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to pe^-)/\Gamma_{\rm total}$		$<2.2 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \overline{p}e^+)/\Gamma_{\rm total}$		$<1.2 \times 10^{-6}$, CL = 90%
$\Gamma(B^+ \to \Lambda^0\mu^+)/\Gamma_{\rm total}$		$<6 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \Lambda^0 e^+)/\Gamma_{\rm total}$		$<3.2 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \overline{\Lambda}^0\mu^+)/\Gamma_{\rm total}$		$<6 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \overline{\Lambda}^0 e^+)/\Gamma_{\rm total}$		$<8 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to \Lambda_c^+\mu^-)/\Gamma_{\rm total}$		$<1.4 \times 10^{-6}$, CL = 90%
$\Gamma(B^0 \to \Lambda_c^+ e^-)/\Gamma_{\rm total}$		$<4 \times 10^{-6}$, CL = 90%
p mean life	[r]	$>9 \times 10^{29}$ years, CL = 90%

A few examples of proton or bound neutron decay follow. For limits on many other nucleon decay channels, see the Baryon Summary Table.

$\tau(N \to e^+\pi)$	$>$ 5300 (n), $>$ 16000 (p) $\times 10^{30}$ years, CL = 90%
$\tau(N \to \mu^+\pi)$	$>$ 3500 (n), $>$ 7700 (p) $\times 10^{30}$ years, CL = 90%
$\tau(N \to e^+K)$	$>$ 17 (n), $>$ 1000 (p) $\times 10^{30}$ years, CL = 90%

$\tau(N \to \mu^+ K)$		> 26 (n), > 1600 (p) $\times 10^{30}$ years, CL = 90%
limit on $n\overline{n}$ oscillations (free n)		$>0.86 \times 10^{8}$ s, CL = 90%
limit on $n\overline{n}$ oscillations (bound n)	[s]	$>2.7 \times 10^{8}$ s, CL = 90%
$\Gamma(\Lambda \to \pi^+ e^-)/\Gamma_{\text{total}}$		$<6 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to \pi^+ \mu^-)/\Gamma_{\text{total}}$		$<6 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to \pi^- e^+)/\Gamma_{\text{total}}$		$<4 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to \pi^- \mu^+)/\Gamma_{\text{total}}$		$<6 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda \to K^+ e^-)/\Gamma_{\text{total}}$		$<2 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^+ \mu^-)/\Gamma_{\text{total}}$		$<3 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^- e^+)/\Gamma_{\text{total}}$		$<2 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^- \mu^+)/\Gamma_{\text{total}}$		$<3 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda \to K^0_S \nu)/\Gamma_{\text{total}}$		$<2 \times 10^{-5}$, CL = 90%
$\Gamma(\Lambda \to \overline{p} \pi^+)/\Gamma_{\text{total}}$		$<9 \times 10^{-7}$, CL = 90%
$\Gamma(\Lambda_c^+ \to \overline{p} 2e^+)/\Gamma_{\text{total}}$		$<2.7 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda_c^+ \to \overline{p} 2\mu^+)/\Gamma_{\text{total}}$		$<9.4 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda_c^+ \to \overline{p} e^+ \mu^+)/\Gamma_{\text{total}}$		$<1.6 \times 10^{-5}$, CL = 90%

ELECTRIC CHARGE (Q)

γ charge (mixed)		$<1 \times 10^{-46}$ e
γ charge (single)		$<1 \times 10^{-35}$ e
$e \to \nu_e \gamma$ and astrophysical limits	[t]	$>6.6 \times 10^{28}$ yr, CL = 90%
ν charge		$<4 \times 10^{-35}$ e, CL = 95%
$\lvert q_p + q_e \rvert / e$	[u]	$<1 \times 10^{-21}$
n charge		$(-0.2 \pm 0.8) \times 10^{-21}$ e
$\Gamma(n \to p \nu_e \overline{\nu}_e)/\Gamma_{\text{total}}$		$<8 \times 10^{-27}$, CL = 68%

$\Delta S = \Delta Q$ RULE

Violations allowed in second-order weak interactions.

$\Gamma(K^+ \to \pi^+ \pi^+ e^- \overline{\nu}_e)/\Gamma_{\text{total}}$	$<1.3 \times 10^{-8}$, CL = 90%
$\Gamma(K^+ \to \pi^+ \pi^+ \mu^- \overline{\nu}_\mu)/\Gamma_{\text{total}}$	$<3.0 \times 10^{-6}$, CL = 95%
Re(x_+), K_{e3} parameter	$(-0.9 \pm 3.0) \times 10^{-3}$
$x = \text{A}(\overline{K}^0 \to \pi^- \ell^+ \nu)/\text{A}(K^0 \to \pi^- \ell^+ \nu) = \text{A}(\Delta S{=}-\Delta Q)/\text{A}(\Delta S{=}\Delta Q)$	
real part of x	-0.002 ± 0.006
imaginary part of x	0.0012 ± 0.0021
$\Gamma(\Sigma^+ \to n \ell^+ \nu)/\Gamma(\Sigma^- \to n \ell^- \overline{\nu}_\ell)$	<0.043
$\Gamma(\Sigma^+ \to n e^+ \nu_e)/\Gamma_{\text{total}}$	$<5 \times 10^{-6}$, CL = 90%
$\Gamma(\Sigma^+ \to n \mu^+ \nu_\mu)/\Gamma_{\text{total}}$	$<3.0 \times 10^{-5}$, CL = 90%

$\Gamma(\Xi^0 \to \Sigma^- e^+ \nu_e)/\Gamma_{\text{total}}$	$<1.6 \times 10^{-4}$, CL = 90%
$\Gamma(\Xi^0 \to \Sigma^- \mu^+ \nu_\mu)/\Gamma_{\text{total}}$	$<9 \times 10^{-4}$, CL = 90%

$\Delta S = 2$ FORBIDDEN

Allowed in second-order weak interactions.

$\Gamma(\Xi^0 \to p\pi^-)/\Gamma_{\text{total}}$	$<8 \times 10^{-6}$, CL = 90%
$\Gamma(\Xi^0 \to p e^- \overline{\nu}_e)/\Gamma_{\text{total}}$	$<1.3 \times 10^{-3}$
$\Gamma(\Xi^0 \to p \mu^- \overline{\nu}_\mu)/\Gamma_{\text{total}}$	$<1.3 \times 10^{-3}$
$\Gamma(\Xi^- \to n\pi^-)/\Gamma_{\text{total}}$	$<1.9 \times 10^{-5}$, CL = 90%
$\Gamma(\Xi^- \to n e^- \overline{\nu}_e)/\Gamma_{\text{total}}$	$<3.2 \times 10^{-3}$, CL = 90%
$\Gamma(\Xi^- \to n \mu^- \overline{\nu}_\mu)/\Gamma_{\text{total}}$	$<1.5 \times 10^{-2}$, CL = 90%
$\Gamma(\Xi^- \to p\pi^-\pi^-)/\Gamma_{\text{total}}$	$<4 \times 10^{-4}$, CL = 90%
$\Gamma(\Xi^- \to p\pi^- e^- \overline{\nu}_e)/\Gamma_{\text{total}}$	$<4 \times 10^{-4}$, CL = 90%
$\Gamma(\Xi^- \to p\pi^- \mu^- \overline{\nu}_\mu)/\Gamma_{\text{total}}$	$<4 \times 10^{-4}$, CL = 90%
$\Gamma(\Omega^- \to \Lambda\pi^-)/\Gamma_{\text{total}}$	$<2.9 \times 10^{-6}$, CL = 90%

$\Delta S = 2$ VIA MIXING

Allowed in second-order weak interactions, e.g. mixing.

$m_{K^0_L} - m_{K^0_S}$	$(0.5293 \pm 0.0009) \times 10^{10}\ \hbar\ \text{s}^{-1}$ (S = 1.3)
$m_{K^0_L} - m_{K^0_S}$	$(3.484 \pm 0.006) \times 10^{-12}$ MeV

$\Delta C = 2$ VIA MIXING

Allowed in second-order weak interactions, e.g. mixing.

$\left\|m_{D^0_1} - m_{D^0_2}\right\| = x\Gamma$	$(0.997 \pm 0.116) \times 10^{10}\ \hbar\ \text{s}^{-1}$
$(\Gamma_{D^0_1} - \Gamma_{D^0_2})/\Gamma = 2y$	$(1.394 \pm 0.056) \times 10^{-2}$

$\Delta B = 2$ VIA MIXING

Allowed in second-order weak interactions, e.g. mixing.

χ_d (B^0-$\overline{B}^0$ mixing probability)	0.1858 ± 0.0011
$\Delta m_{B^0} = m_{B^0_H} - m_{B^0_L}$	$(0.5065 \pm 0.0019) \times 10^{12}\ \hbar\ \text{s}^{-1}$

$x_d = \Delta m_{B^0}/\Gamma_{B^0}$	0.769 ± 0.004
$\Delta m_{B^0_s} = m_{B^0_{sH}} - m_{B^0_{sL}}$	$(17.765 \pm 0.006) \times 10^{12}\ \hbar\ s^{-1}$
$x_s = \Delta m_{B^0_s}/\Gamma_{B^0_s}$	27.03 ± 0.09
χ_s (B^0_s-$\overline{B}^0_s$ mixing parameter)	0.499319 ± 0.000005

$\Delta S = 1$ WEAK NEUTRAL CURRENT FORBIDDEN

Allowed by higher-order electroweak interactions.

$\Gamma(K^+ \to \pi^+ e^+ e^-)/\Gamma_{total}$		$(3.00 \pm 0.09) \times 10^{-7}$
$\Gamma(K^+ \to \pi^+ \mu^+ \mu^-)/\Gamma_{total}$		$(9.17 \pm 0.14) \times 10^{-8}$ (S = 1.8)
$\Gamma(K^+ \to \pi^+ \nu\overline{\nu})/\Gamma_{total}$		$(1.14^{+0.40}_{-0.33}) \times 10^{-10}$
$\Gamma(K^+ \to \pi^+ \pi^0 \nu\overline{\nu})/\Gamma_{total}$		$<4.3 \times 10^{-5}$, CL = 90%
$\Gamma(K^0_S \to \mu^+ \mu^-)/\Gamma_{total}$		$<2.1 \times 10^{-10}$, CL = 90%
$\Gamma(K^0_S \to e^+ e^-)/\Gamma_{total}$		$<9 \times 10^{-9}$, CL = 90%
$\Gamma(K^0_S \to \pi^0 e^+ e^-)/\Gamma_{total}$	[v]	$(3.0^{+1.5}_{-1.2}) \times 10^{-9}$
$\Gamma(K^0_S \to \pi^0 \mu^+ \mu^-)/\Gamma_{total}$		$(2.9^{+1.5}_{-1.2}) \times 10^{-9}$
$\Gamma(K^0_L \to \mu^+ \mu^-)/\Gamma_{total}$		$(6.84 \pm 0.11) \times 10^{-9}$
$\Gamma(K^0_L \to e^+ e^-)/\Gamma_{total}$		$(9^{+6}_{-4}) \times 10^{-12}$
$\Gamma(K^0_L \to \pi^+ \pi^- e^+ e^-)/\Gamma_{total}$	[x]	$(3.11 \pm 0.19) \times 10^{-7}$
$\Gamma(K^0_L \to \pi^0 \pi^0 e^+ e^-)/\Gamma_{total}$		$<6.6 \times 10^{-9}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 \pi^0 \mu^+ \mu^-)/\Gamma_{total}$		$<9.2 \times 10^{-11}$, CL = 90%
$\Gamma(K^0_L \to \mu^+ \mu^- e^+ e^-)/\Gamma_{total}$		$(2.69 \pm 0.27) \times 10^{-9}$
$\Gamma(K^0_L \to e^+ e^- e^+ e^-)/\Gamma_{total}$		$(3.56 \pm 0.21) \times 10^{-8}$
$\Gamma(K^0_L \to \pi^0 \mu^+ \mu^-)/\Gamma_{total}$		$<3.8 \times 10^{-10}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 e^+ e^-)/\Gamma_{total}$		$<2.8 \times 10^{-10}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 \nu\overline{\nu})/\Gamma_{total}$		$<3.0 \times 10^{-9}$, CL = 90%
$\Gamma(K^0_L \to \pi^0 \pi^0 \nu\overline{\nu})/\Gamma_{total}$		$<8.1 \times 10^{-7}$, CL = 90%
$\Gamma(\Sigma^+ \to p e^+ e^-)/\Gamma_{total}$		$<7 \times 10^{-6}$
$\Gamma(\Sigma^+ \to p \mu^+ \mu^-)/\Gamma_{total}$		$(2.4^{+1.7}_{-1.3}) \times 10^{-8}$

$\Delta C = 1$ WEAK NEUTRAL CURRENT FORBIDDEN

Allowed by higher-order electroweak interactions.

$\Gamma(D^+ \to \pi^+ e^+ e^-)/\Gamma_{total}$	$<1.1 \times 10^{-6}$, CL = 90%
$\Gamma(D^+ \to \pi^+ \mu^+ \mu^-)/\Gamma_{total}$	$<6.7 \times 10^{-8}$, CL = 90%
$\Gamma(D^+ \to \rho^+ \mu^+ \mu^-)/\Gamma_{total}$	$<5.6 \times 10^{-4}$, CL = 90%

$\Gamma(D^0 \to \gamma\gamma)/\Gamma_{\rm total}$		$<8.5 \times 10^{-7}$, CL = 90%
$\Gamma(D^0 \to e^+ e^-)/\Gamma_{\rm total}$		$<7.9 \times 10^{-8}$, CL = 90%
$\Gamma(D^0 \to \mu^+ \mu^-)/\Gamma_{\rm total}$		$<6.2 \times 10^{-9}$, CL = 90%
$\Gamma(D^0 \to \pi^0 e^+ e^-)/\Gamma_{\rm total}$		$<4 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \pi^0 \mu^+ \mu^-)/\Gamma_{\rm total}$		$<1.8 \times 10^{-4}$, CL = 90%
$\Gamma(D^0 \to \eta e^+ e^-)/\Gamma_{\rm total}$		$<3 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \eta \mu^+ \mu^-)/\Gamma_{\rm total}$		$<5.3 \times 10^{-4}$, CL = 90%
$\Gamma(D^0 \to \pi^+ \pi^- e^+ e^-)/\Gamma_{\rm total}$		$<7 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \rho^0 e^+ e^-)/\Gamma_{\rm total}$		$<1.0 \times 10^{-4}$, CL = 90%
$\Gamma(D^0 \to \pi^+ \pi^- \mu^+ \mu^-)/\Gamma_{\rm total}$		$(9.6 \pm 1.2) \times 10^{-7}$
$\Gamma(D^0 \to \rho^0 \mu^+ \mu^-)/\Gamma_{\rm total}$		$<2.2 \times 10^{-5}$, CL = 90%
$\Gamma(D^0 \to \omega e^+ e^-)/\Gamma_{\rm total}$		$<6 \times 10^{-6}$, CL = 90%
$\Gamma(D^0 \to \omega \mu^+ \mu^-)/\Gamma_{\rm total}$		$<8.3 \times 10^{-4}$, CL = 90%
$\Gamma(D^0 \to K^- K^+ e^+ e^-)/\Gamma_{\rm total}$		$<1.1 \times 10^{-5}$, CL = 90%
$\Gamma(D^0 \to \phi e^+ e^-)/\Gamma_{\rm total}$		$<5.2 \times 10^{-5}$, CL = 90%
$\Gamma(D^0 \to K^- K^+ \mu^+ \mu^-)/\Gamma_{\rm total}$		$(1.54 \pm 0.32) \times 10^{-7}$
$\Gamma(D^0 \to \phi \mu^+ \mu^-)/\Gamma_{\rm total}$		$<3.1 \times 10^{-5}$, CL = 90%
$\Gamma(D^0 \to K^- \pi^+ \mu^+ \mu^-)/\Gamma_{\rm total}$		$<3.59 \times 10^{-4}$, CL = 90%
$\Gamma(D^0 \to \pi^+ \pi^- \pi^0 \mu^+ \mu^-)/\Gamma_{\rm total}$		$<8.1 \times 10^{-4}$, CL = 90%
$\Gamma(D_s^+ \to K^+ e^+ e^-)/\Gamma_{\rm total}$		$<3.7 \times 10^{-6}$, CL = 90%
$\Gamma(D_s^+ \to K^+ \mu^+ \mu^-)/\Gamma_{\rm total}$		$<1.4 \times 10^{-7}$, CL = 90%
$\Gamma(D_s^+ \to K^*(892)^+ \mu^+ \mu^-)/\Gamma_{\rm total}$		$<1.4 \times 10^{-3}$, CL = 90%
$\Gamma(\Lambda_c^+ \to p e^+ e^-)/\Gamma_{\rm total}$		$<5.5 \times 10^{-6}$, CL = 90%
$\Gamma(\Lambda_c^+ \to p \mu^+ \mu^-$ non-resonant$)/\Gamma_{\rm total}$		$<7.7 \times 10^{-8}$, CL = 90%

$\Delta B = 1$ WEAK NEUTRAL CURRENT FORBIDDEN

Allowed by higher-order electroweak interactions.

$\Gamma(B^+ \to \pi^+ \ell^+ \ell^-)/\Gamma_{\rm total}$		$<4.9 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^+ e^-)/\Gamma_{\rm total}$		$<8.0 \times 10^{-8}$, CL = 90%
$\Gamma(B^+ \to \pi^+ \mu^+ \mu^-)/\Gamma_{\rm total}$		$(1.78 \pm 0.23) \times 10^{-8}$
$\Gamma(B^+ \to \pi^+ \nu \overline{\nu})/\Gamma_{\rm total}$		$<1.4 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ \ell^+ \ell^-)/\Gamma_{\rm total}$	[y]	$(4.7 \pm 0.5) \times 10^{-7}$ (S = 2.3)
$\Gamma(B^+ \to K^+ e^+ e^-)/\Gamma_{\rm total}$		$(5.6 \pm 0.6) \times 10^{-7}$
$\Gamma(B^+ \to K^+ \mu^+ \mu^-)/\Gamma_{\rm total}$		$(4.53 \pm 0.35) \times 10^{-7}$ (S = 1.8)
$\Gamma(B^+ \to K^+ \mu^+ \mu^-$ nonresonant$)/\Gamma_{\rm total}$		$(4.37 \pm 0.27) \times 10^{-7}$
$\Gamma(B^+ \to K^+ \tau^+ \tau^-)/\Gamma_{\rm total}$		$<2.25 \times 10^{-3}$, CL = 90%
$\Gamma(B^+ \to K^+ \overline{\nu} \nu)/\Gamma_{\rm total}$		$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to \rho^+ \nu \overline{\nu})/\Gamma_{\rm total}$		$<3.0 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^*(892)^+ \ell^+ \ell^-)/\Gamma_{\rm total}$	[y]	$(1.01 \pm 0.11) \times 10^{-6}$ (S = 1.1)

$\Gamma(B^+ \to K^*(892)^+ e^+ e^-)/\Gamma_{\text{total}}$		$(1.55^{+0.40}_{-0.31}) \times 10^{-6}$
$\Gamma(B^+ \to K^*(892)^+ \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(9.6 \pm 1.0) \times 10^{-7}$
$\Gamma(B^+ \to K^*(892)^+ \nu\overline{\nu})/\Gamma_{\text{total}}$		$<4.0 \times 10^{-5}$, CL = 90%
$\Gamma(B^+ \to K^+ \pi^+ \pi^- \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(4.3 \pm 0.4) \times 10^{-7}$
$\Gamma(B^+ \to \phi K^+ \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(7.9^{+2.1}_{-1.7}) \times 10^{-8}$
$\Gamma(B^0 \to \gamma\gamma)/\Gamma_{\text{total}}$		$<3.2 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to e^+ e^-)/\Gamma_{\text{total}}$		$<2.5 \times 10^{-9}$, CL = 90%
$\Gamma(B^0 \to e^+ e^- \gamma)/\Gamma_{\text{total}}$		$<1.2 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(7^{+13}_{-11}) \times 10^{-11}$ (S = 1.8)
$\Gamma(B^0 \to \mu^+ \mu^- \gamma)/\Gamma_{\text{total}}$		—
$\Gamma(B^0 \to \mu^+ \mu^- \mu^+ \mu^-)/\Gamma_{\text{total}}$		$<1.8 \times 10^{-10}$, CL = 95%
$\Gamma(B^0 \to SP,\ S \to \mu^+ \mu^-,\ P \to \mu^+ \mu^-)/\Gamma_{\text{total}}$	[z]	$<6.0 \times 10^{-10}$, CL = 95%
$\Gamma(B^0 \to \tau^+ \tau^-)/\Gamma_{\text{total}}$		$<2.1 \times 10^{-3}$, CL = 95%
$\Gamma(B^0 \to \pi^0 \ell^+ \ell^-)/\Gamma_{\text{total}}$		$<5.3 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to \pi^0 e^+ e^-)/\Gamma_{\text{total}}$		$<8.4 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to \pi^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$		$<6.9 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to \eta \ell^+ \ell^-)/\Gamma_{\text{total}}$		$<6.4 \times 10^{-8}$, CL = 90%
$\Gamma(B^0 \to \eta e^+ e^-)/\Gamma_{\text{total}}$		$<1.08 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to \eta \mu^+ \mu^-)/\Gamma_{\text{total}}$		$<1.12 \times 10^{-7}$, CL = 90%
$\Gamma(B^0 \to \pi^0 \nu\overline{\nu})/\Gamma_{\text{total}}$		$<9 \times 10^{-6}$, CL = 90%
$\Gamma(B^0 \to K^0 \ell^+ \ell^-)/\Gamma_{\text{total}}$	[y]	$(3.3 \pm 0.6) \times 10^{-7}$
$\Gamma(B^0 \to K^0 e^+ e^-)/\Gamma_{\text{total}}$		$(2.5^{+1.1}_{-0.9}) \times 10^{-7}$ (S = 1.3)
$\Gamma(B^0 \to K^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(3.39 \pm 0.35) \times 10^{-7}$ (S = 1.1)
$\Gamma(B^0 \to K^0 \nu\overline{\nu})/\Gamma_{\text{total}}$		$<2.6 \times 10^{-5}$, CL = 90%
$\Gamma(B^0 \to \rho^0 \nu\overline{\nu})/\Gamma_{\text{total}}$		$<4.0 \times 10^{-5}$, CL = 90%
$\Gamma(B^0 \to K^*(892)^0 \ell^+ \ell^-)/\Gamma_{\text{total}}$	[y]	$(9.9^{+1.2}_{-1.1}) \times 10^{-7}$
$\Gamma(B^0 \to K^*(892)^0 e^+ e^-)/\Gamma_{\text{total}}$		$(1.03^{+0.19}_{-0.17}) \times 10^{-6}$
$\Gamma(B^0 \to K^*(892)^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(9.4 \pm 0.5) \times 10^{-7}$
$\Gamma(B^0 \to \pi^+ \pi^- \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(2.1 \pm 0.5) \times 10^{-8}$
$\Gamma(B^0 \to K^*(892)^0 \nu\overline{\nu})/\Gamma_{\text{total}}$		$<1.8 \times 10^{-5}$, CL = 90%
$\Gamma(B^0 \to \text{invisible})/\Gamma_{\text{total}}$		$<2.4 \times 10^{-5}$, CL = 90%
$\Gamma(B^0 \to \nu\overline{\nu}\gamma)/\Gamma_{\text{total}}$		$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(B^0 \to \phi \nu\overline{\nu})/\Gamma_{\text{total}}$		$<1.27 \times 10^{-4}$, CL = 90%
$\Gamma(B \to s e^+ e^-)/\Gamma_{\text{total}}$		$(6.7 \pm 1.7) \times 10^{-6}$ (S = 2.0)
$\Gamma(B \to s \mu^+ \mu^-)/\Gamma_{\text{total}}$		$(4.3 \pm 1.0) \times 10^{-6}$
$\Gamma(B \to s \ell^+ \ell^-)/\Gamma_{\text{total}}$	[y]	$(5.8 \pm 1.3) \times 10^{-6}$ (S = 1.8)
$\Gamma(B \to \pi \ell^+ \ell^-)/\Gamma_{\text{total}}$		$<5.9 \times 10^{-8}$, CL = 90%
$\Gamma(B \to \pi e^+ e^-)/\Gamma_{\text{total}}$		$<1.10 \times 10^{-7}$, CL = 90%
$\Gamma(B \to \pi \mu^+ \mu^-)/\Gamma_{\text{total}}$		$<5.0 \times 10^{-8}$, CL = 90%
$\Gamma(B \to K e^+ e^-)/\Gamma_{\text{total}}$		$(4.4 \pm 0.6) \times 10^{-7}$
$\Gamma(B \to K^*(892) e^+ e^-)/\Gamma_{\text{total}}$		$(1.19 \pm 0.20) \times 10^{-6}$ (S = 1.2)

$\Gamma(B \to K\mu^+\mu^-)/\Gamma_{total}$		$(4.4 \pm 0.4) \times 10^{-7}$
$\Gamma(B \to K^*(892)\mu^+\mu^-)/\Gamma_{total}$		$(1.06 \pm 0.09) \times 10^{-6}$
$\Gamma(B \to K\ell^+\ell^-)/\Gamma_{total}$		$(4.8 \pm 0.4) \times 10^{-7}$
$\Gamma(B \to K^*(892)\ell^+\ell^-)/\Gamma_{total}$		$(1.05 \pm 0.10) \times 10^{-6}$
$\Gamma(B \to K\nu\overline{\nu})/\Gamma_{total}$		$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(B \to K^*\nu\overline{\nu})/\Gamma_{total}$		$<2.7 \times 10^{-5}$, CL = 90%
$\Gamma(B \to \pi\nu\overline{\nu})/\Gamma_{total}$		$<8 \times 10^{-6}$, CL = 90%
$\Gamma(B \to \rho\nu\overline{\nu})/\Gamma_{total}$		$<2.8 \times 10^{-5}$, CL = 90%
$\Gamma(\overline{b} \to \overline{s}\overline{\nu}\nu)/\Gamma_{total}$		$<6.4 \times 10^{-4}$, CL = 90%
$\Gamma(\overline{b} \to \mu^+\mu^-\text{ anything})/\Gamma_{total}$		$<3.2 \times 10^{-4}$, CL = 90%
$\Gamma(B^0_s \to \gamma\gamma)/\Gamma_{total}$		$<3.1 \times 10^{-6}$, CL = 90%
$\Gamma(B^0_s \to \phi\gamma)/\Gamma_{total}$		$(3.4 \pm 0.4) \times 10^{-5}$
$\Gamma(B^0_s \to \mu^+\mu^-)/\Gamma_{total}$		$(3.01 \pm 0.35) \times 10^{-9}$
$\Gamma(B^0_s \to e^+e^-)/\Gamma_{total}$		$<9.4 \times 10^{-9}$, CL = 90%
$\Gamma(B^0_s \to \tau^+\tau^-)/\Gamma_{total}$		$<6.8 \times 10^{-3}$, CL = 95%
$\Gamma(B^0_s \to \mu^+\mu^-\mu^+\mu^-)/\Gamma_{total}$		$<8.6 \times 10^{-10}$, CL = 95%
$\Gamma(B^0_s \to SP,\ S \to \mu^+\mu^-,\ P \to \mu^+\mu^-)/\Gamma_{total}$	[z]	$<2.2 \times 10^{-9}$, CL = 95%
$\Gamma(B^0_s \to \phi(1020)\mu^+\mu^-)/\Gamma_{total}$		$(8.4 \pm 0.4) \times 10^{-7}$
$\Gamma(B^0_s \to \overline{K}^*(892)^0\mu^+\mu^-)/\Gamma_{total}$		$(2.9 \pm 1.1) \times 10^{-8}$
$\Gamma(B^0_s \to \pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}$		$(8.4 \pm 1.7) \times 10^{-8}$
$\Gamma(B^0_s \to \phi\nu\overline{\nu})/\Gamma_{total}$		$<5.4 \times 10^{-3}$, CL = 90%

$\Delta T = 1$ WEAK NEUTRAL CURRENT FORBIDDEN

Allowed by higher-order electroweak interactions.

$\Gamma(t \to Zq(q{=}u,c))/\Gamma_{total}$	[aa]	$<5 \times 10^{-4}$, CL = 95%
$\Gamma(t \to Hu)/\Gamma_{total}$		$<1.9 \times 10^{-4}$, CL = 95%
$\Gamma(t \to Hc)/\Gamma_{total}$		$<7.3 \times 10^{-4}$, CL = 95%
$\Gamma(t \to \ell^+\overline{q}\overline{q}'(q{=}d,s,b;\ q'{=}u,c))/\Gamma_{total}$		$<1.6 \times 10^{-3}$, CL = 95%

NOTES

[*a*] Forbidden by angular momentum conservation.

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

[*c*] See the Particle Listings for the (complicated) definition of this quantity.

[*d*] Time-reversal invariance requires this to be 0° or 180°.

[*e*] This coefficient is zero if time invariance is not violated.

[*f*] Allowed by higher-order electroweak interactions.

[*g*] Violates *CP* in leading order. Test of direct *CP* violation since the indirect *CP*-violating and *CP*-conserving contributions are expected to be suppressed.

[*h*] In the 2010 *Review*, the values for these quantities were given using a measure of the asymmetry that was inconsistent with the usual definition.

[*i*] $\mathrm{Re}(\epsilon'/\epsilon) = \epsilon'/\epsilon$ to a very good approximation provided the phases satisfy *CPT* invariance.

[*j*] This mode includes gammas from inner bremsstrahlung but not the direct emission mode $K^0_L \rightarrow \pi^+\pi^-\gamma(\mathrm{DE})$.

[*k*] Neglecting photon channels. See, *e.g.*, A. Pais and S.B. Treiman, Phys. Rev. **D12**, 2744 (1975).

[*l*] Derived from measured values of ϕ_{+-}, ϕ_{00}, $|\eta|$, $|m_{K^0_L} - m_{K^0_S}|$, and $\tau_{K^0_S}$, as described in the introduction to "Tests of Conservation Laws."

[*n*] The $|m_p - m_{\overline{p}}|/m_p$ and $|q_p + q_{\overline{p}}|/e$ are not independent, and both use the more precise measurement of $|q_{\overline{p}}/m_{\overline{p}}|/(q_p/m_p)$.

[*o*] The value is for the sum of the charge states or particle/antiparticle states indicated.

[*p*] A test of additive vs. multiplicative lepton family number conservation.

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

[*r*] The first limit is for $p \rightarrow$ anything or "disappearance" modes of a bound proton. The second entry, a rough range of limits, assumes the dominant decay modes are among those investigated. For antiprotons the best limit, inferred from the observation of cosmic ray $\overline{p}$'s is $\tau_{\overline{p}} > 10^7$ yr, the cosmic-ray storage time, but this limit depends on a number of assumptions. The best direct observation of stored antiprotons gives $\tau_{\overline{p}}/\mathrm{B}(\overline{p} \rightarrow e^-\gamma) > 7 \times 10^5$ yr.

[*s*] There is some controversy about whether nuclear physics and model dependence complicate the analysis for bound neutrons (from which the best limit comes). The first limit here is from reactor experiments with free neutrons.

[*t*] This is the best limit for the mode $e^- \rightarrow \nu\gamma$.

[*u*] The limit is from neutrality-of-matter experiments; it assumes $q_n = q_p + q_e$. See also the charge of the neutron.

[*v*] See the K^0_S Particle Listings for the energy limits used in this measurement.

[*x*] See the K^0_L Particle Listings for the energy limits used in this measurement.

[*y*] An ℓ indicates an e or a μ mode, not a sum over these modes.

[*z*] Here S and P are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/c^2 and 214.3 MeV/c^2, respectively.

[*aa*] This limit is for $\Gamma(t \rightarrow\ Z\,q)/\Gamma(t \rightarrow\ W\,b)$.