BOTTOM, STRANGE MESONS ($B = \pm 1$, $S = \mp 1$)

$B_s^0 = s\overline{b}$, $\overline{B}_s^0 = \overline{s}\,b$, 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 $m_{B_s^0} = 5366.93 \pm 0.10$ MeV

$m_{B_s^0} - m_B = 87.37 \pm 0.12$ MeV

Mean life $\tau = (1.516 \pm 0.006) \times 10^{-12}$ s

$c\tau = 454.5$ μm

$\Delta\Gamma_{B_s^0} = \Gamma_{B_{sL}^0} - \Gamma_{B_{sH}^0} = (0.082 \pm 0.005) \times 10^{12}$ s^{-1}

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

$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0} = (17.765 \pm 0.006) \times 10^{12}$ $\hbar$ s^{-1}

$= (1.1693 \pm 0.0004) \times 10^{-8}$ MeV

$x_s = \Delta m_{B_s^0}/\Gamma_{B_s^0} = 26.93 \pm 0.10$

χ_s (B_s^0-$\overline{B}_s^0$ mixing parameter) $= 0.499314 \pm 0.000005$

CP violation parameters in B_s^0

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

$C_{KK}(B_s^0 \to\ K^+K^-) = 0.162 \pm 0.035$

$S_{KK}(B_s^0 \to\ K^+K^-) = 0.14 \pm 0.05$ (S = 1.3)

$\mathrm{r}_B(B_s^0 \to\ D_s^\mp K^\pm) = 0.37^{+0.10}_{-0.09}$

$\mathrm{r}_B(B_s^0 \to\ D_s^\mp K^\pm \pi^\pm \pi^\mp) = 0.47 \pm 0.08$

$\delta_B(B_s^0 \to\ D_s^\pm K^\mp) = (358 \pm 14)^\circ$

$\delta_B(B_s^0 \to\ D_s^\pm K^\mp \pi^\pm \pi^\mp) = (-6^{+10}_{-13})^\circ$

CP Violation phase β_s ($b \to\ c\overline{c}s$) $= (2.0 \pm 0.8) \times 10^{-2}$ rad

CP Violation phase β_s ($b \to\ s\overline{s}s$) $= (3.7 \pm 3.5) \times 10^{-2}$ rad

$|\lambda|$ ($B_s^0 \to\ J/\psi(1S)\phi$) $= 0.988 \pm 0.009$

$|\lambda|$ ($b \to\ c\overline{c}s$) $= 0.989 \pm 0.008$

A, CP violation parameter $= -0.79 \pm 0.08$

C, CP violation parameter $= 0.19 \pm 0.06$

S, CP violation parameter $= 0.17 \pm 0.06$

$A_{CP}^L(B_s \to\ J/\psi\overline{K}^*(892)^0) = -0.05 \pm 0.06$

$A_{CP}^{\parallel}(B_s \to\ J/\psi \overline{K}^*(892)^0) = 0.17 \pm 0.15$
$A_{CP}^{\perp}(B_s \to\ J/\psi \overline{K}^*(892)^0) = -0.05 \pm 0.10$
$\boldsymbol{A_{CP}(B_s \to\ \pi^+ K^-)} = 0.224 \pm 0.012$
$A_{CP}(B_s^0 \to\ [K^+K^-]_D \overline{K}^*(892)^0) = 0.06 \pm 0.04$
$A_{CP}(B_s^0 \to\ [\pi^+K^-]_D K^*(892)^0) = -0.009 \pm 0.023$
$A_{CP}(B_s^0 \to\ [\pi^+\pi^-]_D K^*(892)^0) = 0.00 \pm 0.06$
$A_{CP}(B_s^0 \to\ [K^+\pi^-\pi^+\pi^-]_D \overline{K}^*(892)^0) = -0.029 \pm 0.024$
$A_{CP}(B_s^0 \to\ [\pi^+\pi^-\pi^+\pi^-]_D \overline{K}^*(892)^0) = 0.02 \pm 0.05$
$R_s^+ = \Gamma(B_s^0 \to\ [\pi^-K^+]_D \overline{K}^{*0}) / \Gamma(B_s^0 \to\ [\pi^+K^-]_D \overline{K}^{*0}) = 0.004 \pm 0.006$
$R_s^- = \Gamma(\overline{B}_s^0 \to\ [\pi^+K^-]_D K^{*0}) / \Gamma(\overline{B}_s^0 \to\ [\pi^-K^+]_D K^{*0}) = 0.004 \pm 0.006$
$R_s^+ = \Gamma(B_s^0 \to\ [\pi^-K^+\pi^+\pi^-]_D \overline{K}^{*0}) / \Gamma(B_s^0 \to\ [\pi^+K^-\pi^+\pi^-]_D \overline{K}^{*0}) = 0.019 \pm 0.008$
$R_s^- = \Gamma(\overline{B}_s^0 \to\ [\pi^+K^-\pi^+\pi^-]_D K^{*0}) / \Gamma(\overline{B}_s^0 \to\ [\pi^-K^+\pi^+\pi^-]_D K^{*0}) = 0.015 \pm 0.008$
$S(B_s^0 \to\ \phi\gamma) = 0.43 \pm 0.32$
$C(B_s^0 \to\ \phi\gamma) = 0.11 \pm 0.31$
$A^{\Delta}(B_s^0 \to\ \phi\gamma) = -0.7 \pm 0.4$
$\Delta a_\perp\ <\ 1.2 \times 10^{-12}$ 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.*, $B \to D^\pm$ 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) %		–
$D_s^\pm$ anything		(92 ±11) %		–
$D^0/\overline{D}^0$ anything		(38 ±10) %		–
$\ell \nu_\ell X$		(9.6 ± 0.8) %		–
$e^+ \nu X^-$		(9.1 ± 0.8) %		–
$\mu^+ \nu X^-$		(10.2 ± 1.0) %		–
$D_s^- \ell^+ \nu_\ell$ anything	[a]	(8.1 ± 1.3) %		–
$D_s^{*-} \ell^+ \nu_\ell$ anything		(5.4 ± 1.1) %		–
$D_s^- \mu^+ \nu_\mu$		(2.29± 0.21) %		2321
$D_s^{*-} \mu^+ \nu_\mu$		(5.2 ± 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
$D_{s1}(2536)^\mp K^\pm$, $D_{s1}^- \to \overline{D}^*(2007)^0 K^-$		(2.48± 0.28) $\times 10^{-5}$		–
$D_s^- K^+ \pi^+ \pi^-$		(3.2 ± 0.6) $\times 10^{-4}$		2249
$D_s^+ D_s^-$		(4.5 ± 0.6) $\times 10^{-3}$	S=1.3	1824
$D_s^- D^+$		(3.1 ± 0.5) $\times 10^{-4}$		1875
$D^+ D^-$		(2.2 ± 0.6) $\times 10^{-4}$		1925
$D^{*+} D^{*-}$		(2.14± 0.32) $\times 10^{-4}$		1778

$D^0\overline{D}^0$	$(\ 1.9 \pm 0.5\ ) \times 10^{-4}$		1930
$D_s^{*-}\pi^+$	$(\ 1.9\ ^{+\ 0.5}_{-\ 0.4}\ ) \times 10^{-3}$		2265
$D_s^{*\mp}K^\pm$	$(\ 1.32^{+\ 0.40}_{-\ 0.32}) \times 10^{-4}$		–
$D_s^{*-}\rho^+$	$(\ 9.5 \pm 2.0\ ) \times 10^{-3}$		2191
$D_s^{*+}D_s^- + D_s^{*-}D_s^+$	$(\ 1.51 \pm 0.13)$ %		1742
$D_s^{*+}D_s^{*-}$	$(\ 1.58 \pm 0.20)$ %	S=1.3	1655
$D_s^{(*)+}D_s^{(*)-}$	$(\ 4.5 \pm 1.4\ )$ %		–
$D^{*-}D_s^+$	$(\ 4.0 \pm 0.7\ ) \times 10^{-4}$		1801
$\overline{D}^{*0}\overline{K}^0$	$(\ 2.8 \pm 1.1\ ) \times 10^{-4}$		2278
$\overline{D}^0\overline{K}^0$	$(\ 4.3 \pm 0.9\ ) \times 10^{-4}$		2330
$\overline{D}^0K^-\pi^+$	$(\ 1.04 \pm 0.13) \times 10^{-3}$		2312
$\overline{D}^*(2007)^0K^-\pi^+$	$(\ 7.3 \pm 2.6\ ) \times 10^{-4}$		2259
$\overline{D}^0\overline{K}^*(892)^0$	$(\ 4.4 \pm 0.6\ ) \times 10^{-4}$		2264
$\overline{D}^0\overline{K}^*(1410)$	$(\ 3.9 \pm 3.5\ ) \times 10^{-4}$		2117
$\overline{D}^0\overline{K}_0^*(1430)$	$(\ 3.0 \pm 0.7\ ) \times 10^{-4}$		2113
$\overline{D}^0\overline{K}_2^*(1430)$	$(\ 1.1 \pm 0.4\ ) \times 10^{-4}$		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%	1884
$\overline{D}^0\overline{K}_3^*(1780)$	$< 2.6 \times 10^{-5}$	CL=90%	1970
$\overline{D}^0\overline{K}_4^*(2045)$	$< 3.1 \times 10^{-5}$	CL=90%	1835
$\overline{D}^0K^-\pi^+$(non-resonant)	$(\ 2.1 \pm 0.8\ ) \times 10^{-4}$		2312
$[K^+K^-]_D\overline{K}^*(892)^0$	$(\ 4.4 \pm 0.6\ ) \times 10^{-4}$		–
$[\pi^+\pi^-]_D\overline{K}^*(892)^0$	$(\ 4.4 \pm 0.6\ ) \times 10^{-4}$		–
$[\pi^+\pi^-\pi^+\pi^-]_D\overline{K}^*(892)^0$	$(\ 4.4 \pm 0.6\ ) \times 10^{-4}$		–
$D_{s2}^*(2573)^-\pi^+,\ D_{s2}^* \to \overline{D}^0K^-$	$(\ 2.6 \pm 0.4\ ) \times 10^{-4}$		–
$D_{s1}^*(2700)^-\pi^+,\ D_{s1}^* \to \overline{D}^0K^-$	$(\ 1.6 \pm 0.8\ ) \times 10^{-5}$		–
$D_{s1}^*(2860)^-\pi^+,\ D_{s1}^* \to \overline{D}^0K^-$	$(\ 5 \pm 4\ ) \times 10^{-5}$		–
$D_{s3}^*(2860)^-\pi^+,\ D_{s3}^* \to \overline{D}^0K^-$	$(\ 2.2 \pm 0.6\ ) \times 10^{-5}$		–
$\overline{D}^0K^+K^-$	$(\ 5.6 \pm 0.9\ ) \times 10^{-5}$		2243
$\overline{D}^0f_0(980)$	$< 3.1 \times 10^{-6}$	CL=90%	2242
$\overline{D}^0\phi$	$(\ 2.30 \pm 0.25) \times 10^{-5}$		2235
$\overline{D}^{*0}\phi$	$(\ 3.2 \pm 0.4\ ) \times 10^{-5}$		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
$J/\psi(1S)\phi$	$(\ 1.03 \pm 0.04) \times 10^{-3}$		1588
$J/\psi(1S)\phi\phi$	$(\ 1.18^{+\ 0.14}_{-\ 0.16}) \times 10^{-5}$		764

$J/\psi(1S)\pi^0$	$< 1.21 \times 10^{-5}$	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
$J/\psi K^*(892)^0\overline{K}^*(892)^0$	$(1.08 \pm 0.09) \times 10^{-4}$		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
$J/\psi(1S)\overline{D}^0$	$< 1.0 \times 10^{-6}$	CL=90%	996

$\psi(2S)\eta$	(3.3 ± 0.9)	$\times 10^{-4}$		1338
$\psi(2S)\eta'$	(1.29± 0.35)	$\times 10^{-4}$		1158
$\psi(2S)\pi^+\pi^-$	(6.9 ± 1.2)	$\times 10^{-5}$		1397
$\psi(2S)\phi$	(5.2 ± 0.4)	$\times 10^{-4}$		1120
$\psi(2S)K^0$	(1.9 ± 0.5)	$\times 10^{-5}$		1352
$\psi(2S)K^-\pi^+$	(3.1 ± 0.4)	$\times 10^{-5}$		1310
$\psi(2S)\overline{K}^*(892)^0$	(3.3 ± 0.5)	$\times 10^{-5}$		1196
$\chi_{c1}\phi$	(1.95± 0.25)	$\times 10^{-4}$		1275
$\chi_{c1}(3872)\phi$	(9.7 ± 3.3)	$\times 10^{-5}$		936
$\chi_{c1}(3872)(K^+K^-)_{\ non-\phi}$	(7.6 ± 3.0)	$\times 10^{-5}$		961
$\chi_{c1}(3872)\pi^+\pi^-$	(3.7 ± 1.5)	$\times 10^{-5}$		1264
$\pi^+\pi^-$	(7.2 ± 1.0)	$\times 10^{-7}$		2680
$\pi^0\pi^0$	< 7.7	$\times 10^{-6}$	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 ± 0.7)	$\times 10^{-5}$		2507
$\phi f_0(980)$, $f_0(980)\to\ \pi^+\pi^-$	(1.12± 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 ± 0.8)	$\times 10^{-7}$		2526
$\phi\pi^+\pi^-$	(3.5 ± 0.5)	$\times 10^{-6}$		2579
$\phi\phi$	(1.84± 0.14)	$\times 10^{-5}$		2482
$\phi\phi\phi$	(2.2 ± 0.6)	$\times 10^{-6}$		2165
π^+K^-	(5.9 ± 0.7)	$\times 10^{-6}$		2659
K^+K^-	(2.72± 0.23)	$\times 10^{-5}$		2638
$K^0\overline{K}^0$	(1.76± 0.31)	$\times 10^{-5}$		2637
$K^0\pi^+\pi^-$	(9.5 ± 2.1)	$\times 10^{-6}$		2653
$K^0K^\pm\pi^\mp$	(8.4 ± 0.9)	$\times 10^{-5}$		2622
$K^*(892)^-\pi^+$	(2.9 ± 1.1)	$\times 10^{-6}$		2607
$K^*(892)^\pm K^\mp$	(1.9 ± 0.5)	$\times 10^{-5}$		2585
$K^*_0(1430)^\pm K^\mp$	(3.1 ± 2.5)	$\times 10^{-5}$		–
$K^*_2(1430)^\pm K^\mp$	(1.0 ± 1.7)	$\times 10^{-5}$		–
$K^*(892)^0\overline{K}^0$ + c.c.	(2.0 ± 0.6)	$\times 10^{-5}$		2585
$K^*_0(1430)\overline{K}^0$ + c.c.	(3.3 ± 1.0)	$\times 10^{-5}$		2468
$K^*_2(1430)^0\overline{K}^0$ + c.c.	(1.7 ± 2.2)	$\times 10^{-5}$		2467
$K^0_S\overline{K}^*(892)^0$ + c.c.	(1.6 ± 0.4)	$\times 10^{-5}$		2585
$K^0K^+K^-$	(1.3 ± 0.6)	$\times 10^{-6}$		2568
$\overline{K}^*(892)^0\rho^0$	< 7.67	$\times 10^{-4}$	CL=90%	2550
$\overline{K}^*(892)^0K^*(892)^0$	(1.11± 0.27)	$\times 10^{-5}$		2531

$\phi K^*(892)^0$		$(\ 1.14 \pm\ 0.30) \times 10^{-6}$			2507
$p\overline{p}$		$<\ 4.4 \times 10^{-9}$		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
$p\overline{p}p\overline{p}$		$(\ 2.3 \pm 1.0\ ) \times 10^{-8}$			1797
$p\overline{\Lambda}K^-$ + 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 (LF), lepton (L), baryon (B) number 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
$f_2(1270)\gamma$	$B1$	$(\ 9\ ^{+\ 4}_{-\ 5}\ ) \times 10^{-6}$			2532
$f_2'(1525)\gamma$	$B1$	$(\ 6.6\ ^{+\ 0.9}_{-\ 0.8}\ ) \times 10^{-6}$			2469
$\phi(1680)\gamma,\ \phi \to\ K^+K^-$	$B1$	$(\ 9.2 \pm 2.4\ ) \times 10^{-7}$			–
$\phi_3(1850)\gamma,\ \phi_3 \to\ K^+K^-$	$B1$	$(\ 7\ ^{+\ 6}_{-\ 5}\ ) \times 10^{-8}$			–
$f_2(2010)\gamma,\ f_2 \to\ K^+K^-$	$B1$	$(\ 1.0\ ^{+\ 0.7}_{-\ 0.5}\ ) \times 10^{-7}$			–
$\mu^+\mu^-$	$B1$	$(\ 3.34 \pm 0.27) \times 10^{-9}$			2681
e^+e^-	$B1$	$<\ 9.4 \times 10^{-9}$		CL=90%	2683
$\tau^+\tau^-$	$B1$	$<\ 6.8 \times 10^{-3}$		CL=95%	2011
$\mu^+\mu^-\gamma$	$B1$	$<\ 4.2 \times 10^{-8}$		CL=95%	2681
$\mu^+\mu^-\mu^+\mu^-$	$B1$	$<\ 8.6 \times 10^{-10}$		CL=95%	2673
$SP,\ S \to\ \mu^+\mu^-,\ P \to\ \mu^+\mu^-$	$B1$	$[b]\ <\ 2.2 \times 10^{-9}$		CL=95%	–
$aa,\ a \to\ \mu^+\mu^-$	$B1$	$<\ 5.8 \times 10^{-10}$		CL=95%	–
$\phi(1020)\mu^+\mu^-$	$B1$	$(\ 8.3 \pm 0.4\ ) \times 10^{-7}$			2582
$f_2'(1525)\mu^+\mu^-$	$B1$	$(\ 1.60 \pm 0.22) \times 10^{-7}$			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
$\overline{D}^0\mu^+\mu^-$	$B1$	$<\ 1.2 \times 10^{-7}$		CL=90%	2354
$\phi\nu\overline{\nu}$	$B1$	$<\ 5.4 \times 10^{-3}$		CL=90%	2587
$e^\pm\mu^\mp$	LF	$[c]\ <\ 5.4 \times 10^{-9}$		CL=90%	2682
$e^\pm\tau^\mp$	LF	$<\ 1.4 \times 10^{-3}$		CL=90%	2389
$\mu^\pm\tau^\mp$	LF	$<\ 4.2 \times 10^{-5}$		CL=95%	2388
$\phi\mu^\pm e^\mp$	LF	$<\ 1.6 \times 10^{-8}$		CL=90%	2586
$\phi\mu^\pm\tau^\mp$	LF	$<\ 1.0 \times 10^{-5}$		CL=90%	2241
$p\mu^-$	L,B	$<\ 1.21 \times 10^{-8}$		CL=90%	2600

B_s^*

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

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

Mass $m = 5415.4 \pm 1.4$ MeV (S = 2.6)
$m_{B_s^*} - m_{B_s} = 48.5 \pm 1.4$ MeV (S = 2.6)

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 $m = 5828.73 \pm 0.20$ MeV
$m_{B_{s1}^0} - m_{B^{*+}} = 503.98 \pm 0.17$ 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 $m = 5839.88 \pm 0.12$ MeV
$m_{B_{s2}^{*0}} - m_{B^+} = 560.48 \pm 0.12$ 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
$B^0K_S^0$	0.43 ± 0.11	245
$B^{*0}K_S^0$	0.04 ± 0.04	–

NOTES

[*a*] Not a pure measurement. See note at head of B_s^0 Decay Modes.

[*b*] 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.

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