BOTTOM BARYONS ($B = -1$)

$\Lambda_b^0 = udb$, $\Xi_b^0 = usb$, $\Xi_b^- = dsb$, $\Omega_b^- = ssb$

Λ_b^0

$I(J^P) = 0(\frac{1}{2}^+)$

$I(J^P)$ not yet measured; $0(\frac{1}{2}^+)$ is the quark model prediction.

Mass $m = 5619.4 \pm 0.6$ MeV

$m_{\Lambda_b^0} - m_{B^0} = 339.2 \pm 1.4$ MeV

$m_{\Lambda_b^0} - m_{B^+} = 339.7 \pm 0.7$ MeV

Mean life $\tau = (1.429 \pm 0.024) \times 10^{-12}$ s

$c\tau = 428\ \mu$m

$A_{CP}(\Lambda_b \to\ p\pi^-) = 0.03 \pm 0.18$

$A_{CP}(\Lambda_b \to\ pK^-) = 0.37 \pm 0.17$

The branching fractions B(b-baryon $\to\ \Lambda\ell^-\overline{\nu}_\ell$anything) and B($\Lambda_b^0 \to\ \Lambda_c^+\ell^-\overline{\nu}_\ell$anything) are not pure measurements because the underlying measured products of these with B($b \to\ b$-baryon) were used to determine B($b \to\ b$-baryon), as described in the note "Production and Decay of b-Flavored Hadrons."

For inclusive branching fractions, *e.g.*, $\Lambda_b \to\ \overline{\Lambda}_c$anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

Λ_b^0 DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$J/\psi(1S)\Lambda\times$ B($b \to\ \Lambda_b^0$)	$(5.8\pm0.8) \times 10^{-5}$		1740
$\Lambda_c^+\pi^-$	$(5.7^{+4.0}_{-2.6}) \times 10^{-3}$	S=1.6	2342
$\Lambda_c^+ a_1(1260)^-$	seen		2153
$\Lambda_c^+\pi^+\pi^-\pi^-$	$(8\ ^{+5}_{-4}) \times 10^{-3}$	S=1.6	2323
$\Lambda_c(2595)^+\pi^-$, $\Lambda_c(2595)^+ \to\ \Lambda_c^+\pi^+\pi^-$	$(3.7^{+2.8}_{-2.3}) \times 10^{-4}$		2210
$\Lambda_c(2625)^+\pi^-$, $\Lambda_c(2625)^+ \to\ \Lambda_c^+\pi^+\pi^-$	$(3.6^{+2.7}_{-2.1}) \times 10^{-4}$		2193
$\Sigma_c(2455)^0\pi^+\pi^-$, $\Sigma_c^0 \to\ \Lambda_c^+\pi^-$	$(6\ ^{+5}_{-4}) \times 10^{-4}$		2265

$\Sigma_c(2455)^{++}\pi^-\pi^-$, $\Sigma_c^{++}\to\Lambda_c^+\pi^+$		$(3.5^{+2.8}_{-2.3})\times10^{-4}$		2265
$\Lambda_c^+\ell^-\overline{\nu}_\ell$ anything	[a]	(9.8±2.2) %		–
$\Lambda_c^+\ell^-\overline{\nu}_\ell$		$(6.5^{+3.2}_{-2.5})$ %	S=1.8	2345
$\Lambda_c^+\pi^+\pi^-\ell^-\overline{\nu}_\ell$		(5.6±3.1) %		2335
$\Lambda_c(2595)^+\ell^-\overline{\nu}_\ell$		$(8\ \pm5\ )\times10^{-3}$		2212
$\Lambda_c(2625)^+\ell^-\overline{\nu}_\ell$		$(1.4^{+0.9}_{-0.7})$ %		2195
ph^-	[b]	$< 2.3 \times10^{-5}$	CL=90%	2730
$p\pi^-$		$(4.0\pm0.8)\times10^{-6}$		2730
pK^-		$(4.8\pm0.9)\times10^{-6}$		2708
$\Lambda\mu^+\mu^-$		$(1.7\pm0.7)\times10^{-6}$		2695
$\Lambda\gamma$		$< 1.3 \times10^{-3}$	CL=90%	2699

$\Lambda_b(5912)^0$ $J^P = \frac{1}{2}^-$

Mass $m = 5912.0 \pm 0.6$ MeV
Full width $\Gamma < 0.66$ MeV, CL = 90%

$\Lambda_b(5912)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0\pi^+\pi^-$	seen	86

$\Lambda_b(5920)^0$ $J^P = \frac{3}{2}^-$

Mass $m = 5919.8 \pm 0.6$ MeV
Full width $\Gamma < 0.63$ MeV, CL = 90%

$\Lambda_b(5920)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0\pi^+\pi^-$	seen	108

Σ_b

$I(J^P) = 1(\frac{1}{2}^+)$
I, J, P need confirmation.

Mass $m(\Sigma_b^+) = 5811.3 \pm 1.9$ MeV
Mass $m(\Sigma_b^-) = 5815.5 \pm 1.8$ MeV
$m_{\Sigma_b^+} - m_{\Sigma_b^-} = -4.2 \pm 1.1$ MeV
$\Gamma(\Sigma_b^+) = 9.7^{+4.0}_{-3.0}$ MeV
$\Gamma(\Sigma_b^-) = 4.9^{+3.3}_{-2.4}$ MeV

Σ_b DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0\pi$	dominant	134

Σ_b^*

$I(J^P) = 1(\frac{3}{2}^+)$
I, J, P need confirmation.

Mass $m(\Sigma_b^{*+}) = 5832.1 \pm 1.9$ MeV
Mass $m(\Sigma_b^{*-}) = 5835.1 \pm 1.9$ MeV
$m_{\Sigma_b^{*+}} - m_{\Sigma_b^{*-}} = -3.0^{+1.0}_{-0.9}$ MeV
$\Gamma(\Sigma_b^{*+}) = 11.5 \pm 2.8$ MeV
$\Gamma(\Sigma_b^{*-}) = 7.5 \pm 2.3$ MeV
$m_{\Sigma_b^*} - m_{\Sigma_b} = 21.2 \pm 2.0$ MeV

Σ_b^* DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_b^0\pi$	dominant	161

Ξ_b^0, Ξ_b^-

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$
I, J, P need confirmation.

$m(\Xi_b^-) = 5791.1 \pm 2.2$ MeV
$m(\Xi_b^0) = 5788 \pm 5$ MeV
$m_{\Xi_b^-} - m_{\Xi_b^0} = 3 \pm 6$ MeV
Mean life $\tau_{\Xi_b^-} = (1.56 \pm 0.26) \times 10^{-12}$ s
Mean life $\tau_{\Xi_b} = (1.49^{+0.19}_{-0.18}) \times 10^{-12}$ s

Ξ_b DECAY MODES	Fraction (Γ_i/Γ)	Scale factor	p (MeV/c)
$\Xi_b \to\ \Xi^-\ell^-\overline{\nu}_\ell X \times \mathrm{B}(\overline{b} \to\ \Xi_b)$	$(3.9\ \pm 1.2\ ) \times 10^{-4}$	1.4	–
$\Xi_b^- \to\ J/\psi\Xi^- \times\ \mathrm{B}(b \to\ \Xi_b^-)$	$(1.02^{+0.26}_{-0.21}) \times 10^{-5}$		1779

$\Xi_b(5945)^0$ $J^P = \frac{3}{2}^+$

Mass $m = 5945.5 \pm 2.3$ MeV
Full width $\Gamma = 2.1 \pm 1.7$ MeV

$\Xi_b(5945)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^- \pi^+$	seen	72

Ω_b^- $I(J^P) = 0(\frac{1}{2}^+)$

I, J, P need confirmation.

Mass $m = 6071 \pm 40$ MeV (S = 6.2)
Mean life $\tau = (1.1^{+0.5}_{-0.4}) \times 10^{-12}$ s

Ω_b^- DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$J/\psi\,\Omega^- \times$B($b \rightarrow \ \Omega_b$)	$(2.9^{+1.1}_{-0.8}) \times 10^{-6}$	1826

b-baryon ADMIXTURE (Λ_b, Ξ_b, Σ_b, Ω_b)

Mean life $\tau = (1.402 \pm 0.023) \times 10^{-12}$ s

These branching fractions are actually an average over weakly decaying b-baryons weighted by their production rates at the LHC, LEP, and Tevatron, branching ratios, and detection efficiencies. They scale with the b-baryon production fraction B($b \rightarrow$ b-baryon).

The branching fractions B(b-baryon $\rightarrow \ \Lambda \ell^- \overline{\nu}_\ell$ anything) and B($\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell$ anything) are not pure measurements because the underlying measured products of these with B($b \rightarrow$ b-baryon) were used to determine B($b \rightarrow$ b-baryon), as described in the note "Production and Decay of b-Flavored Hadrons."

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

b-baryon ADMIXTURE DECAY MODES (Λ_b,Ξ_b,Σ_b,Ω_b)	Fraction (Γ_i/Γ)	p (MeV/c)
$p\mu^-\overline{\nu}$ anything	($5.3^{+\ 2.2}_{-\ 1.9}$) %	–
$p\ell\overline{\nu}_\ell$ anything	(5.1$\pm$ 1.2) %	–
p anything	(63 $\pm$21) %	–

$\Lambda\ell^-\overline{\nu}_\ell$ anything	(3.4± 0.6) %	–
$\Lambda/\overline{\Lambda}$ anything	(36 ± 7) %	–
$\Xi^-\ell^-\overline{\nu}_\ell$ anything	(5.9± 1.6) $\times 10^{-3}$	–

NOTES

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

[*b*] Here h^- means π^- or K^-.