

BOTTOM, STRANGE MESONS

($B = \pm 1, S = \mp 1$)

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

B_s^0

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

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

$$\text{Mass } m_{B_s^0} = 5367.5 \pm 1.8 \text{ MeV} \quad (S = 1.1)$$

$$\text{Mean life } \tau = (1.466 \pm 0.059) \times 10^{-12} \text{ s}$$

$$c\tau = 439 \text{ } \mu\text{m}$$

B_s^0 - \bar{B}_s^0 mixing parameters

$$\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0} > 14.4 \times 10^{12} \hbar \text{ s}^{-1}, \text{ CL} = 95\%$$

$$> 94.8 \times 10^{-10} \text{ MeV}, \text{ CL} = 95\%$$

$$x_s = \Delta m_{B_s^0} / \Gamma_{B_s^0} > 19.9, \text{ CL} = 95\%$$

$$\chi_s > 0.49878, \text{ CL} = 95\%$$

These branching fractions all scale with $B(\bar{b} \rightarrow B_s^0)$, the LEP B_s^0 production fraction. The first four were evaluated using $B(\bar{b} \rightarrow B_s^0) = (10.7 \pm 1.4)\%$ and the rest assume $B(\bar{b} \rightarrow B_s^0) = 12\%$.

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

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

B_s^0 DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
D_s^- anything	(94 \pm 30) %		—
$D_s^- \ell^+ \nu_\ell$ anything	[a] (7.9 \pm 2.4) %		—
$D_s^- \pi^+$	< 13 %		2321
$D_s^{(*)+} D_s^{(*)-}$	(23 $^{+21}_{-13}$) %		—
$J/\psi(1S)\phi$	(9.3 \pm 3.3) $\times 10^{-4}$		1588
$J/\psi(1S)\pi^0$	< 1.2 $\times 10^{-3}$	90%	1787
$J/\psi(1S)\eta$	< 3.8 $\times 10^{-3}$	90%	1734

$\psi(2S)\phi$	seen				1121
$\pi^+\pi^-$	< 1.7	$\times 10^{-4}$	90%		2680
$\pi^0\pi^0$	< 2.1	$\times 10^{-4}$	90%		2680
$\eta\pi^0$	< 1.0	$\times 10^{-3}$	90%		2654
$\eta\eta$	< 1.5	$\times 10^{-3}$	90%		2627
$\rho^0\rho^0$	< 3.20	$\times 10^{-4}$	90%		2569
$\phi\rho^0$	< 6.17	$\times 10^{-4}$	90%		2527
$\phi\phi$	(1.4 \pm 0.8) $\times 10^{-5}$				2483
π^+K^-	< 2.1	$\times 10^{-4}$	90%		2659
K^+K^-	< 5.9	$\times 10^{-5}$	90%		2638
$\bar{K}^*(892)^0\rho^0$	< 7.67	$\times 10^{-4}$	90%		2550
$\bar{K}^*(892)^0K^*(892)^0$	< 1.681	$\times 10^{-3}$	90%		2531
$\phi K^*(892)^0$	< 1.013	$\times 10^{-3}$	90%		2507
$p\bar{p}$	< 5.9	$\times 10^{-5}$	90%		2514
$\gamma\gamma$	<i>B1</i>	< 1.48	$\times 10^{-4}$	90%	2684
$\phi\gamma$		< 1.2	$\times 10^{-4}$	90%	2587

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

$\mu^+\mu^-$	<i>B1</i>	< 1.5	$\times 10^{-7}$	90%	2682
e^+e^-	<i>B1</i>	< 5.4	$\times 10^{-5}$	90%	2684
$e^\pm\mu^\mp$	<i>LF</i>	[<i>b</i>] < 6.1	$\times 10^{-6}$	90%	2683
$\phi(1020)\mu^+\mu^-$	<i>B1</i>	< 4.7	$\times 10^{-5}$	90%	2582
$\phi\nu\bar{\nu}$	<i>B1</i>	< 5.4	$\times 10^{-3}$	90%	2587

NOTES

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

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