

BOTTOM, STRANGE MESONS

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

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

B_s^0

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

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

$$\text{Mass } m_{B_s^0} = 5369.6 \pm 2.4 \text{ MeV}$$

$$\text{Mean life } \tau = (1.493 \pm 0.062) \times 10^{-12} \text{ s}$$

$$c\tau = 448 \text{ } \mu\text{m}$$

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

$$\chi_B \text{ at high energy} = f_d\chi_d + f_s\chi_s = 0.118 \pm 0.005$$

$$\Delta m_{B_s^0} = m_{B_s^0 H} - m_{B_s^0 L} > 10.6 \times 10^{12} \hbar \text{ s}^{-1}, \text{ CL} = 95\%$$

$$x_s = \Delta m_{B_s^0} / \Gamma_{B_s^0} > 15.7, \text{ CL} = 95\%$$

$$\chi_s > 0.4980, \text{ CL} = 95\%$$

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 "Production and Decay of b -Flavored Hadrons."

B_s^0 DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
D_s^- anything	(92 \pm 31) %		—
$D_s^- \ell^+ \nu_\ell$ anything	[ggg] (8.1 \pm 2.4) %		—
$D_s^- \pi^+$	< 13 %		2321
$D_s^{(*)+} D_s^{(*)-}$	< 21.8 %	90%	—
$J/\psi(1S)\phi$	(9.3 \pm 3.3) $\times 10^{-4}$		1590
$J/\psi(1S)\pi^0$	< 1.2 $\times 10^{-3}$	90%	1788
$J/\psi(1S)\eta$	< 3.8 $\times 10^{-3}$	90%	1735
$\psi(2S)\phi$	seen		1122

$\pi^+ \pi^-$	< 1.7	$\times 10^{-4}$	90%	1122
$\pi^0 \pi^0$	< 2.1	$\times 10^{-4}$	90%	2861
$\eta \pi^0$	< 1.0	$\times 10^{-3}$	90%	2655
$\eta \eta$	< 1.5	$\times 10^{-3}$	90%	2628
$\pi^+ K^-$	< 2.1	$\times 10^{-4}$	90%	2660
$K^+ K^-$	< 5.9	$\times 10^{-5}$	90%	2639
$p \bar{p}$	< 5.9	$\times 10^{-5}$	90%	2515
$\gamma \gamma$	< 1.48	$\times 10^{-4}$	90%	2685
$\phi \gamma$	< 7	$\times 10^{-4}$	90%	2588

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

$\mu^+ \mu^-$	<i>B1</i>	< 2.0	$\times 10^{-6}$	90%	2682
$e^+ e^-$	<i>B1</i>	< 5.4	$\times 10^{-5}$	90%	2864
$e^\pm \mu^\mp$	<i>LF</i> [ee]	< 6.1	$\times 10^{-6}$	90%	2864
$\phi \nu \bar{\nu}$	<i>B1</i>	< 5.4	$\times 10^{-3}$	90%	—
