

# BOTTOM BARYONS

## ( $B = -1$ )

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

$\Lambda_b^0$

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

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

$$\text{Mass } m = 5624 \pm 9 \text{ MeV} \quad (S = 1.8)$$

$$\text{Mean life } \tau = (1.230 \pm 0.074) \times 10^{-12} \text{ s}$$

$$c\tau = 369 \text{ } \mu\text{m}$$

These branching fractions are actually an average over weakly decaying  $b$ -baryons weighted by their production rates in  $Z$  decay (or high-energy  $p\bar{p}$ ), branching ratios, and detection efficiencies. They scale with the LEP  $b$ -baryon production fraction  $B(b \rightarrow b\text{-baryon})$  and are evaluated for our value  $B(b \rightarrow b\text{-baryon}) = (10.0 \pm 2.0)\%$ .

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

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.

$\Lambda_b^0$ DECAY MODES	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level	$p$ (MeV/c)
$J/\psi(1S)\Lambda$	$(4.7 \pm 2.8) \times 10^{-4}$		1744
$\Lambda_c^+ \pi^-$	seen		2345
$\Lambda_c^+ a_1(1260)^-$	seen		2155
$\Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything}$	[a] $(9.1 \pm 2.3) \%$		—
$\Lambda_c^+ \ell^- \bar{\nu}_\ell$	$(5.0^{+1.9}_{-1.4}) \%$		2347
$\Lambda_c^+ \pi^+ \pi^- \ell^- \bar{\nu}_\ell$	$(5.6 \pm 3.1) \%$		2337
$p h^-$	[b] $< 2.3 \times 10^{-5}$	90%	2732
$p \pi^-$	$< 5.0 \times 10^{-5}$	90%	2732
$p K^-$	$< 5.0 \times 10^{-5}$	90%	2711
$\Lambda \gamma$	$< 1.3 \times 10^{-3}$	90%	2701

**$b$ -baryon ADMIXTURE ( $\Lambda_b, \Xi_b, \Sigma_b, \Omega_b$ )**

$$\text{Mean life } \tau = (1.209 \pm 0.049) \times 10^{-12} \text{ s}$$

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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.

 **$b$ -baryon ADMIXTURE DECAY MODES**

$(\Lambda_b, \Xi_b, \Sigma_b, \Omega_b)$	Fraction ( $\Gamma_i/\Gamma$ )	$p$ (MeV/c)
$p\mu^- \bar{\nu}$ anything	$(4.9^{+2.1}_{-1.8})\%$	—
$p\ell \bar{\nu}_\ell$ anything	$(4.7 \pm 1.2)\%$	—
$p$ anything	$(59 \pm 21)\%$	—
$\Lambda \ell^- \bar{\nu}_\ell$ anything	$(3.2 \pm 0.7)\%$	—
$\Lambda/\bar{\Lambda}$ anything	$(33 \pm 8)\%$	—
$\Xi^- \ell^- \bar{\nu}_\ell$ anything	$(5.5 \pm 1.6) \times 10^{-3}$	—

## NOTES

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

[b] Here  $h^-$  means  $\pi^-$  or  $K^-$ .