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 $m = 5619.58 \pm 0.17$ MeV
$m_{\Lambda_b^0} - m_{B^0} = 339.2 \pm 1.4$ MeV
$m_{\Lambda_b^0} - m_{B^+} = 339.72 \pm 0.28$ MeV
Mean life $\tau = (1.470 \pm 0.010) \times 10^{-12}$ s
$c\tau = 440.7$ μm
$A_{CP}(\Lambda_b \to p\pi^-) = 0.06 \pm 0.08$
$A_{CP}(\Lambda_b \to pK^-) = -0.10 \pm 0.09$
$A_{CP}(\Lambda_b \to p\overline{K}^0\pi^-) = 0.22 \pm 0.13$
$\Delta A_{CP}(J/\psi p\pi^-/K^-) \equiv A_{CP}(J/\psi p\pi^-) - A_{CP}(J/\psi pK^-)$
$= (5.7 \pm 2.7) \times 10^{-2}$
$A_{CP}(\Lambda_b \to \Lambda K^+\pi^-) = -0.53 \pm 0.25$
$A_{CP}(\Lambda_b \to \Lambda K^+K^-) = -0.28 \pm 0.12$
α decay parameter for $\Lambda_b \to J/\psi\Lambda = 0.18 \pm 0.13$
$A_{FB}^{\ell}(\mu\mu)$ in $\Lambda_b \to \Lambda\mu^+\mu^- = -0.05 \pm 0.09$
$A_{FB}^{h}(p\pi)$ in $\Lambda_b \to \Lambda(p\pi)\mu^+\mu^- = -0.29 \pm 0.08$
$f_L(\mu\mu)$ longitudinal polarization fraction in $\Lambda_b \to \Lambda\mu^+\mu^-$
$= 0.61^{+0.11}_{-0.14}$

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 $\pm$0.8) $\times 10^{-5}$		1740
$pD^0\pi^-$	(6.5 $\pm$0.7) $\times 10^{-4}$		2370
pD^0K^-	(4.7 $\pm$0.8) $\times 10^{-5}$		2269

$pJ/\psi\pi^-$		$(2.6 \ ^{+0.5}_{-0.4}) \times 10^{-5}$		1755
$pJ/\psi K^-$		$(3.2 \ ^{+0.6}_{-0.5}) \times 10^{-4}$		1589
$P_c(4380)^+ K^-$, $P_c \to pJ/\psi$	[a]	$(2.7 \pm 1.4) \times 10^{-5}$		–
$P_c(4450)^+ K^-$, $P_c \to pJ/\psi$	[a]	$(1.3 \pm 0.4) \times 10^{-5}$		–
$pJ/\psi(1S)\pi^+\pi^- K^-$		$(6.6 \ ^{+1.3}_{-1.1}) \times 10^{-5}$		1410
$p\psi(2S)K^-$		$(6.6 \ ^{+1.2}_{-1.0}) \times 10^{-5}$		1063
$p\overline{K}^0\pi^-$		$(1.3 \pm 0.4) \times 10^{-5}$		2693
$pK^0 K^-$		$< 3.5 \times 10^{-6}$	CL=90%	2639
$\Lambda_c^+\pi^-$		$(4.9 \pm 0.4) \times 10^{-3}$	S=1.2	2342
$\Lambda_c^+ K^-$		$(3.59 \pm 0.30) \times 10^{-4}$	S=1.2	2314
$\Lambda_c^+ a_1(1260)^-$		seen		2153
$\Lambda_c^+ D^-$		$(4.6 \pm 0.6) \times 10^{-4}$		1886
$\Lambda_c^+ D_s^-$		$(1.10 \pm 0.10) \%$		1833
$\Lambda_c^+\pi^+\pi^-\pi^-$		$(7.7 \pm 1.1) \times 10^{-3}$	S=1.1	2323
$\Lambda_c(2595)^+\pi^-$, $\Lambda_c(2595)^+ \to \Lambda_c^+\pi^+\pi^-$		$(3.4 \pm 1.5) \times 10^{-4}$		2210
$\Lambda_c(2625)^+\pi^-$, $\Lambda_c(2625)^+ \to \Lambda_c^+\pi^+\pi^-$		$(3.3 \pm 1.3) \times 10^{-4}$		2193
$\Sigma_c(2455)^0\pi^+\pi^-$, $\Sigma_c^0 \to \Lambda_c^+\pi^-$		$(5.7 \pm 2.2) \times 10^{-4}$		2265
$\Sigma_c(2455)^{++}\pi^-\pi^-$, $\Sigma_c^{++} \to \Lambda_c^+\pi^+$		$(3.2 \pm 1.6) \times 10^{-4}$		2265
$\Lambda_c^+\ell^-\overline{\nu}_\ell$ anything	[b]	$(10.4 \pm 2.2) \%$		–
$\Lambda_c^+\ell^-\overline{\nu}_\ell$		$(6.2 \ ^{+1.4}_{-1.3}) \%$		2345
$\Lambda_c^+\pi^+\pi^-\ell^-\overline{\nu}_\ell$		$(5.6 \pm 3.1) \%$		2335
$\Lambda_c(2595)^+\ell^-\overline{\nu}_\ell$		$(7.9 \ ^{+4.0}_{-3.5}) \times 10^{-3}$		2212
$\Lambda_c(2625)^+\ell^-\overline{\nu}_\ell$		$(1.3 \ ^{+0.6}_{-0.5}) \%$		2195
ph^-	[c]	$< 2.3 \times 10^{-5}$	CL=90%	2730
$p\pi^-$		$(4.3 \pm 0.8) \times 10^{-6}$		2730
pK^-		$(5.1 \pm 0.9) \times 10^{-6}$		2709
pD_s^-		$< 4.8 \times 10^{-4}$	CL=90%	2364
$p\mu^-\overline{\nu}_\mu$		$(4.1 \pm 1.0) \times 10^{-4}$		2730
$\Lambda\mu^+\mu^-$		$(1.08 \pm 0.28) \times 10^{-6}$		2695
$\Lambda\gamma$		$< 1.3 \times 10^{-3}$	CL=90%	2699
$\Lambda^0\eta$		$(9 \ ^{+7}_{-5}) \times 10^{-6}$		–

$\Lambda^0\eta'(958)$	$< 3.1 \times 10^{-6}$	CL=90%	–
$\Lambda\pi^+\pi^-$	$(4.7 \pm 1.9) \times 10^{-6}$		2692
$\Lambda K^+\pi^-$	$(5.7 \pm 1.3) \times 10^{-6}$		2660
ΛK^+K^-	$(1.61 \pm 0.23) \times 10^{-5}$		2605
$\Lambda^0\phi$	$(2.0 \pm 0.5) \times 10^{-6}$		–

$\Lambda_b(5912)^0$

$J^P = \frac{1}{2}^-$

Mass $m = 5912.18 \pm 0.21$ 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 $m = 5919.90 \pm 0.19$ MeV (S = 1.1)
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.

$m(\Xi_b^-) = 5794.5 \pm 1.4$ MeV (S = 4.0)
$m(\Xi_b^0) = 5791.9 \pm 0.5$ MeV
$m_{\Xi_b^-} - m_{\Lambda_b^0} = 177.9 \pm 0.9$ MeV (S = 2.1)
$m_{\Xi_b^0} - m_{\Lambda_b^0} = 172.5 \pm 0.4$ MeV
$m_{\Xi_b^-} - m_{\Xi_b^0} = 5.9 \pm 0.6$ MeV
Mean life $\tau_{\Xi_b^-} = (1.571 \pm 0.040) \times 10^{-12}$ s
Mean life $\tau_{\Xi_b^0} = (1.479 \pm 0.031) \times 10^{-12}$ s

Ξ_b DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
$\Xi^-\ell^-\overline{\nu}_\ell X \times$ B($\overline{b} \to \Xi_b$)	$(3.9 \pm 1.2) \times 10^{-4}$	S=1.4	–
$J/\psi\,\Xi^- \times$ B($b \to \Xi_b^-$)	$(1.02^{+0.26}_{-0.21}) \times 10^{-5}$		1782
$p D^0 K^- \times$ B($\overline{b} \to \Xi_b$)	$(1.8 \pm 0.6) \times 10^{-6}$		2374
$p\overline{K}^0\pi^- \times$ B($\overline{b} \to \Xi_b$)/B($\overline{b} \to B^0$)	$< 1.6 \times 10^{-6}$	CL=90%	2783
$p K^0 K^- \times$ B($\overline{b} \to \Xi_b$)/B($\overline{b} \to B^0$)	$< 1.1 \times 10^{-6}$	CL=90%	2730
$p K^- K^- \times$ B($\overline{b} \to \Xi_b$)	$(3.6 \pm 0.8) \times 10^{-8}$		2731
$\Lambda\pi^+\pi^- \times$ B($b \to \Xi_b^0$)/B($b \to \Lambda_b^0$)	$< 1.7 \times 10^{-6}$	CL=90%	2781

$\Lambda K^- \pi^+ \times$ B($b \to \ \Xi_b^0$)/B($b \to \ \Lambda_b^0$)	< 8	$\times 10^{-7}$	CL=90%	2751
$\Lambda K^+ K^- \times$ B($b \to \ \Xi_b^0$)/B($b \to \ \Lambda_b^0$)	< 3	$\times 10^{-7}$	CL=90%	2698
$\Lambda_c^+ K^- \times$ B($\overline{b} \to \ \Xi_b$)	(6 ± 4)	$\times 10^{-7}$		2416
$\Lambda_b^0 \pi^- \times$ B($b \to \ \Xi_b^-$)/B($b \to \ \Lambda_b^0$)	(5.7 ± 2.0)	$\times 10^{-4}$		99

$\Xi_b'(5935)^-$

$J^P = \frac{1}{2}^+$

Mass $m = 5935.02 \pm 0.05$ MeV
$m_{\Xi_b'(5935)^-} - m_{\Xi_b^0} - m_{\pi^-} = 3.653 \pm 0.019$ MeV
Full width $\Gamma < 0.08$ MeV, CL = 95%

$\Xi_b'(5935)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 \pi^- \times$ B($\overline{b} \to \ \Xi_b'(5935)^-$)/B($\overline{b} \to \ \Xi_b^0$)	(11.8$\pm$1.8) %	31

$\Xi_b(5945)^0$

$J^P = \frac{3}{2}^+$

Mass $m = 5949.8 \pm 1.4$ MeV
Full width $\Gamma = 0.90 \pm 0.18$ MeV

$\Xi_b(5945)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^- \pi^+$	seen	73

$\Xi_b^*(5955)^-$

$J^P = \frac{3}{2}^+$

Mass $m = 5955.33 \pm 0.13$ MeV
$m_{\Xi_b^*(5955)^-} - m_{\Xi_b^0} - m_{\pi^-} = 23.96 \pm 0.13$ MeV
Full width $\Gamma = 1.65 \pm 0.33$ MeV

$\Xi_b^*(5955)^-$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_b^0 \pi^- \times$ B($\overline{b} \to \ \Xi_b^*(5955)^-$)/B($\overline{b} \to \ \Xi_b^0$)	(20.7$\pm$3.5) %	84

Ω_b^-

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

Mass $m = 6046.1 \pm 1.7$ MeV
$m_{\Omega_b^-} - m_{\Lambda_b^0} = 426.4 \pm 2.2$ MeV
$m_{\Omega_b^-} - m_{\Xi_b^-} = 247.3 \pm 3.2$ MeV
Mean life $\tau = (1.64^{+0.18}_{-0.17}) \times 10^{-12}$ s
Mean life $\tau = 1.11 \pm 0.16$

Ω_b^- DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$J/\psi\,\Omega^- \times$B($b \to\ \Omega_b$)	$(2.9^{+1.1}_{-0.8}) \times 10^{-6}$		1806
$pK^-K^- \times$B($\overline{b} \to\ \Omega_b$)	$< 2.5 \times 10^{-9}$	90%	2866
$p\pi^-\pi^- \times$B($\overline{b} \to\ \Omega_b$)	$< 1.5 \times 10^{-8}$	90%	2943
$pK^-\pi^- \times$B($\overline{b} \to\ \Omega_b$)	$< 7 \times 10^{-9}$	90%	2915

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

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($b \to\ b$-baryon).

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.*, $B \to\ D^\pm$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	($5.6^{+\ 2.2}_{-\ 1.9}$) %	–
$p\ell\overline{\nu}_\ell$anything	(5.4± 1.2) %	–
$p$anything	(67 ±21) %	–
$\Lambda\ell^-\overline{\nu}_\ell$anything	(3.6± 0.6) %	–
$\Lambda\ell^+\nu_\ell$anything	(3.0± 0.8) %	–
Λanything	(38 ± 7) %	–
$\Xi^-\ell^-\overline{\nu}_\ell$anything	(6.3± 1.6) $\times 10^{-3}$	–

NOTES

[*a*] P_c^+ is a pentaquark-charmonium state.

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

[*c*] Here h^- means π^- or K^-.