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

NODE=MXXX046

B_s^0

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

NODE=S086

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

Mass $m_{B_s^0} = 5366.93 \pm 0.10$ MeV — NODE=S086M;DTYPE=M

$m_{B_s^0} - m_B = 87.37 \pm 0.12$ MeV — NODE=S086DM;DTYPE=D

Mean life $\tau = (1.515 \pm 0.006) \times 10^{-12}$ s — NODE=S086T;DTYPE=T;OUR EVAL; → UNCHECKED ←

$c\tau = 454.2\ \mu$m — NODE=S086CTA;DTYPE=C;OUR EVAL

$\Delta\Gamma_{B_s^0} = \Gamma_{B_{sL}^0} - \Gamma_{B_{sH}^0} = (0.0783 \pm 0.0035) \times 10^{12}\ s^{-1}$ — NODE=S086DGS;DTYPE=w;OUR EVAL; → UNCHECKED ←

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

CLUMP=Y

$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0} = (17.766 \pm 0.006) \times 10^{12}\ \hbar\ s^{-1}$ — NODE=S086D;DTYPE=y;CLUMP=Y;OUR EVAL;→ UNCHECKED ←

$= (1.1694 \pm 0.0004) \times 10^{-8}$ MeV — NODE=S086D1;DTYPE=y;CLUMP=Y;OUR EVAL

$x_s = \Delta m_{B_s^0}/\Gamma_{B_s^0} = 26.91 \pm 0.11$ — NODE=S086DG;DTYPE=y;CLUMP=Y;OUR EVAL;→ UNCHECKED ←

χ_s (B_s^0-$\overline{B}_s^0$ mixing parameter) $= 0.499313 \pm 0.000006$ — NODE=S086CHS;DTYPE=y;CLUMP=Y; OUR EVAL;→ UNCHECKED ←

CP violation parameters in B_s^0

CLUMP=C

$\mathrm{Re}(\epsilon_{B_s^0})\ /\ (1 + |\epsilon_{B_s^0}|^2) = (-0.15 \pm 0.70) \times 10^{-3}$ — NODE=S086EPS;DTYPE=v;CLUMP=C; OUR EVAL;→ UNCHECKED ←

$C_{KK}(B_s^0 \to K^+K^-) = 0.162 \pm 0.035$ — NODE=S086CK1;DTYPE=v;CLUMP=C

$S_{KK}(B_s^0 \to K^+K^-) = 0.14 \pm 0.05$ (S = 1.3) — NODE=S086SK1;DTYPE=v;CLUMP=C

$\mathrm{r}_B(B_s^0 \to D_s^\mp K^\pm) = 0.318 \pm 0.034$ — NODE=S086ARX;DTYPE=v;CLUMP=C

$\mathrm{r}_B(B_s^0 \to D_s^\mp K^\pm\pi^\pm\pi^\mp) = 0.47 \pm 0.08$ — NODE=S086A28;DTYPE=v;CLUMP=C

$\delta_B(B_s^0 \to D_s^\pm K^\mp) = (348 \pm 6)^\circ$ — NODE=S086DRX;DTYPE=v;CLUMP=C

$\delta_B(B_s^0 \to D_s^\pm K^\mp\pi^\pm\pi^\mp) = (-6^{+10}_{-13})^\circ$ — NODE=S086A29;DTYPE=v;CLUMP=C

CP Violation phase β_s ($b \to c\overline{c}s$) $= (2.7 \pm 0.7) \times 10^{-2}$ rad — NODE=S086PHS;DTYPE=v;CLUMP=C; OUR EVAL;→ UNCHECKED ←

CP Violation phase β_s ($b \to s\overline{s}s$) $= (3.7 \pm 3.5) \times 10^{-2}$ rad — NODE=S086PBS;DTYPE=v;CLUMP=C

CP Violation phase β_s ($B_s^0 \to J/\psi(1S)\phi$) $= (3.0 \pm 0.7) \times 10^{-2}$ rad — NODE=S086PJS;DTYPE=v;CLUMP=C;OUR EVAL;→ UNCHECKED ←

$|\lambda|$ ($B_s^0 \to J/\psi(1S)\phi$) $= 0.995 \pm 0.009$ — NODE=S086LJP;DTYPE=v;CLUMP=C;OUR EVAL;→ UNCHECKED ←

$|\lambda|$ ($b \to c\overline{c}s$) $= 0.989 \pm 0.008$ — NODE=S086LAM;DTYPE=v;CLUMP=C

A, CP violation parameter $= -0.79 \pm 0.08$ — NODE=S086JKA;DTYPE=v;CLUMP=C

C, CP violation parameter $= 0.19 \pm 0.06$ — NODE=S086JKC;DTYPE=v;CLUMP=C

S, CP violation parameter $= 0.17 \pm 0.06$ — NODE=S086JKS;DTYPE=v;CLUMP=C

$A_{CP}^L(B_s \to J/\psi\overline{K}^*(892)^0) = 0.021 \pm 0.027$ — NODE=S086PK4;DTYPE=v;CLUMP=C

$A_{CP}^\parallel(B_s \to J/\psi\overline{K}^*(892)^0) = -0.07 \pm 0.06$ — NODE=S086PK5;DTYPE=v;CLUMP=C

$A_{CP}^\perp(B_s \to J/\psi\overline{K}^*(892)^0) = 0.06 \pm 0.05$ — NODE=S086PK6;DTYPE=v;CLUMP=C

$\boldsymbol{A_{CP}(B_s \to \pi^+K^-)} = 0.224 \pm 0.012$ — NODE=S086CP1;DTYPE=v;CLUMP=C

$A_{CP}(B_s^0 \to [K^+K^-]_D\overline{K}^*(892)^0) = 0.06 \pm 0.04$ — NODE=S086CP2;DTYPE=v;CLUMP=C

$A_{CP}(B_s^0 \to [\pi^+K^-]_D K^*(892)^0) = -0.009 \pm 0.023$ — NODE=S086CP3;DTYPE=v;CLUMP=C

$A_{CP}(B_s^0 \to [\pi^+\pi^-]_D K^*(892)^0) = 0.00 \pm 0.06$ — NODE=S086CP4;DTYPE=v;CLUMP=C

$A_{CP}(B_s^0 \to [K^+\pi^-\pi^+\pi^-]_D\overline{K}^*(892)^0) = -0.029 \pm 0.024$ — NODE=S086A37;DTYPE=v;CLUMP=C

$A_{CP}(B_s^0 \to [\pi^+\pi^-\pi^+\pi^-]_D\overline{K}^*(892)^0) = 0.02 \pm 0.05$ — NODE=S086A41;DTYPE=v;CLUMP=C

$R_s^+ = \Gamma(B_s^0 \to [\pi^-K^+]_D\overline{K}^{*0})\ /\ \Gamma(B_s^0 \to [\pi^+K^-]_D\overline{K}^{*0}) = 0.004 \pm 0.006$ — NODE=S086A40;DTYPE=v;CLUMP=C

$R_s^- = \Gamma(\overline{B}_s^0 \to [\pi^+K^-]_D K^{*0})\ /\ \Gamma(\overline{B}_s^0 \to [\pi^-K^+]_D K^{*0}) = 0.004 \pm 0.006$ — NODE=S086A42;DTYPE=v;CLUMP=C

$R_s^+ = \Gamma(B_s^0 \to [\pi^- K^+ \pi^+ \pi^-]_D \overline{K}^{*0}) \,/\, \Gamma(B_s^0 \to [\pi^+ K^- \pi^+ \pi^-]_D \overline{K}^{*0}) = 0.019 \pm 0.008$ NODE=S086A43;DTYPE=v;CLUMP=C

$R_s^- = \Gamma(\overline{B}_s^0 \to [\pi^+ K^- \pi^+ \pi^-]_D K^{*0}) \,/\, \Gamma(\overline{B}_s^0 \to [\pi^- K^+ \pi^+ \pi^-]_D K^{*0}) = 0.015 \pm 0.008$ NODE=S086A44;DTYPE=v;CLUMP=C

$S(B_s^0 \to \phi\gamma) = 0.43 \pm 0.32$ NODE=S086A23;DTYPE=v;CLUMP=C

$C(B_s^0 \to \phi\gamma) = 0.11 \pm 0.31$ NODE=S086A24;DTYPE=v;CLUMP=C

$A^{\Delta}(B_s^0 \to \phi\gamma) = -0.7 \pm 0.4$ NODE=S086A07;DTYPE=v

$\Delta a_\perp < 1.2 \times 10^{-12}$ GeV, CL = 95% NODE=S086CT1;DTYPE=t

$\Delta a_\parallel = (-0.9 \pm 1.5) \times 10^{-14}$ GeV NODE=S086CT0;DTYPE=t

$\Delta a_X = (1.0 \pm 2.2) \times 10^{-14}$ GeV NODE=S086A03;DTYPE=t

$\Delta a_Y = (-3.8 \pm 2.2) \times 10^{-14}$ GeV NODE=S086A04;DTYPE=t

$\mathrm{Re}(\xi) = -0.022 \pm 0.033$ NODE=S086A00;DTYPE=t

$\mathrm{Im}(\xi) = 0.004 \pm 0.011$ NODE=S086A01;DTYPE=t

These branching fractions all scale with $B(\overline{b} \to B_s^0)$. NODE=S086215;NODE=S086

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)	
$D_s^\pm$ anything		(65 ± 5) %		–	DESIG=175
$D^0 / \overline{D}^0$ anything		(24 ± 4) %		–	DESIG=174
$D^\pm$ anything		(13 ± 5) %		–	DESIG=198
$\ell \nu_\ell X$		(9.6 ± 0.8) %		–	DESIG=49
$e^+ \nu X^-$		(9.1 ± 0.8) %		–	DESIG=98
$\mu^+ \nu X^-$		(10.2 ± 1.0) %		–	DESIG=99
$D_s^- \ell^+ \nu_\ell$ anything	[a]	(8.1 ± 1.3) %		–	DESIG=4
$D_s^{*-} \ell^+ \nu_\ell$ anything		(5.4 ± 1.1) %		–	DESIG=120
$D_s^- \mu^+ \nu_\mu$		(2.31 ± 0.21) %		2321	DESIG=150
$D_s^{*-} \mu^+ \nu_\mu$		(5.2 ± 0.5) %		2266	DESIG=151
$D_{s1}(2536)^- \mu^+ \nu_\mu$, $D_{s1}^- \to D^{*-} K_S^0$		$(2.7 \pm 0.7) \times 10^{-3}$		–	DESIG=36
$D_{s1}(2536)^- X \mu^+ \nu$, $D_{s1}^- \to \overline{D}^0 K^+$		$(4.4 \pm 1.3) \times 10^{-3}$		–	DESIG=46
$D_{s2}(2573)^- X \mu^+ \nu$, $D_{s2}^- \to \overline{D}^0 K^+$		$(2.7 \pm 1.0) \times 10^{-3}$		–	DESIG=47
$K^- \mu^+ \nu_\mu$		$(1.06 \pm 0.09) \times 10^{-4}$		2660	DESIG=154
$D_s^- \pi^+$		$(2.98 \pm 0.13) \times 10^{-3}$		2320	DESIG=5
$D_s^- \rho^+$		$(6.9 \pm 1.4) \times 10^{-3}$		2249	DESIG=39
$D_s^- \pi^+ \pi^+ \pi^-$		$(6.1 \pm 1.0) \times 10^{-3}$		2301	DESIG=32
$D_{s1}(2536)^- \pi^+$, $D_{s1}^- \to D_s^- \pi^+ \pi^-$		$(2.4 \pm 0.8) \times 10^{-5}$		–	DESIG=58
$D_s^\mp K^\pm$		$(2.25 \pm 0.12) \times 10^{-4}$		2293	DESIG=37
$D_{s1}(2536)^\mp K^\pm$, $D_{s1}^- \to \overline{D}^*(2007)^0 K^-$		$(2.48 \pm 0.28) \times 10^{-5}$		–	DESIG=180
$D_s^- K^+ \pi^+ \pi^-$		$(3.2 \pm 0.6) \times 10^{-4}$		2249	DESIG=57
$D_s^+ D_s^-$		$(4.5 \pm 0.6) \times 10^{-3}$	S=1.3	1824	DESIG=33
$D_s^- D^+$		$(3.1 \pm 0.5) \times 10^{-4}$		1875	DESIG=72
$D^+ D^-$		$(2.2 \pm 0.6) \times 10^{-4}$		1925	DESIG=73
$D^{*+} D^{*-}$		$(2.14 \pm 0.32) \times 10^{-4}$		1778	DESIG=177
$D^0 \overline{D}^0$		$(1.9 \pm 0.5) \times 10^{-4}$		1930	DESIG=74

$D_s^{*-}\pi^+$	$(1.9\ {}^{+\ 0.5}_{-\ 0.4}) \times 10^{-3}$		2265	DESIG=40
$D_s^{*\mp}K^\pm$	$(1.32{}^{+\ 0.40}_{-\ 0.32}) \times 10^{-4}$		–	DESIG=113
$D_s^{*-}\rho^+$	$(9.5 \pm 2.0) \times 10^{-3}$		2191	DESIG=41
$D_s^{*+}D_s^- + D_s^{*-}D_s^+$	(1.51 ± 0.13) %		1742	DESIG=34
$D_s^{*+}D_s^{*-}$	(1.58 ± 0.20) %	S=1.3	1655	DESIG=35
$D_s^{(*)+}D_s^{(*)-}$	(4.5 ± 1.4) %		–	DESIG=24
$D^{*-}D_s^+$	$(4.0 \pm 0.7) \times 10^{-4}$		1801	DESIG=163
$\overline{D}^{*0}\overline{K}^0$	$(2.8 \pm 1.1) \times 10^{-4}$		2278	DESIG=123
$\overline{D}^0\overline{K}^0$	$(4.3 \pm 0.9) \times 10^{-4}$		2330	DESIG=122
$\overline{D}^0 K^-\pi^+$	$(1.04 \pm 0.13) \times 10^{-3}$		2312	DESIG=65
$\overline{D}^*(2007)^0 K^-\pi^+$	$(7.3 \pm 2.6) \times 10^{-4}$		2259	DESIG=165
$\overline{D}^0\overline{K}^*(892)^0$	$(4.4 \pm 0.6) \times 10^{-4}$		2264	DESIG=48
$\overline{D}^0\overline{K}^*(1410)$	$(3.9 \pm 3.5) \times 10^{-4}$		2117	DESIG=84
$\overline{D}^0\overline{K}_0^*(1430)$	$(3.0 \pm 0.7) \times 10^{-4}$		2113	DESIG=85
$\overline{D}^0\overline{K}_2^*(1430)$	$(1.1 \pm 0.4) \times 10^{-4}$		2112	DESIG=86
$\overline{D}^0\overline{K}^*(1680)$	$< 7.8 \times 10^{-5}$	CL=90%	1997	DESIG=87
$\overline{D}^0\overline{K}_0^*(1950)$	$< 1.1 \times 10^{-4}$	CL=90%	1884	DESIG=88
$\overline{D}^0\overline{K}_3^*(1780)$	$< 2.6 \times 10^{-5}$	CL=90%	1970	DESIG=89
$\overline{D}^0\overline{K}_4^*(2045)$	$< 3.1 \times 10^{-5}$	CL=90%	1835	DESIG=90
$\overline{D}^0 K^-\pi^+$ (non-resonant)	$(2.1 \pm 0.8) \times 10^{-4}$		2312	DESIG=91
$[K^+K^-]_D\overline{K}^*(892)^0$	$(4.4 \pm 0.6) \times 10^{-4}$		–	DESIG=184
$[\pi^+\pi^-]_D\overline{K}^*(892)^0$	$(4.4 \pm 0.6) \times 10^{-4}$		–	DESIG=185
$[\pi^+\pi^-\pi^+\pi^-]_D\overline{K}^*(892)^0$	$(4.4 \pm 0.6) \times 10^{-4}$		–	DESIG=188
$D_{s2}^*(2573)^-\pi^+,\ D_{s2}^* \to \overline{D}^0 K^-$	$(2.6 \pm 0.4) \times 10^{-4}$		–	DESIG=92
$D_{s1}^*(2700)^-\pi^+,\ D_{s1}^* \to \overline{D}^0 K^-$	$(1.6 \pm 0.8) \times 10^{-5}$		–	DESIG=93
$D_{s1}^*(2860)^-\pi^+,\ D_{s1}^* \to \overline{D}^0 K^-$	$(5 \pm 4) \times 10^{-5}$		–	DESIG=94
$D_{s3}^*(2860)^-\pi^+,\ D_{s3}^* \to \overline{D}^0 K^-$	$(2.2 \pm 0.6) \times 10^{-5}$		–	DESIG=95
$\overline{D}^0 K^+K^-$	$(5.6 \pm 0.9) \times 10^{-5}$		2243	DESIG=51
$\overline{D}^0 f_0(980)$	$< 3.1 \times 10^{-6}$	CL=90%	2242	DESIG=114
$\overline{D}^0\phi$	$(2.30 \pm 0.25) \times 10^{-5}$		2235	DESIG=75
$\overline{D}^{*0}\phi$	$(3.2 \pm 0.4) \times 10^{-5}$		2178	DESIG=143
$D^{*\mp}\pi^\pm$	$< 6.1 \times 10^{-6}$	CL=90%	–	DESIG=70
$\eta_c\phi$	$(5.0 \pm 0.9) \times 10^{-4}$		1663	DESIG=131
$\eta_c\pi^+\pi^-$	$(1.8 \pm 0.7) \times 10^{-4}$		1840	DESIG=132
$J/\psi(1S)\phi$	$(1.01 \pm 0.04) \times 10^{-3}$		1588	DESIG=7
$J/\psi(1S)\phi\phi$	$(1.17{}^{+\ 0.14}_{-\ 0.16}) \times 10^{-5}$		764	DESIG=124
$J/\psi(1S)\pi^0$	$< 1.21 \times 10^{-5}$	CL=90%	1787	DESIG=21
$J/\psi(1S)\eta$	$(4.45 \pm 0.25) \times 10^{-4}$	S=1.1	1733	DESIG=22
$J/\psi(1S)K_S^0$	$(1.92 \pm 0.14) \times 10^{-5}$		1743	DESIG=44
$J/\psi(1S)\overline{K}^*(892)^0$	$(3.95 \pm 0.24) \times 10^{-5}$		1637	DESIG=45
$J/\psi(1S)\eta'$	$(3.53 \pm 0.22) \times 10^{-4}$	S=1.1	1612	DESIG=50
$J/\psi(1S)\pi^+\pi^-$	$(2.00 \pm 0.17) \times 10^{-4}$	S=1.7	1775	DESIG=52
$J/\psi(1S)f_0(500),\ f_0 \to \pi^+\pi^-$	$< 4 \times 10^{-6}$	CL=90%	–	DESIG=101
$J/\psi(1S)\rho,\ \rho \to \pi^+\pi^-$	$< 3.4 \times 10^{-6}$	CL=90%	–	DESIG=108
$J/\psi(1S)f_0(980),\ f_0 \to \pi^+\pi^-$	$(1.23 \pm 0.15) \times 10^{-4}$	S=2.1	–	DESIG=42
$J/\psi(1S)f_2(1270),\ f_2 \to \pi^+\pi^-$	$(1.0 \pm 0.4) \times 10^{-6}$		–	DESIG=53
$J/\psi(1S)f_2(1270)_0,\ f_2 \to \pi^+\pi^-$	$(7.2 \pm 1.6) \times 10^{-7}$		–	DESIG=103
$J/\psi(1S)f_2(1270)_\parallel,\ f_2 \to \pi^+\pi^-$	$(1.04 \pm 0.32) \times 10^{-6}$		–	DESIG=104

$J/\psi(1S)\, f_2(1270)_\perp,\ \ f_2 \to \pi^+\pi^-$	$(1.3 \pm 0.7) \times 10^{-6}$		–	DESIG=105
$J/\psi(1S)\, f_0(1370),\ \ f_0 \to \pi^+\pi^-$	$(4.4 {}^{+\ 0.6}_{-\ 4.0}) \times 10^{-5}$		–	DESIG=43
$J/\psi(1S)\, f_0(1500),\ \ f_0 \to \pi^+\pi^-$	$(2.02 {}^{+\ 0.32}_{-\ 0.24}) \times 10^{-5}$		–	DESIG=106
$J/\psi(1S)\, f'_2(1525)_0,\ \ f'_2 \to \pi^+\pi^-$	$(1.02 \pm 0.22) \times 10^{-6}$		–	DESIG=107
$J/\psi(1S)\, f'_2(1525)_\parallel,\ \ f'_2 \to \pi^+\pi^-$	$(1.2 {}^{+\ 2.6}_{-\ 0.8}) \times 10^{-7}$		–	DESIG=109
$J/\psi(1S)\, f'_2(1525)_\perp,\ \ f'_2 \to \pi^+\pi^-$	$(5 \pm 4) \times 10^{-7}$		–	DESIG=110
$J/\psi(1S)\, f_0(1790),\ \ f_0 \to \pi^+\pi^-$	$(4.8 {}^{+10.0}_{-\ 1.0}) \times 10^{-6}$		–	DESIG=111
$J/\psi(1S)\,\pi^+\pi^-$ (nonresonant)	$(1.72 {}^{+\ 1.00}_{-\ 0.34}) \times 10^{-5}$		1775	DESIG=54
$J/\psi(1S)\,\overline{K}^0\pi^+\pi^-$	$< 4.4 \times 10^{-5}$	CL=90%	1675	DESIG=81
$J/\psi(1S)\,K^+K^-$	$(7.9 \pm 0.7) \times 10^{-4}$		1601	DESIG=71
$J/\psi(1S)\,K^0K^-\pi^+ +$ c.c.	$(9.5 \pm 1.3) \times 10^{-4}$		1538	DESIG=79
$J/\psi(1S)\,\overline{K}^0K^+K^-$	$< 1.2 \times 10^{-5}$	CL=90%	1333	DESIG=80
$J/\psi\, K^*(892)^0\,\overline{K}^*(892)^0$	$(1.07 \pm 0.09) \times 10^{-4}$		1082	DESIG=159
$J/\psi(1S)\, f'_2(1525)$	$(2.6 \pm 0.6) \times 10^{-4}$		1310	DESIG=56
$J/\psi(1S)\, p\overline{p}$	$(3.6 \pm 0.4) \times 10^{-6}$		982	DESIG=60
$J/\psi(1S)\,\gamma$	$< 7.3 \times 10^{-6}$	CL=90%	1790	DESIG=112
$J/\psi\,\mu^+\mu^-,\ \ J/\psi \to \mu^+\mu^-$	$< 2.6 \times 10^{-9}$	CL=95%	–	DESIG=168
$J/\psi(1S)\,\pi^+\pi^-\pi^+\pi^-$	$(7.4 \pm 0.8) \times 10^{-5}$		1731	DESIG=77
$J/\psi(1S)\, f_1(1285)$	$(7.2 \pm 1.4) \times 10^{-5}$		1460	DESIG=78
$J/\psi(1S)\,\overline{D}^0$	$< 1.0 \times 10^{-6}$	CL=90%	996	DESIG=183
$\psi(2S)\,\eta$	$(3.7 \pm 0.8) \times 10^{-4}$		1338	DESIG=66
$\psi(2S)\,\eta'$	$(1.37 \pm 0.33) \times 10^{-4}$		1158	DESIG=100
$\psi(2S)\,\pi^+\pi^-$	$(6.8 \pm 1.2) \times 10^{-5}$		1397	DESIG=67
$\psi(2S)\,\phi$	$(5.1 \pm 0.4) \times 10^{-4}$		1120	DESIG=6
$\psi(2S)\,K^0$	$(1.9 \pm 0.5) \times 10^{-5}$		1352	DESIG=166
$\psi(2S)\,K^-\pi^+$	$(3.1 \pm 0.4) \times 10^{-5}$		1310	DESIG=118
$\psi(2S)\,\overline{K}^*(892)^0$	$(3.3 \pm 0.5) \times 10^{-5}$		1196	DESIG=119
$\chi_{c1}\,\phi$	$(1.92 \pm 0.25) \times 10^{-4}$		1275	DESIG=68
$\chi_{c1}(3872)\,\phi$	$(9.6 \pm 3.2) \times 10^{-5}$		936	DESIG=152
$\chi_{c1}(3872)\,(K^+K^-)_{non-\phi}$	$(7.6 \pm 3.0) \times 10^{-5}$		961	DESIG=160
$\chi_{c1}(3872)\,\pi^+\pi^-$	$(3.7 \pm 1.5) \times 10^{-5}$		1264	DESIG=173
$\pi^+\pi^-$	$(7.1 \pm 0.8) \times 10^{-7}$		2680	DESIG=16
$\pi^0\pi^0$	$< 7.7 \times 10^{-6}$	CL=90%	2680	DESIG=14
$\eta\pi^0$	$< 1.0 \times 10^{-3}$	CL=90%	2654	DESIG=13
$\eta\eta$	$< 1.43 \times 10^{-4}$	CL=90%	2627	DESIG=12
$\rho^0\rho^0$	$< 3.20 \times 10^{-4}$	CL=90%	2569	DESIG=25
$\eta' K^0_S$	$< 8.16 \times 10^{-6}$	CL=90%	2573	DESIG=169
$\eta'\eta$	$< 6.5 \times 10^{-5}$	CL=90%	2568	DESIG=153
$\eta'\eta'$	$(3.3 \pm 0.7) \times 10^{-5}$		2507	DESIG=121
$\eta'\phi$	$< 8.2 \times 10^{-7}$	CL=90%	2495	DESIG=129
$\phi f_0(980),\ \ f_0(980) \to \pi^+\pi^-$	$(1.12 \pm 0.21) \times 10^{-6}$		–	DESIG=126
$\phi f_2(1270),\ \ f_2(1270) \to \pi^+\pi^-$	$(6.1 {}^{+\ 1.8}_{-\ 1.5}) \times 10^{-7}$		–	DESIG=127
$\phi\rho^0$	$(2.7 \pm 0.8) \times 10^{-7}$		2526	DESIG=28
$\phi\pi^+\pi^-$	$(3.5 \pm 0.5) \times 10^{-6}$		2579	DESIG=125
$\phi\phi$	$(1.83 \pm 0.14) \times 10^{-5}$		2482	DESIG=30
$\phi\phi\phi$	$(2.1 \pm 0.6) \times 10^{-6}$		2165	DESIG=136
π^+K^-	$(5.9 \pm 0.6) \times 10^{-6}$		2659	DESIG=9
K^+K^-	$(2.61 \pm 0.16) \times 10^{-5}$		2638	DESIG=10
$K^0\overline{K}^0$	$(1.76 \pm 0.31) \times 10^{-5}$		2637	DESIG=38

$K^0\pi^+\pi^-$		$(9.5 \pm 2.1) \times 10^{-6}$		2653	DESIG=61
$K^0 K^\pm \pi^\mp$		$(8.4 \pm 0.9) \times 10^{-5}$		2622	DESIG=62
$K^*(892)^-\pi^+$		$(2.9 \pm 1.1) \times 10^{-6}$		2607	DESIG=96
$K^*(892)^\pm K^\mp$		$(1.9 \pm 0.5) \times 10^{-5}$		2585	DESIG=97
$K_0^*(1430)^\pm K^\mp$		$(3.1 \pm 2.5) \times 10^{-5}$		–	DESIG=144
$K_2^*(1430)^\pm K^\mp$		$(1.0 \pm 1.7) \times 10^{-5}$		–	DESIG=145
$K^*(892)^0\overline{K}^0$ + c.c.		$(2.0 \pm 0.6) \times 10^{-5}$		2585	DESIG=146
$K_0^*(1430)\overline{K}^0$ + c.c.		$(3.3 \pm 1.0) \times 10^{-5}$		2468	DESIG=147
$K_2^*(1430)^0\overline{K}^0$ + c.c.		$(1.7 \pm 2.2) \times 10^{-5}$		2467	DESIG=148
$K_S^0\overline{K}^*(892)^0$ + c.c.		$(1.6 \pm 0.4) \times 10^{-5}$		2585	DESIG=115
$K^0 K^+ K^-$		$(1.3 \pm 0.6) \times 10^{-6}$		2568	DESIG=63
$\overline{K}^*(892)^0\rho^0$		$< 7.67 \times 10^{-4}$	CL=90%	2550	DESIG=26
$\overline{K}^*(892)^0 K^*(892)^0$		$(1.11 \pm 0.27) \times 10^{-5}$		2531	DESIG=27
$\phi K^*(892)^0$		$(1.14 \pm 0.30) \times 10^{-6}$		2507	DESIG=29
$p\overline{p}$		$< 4.4 \times 10^{-9}$	CL=90%	2514	DESIG=17
$p\overline{p}K^0$		$(9.1 \pm 2.0) \times 10^{-7}$		2396	DESIG=197
$p\overline{p}K^+K^-$		$(4.5 \pm 0.5) \times 10^{-6}$		2231	DESIG=133
$p\overline{p}K^+\pi^-$		$(1.39 \pm 0.26) \times 10^{-6}$		2355	DESIG=134
$p\overline{p}\pi^+\pi^-$		$(4.3 \pm 2.0) \times 10^{-7}$		2454	DESIG=135
$p\overline{p}p\overline{p}$		$(2.3 \pm 1.0) \times 10^{-8}$		1797	DESIG=178
$p\overline{\Lambda}K^-$ + c.c.		$(5.5 \pm 1.0) \times 10^{-6}$		2358	DESIG=128
$\Lambda_c^-\Lambda\pi^+$		$(3.6 \pm 1.6) \times 10^{-4}$		1979	DESIG=69
$\Lambda_c^-\Lambda_c^+$		$< 8.0 \times 10^{-5}$	CL=95%	1405	DESIG=76

Lepton family (*LF*), lepton (*L*), baryon (*B*) number violating modes or $\Delta B = 1$ weak neutral current (*B1*) modes NODE=S086;CLUMP=B

$\gamma\gamma$	*B1*	$< 3.1 \times 10^{-6}$	CL=90%	2683	DESIG=11
$\phi\gamma$	*B1*	$(3.4 \pm 0.4) \times 10^{-5}$		2587	DESIG=18
$f_2(1270)\gamma$	*B1*	$(9 \, {}^{+4}_{-5}) \times 10^{-6}$		2532	DESIG=191
$f_2'(1525)\gamma$	*B1*	$(6.7 \, {}^{+0.9}_{-0.8}) \times 10^{-6}$		2469	DESIG=192
$\phi(1680)\gamma$, $\phi \to K^+K^-$	*B1*	$(9.3 \pm 2.4) \times 10^{-7}$		–	DESIG=193
$\phi_3(1850)\gamma$, $\phi_3 \to K^+K^-$	*B1*	$(7 \, {}^{+6}_{-5}) \times 10^{-8}$		–	DESIG=194
$f_2(2010)\gamma$, $f_2 \to K^+K^-$	*B1*	$(1.0 \, {}^{+0.7}_{-0.5}) \times 10^{-7}$		–	DESIG=195
$\mu^+\mu^-$	*B1*	$(3.34 \pm 0.27) \times 10^{-9}$		2681	DESIG=15
e^+e^-	*B1*	$< 9.4 \times 10^{-9}$	CL=90%	2683	DESIG=20
$\tau^+\tau^-$	*B1*	$< 6.8 \times 10^{-3}$	CL=95%	2011	DESIG=130
$\mu^+\mu^-\gamma$	*B1*	$< 4.2 \times 10^{-8}$	CL=95%	2681	DESIG=170
$\mu^+\mu^-\mu^+\mu^-$	*B1*	$< 8.6 \times 10^{-10}$	CL=95%	2673	DESIG=59
SP, $S \to \mu^+\mu^-$, $P \to \mu^+\mu^-$	*B1*	[*b*] $< 2.2 \times 10^{-9}$	CL=95%	–	DESIG=64
aa, $a \to \mu^+\mu^-$	*B1*	$< 5.8 \times 10^{-10}$	CL=95%	–	DESIG=167
$\phi(1020)\mu^+\mu^-$	*B1*	$(8.2 \pm 0.4) \times 10^{-7}$		2582	DESIG=31
$f_2'(1525)\mu^+\mu^-$	*B1*	$(1.57 \pm 0.22) \times 10^{-7}$		2464	DESIG=164
$\overline{K}^*(892)^0\mu^+\mu^-$	*B1*	$(2.9 \pm 1.1) \times 10^{-8}$		2605	DESIG=137
$\pi^+\pi^-\mu^+\mu^-$	*B1*	$(8.4 \pm 1.7) \times 10^{-8}$		2670	DESIG=117
$\overline{D}^0\mu^+\mu^-$	*B1*	$< 1.2 \times 10^{-7}$	CL=90%	2354	DESIG=182
$\phi\nu\overline{\nu}$	*B1*	$< 5.4 \times 10^{-3}$	CL=90%	2587	DESIG=19
$e^\pm\mu^\mp$	*LF*	[*c*] $< 5.4 \times 10^{-9}$	CL=90%	2682	DESIG=23
$e^\pm\tau^\mp$	*LF*	$< 1.4 \times 10^{-3}$	CL=90%	2389	DESIG=171
$\mu^\pm\tau^\mp$	*LF*	$< 4.2 \times 10^{-5}$	CL=95%	2388	DESIG=149
$\phi\mu^\pm e^\mp$	*LF*	$< 1.6 \times 10^{-8}$	CL=90%	2586	DESIG=176
$\phi\mu^\pm\tau^\mp$	*LF*	$< 1.0 \times 10^{-5}$	CL=90%	2241	DESIG=196
$p\mu^-$	*L,B*	$< 1.21 \times 10^{-8}$	CL=90%	2600	DESIG=179

B_s^*

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

NODE=S087

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)

NODE=S087M;DTYPE=M

NODE=S087DM;DTYPE=D

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

NODE=S087215;DESIG=1;OUR EST; → UNCHECKED ←

$B_{s1}(5830)^0$

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

NODE=M187

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

NODE=M187M;DTYPE=M

NODE=M187DM;DTYPE=D
NODE=M187W;DTYPE=G

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

NODE=M187215;DESIG=1

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

$I(J^P) = 0(2^+)$
I, J, P need confirmation.

NODE=M186

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

NODE=M186M;DTYPE=M

NODE=M186DM2;DTYPE=D
NODE=M186W;DTYPE=G

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

NODE=M186215;NODE=M186

$B_{s2}^*(5840)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$B^+ K^-$	**DEFINED AS 1**	252	DESIG=1
$B^{*+} K^-$	0.093 ± 0.018	141	DESIG=2
$B^0 K_S^0$	0.43 ± 0.11	245	DESIG=4
$B^{*0} K_S^0$	0.04 ± 0.04	–	DESIG=3

NOTES

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

LINKAGE=X86

[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.

LINKAGE=BSP

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

LINKAGE=SG