

# 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.

$$\text{Mass } m_{B_s^0} = 5369.3 \pm 2.0 \text{ MeV}$$

$$\text{Mean life } \tau = (1.54 \pm 0.07) \times 10^{-12} \text{ s}$$

$$c\tau = 462 \text{ } \mu\text{m}$$

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

$$\chi_B \text{ at high energy} = f_d\chi_d + f_s\chi_s = 0.118 \pm 0.006$$

$$\Delta m_{B_s^0} = m_{B_s^0 H} - m_{B_s^0 L} > 9.1 \times 10^{12} \hbar \text{ s}^{-1}, \text{ CL} = 95\%$$

$$x_s = \Delta m_{B_s^0} / \Gamma_{B_s^0} > 14.0, \text{ CL} = 95\%$$

$$\chi_s > 0.4975, \text{ CL} = 95\%$$

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  $B(\bar{b} \rightarrow B_s^0) = (10.5_{-1.7}^{+1.8})\%$  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 ( $\Gamma_i/\Gamma$ )	Confidence level	$P$ (MeV/c)
$D_s^-$ anything	(92 ± 33 ) %		–
$D_s^- \ell^+ \nu_\ell$ anything	[ggg] ( 8.1 ± 2.5 ) %		–
$D_s^- \pi^+$	< 13 %		2321
$J/\psi(1S)\phi$	( 9.3 ± 3.3 ) × 10 <sup>-4</sup>		1590
$J/\psi(1S)\pi^0$	< 1.2 × 10 <sup>-3</sup>	90%	1788
$J/\psi(1S)\eta$	< 3.8 × 10 <sup>-3</sup>	90%	1735
$\psi(2S)\phi$	seen		1122
$\pi^+ \pi^-$	< 1.7 × 10 <sup>-4</sup>	90%	1122
$\pi^0 \pi^0$	< 2.1 × 10 <sup>-4</sup>	90%	2861
$\eta \pi^0$	< 1.0 × 10 <sup>-3</sup>	90%	2655
$\eta \eta$	< 1.5 × 10 <sup>-3</sup>	90%	2628
$\pi^+ K^-$	< 2.1 × 10 <sup>-4</sup>	90%	2660
$K^+ K^-$	< 5.9 × 10 <sup>-5</sup>	90%	2639
$p \bar{p}$	< 5.9 × 10 <sup>-5</sup>	90%	2515
$\gamma \gamma$	< 1.48 × 10 <sup>-4</sup>	90%	2685
$\phi \gamma$	< 7 × 10 <sup>-4</sup>	90%	2588
<b>Lepton Family number (LF) violating modes or <math>\Delta B = 1</math> weak neutral current (B1) modes</b>			
$\mu^+ \mu^-$	B1 < 2.0 × 10 <sup>-6</sup>	90%	2682
$e^+ e^-$	B1 < 5.4 × 10 <sup>-5</sup>	90%	2864
$e^\pm \mu^\mp$	LF [gg] < 4.1 × 10 <sup>-5</sup>	90%	2864
$\phi \nu \bar{\nu}$	B1 < 5.4 × 10 <sup>-3</sup>	90%	–